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Part A: Overview and architecture

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseaux locaux et métropolitains —

Partie A: Présentation et architecture

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IEEE Std 802®-2024
(Revision of IEEE Std 802-2014 as amended by
IEEE Std 802d™-2017, IEEE Std 802c™-2017,
and IEEE Std 802f™-2023)

IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture

Developed by the

LAN/MAN Standards Committee
of the
IEEE Computer Society

Approved 11 December 2024

IEEE SA Standards Board

Abstract: An overview to the family of IEEE 802® standards is provided in this standard. It describes the reference models for the IEEE 802 standards and explains the relationship of these standards to the higher layer protocols; it specifies the structure of IEEE 802 MAC addresses; it specifies identification of public, private, prototype, and standard protocols; it specifies an object identifier hierarchy used within IEEE 802 for uniform allocation of object identifiers used in IEEE 802 standards; and it specifies a method for higher layer protocol identification.

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 identifiers, protocol types

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Introduction

This introduction is not part of IEEE Std 802-2024, IEEE Standard for Local and Metropolitan Area Networks Overview and Architecture.

This document is the third major revision of the IEEE 802® overview and architecture. This revision integrates into the previous revision of the standard, IEEE Std 802-2014, the three subsequent amendments:

— IEEE Std 802d™-2017, which specifies a Uniform Resource Name (URN) root identifier for YANG data models

— IEEE Std 802c™-2017, which specifies an optional local medium access control (MAC) address space structure

— IEEE Std 802f™-2023, which specifies a YANG module that contains EtherType information

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IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture

1. Overview

1.1 Scope

This standard contains descriptions of the IEEE 802® standards published by the IEEE for frame-based data networks as well as a reference model (RM) for protocol standards. A specification for the identification of public, private, and standard protocols is included.

1.2 Purpose

This standard serves as the foundation for the family of IEEE 802 standards published by IEEE for local area networks (LANs), metropolitan area networks (MANs), personal area networks (PANs), and regional area networks (RANs), etc.

1.3 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*).

The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (*should* equals *is recommended that*).[6]

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted to*).[7]

The word *can* is used for statements of possibility and capability, whether material, physical, or causal (*can* equals *is able to*).

[6]The use of the word *must* is deprecated and cannot be used when stating mandatory requirements, *must* is used only to describe unavoidable situations.

[7]The use of *will* is deprecated and cannot be used when stating mandatory requirements, *will* is only used in statements of fact.

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2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used; therefore, each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (included any amendments or corrigenda) applies.

IEEE Std 802.1Q™, IEEE Standard for Local and Metropolitan Area Networks—Bridges and Bridged Networks.[8, 9]

IEEE Std 802.1AC™, IEEE Standard for Local and Metropolitan Area Networks—Media Access Control (MAC) Service Definition.

IETF RFC 2578, Structure of Management Information Version 2 (SMIv2).[10]

IETF RFC 3406, Uniform Resource Names (URN) Namespace Definition Mechanisms, October 2002.

IETF RFC 8069, URN Namespace for IEEE, February 2017.

ISO/IEC/IEEE 8802-2:1998, International Standard for Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements—Part 2: Logical link control.[11]

ITU-T Recommendation X.660, Information technology—Procedures for the operation of object identifier registration authorities: General procedures and top arcs of the international object identifier tree.[12]

[8]The IEEE standards referred to in Clause 2 are trademarks owned by The Institute of Electrical and Electronics Engineers, Incorporated.

[9]IEEE publications are available from The Institute of Electrical and Electronics Engineers (https://standards.ieee.org/).

[10]IETF documents (i.e., RFCs) are available the Internet Engineering Task Force (https://www.rfc-archive.org/).

[11]ISO/IEC publications are available from the International Organization for Standardization (https://www.iso.org/standards.html) and the International Electrotechnical Commission (https://www.iec.ch/). ISO/IEC publications are also available in the United States from the American National Standards Institute (https://www.ansi.org/).

[12]ITU-T publications are available from the International Telecommunications Union (https://www.itu.int/).

