
**Information technology —
Telecommunications and information
exchange between systems — High rate
60 GHz PHY, MAC and HDMI PAL**

*Technologies de l'information — Téléinformatique — PHY, MAC et
HDMI PAL 60 GHz à haut débit*

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 13156 was prepared by Ecma International (as ECMA-387) and was adopted, under a special "fast-track procedure", by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

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Introduction

This is a standard for a 60 GHz PHY, MAC and HDMI¹ PAL for short range unlicensed communications providing high rate wireless personal area network (including point-to-point) transport for both bulk data transfer and multimedia streaming; addressing usages and applications such as high definition (uncompressed / lightly compressed) AV streaming, access point, wireless docking station, and short range sync-and-go.

The standard defines three device types. All device types coexist and interoperate with each other. None of the types requires presence of another type for its operation.

- Device Type A offers video streaming and WPAN applications in 10 meter range LOS/NLOS multipath environments. It uses high gain trainable antennas. This device type is considered as the 'high end - high performance' device.
- Device Type B offers video and data applications over shorter range (1-3 meters) point to point LOS links with non-trainable antennas. It is considered as the "economy" device and trades off range and NLOS performance in favour of low cost implementation and low power consumption.
- Device Type C is positioned to support data only applications over point to point LOS links at less than 1 meter range with non-trainable antennas and no QoS guarantees. This type is considered a 'bottom end' device providing simplest implementation, lowest cost and lowest power consumption.

Four frequency channels are defined and used by all the three device types. The frequency separation for these channels is 2.160 GHz and the symbol rate on each channel is 1.728 Gsps. All device types follow the same frequency plan defined in the major regulatory domains. The standard supports bonding of two or three adjacent channels. The channel bonding allows achieving higher data rates, or the same data rates while using smaller, more efficient constellations.

A single MAC layer protocol is defined within which Type B and Type C devices support limited functionality supported by their respective PHY layers as illustrated in Figure 1. A multiplexing sublayer (MUX) is defined to enable the coexistence of concurrently active higher layer protocols within a single device.

There is an HDMI PAL defined in the standard which places the 60 GHz wireless solution between the HDMI source and HDMI sink. In the wireless HDMI transmitter, the HDMI TMDS coding is removed prior to wireless transmission. The three HDMI data types (video, control and data) are multiplexed together with the video flagged for unequal error protection (UEP) and data/control flagged for equal error protection (EEP). In the wireless HDMI receiver, the three HDMI data types are demultiplexed prior to reapplying the TMDS coding and sending on to the HDMI data sink.

