EIBA Handbook Series

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Volume 3:
System Specifications

Part 3: Medium Independent Layers

Chapter 1: Physical Layer General

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1. Overview

The physical layer (PhL) (also called "layer-1") is the layer between the physical layer user and the medium. The EIB physical layer conforms to the definitions of the ISO/OSI model (ISO 7498) physical layer. It consists of the following components, see Fig. 3/3/1-1:

- the logical unit of the physical layer, consisting itself of a medium-dependent and a medium independent sublayer
- the medium attachment unit (MAU)
- the medium interface (i.e. the connector)
- the medium

- optionally: a separate power supply to the medium, for remote powered devices.

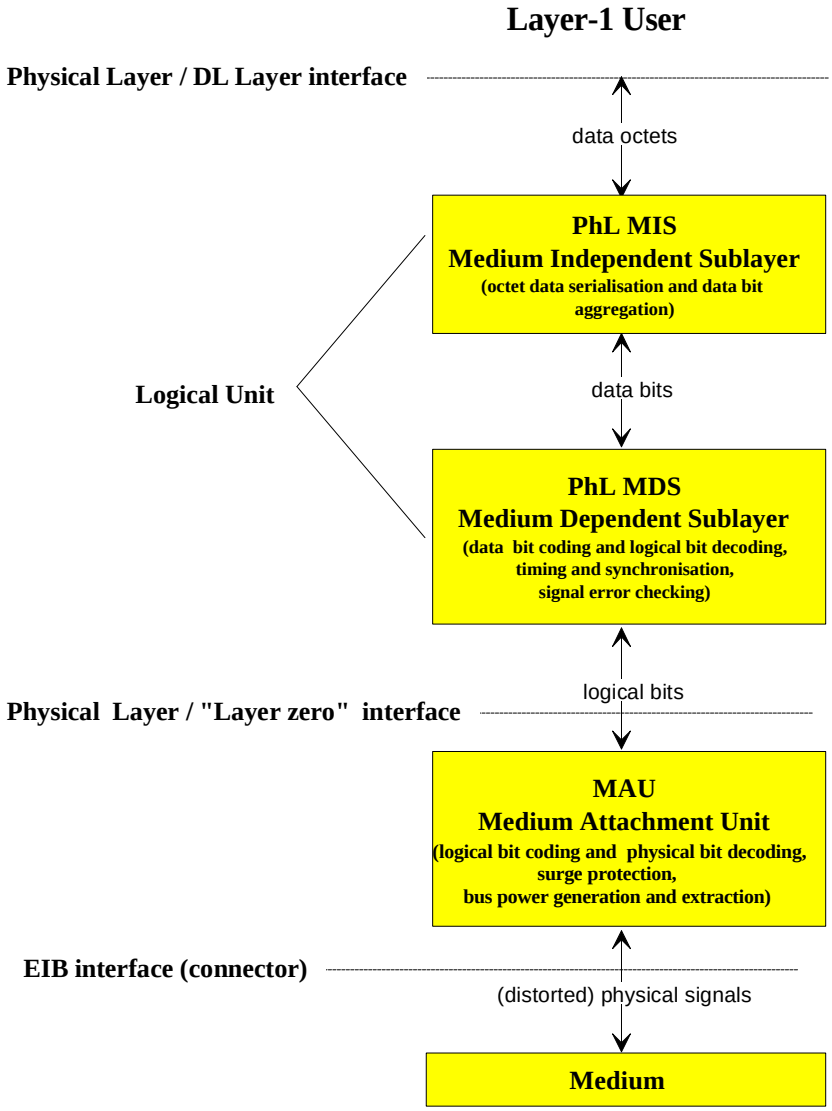

Fig. 3/3/1-1: Physical Layer Overview

1.1 Layer-1 Logical Unit Functionality

In transmission direction the medium-independent sublayer of the layer-1 Logical Unit serializes each data octet in a sequence of data bits. The medium-dependent sublayer of the Logical Unit frames the data bits with the help of the information given by the class parameter[1] to build the UART character. Finally the medium-dependent sublayer transforms the framed data bits in an asynchronous timed logical signal.

In reception direction the medium-dependent sublayer of the layer-1 Logical Unit transforms the logical signal given by the MAU in a data bit stream. The logical signal itself and the data bit framing is checked; the data bits are reconstructed. Then the medium-dependent sublayer of the layer-1 Logical Unit passes the data bit stream and the checking information to the medium-independent sublayer which aggregates the bit stream to data octets. The medium-independent sublayer of the layer-1 Logical Unit passes the received data octets plus the class information generated in the Logical Unit during reception to the Layer-1 User.

1.2 The Task of the Medium Attachment Unit (MAU)

The medium attachment unit (MAU) codes logical signals to physical signals and decodes physical signals to logical ones. Surge protection and bus power generation / extraction may be further MAU tasks. MAU and the medium exchange physical signals via the EIB connector.

The MAU can be regarded as the analog part of the physical layer. Besides its communication-relevant tasks of coding logical data bits into the physical signal and decoding logical data bits from the physical signal, the MAU may also extract the power needed for remote powered devices. Optionally the MAU may monitor the power signal contained in the physical signal to generate a save signal (i.e. an interrupt) to the Layer-1 User in case of power decrease. Ideally the MAU automatically corrects a wrong signal polarity; nonetheless minimum requirements for EIB devices in case of wrong signal polarity are:

- EIB devices must not be damaged by wrong polarity.
- the power consumption of a wrongly connected EIB device shall not exceed a defined level.

[1] For the definition of the class parameter, please refer to the specification of the Physical Layer services for each medium.

1.3 Layer-1 Service Interface

The Logical Unit of layer-1 and the Layer-1 User communicate locally with one each other by physical services. A physical service consists of the .req (request), .ind (indication) and the .con (confirmation) service primitives (see also Fig. 3/3/1-1 and Chapter 3/3/2 “Data Link Layer General”).

The Layer-1 User passes a data octet plus class (e.g. timing) information to the layer-1 Logical Unit by the Ph_data.req service primitive. The Layer-1 Logical Unit passes a data octet plus class information to the Layer-1 User by the Ph_data.ind service primitive; status information is passed to the Layer-1 User by the Ph_data.con and the Ph_Reset.con service primitives.

The Layer-1 User may initiate a reset at the physical layer by the Ph_Reset.req service primitive to which the physical layer responds with a Ph_Reset.con service primitive containing status/error information.

The layer-1 Logical Unit may spontaneously pass a data octet plus status/error information to the layer-1 User by the Ph_data.ind service primitive.

1.4 Possible EIB Media and their Impact on Layer-1

EIB is defined for the following media:

- Twisted Pair
  (See Chapter 3/2/1 "EIB Implementation on Twisted Pair")
- Power Line
  (See Chapter 3/2/2 "EIB Implementation on Powerline")
- Radio Frequency
- Infra-Red

Each medium needs a specially dedicated medium attachment unit and an adapted layer-1 Logical Unit. See specific chapters as indicated for the media above.

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