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5 # IEEE P802f/D2.4

6 # Draft Standard for Local and
7 # Metropolitan Area Networks:
8 # Overview and Architecture
9 # Amendment 3: YANG Data Model for
10 # EtherTypes

11 Prepared by the

12 **Time-Sensitive Networking Task Group of IEEE 802.1** of the

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

14 **This page is not part of the draft.**

IEEE P802f/D2.4

Draft Standard for Local and Metropolitan Area Networks: Overview and Architecture Amendment 3: YANG Data Model for EtherTypes

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

LAN/MAN Standards Committee of the IEEE Computer Society

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1 **Abstract**: This amendment specifies a YANG module containing the EtherType information,
2 including a compact human-readable name and description, for a subset of EtherTypes taken from
3 the IEEE Registration Authority EtherType public listing. This amendment also addresses errors
4 and omissions in IEEE Std 802 description of existing functionality.

5 **Keywords:** BANs, body area networks, EtherTypes, IEEE 802[®], IEEE 802 architecture, IEEE 802
reference model, LANs, local area networks, MANs, metropolitan area networks, object identifiers,
PANs, personal area networks, RANs, regional area networks, protocol development, protocol
types, YANG

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14 3rd Standards Association recirculation ballot.

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Participants

The following is a list of participants in the IEEE 802.1 Working Group.

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Jessy Rouyer, *Vice-Chair*

Janos Farkas, *Chair, Time-Sensitive Networking Task Group*

Marc Holness, *Technical Editor*

The following members of the individual balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

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₁ **Introduction to IEEE P802f/D2.4**

₂

> This introduction is not part of IEEE P802f/D2.4, Draft Standard for Local and Metropolitan Area
> Networks: Overview and Architecture Amendment 3: YANG Data Model for EtherTypes. Additionally,
> the Annex, containing the Tutorial, is not part of this Standard.

₃ This amendment specifies a YANG module that contains the EtherType information, including a compact
₄ human-readable name and description, for a subset of EtherTypes taken from the IEEE Registration
₅ Authority EtherType public listing. This amendment also addresses errors and omissions in IEEE Std 802
₆ description of existing functionality.

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(This amendment is based on IEEE Std 802-2014, as previously amended by IEEE Std 802d-2017 and IEEE Std 802c-2017.)

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 either by using ~~strikethrough~~ (to remove old material) and <u>underscore</u> (to add new material). **Delete** removes existing material. **Insert** adds new material without disturbing the existing material. Insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. **Replace** is used to make changes in figures or equations by removing the existing figure or equation and replacing it with a new one. Editing instructions, change markings, and this NOTE will not be carried over into future editions because the changes will be incorporated into the base standard.[6]

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

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2. Normative references

Change the text of Clause 2 as follows:

IEEE Std 802.1D™, IEEE Standard for Local and metropolitan area networks—Media Access Control (MAC) Bridges.[1,2]

IEEE Std 802.1Q™, IEEE Standard for Local and metropolitan area networks—Virtual Bridged Local Area Networks.[1,2]

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5. Reference models (RMs)

5.3.2.1 Bridges and bridged IEEE 802 networks

Change the text of the 1st paragraph of 5.3.2.1 as follows:

Bridges are stations that interconnect multiple access domains. IEEE Std 802.1DQ[7] provides the basic specification for bridge interworking among IEEE 802 networks. A bridged IEEE 802 network consists of one or more bridges together with the complete set of access domains that they interconnect. A bridged IEEE 802 network provides end stations belonging to any of its access domains with the connectivity of a network that contains the whole set of attached end stations. IEEE Std 802.1Q adds additional capabilities to the bridge specification in IEEE Std 802.1D including virtual local area networks (VLANs), priorities, and provider bridging, as described in 5.3.2.5 includes provisions for MAC Bridging, virtual local area networks (VLANs), priorities and provider bridging.

Change the text of the last paragraph of 5.3.2.1 as follows:

The term *switch* is often used to refer to some classes of bridge. However, there is no consistent meaning applied to the distinction between the terms *bridge* and *switch*, and IEEE Std 802.1DQ does not make any such distinction. Hence, this standard only uses the term *bridge*.

5.3.2.3 Resolving topologies with multiple paths

Change the text of 5.3.2.3 as follows:

A key aspect of IEEE Std 802.1D and IEEE Std 802.1Q is the specification of the rapid spanning tree protocol (RSTP), which is used by bridges to configure their interconnections in order to prevent looping data paths in the bridged IEEE 802 network. If the basic interconnection topology of bridges and networks contains multiple possible paths between certain points, use of the RSTP blocks some paths in order to produce a simply connected active topology for the flow of MAC user traffic between end stations. For each point of attachment of a bridge to a network, the RSTP selects whether MAC user traffic is to be received and transmitted by the bridge at that point of attachment.

5.3.2.4 Transparent bridging

Change the text of 5.3.2.4 as follows:

IEEE Std 802.1D and IEEE Std 802.1Q specify specifies transparent bridging operation, so called because the MAC bridging function does not require the MAC user frames transmitted and received to carry any additional information relating to the operation of the bridging functions; end-station operation is unchanged by the presence of bridges.