1. HDMI is the registered trademark of the HDMI LLC.

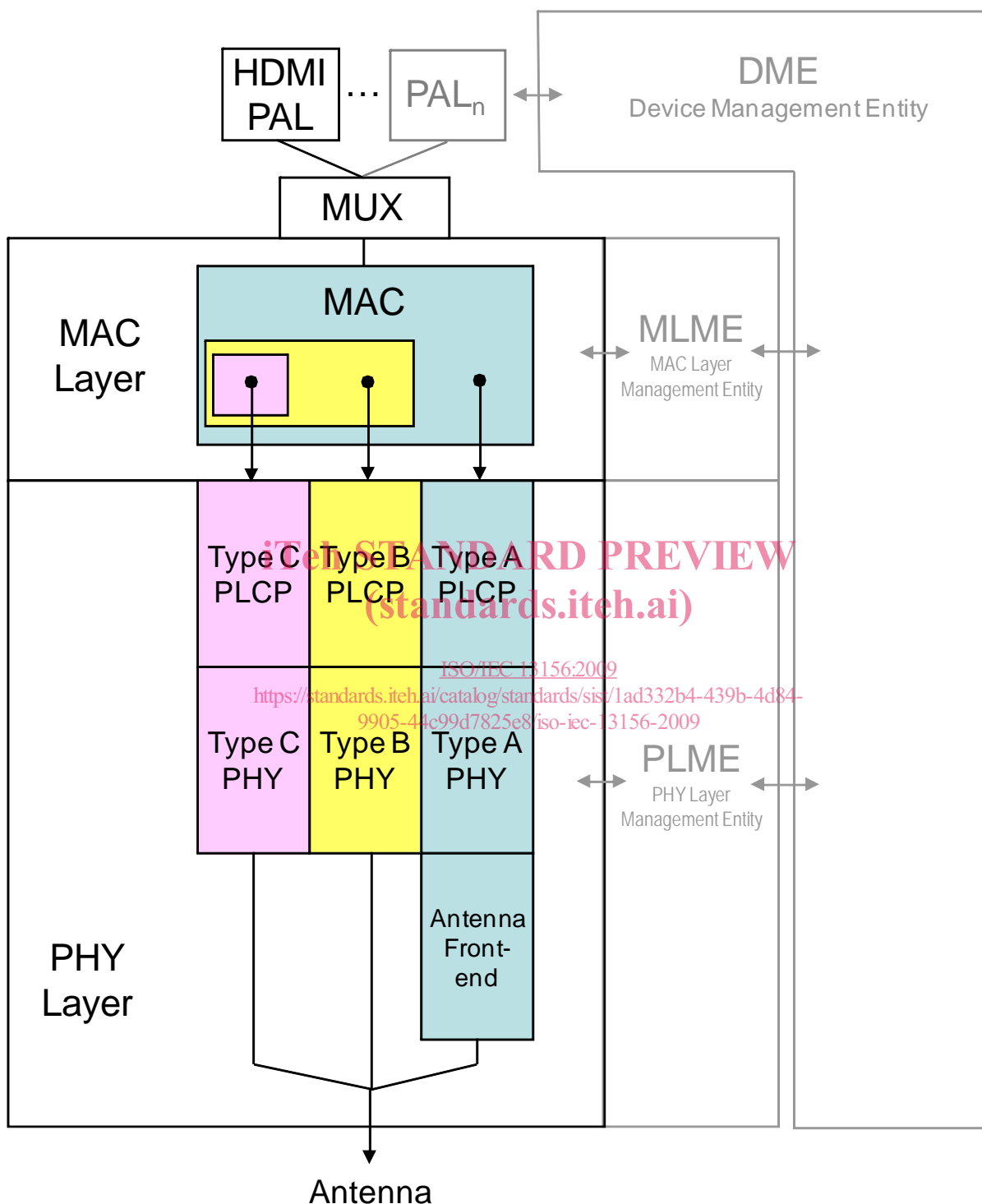


Figure 1 - Protocol structure

NOTE The DME, MLME, PLME, and PALs (except the HDMI PAL) are outside the scope of this standard and all references to these are informative.

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1 Scope

This Standard specifies a physical layer (PHY), distributed medium access control (MAC) sublayer, and an HDMI protocol adaptation layer (PAL) for 60 GHz wireless networks.

2 Conformance

Conforming devices of Type A, B or C shall implement the MAC sublayer and the PHY layer and may implement the HDMI PAL as specified herein.

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 8802-11:2005/Amd. 6, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications - Amendment 6: Medium Access Control (MAC) Security Enhancements* 3156-2009

ISO/IEC 10646:2003, *Information technology – Universal Multiple-Octet Coded Character Set (UCS)*

ISO/IEC 18033-3:2005, *Information technology – Security techniques – Encryption algorithms – Part 3: Block ciphers*

4 Terms and definitions

For the purposes of this document, the following terms and definitions apply. For terms and definitions not defined in this Clause, the term and definitions given in IEEE 100, *The Authoritative Dictionary of IEEE Standards Terms*, Seventh Edition apply.

4.1

Beacon Group

BG

set of devices from which a device receives beacons that identify the same beacon period start time (BPST) as the device

4.2

Beacon Period

BP

period of time declared by a device during which it sends or listens for beacons