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3. Definitions, acronyms and abbreviations

3.1 Definitions

For this document, the following terms and definitions apply. *The IEEE Standards Dictionary Online*[13] should be consulted for terms not defined in this clause.[14]

access domain: A set of stations in an IEEE 802® network together with interconnecting data transmission media and functional units (e.g., repeaters), in which the stations use the same medium access control (MAC) protocol to access a common communications channel to exchange information.

bridge: In the general sense, a functional unit that interconnects two or more access domains. In the context of IEEE Std 802, this is narrowed to interconnecting two or more bridgeable IEEE 802® networks that use the same data link layer (DLL) protocols above the medium access control (MAC) sublayer, but can use different MAC protocols. Forwarding and filtering decisions are made on the basis of Layer 2 information.

bridgeable network: A communication resource that provides the medium access control (MAC) service specified in IEEE Std 802.1AC, between two or more MAC service access points (MSAPs), supporting the MAC Internal Sublayer Service.

end station: A functional unit in an IEEE 802® network that acts as a source of, and/or destination for, link layer data traffic carried on the network.

Ethernet: A communication protocol specified by IEEE Std 802.3™.

EtherType: A 2-octet value assigned by the IEEE Registration Authority (RA) that provides data field context for medium access control (MAC) frame interpretation (protocol identification).

Extended Unique Identifier (EUI): A 48-bit or 64-bit identifier intended to be globally unique and sub-assigned, by the assignee of a block of such identifiers assigned by the IEEE Registration Authority, to a hardware device instance or other object that requires unique identification.

filtering: A function in a bridge that is used to determine if a received medium access control (MAC) frame is to be forwarded or discarded on any given outbound port.

forwarding: A function in a bridge that transfers a received medium access control (MAC) frame to one or more outbound ports.

handover: A process by which a mobile node obtains facilities and preserves traffic flows when traffic is switched from one link to another.

interworking: The use of interconnected stations in a network for the exchange of data, by means of protocols operating over the underlying data transmission paths.

local area network (LAN): A network of devices, whether indoors or outdoors, covering a limited geographic area, e.g., a building or campus.

local medium access control (MAC) address: A medium access control (MAC) address with the universally or locally administered (U/L) bit set to one.

[13]The *IEEE Standards Dictionary Online* is a compendium of balloted definitions from individual approved standards.

[14]The *IEEE Standards Dictionary Online* is available at https://dictionary.ieee.org. An IEEE Account is required for access to the dictionary, and one can be created at no charge on the dictionary sign-in page.

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logical link: A logical communication connection between two devices.

logical link control (LLC) entity: The instantiation of an active element embodying LLC-specific capabilities at a single station.

logical link control (LLC) protocol data unit (LPDU): An LLC protocol data unit carried in the data field of a frame as an medium access control (MAC) service data unit (MSDU).

medium access control (MAC) entity: The instantiation of an active element embodying MAC-specific capabilities at a single station.

medium access control (MAC) frame: A data structure consisting of fields in accordance with a MAC protocol, for the communication of user data and/or control information in a network.

medium access control (MAC) protocol: A protocol that governs access to the transmission medium in a network, to enable the exchange of data between stations in a network.

medium access control (MAC) service data unit (MSDU): Data sent within a MAC frame by a MAC entity for delivery to one or more MAC entities.

media-independent control function: A parallel control plane that provides control functions for different medium access control (MAC) and physical layer (PHY) sublayers and provides a media-independent abstraction to higher layer protocols.

media-independent handover function: A function that provides the ability to relocate traffic flows between different medium access technologies and associated physical media.

metropolitan area network (MAN): A network of devices, extending over a large geographical area such as an urban area, often providing integrated communication services such as data, voice, and video.

Network Unique Identifier (NUI): An identifier that is unique within the IEEE 802® local area network (LAN).

personal area network (PAN): A network of devices extending over a region generally smaller than about ten meters, used to convey information among a group of participant stations.

private protocol: A protocol whose use and specification are controlled by a private organization.

protocol data unit: A unit of information transmitted among peer instances of a layer or sublayer comprising protocol-specific control information and user data.

public protocol: A protocol whose specification is published and known to the public, but controlled by an organization other than a formal standards body.

regional area network (RAN): A network of devices that generally covers a service area that is larger than metropolitan area networks (MANs), typically in sparsely populated areas.

repeater: A device used to interconnect segments of the physical communications media, for example, to extend the range of a network when the physical specifications of the technology would otherwise be exceeded, while providing a one access domain for the attached stations.

standard protocol: A protocol whose specification is published and known to the public and is controlled by a standards body.

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station: An end station or bridge. *See also*: **bridge**; **end station**.