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[7] Information on normative references can be found in Clause 2.

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7. IEEE 802 network management

7.2.2 Management architecture

Change the text of 7.2.2 as follows:

The Simple Network Management Protocol (SNMP), as described in IETF RFC 3411 [B5], and Network Configuration Protocol (NETCONF), as described in RFC 6241 [B15], are examples of provides a general-purpose management protocols that can be used for the management of IEEE 802 network equipment.

7.2.3 Managed object definitions

Change the text of 7.2.3 as follows:

In order for an IEEE 802 standard to specify management facilities, it is necessary for it to specify managed objects that model the operations that can be performed on the communications resources specified in the standard. The components of a managed object definition are as follows:

a) A definition of the functionality provided by the managed object, and the relationship between this functionality and the resource to which it relates.

b) A definition of the syntax that is used to convey management operations, and their arguments and results, in a management protocol.

c) An address that allows the management protocol to specifically communicate with the managed object in question. In IEEE 802 this is done with an object identifier (OID), as described in Clause 10, or a Uniform Resource Name (URN), as described in Clause 11.

The functionality of a managed object can be described in a manner that is independent of the protocol that is used; this abstract definition can then be used in conjunction with a definition of the syntactic elements required in order to produce a complete definition of the object for use with specific management protocols.

SNMP is used in many cases together with the structure of management information known as SMIv2 (IETF RFC 2578, IETF RFC 2579 [B3], and IETF RFC 2580 [B4]), which uses a set of macros based on a subset of ASN.1 for defining managed objects. YANG (IETF RFC 7950) is a data modeling language used to model configuration data, state data, remote procedure calls, and notifications for network management protocols.

The choice of notational tools for defining managed objects depends on which of the available management protocols the standard supports.

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8. MAC addresses

8.2.2 Assignment of universal addresses

Change the text of 8.2.2 as follows:

A universal address consists of two parts: the leading bits (24, 28, or 36) are assigned by the IEEE RA with the U/L bit set to zero and the remaining bits by that assignee. An example of an EUI-48 is shown in Figure 10. For MA-M and MA-S, the final 4 bits of the assigned number are in a nibble that is not adjacent to the other bits in the assigned number when displayed with LSB on the left and most significant bit (MSB) on the right. For example, when using an MA-S to create an EUI-48, the MA-S value is contained in octets 0, 1, 2, 3 and the ~~least~~ most significant ~~nibble~~ four bits of octet 4, and the value assigned by the assignee is contained in the ~~most~~ least significant ~~nibble~~ four bits of octet 4 and in octet 5.

Change the NOTE of 8.2.4 as follows:

NOTE—While some implementations have used a single EUI-48 or EUI-64 to identify all of the system's points of attachment to IEEE 802 networks, this approach does not inherently meet the requirements of IEEE 802.1~~D~~Q™ ~~MAC bridging~~.

8.3 Interworking with 48-bit and 64-bit MAC addresses

Change the text of 8.3 as follows:

In response to concerns that the EUI-48 space could be exhausted by the breadth of products requiring unique identifiers, 64-bit MAC addresses were introduced. Initially, new IEEE standards projects that did not require backward compatibility with EUI-48 were requested to use 64-bit MAC addresses. This led to some IEEE 802 standards adopting 64-bit MAC addressing, which cannot be bridged onto IEEE 802 networks that use 48-bit MAC addressing. The reason is that the bridging function in ~~IEEE Std 802.1D and~~ IEEE Std 802.1Q assumes that 48-bit MAC addresses are unique among all the connected networks. Truncating a~~n~~ 64-bit MAC address into a~~n~~ 48-bit field can lead to two stations having the same 48-bit value. Instead, traffic between 64-bit and 48-bit MAC addressed networks needs to be routed at a layer above the DLL.

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9. Protocol identifiers and context-dependent identifiers

9.2 EtherTypes

9.2.1 Format, function, and administration

Change the footnote in the first paragraph of 9.2.1:

EtherType protocol identification values are assigned by the IEEE RA[8] and are used to identify the protocol that is to be invoked to process the user data in the frame. An EtherType is a sequence of 2 octets, interpreted as a 16-bit numeric value with the first octet containing the most significant 8 bits and the second octet containing the least significant 8 bits. Values in the 0–1535 range are not available for use in order to retain legacy compatibility with Length field based protocols, e.g., IEEE Std 802.3.

Change the second paragraph of 9.2.1 as follows:

Examples of EtherTypes are 0x08-00 and 0x86-DD, which are used to identify IPv4 and IPv6, respectively.

Insert a new sub-clause 9.2.1a, after 9.2.1, and renumber the following existing sub-clauses accordingly.

9.2.1a Public EtherType assignments subset

The IEEE Registration Authority (RA) provides a public listing of EtherType assignments[9]. Many of these are for private or proprietary purposes. However, others are incorporated into well-known standards. In some cases, the IEEE RA Public Listing for an EtherType identifies an assignee without explicitly identifying the standards in which the use of that EtherType is specified. For ready reference by users and developers of such standards, Annex F identifies some well-known EtherTypes and the protocols they identify. This subset is derived by combining the EtherTypes listed in the ietf-ethertypes YANG module specified in IETF RFC 8519 [B11] with the subset of EtherTypes defined by IEEE 802 Standards (e.g., IEEE 802.1Q, 802.3, etc.) and as provided by participants that developed this standard. Information on products released after that date can be found on the IEEE SA Registration Authority web site: https://standards.ieee.org/products-programs/regauth/ethertype/ and https://regauth.standards.ieee.org/standards-ra-web/pub/view.html#registries. The subset in Table F.1 and in F.3 is provided solely for the convenience of users of this standard and does not constitute an endorsement by IEEE of the listed protocols.

The EtherType public listing includes the following fields, specified by the EtherType assignee:

— **Assignment** — The hexadecimal representation of the EtherType.
— **Assignment Type** — The type is EtherType[10].
— **Company Name** — The registrant of the Assignment.
— **Company Address** — The address of the registrant.
— **Protocol** — A brief protocol description, as provided by the registrant.

This Standard includes the following fields in Table F.1 for use by the YANG module:

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[8]More information on EtherTypes can be found at http://standards.ieee.org/develop/regauth/llc on the IEEE RA web site, https://standards.ieee.org/products-programs/regauth/ethertype and https://regauth.standards.ieee.org/standards-ra-web/pub/view.html#registries.

[9]The EtherType public listing is the public view of the EtherType registry managed by the Registration Authority (see https://regauth.standards.ieee.org/).

[10]EtherType is the only assignment type for the records in the EtherType public listing.

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a)   **Friendly Name** — A short alphanumeric name for the Assignment that is unique within the YANG module in Annex F.2 and is used to enumerate the entry.

b)   **Short Description** — A short description of the assigned protocol per its typical usage.

c)   **Reference** — A reference to a standard associated with the EtherType assignment.

A YANG model representation can be found in Annex F.3.2.

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Annex A

(informative)

Bibliography

Insert the following bibliography reference in the appropriate collating sequence:

[B11] IETF RFC 8519, YANG Data Model for Network Access Control Lists (ACLs), March 2019.

[B15] IETF RFC 6241, Network Configuration Protocol (NETCONF), June 2011.

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Annex D

(informative)

List of IEEE 802 standards

Delete the following standard reference from the list.

IEEE Std 802.1D™, IEEE Standard for Local and metropolitan area networks: Media Access Control
(MAC) Bridges.

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1 *Insert a new Annex as follows:*

Annex F

3 (informative)

EtherType Listing Subset

F.1 Introduction

6 This Annex lists the subset of EtherType assignments described in 9.2.1 in tabular form (Table F.1) and in
7 the form of a YANG module (F.2). This subset is provided solely for the convenience of the users of this
8 standard and does not constitute an endorsement by IEEE of the listed protocols.

F.2 Tabular format

10 A subset of EtherType assignments by the IEEE RA is given in Table F.1. Each Friendly Name in Table F.1
11 is unique and is used as an identifier in the YANG module. The Short Description identifies the protocol,
12 protocol message, or protocol field that uses the assignment as specified in the Reference, or the EtherType
13 assignment itself as named in the Reference. Where the Reference specifies more than one name or use
14 (distinguished for example by sub-type) these are included in the Short Description field.

15

Table F.1 — EtherType listing subset[a]

EtherType Assignment (HEX)	Friendly Name	Short Description	Reference
08-00	ipv4	Internet Protocol version 4 (IPv4)	IETF RFC 894
08-06	arp	Address Resolution Protocol (ARP)	IETF RFC 826, IETF RFC 7042
08-42	wol	Wake-on-LAN	IEEE Std 802
22-E2	msp	MAC Status Protocol (MSP)	IEEE Std 802.1Q
22-E7	cnm	Congestion Notification Message (CNM)	IEEE Std 802.1Q
22-E9	cn-tag	Congestion Notification Tag (CN-TAG)	IEEE Std 802.1Q
22-EA	msrp	Multiple Stream Reservation Protocol (MSRP)	IEEE Std 802.1Q
22-F3	trill	Transparent Interconnection of Lots of Links	IETF RFC 6325

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Table F.1 — EtherType listing subset[a] *(continued)*