Structured Local Address Plan (SLAP): An optional standardized specification to differentiate local medium access control (MAC) addresses.

universal address: A 48-bit Extended Unique Identifier (EUI-48) or 64-bit Extended Unique Identifier (EUI-64) that is used as a unique address.

3.2 Acronyms and abbreviations

AAI	Administratively Assigned Identifier
AAI-48	48-bit AAI
AAI-64	64-bit AAI
AN	auto negotiation
BAN	body area network
BS	base station
BSS	basic service set
CID	Company ID
CGMII	100 Gb/s media-independent interface
CPE	customer-premises equipment
CS	convergence sublayer
C-SAP	control service access point
DCN	data center networking
DLL	data link layer
ELI	Extended Local Identifier
ELI-48	48-bit ELI
ELI-64	64-bit ELI
EPON	Ethernet passive optical networks
EUI	Extended Unique Identifier
EUI-48	48-bit EUI
EUI-64	64-bit EUI
FEC	forward error correction
HLPDE	higher layer protocol discrimination entity
IANA	Internet Assigned Numbers Authority[15]
IEEE RA	Institute of Electrical and Electronic Engineers Registration Authority
IEEE RAC	Institute of Electrical and Electronic Engineers Registration Authority Committee
I/G	individual/group
IM	implementation model
IoT	Internet of things
IP	Internet Protocol
LAN	local area network
LLC	logical link control
LPDU	logical link control protocol data unit
LSAP	link service access point
LSB	least significant bit

[15]See https://www.iana.org.

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LMSC	Local Area Network/Metropolitan Area Network (LAN/MAN) Standards Committee
MAC	medium access control, media access control[16]
MA-L	MAC Address Block Large
MA-M	MAC Address Block Medium
MAN	metropolitan area network
MA-S	MAC Address Block Small
MCPS	MAC common part sublayer
MCPS-SAP	MAC common part sublayer data service access point
MDI	medium dependent interface
MIB	management information base
MICF	media-independent control function
MICLSAP	media-independent control link service access point
MICPSAP	media-independent control physical service access point
MICSAP	media-independent control service access point
MIH	media-independent handover
MIHF	media-independent handover function
MLME	MAC sublayer management entity
MSAP	MAC service access point
M-SAP	management service access point
MSB	most significant bit
MSDU	medium access control protocol data unit
MSTP	multiple spanning tree protocol
NCMS	network control and management system
NETCONF	Network Configuration Protocol
NID	Namespace Identifier
NUI	Network Unique Identifier
NUI-48	48-bit NUI
NUI-64	64-bit NUI
OAM	operations, administration, and maintenance
OID	object identifier
OLT	optical line terminal
OMG®	Object Management Group®
ONU	optical network unit
OSI/RM	Open Systems Interconnection basic reference model
OUI	Organizationally Unique Identifier
PAN	personal area network
PCS	physical coding sublayer
PDU	protocol data unit
PIF	protocol identification field
PHY	physical layer (OSI reference model and IEEE 802® reference model)
PHY	physical layer device or entity (IEEE 802.3™ reference model)
PICS	protocol implementation conformance statement
PLME	physical layer management entity
PMA	physical medium attachment

[16]Both forms are used, with the same meaning. This standard uses medium.

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PMD	physical medium dependent
PSAP	physical service access point
RAN	regional area network
RM	reference model
RS	reconciliation sublayer
RSTP	rapid spanning tree protocol
SAP	service access point
SAI	Standard Assigned Identifier
SAI-48	48-bit Standard Assigned Identifier
SAI-64	64-bit Standard Assigned Identifier
SLAP	Structured Local Address Plan
SNAP	Subnetwork Access Protocol
SNMP	Simple Network Management Protocol
SPB	shortest path bridging
SSF	spectrum sensing function
SS/MS	subscriber station/mobile subscriber station
TSN	Time-Sensitive Networking
U/L	universally or locally administered
UML™	unified modeling language®
URN	Uniform Resource Name
VLAN	virtual local area network
VOIP	voice over Internet protocol
WAN	wide area network
WLAN	wireless local area network
WPAN	wireless personal area network
WRAN	wireless regional area network
YANG	The name of the data modeling language specified in IETF RFC 6020 [B16][17] and IETF RFC 7950 [B18].

[17]The numbers in brackets correspond to the numbers of the bibliography in Annex A.

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