EtherType Assignment (HEX)	Friendly Name	Short Description	Reference
60-03	decnet	DECnet DNA Routing	DECnet DIGITAL Network Architecture - Ethernet Data Link Architectural Specification v1.0.0
80-35	rarp	Reverse Address Resolution Protocol	IETF RFC 903
80-9B	appletalk	Appletalk (Ethertalk)	Inside Appletalk, Second Edition
80-F3	aarp	Appletalk Address Resolution Protocol	Inside Appletalk, Second Edition
81-00	c-tag	Customer VLAN Tag (C-TAG)	IEEE Std 802.1Q
81-37	ipx	Internetwork Packet Exchange (IPX)	Internetwork Packet Exchange - Novell, Inc.
82-04	qnx	QNX Qnet	QNX - Quantum Software Systems, Ltd.
86-DD	ipv6	Internet Protocol Version 6 (IPv6)	IETF RFC 2464
88-08	efc	Multipoint Control Protocol (MPCP)	IEEE Std 802.3
88-09	esp	Ethernet Slow Protocol	IEEE Std 802.3
88-19	cobranet	CobraNet	CobraNet Programmer's Reference, Version 2.5
88-47	mpls-unicast	Multiprotocol Label Switching (MPLS) unicast traffic	IETF RFC 3031
88-48	mpls-multicast	Multiprotocol Label Switching (MPLS) multicast	IETF RFC 3031
88-63	pppoe-discovery	Point-to-Point Protocol over Ethernet (PPPoE) Discovery Stage	IETF RFC 2516
88-64	pppoe-session	Point-to-Point Protocol over Ethernet (PPPoE) Session Stage	IETF RFC 2516
88-6D	intel-ans	Intel Advanced Networking Services Probe Packets	Intel® Advanced Network Services (Intel® ANS) Advanced Settings for Teams
88-70	llc-encaps	LLC Encapsulation	IEEE Std 802.1AC
88-7B	homeplug	Homeplug	INT51X1 datasheet
88-8E	eapol	Port Access Entity (PAE) EtherType, Extensible Authentication Protocol over LANs (EAPOL)	IEEE Std 802.1X
88-92	profinet	PROFINET	IEC 61158-6-10

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Table F.1 — EtherType listing subset[a] *(continued)*

EtherType Assignment (HEX)	Friendly Name	Short Description	Reference
88-9A	hyperscsi	Small Computer System Interface (SCSI) over Ethernet.	An Ethernet Based Data Storage Protocol for Home Network
88-A2	aoe	Advanced Technology Attachment (ATA) over Ethernet.	AoE (ATA over Ethernet)
88-A4	ethercat	Ethernet for Control Automation Technology (EtherCAT)	IEC 61158-4-12
88-A8	s-tag	Service VLAN Tag (S-TAG) or Backbone VLAN Tag (B-TAG)	IEEE Std 802.1Q
88-AB	ethernet-powerlink	Ethernet Powerlink	IEC 61158-4-13
88-B5	exp1	Local experimental EtherType 1	IEEE Std 802
88-B6	exp2	Local experimental EtherType 2	IEEE Std 802
88-B7	oui-ext	OUI Extended EtherType	IEEE Std 802
88-B8	goose	IEC 61850 Generic Object Oriented Substation Event (GOOSE)	IEC 61850-8-1
88-B9	gse	IEC 61850 Generic Substation Events (GSE) management services	IEC 61850-8-1
88-BA	sv	IEC 61850 Sampled Value Transmission (SV)	IEC 61850-8-2
88-C7	pre-auth	RSNA Pre-Authentication	IEEE Std 802.11
88-CC	lldp	Link Layer Discovery Protocol (LLDP)	IEEE Std 802.1AB
88-CD	sercos	Sercos Interface	IEC 61158-4-19
88-DC	wsmp	WAVE Short Message Protocol (WSMP)	IEEE Std 1609
88-E1	homeplug-av-mme	HomePlug AV Mobile Management Entity (MME)	HomePlug AV Specification
88-E3	mrp	Media Redundancy Protocol	IEC 62439-2
88-E5	macsec	MACsec EtherType	IEEE Std 802.1AE
88-E7	i-tag	Backbone Service Instance Tag	IEEE Std 802.1Q
88-F5	mvrp	Multiple VLAN Registration Protocol (MVRP)	IEEE Std 802.1Q
88-F6	mmrp	Multiple MAC Registration Protocol (MMRP)	IEEE Std 802.1Q
88-F7	ptp	Precision Time Protocol	IEEE Std 1588
89-02	cfm	IEEE 802.1Q Connectivity Fault Management (CFM) PDU Encapsulation EtherType	IEEE Std 802.1Q

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Table F.1 — EtherType listing subset[a] *(continued)*

EtherType Assignment (HEX)	Friendly Name	Short Description	Reference
89-06	fcoe	Fibre Channel over Ethernet (FCoE)	T11 FC-BB-5
89-0D	wlan-mgmt	802.11 Management Protocol	IEEE Std 802.11
89-10	encap	Backbone Service Encapsulated Addresses	IEEE Std 802.1Q
89-14	fip	FCoE Initialization Protocol	T11 FC-BB-5
89-15	roce	Remote Direct Memory Access (RDMA) over Converged Ethernet (RoCEv1)	InfiniBand™ Architecture Specification
89-17	mis	Media Independent Service (MIS) Protocol	IEEE Std 802.21
89-1D	tte	Time-Triggered Ethernet (TTE) Protocol Control Frame	SAE AS6802
89-29	mirp	Multiple I-SID Registration Protocol (MIRP)	IEEE Std 802.1Q
89-2F	hsr	High-availability Seamless Redundancy (HSR)	IEC 62439-3
89-3F	e-tag	Bridge Port Extension Tag (E-TAG)	IEEE Std 802.1BR
89-40	ecp	Edge Control Protocol	IEEE Std 802.1Q
89-4B	f-tag	Flow Filtering Tag (F-TAG)	IEEE Std 802.1Q
89-52	drcp	Distributed Relay Control Protocol (DRCP)	IEEE Std 802.1AX
89-A2	cim	Congestion Isolation Message (CIM)	IEEE Std 802.1Q
C9-D1	llc-legacy	LLC Encapsulation (obsolete)	IEEE Std 802.1AC
E2-3B	mpp	MAC Privacy protection Protocol	IEEE Std 802.1AE
F1-C1	r-tag	Frame Replication and Elimination for Reliability (FRER) Redundancy Tag (R-TAG)	IEEE Std 802.1CB

[a]Hexadecimal values in the Assignment field are provided from the public listing, while the information in the other fields (i.e., Friendly Name, Short Description, and Reference) is specified herein.

F.3 YANG module for EtherType subset

F.3.1 YANG Framework

The YANG module representation of the EtherType subset (as defined in Table F.1) is provided in this Annex.

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Changes to the ieee802-ethertypes.yang module, adding or revising entries, are made by amending or revising this standard and will add a new revision statement to the module. YANG augmentation should not be used to extend the module.

NOTE — The ietf-ethertypes.yang module (as defined in rfc8519) is currently used by the ietf-packet-fields.yang module (as defined in rfc8519) and the ietf-detnet.yang module. Moving forward it is anticipated that the YANG module (ieee802-ethertype.yang) defined in Annex F.3.2 will supersede ietf-ethertypes.yang, which would result in ietf-ethertypes.yang being deprecated.

F.3.2 Definition for ieee802-ethertype YANG module[11,12]

```
module ieee802-ethertype {

  namespace "urn:ieee:std:802.1Q:yang:ieee802-ethertype";
  prefix "ieee-ethertype";

  organization
    "IEEE 802.1 Working Group";

  contact
    "WG-URL: http://ieee802.org/1/
     WG-EMail: stds-802-1@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
    "This module contains a subset of commonly used 802 network EtherTypes.

     Copyright (C) IEEE (2023).

     This version of this YANG module is part of the IEEE Std 802;
     see the standard itself for full legal notices.";

  revision "2023-04-17" {
    description
      "Initial revision.";
    reference
      "IEEE Std 802f, Overview and Architecture -
       YANG Data Model for EtherTypes";
  }

  typedef ethertype {
    type enumeration {
      enum ipv4 {
        value 2048;
        description
          "08-00  Internet Protocol version 4 (IPv4)";
        reference
```

---

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

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

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```
 1        "Organization: Xerox, US
 2         Reference: IETF RFC 894";
 3      }
 4      enum arp {
 5        value 2054;
 6        description
 7          "08-06  Address Resolution Protocol (ARP)";
 8        reference
 9          "Organization: Symbolics, Inc.
10           Reference: IETF RFC 826, IETF RFC 7042";
11      }
12      enum wol {
13        value 2114;
14        description
15          "08-42  Wake-on-LAN";
16        reference
17          "Organization: None
18           Reference: IEEE Std 802";
19      }
20      enum msp {
21        value 8930;
22        description
23          "22-E2  MAC Status Protocol (MSP)";
24        reference
25          "Organization: IEEE 802.1 Working Group
26           Reference: IEEE Std 802.1Q";
27      }
28      enum cnm {
29        value 8935;
30        description
31          "22-E7  Congestion Notification Message (CNM)";
32        reference
33          "Organization: IEEE 802.1 Working Group
34           Reference: IEEE Std 802.1Q";
35      }
36      enum cn-tag {
37        value 8937;
38        description
39          "22-E9  Congestion Notification Tag (CN-TAG)";
40        reference
41          "Organization: IEEE 802.1 Working Group
42           Reference: IEEE Std 802.1Q";
43      }
44      enum msrp {
45        value 8938;
46        description
47          "22-EA  Multiple Stream Reservation Protocol (MSRP)";
48        reference
49          "Organization: IEEE 802.1 Working Group
50           Reference: IEEE Std 802.1Q";
51      }
52      enum trill {
53        value 8947;
54        description
55          "22-F3  Transparent Interconnection of Lots of Links";
56        reference
57          "Organization: IETF TRILL Working Group
58           Reference: IETF RFC 6325";
59      }
60      enum decnet {
61        value 24579;
62        description
63          "60-03  DECnet DNA Routing";
64        reference
```

```
1          "Organization: DEC
2          Reference: DECnet DIGITAL Network Architecture - Ethernet
3          Data Link Architectural Specification v1.0.0";
4      }
5      enum rarp {
6        value 32821;
7        description
8          "80-35  Reverse Address Resolution Protocol";
9        reference
10          "Organization: Private
11          Reference: IETF RFC 903";
12      }
13      enum appletalk {
14        value 32923;
15        description
16          "80-9B  Appletalk (Ethertalk)";
17        reference
18          "Organization: Private
19          Reference: Inside Appletalk, Second Edition";
20      }
21      enum aarp {
22        value 33011;
23        description
24          "80-F3  Appletalk Address Resolution Protocol";
25        reference
26          "Organization: Private
27          Reference: Inside Appletalk, Second Edition";
28      }
29      enum c-tag {
30        value 33024;
31        description
32          "81-00  Customer VLAN Tag (C-TAG)";
33        reference
34          "Organization: IEEE 802.1 Working Group
35          Reference: IEEE Std 802.1Q";
36      }
37      enum ipx {
38        value 33079;
39        description
40          "81-37  Internetwork Packet Exchange (IPX)";
41        reference
42          "Organization: Novell, Inc.
43          Reference: Internetwork Packet Exchange - Novell, Inc.";
44      }
45      enum qnx {
46        value 33284;
47        description
48          "82-04  QNX Qnet";
49        reference
50          "Organization: Quantum Software Systems, Ltd.
51          Reference: QNX - Quantum Software Systems, Ltd.";
52      }
53      enum ipv6 {
54        value 34525;
55        description
56          "86-DD  Internet Protocol Version 6 (IPv6)";
57        reference
58          "Organization: USC/ISI
59          Reference: IETF RFC 2464";
60      }
61      enum efc {
62        value 34824;
63        description
64          "88-08  Multipoint Control Protocol (MPCP)";
```

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```
 1         reference
 2           "Organization: IEEE 802.3 Working Group
 3           Reference: IEEE Std 802.3";
 4       }
 5       enum esp {
 6         value 34825;
 7         description
 8           "88-09  Ethernet Slow Protocol";
 9         reference
10           "Organization: IEEE 802.3 Working Group
11           Reference: IEEE Std 802.3";
12       }
13       enum cobranet {
14         value 34841;
15         description
16           "88-19  CobraNet";
17         reference
18           "Organization: Peak Audio
19           Reference: CobraNet Programmer's Reference, Version 2.5";
20       }
21       enum mpls-unicast {
22         value 34887;
23         description
24           "88-47  Multiprotocol Label Switching (MPLS) unicast
25           traffic";
26         reference
27           "Organization: Cisco Systems
28           Reference: IETF RFC 3031";
29       }
30       enum mpls-multicast {
31         value 34888;
32         description
33           "88-48  Multiprotocol Label Switching (MPLS) multicast";
34         reference
35           "Organization: Cisco Systems
36           Reference: IETF RFC 3031";
37       }
38       enum pppoe-discovery {
39         value 34915;
40         description
41           "88-63  Point-to-Point Protocol over Ethernet (PPPoE)
42           Discovery Stage";
43         reference
44           "Organization: UUNET Technologies, Inc.
45           Reference: IETF RFC 2516";
46       }
47       enum pppoe-session {
48         value 34916;
49         description
50           "88-64  Point-to-Point Protocol over Ethernet (PPPoE)
51           Session Stage";
52         reference
53           "Organization: UUNET Technologies, Inc.
54           Reference: IETF RFC 2516";
55       }
56       enum intel-ans {
57         value 34925;
58         description
59           "88-6D  Intel Advanced Networking Services Probe Packets";
60         reference
61           "Organization: Intel Corporation
62           Reference: Intel(R) Advanced Network Services (Intel(R) ANS)
63           Advanced Settings for Teams";
64       }
```

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```
1    enum llc-encaps {
2      value 34928;
3      description
4        "88-70  LLC Encapsulation";
5      reference
6        "Organization: IEEE 802.1 Working Group
7        Reference: IEEE Std 802.1AC";
8    }
9    enum homeplug {
10     value 34939;
11     description
12       "88-7B  Homeplug";
13     reference
14       "Organization: Intellon Corporation
15       Reference: INT51X1 datasheet";
16   }
17   enum eapol {
18     value 34958;
19     description
20       "88-8E  Port Access Entity (PAE) EtherType, Extensible
21       Authentication Protocol over LANs (EAPOL)";
22     reference
23       "Organization: IEEE 802.1 Working Group
24       Reference: IEEE Std 802.1X";
25   }
26   enum profinet {
27     value 34962;
28     description
29       "88-92  PROFINET";
30     reference
31       "Organization: PROFIBUS International
32       Reference: IEC 61158-6-10";
33   }
34   enum hyperscsi {
35     value 34970;
36     description
37       "88-9A  Small Computer System Interface (SCSI) over
38       Ethernet.";
39     reference
40       "Organization: Data Storage Institute
41       Reference: An Ethernet Based Data Storage Protocol for Home
42       Network";
43   }
44   enum aoe {
45     value 34978;
46     description
47       "88-A2  Advanced Technology Attachment (ATA) over Ethernet.";
48     reference
49       "Organization: Coraid Inc
50       Reference: AoE (ATA over Ethernet)";
51   }
52   enum ethercat {
53     value 34980;
54     description
55       "88-A4  Ethernet for Control Automation Technology
56       (EtherCAT)";
57     reference
58       "Organization: Beckhoff Automation GmbH & Co KG
59       Reference: IEC 61158-4-12";
60   }
61   enum s-tag {
62     value 34984;
63     description
64       "88-A8  Service VLAN Tag (S-TAG) or Backbone VLAN Tag
```

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```
 1            (B-TAG)";
 2          reference
 3            "Organization: IEEE 802.1 Working Group
 4            Reference: IEEE Std 802.1Q";
 5        }
 6      enum ethernet-powerlink {
 7          value 34987;
 8          description
 9            "88-AB  Ethernet Powerlink";
10          reference
11            "Organization: Ethernet Powerlink Standardization Group
12            (EPSG)
13            Reference: IEC 61158-4-13";
14        }
15      enum exp1 {
16          value 34997;
17          description
18            "88-B5  Local experimental EtherType 1";
19          reference
20            "Organization: IEEE 802.1 Working Group
21            Reference: IEEE Std 802";
22        }
23      enum exp2 {
24          value 34998;
25          description
26            "88-B6  Local experimental EtherType 2";
27          reference
28            "Organization: IEEE 802.1 Working Group
29            Reference: IEEE Std 802";
30        }
31      enum oui-ext {
32          value 34999;
33          description
34            "88-B7  OUI Extended EtherType";
35          reference
36            "Organization: IEEE 802.1 Working Group
37            Reference: IEEE Std 802";
38        }
39      enum goose {
40          value 35000;
41          description
42            "88-B8  IEC 61850 Generic Object Oriented Substation Event
43            (GOOSE)";
44          reference
45            "Organization: IEC TC57
46            Reference: IEC 61850-8-1";
47        }
48      enum gse {
49          value 35001;
50          description
51            "88-B9  IEC 61850 Generic Substation Events (GSE) management
52            services";
53          reference
54            "Organization: IEC TC57
55            Reference: IEC 61850-8-1";
56        }
57      enum sv {
58          value 35002;
59          description
60            "88-BA  IEC 61850 Sampled Value Transmission (SV)";
61          reference
62            "Organization: IEC TC57
63            Reference: IEC 61850-8-2";
64        }
```

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```
 1        enum pre-auth {
 2          value 35015;
 3          description
 4            "88-C7  RSNA Pre-Authentication";
 5          reference
 6            "Organization: IEEE 802.11 Working Group
 7            Reference: IEEE Std 802.11";
 8        }
 9        enum lldp {
10          value 35020;
11          description
12            "88-CC  Link Layer Discovery Protocol (LLDP)";
13          reference
14            "Organization: IEEE 802.1 Working Group
15            Reference: IEEE Std 802.1AB";
16        }
17        enum sercos {
18          value 35021;
19          description
20            "88-CD  Sercos Interface";
21          reference
22            "Organization: sercos international e.V.
23            Reference: IEC 61158-4-19";
24        }
25        enum wsmp {
26          value 35036;
27          description
28            "88-DC  WAVE Short Message Protocol (WSMP)";
29          reference
30            "Organization: IEEE P1609 WG
31            Reference: IEEE Std 1609";
32        }
33        enum homeplug-av-mme {
34          value 35041;
35          description
36            "88-E1  HomePlug AV Mobile Management Entity (MME)";
37          reference
38            "Organization: HomePlug Powerline Alliance, Inc.
39            Reference: HomePlug AV Specification";
40        }
41        enum mrp {
42          value 35043;
43          description
44            "88-E3  Media Redundancy Protocol";
45          reference
46            "Organization: Siemens AG
47            Reference: IEC 62439-2";
48        }
49        enum macsec {
50          value 35045;
51          description
52            "88-E5  MACsec EtherType";
53          reference
54            "Organization: IEEE 802 LAN/MAN Standards Committee
55            Reference: IEEE Std 802.1AE";
56        }
57        enum i-tag {
58          value 35047;
59          description
60            "88-E7  Backbone Service Instance Tag";
61          reference
62            "Organization: IEEE 802.1 Working Group
63            Reference: IEEE Std 802.1Q";
64        }
```

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```
1      enum mvrp {
2        value 35061;
3        description
4          "88-F5  Multiple VLAN Registration Protocol (MVRP)";
5        reference
6          "Organization: IEEE 802.1 Working Group
7          Reference: IEEE Std 802.1Q";
8      }
9      enum mmrp {
10       value 35062;
11       description
12         "88-F6  Multiple MAC Registration Protocol (MMRP)";
13       reference
14         "Organization: IEEE 802.1 Working Group
15         Reference: IEEE Std 802.1Q";
16     }
17     enum ptp {
18       value 35063;
19       description
20         "88-F7  Precision Time Protocol";
21       reference
22         "Organization: IEEE I&M Society TC9
23         Reference: IEEE Std 1588";
24     }
25     enum cfm {
26       value 35074;
27       description
28         "89-02  IEEE 802.1Q Connectivity Fault Management (CFM) PDU
29         Encapsulation EtherType";
30       reference
31         "Organization: IEEE 802.1 Working Group
32         Reference: IEEE Std 802.1Q";
33     }
34     enum fcoe {
35       value 35078;
36       description
37         "89-06  Fibre Channel over Ethernet (FCoE)";
38       reference
39         "Organization: Cisco Systems, Inc
40         Reference: T11 FC-BB-5";
41     }
42     enum wlan-mgmt {
43       value 35085;
44       description
45         "89-0D  802.11 Management Protocol";
46       reference
47         "Organization: IEEE 802.11 Working Group
48         Reference: IEEE Std 802.11";
49     }
50     enum encap {
51       value 35088;
52       description
53         "89-10  Backbone Service Encapsulated Addresses";
54       reference
55         "Organization: IEEE 802.1 Working Group
56         Reference: IEEE Std 802.1Q";
57     }
58     enum fip {
59       value 35092;
60       description
61         "89-14  FCoE Initialization Protocol";
62       reference
63         "Organization: Brocade Communications Systems LLC
64         Reference: T11 FC-BB-5";
```

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```
 1        }
 2      enum roce {
 3        value 35093;
 4        description
 5          "89-15  Remote Direct Memory Access (RDMA) over Converged
 6          Ethernet (RoCEv1)";
 7        reference
 8          "Organization: Mellanox Technologies, Inc.
 9          Reference: InfiniBand(TM) Architecture Specification";
10        }
11      enum mis {
12        value 35095;
13        description
14          "89-17  Media Independent Service (MIS) Protocol";
15        reference
16          "Organization: IEEE 802.21 Working Group
17          Reference: IEEE Std 802.21";
18        }
19      enum tte {
20        value 35101;
21        description
22          "89-1D  Time-Triggered Ethernet (TTE) Protocol Control
23          Frame";
24        reference
25          "Organization: TTTech Computertechnik AG
26          Reference: SAE AS6802";
27        }
28      enum mirp {
29        value 35113;
30        description
31          "89-29  Multiple I-SID Registration Protocol (MIRP)";
32        reference
33          "Organization: IEEE 802.1 Working Group
34          Reference: IEEE Std 802.1Q";
35        }
36      enum hsr {
37        value 35119;
38        description
39          "89-2F  High-availability Seamless Redundancy (HSR)";
40        reference
41          "Organization: International Electrotechnical Commission
42          Reference: IEC 62439-3";
43        }
44      enum e-tag {
45        value 35135;
46        description
47          "89-3F  Bridge Port Extension Tag (E-TAG)";
48        reference
49          "Organization: IEEE 802.1 Working Group
50          Reference: IEEE Std 802.1BR";
51        }
52      enum ecp {
53        value 35136;
54        description
55          "89-40  Edge Control Protocol";
56        reference
57          "Organization: IEEE 802.1 Working Group
58          Reference: IEEE Std 802.1Q";
59        }
60      enum f-tag {
61        value 35147;
62        description
63          "89-4B  Flow Filtering Tag (F-TAG)";
64        reference
```

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```
 1          "Organization: IEEE 802.1 Working Group
 2          Reference: IEEE Std 802.1Q";
 3        }
 4      enum drcp {
 5        value 35154;
 6        description
 7          "89-52  Distributed Relay Control Protocol (DRCP)";
 8        reference
 9          "Organization: IEEE 802.1 Working Group
10          Reference: IEEE Std 802.1AX";
11      }
12      enum cim {
13        value 35234;
14        description
15          "89-A2  Congestion Isolation Message (CIM)";
16        reference
17          "Organization: IEEE 802.1 Working Group
18          Reference: IEEE Std 802.1Q";
19      }
20      enum llc-legacy {
21        value 51665;
22        description
23          "C9-D1  LLC Encapsulation (obsolete)";
24        reference
25          "Organization: IEEE 802.1 Working Group
26          Reference: IEEE Std 802.1AC";
27      }
28      enum mpp {
29        value 57915;
30        description
31          "E2-3B  MAC Privacy protection Protocol";
32        reference
33          "Organization:
34          Reference: IEEE Std 802.1AE";
35      }
36      enum r-tag {
37        value 61889;
38        description
39          "F1-C1  Frame Replication and Elimination for Reliability
40          (FRER) Redundancy Tag (R-TAG)";
41        reference
42          "Organization: IEEE 802.1 Working Group
43          Reference: IEEE Std 802.1CB";
44      }
45    }
46    description
47      "IEEE Std 802 EtherTypes subset.";
48  }
49
50 }
51

52
```

IEEE Standard for Local and Metropolitan Area Networks:
Overview and Architecture Amendment 3: YANG Data Model for EtherTypes

IEEE P802f/D2.4
August 11, 2023

Insert a new Annex as follows:

Annex G

(informative)

Wake-on-LAN

Wake-on-LAN (WoL) is a common protocol to wake up devices from a very low power mode remotely. It can be implemented over IEEE 802 networks as a frame using the EtherType 08-42. The payload of a WoL packet following the EtherType is shown in Figure G.1.

Figure G.1— Wake-on-LAN packet payload fields

6 octets	96 octets	0, 4 or 6 octets
Synchronization Stream	**Target MAC**	**Password (optional)**

The Synchronization Stream contains the all-stations broadcast MAC address, as specified in 8.2.2. The Target MAC contains 16 duplications of the destination MAC address. The Password field is optional, but if present, contains either 4 octets (for an IPv4 address) or 6 octets (for a MAC address).