EIBA Handbook Series

Release 3.0

Volume 3:
System Specifications

Part 1: Architecture

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1. Introduction

This part will describe the standardized architecture of the EIB System and the organization of its description into the various parts and chapters of this Volume.

This Part 3/1 "Architecture" will be extended in a future version of these handbook series.

2. Introduction to Volume 3 "System Specifications"

EIB is a distributed control system which allows to materialize electronic systems for buildings and homes. In functional buildings like banks, hospitals, libraries, city halls, theaters, sport arenas and industrial works typical EIB applications are heating, ventilation, air conditioning, lights and blinds control. Typical EIB home applications in one-family houses or multiple dwelling units are also heating, ventilation, air conditioning, lights and blinds control, additionally materialization of smart household appliances and their interconnection is possible by EIB.

Volume 3 "System Specifications" defines system neutrally the EIB data communication for use at the field level of building and home automation.

The EIB system offers standardized basic and system components and devices, e.g. Bus Coupling Units (BCU), Power Supply Units (PSU), Filters, Twisted Pair and Powerline 'Repeaters', Bus Interface Modules (BIM), Routers and RS232 data interfaces.

Seen from the communication point of view building and home applications can be materialized by fitting out each application-specific device with an EIB bus access module (BAU) so that they can be interconnected to an EIB network. So an EIB network consists of a number of up to 65535 interconnected EIB devices which realize one or several building and home applications of a home, a multiple dwelling unit, a single building or even a complex of industrial, university or administrational buildings.

EIB offers the possibility to build up devices in a modular form using system devices like BCU’s or BIM’s, which support the communication specific functions. A standardized interface called Physical External Interface (PEI) reduces the expense of developing an EIB device and allows their exchangeability.

The EIB system is based on the EIB standard which is the basis for EIB product certification (EIB mark).

In the EIB system Twisted Pair (TP), Power Line (PL), Infra-Red (IR) and Radio Frequency (RF) media are used.

3. Normative References

This Volume 3 "System Specifications" incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this Volume 3 only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- EN 27498 Information processing systems. Open System Interconnection. Basic reference model (ISO 7498:1984 and addendum 1:1987)
- EN/IEC 1140 SELV
- (pr)EN(v) 50090 HBES (Home and Building Electronic System)

4. Notes on the Wording in this Document

As the EIB System is in constant evolution, its wording is subject to extension and/or restrictions. It has been intended to comply to the definition of the glossary in Part 1/3 "Glossary". Some chapters may refine the used terminology as it is understood by the author. This may lead to interchangeable use of wording like "EIB Communication Objects" and "Communication Objects", "EIB Objects" and "EIB Interface Objects", "Shared Variable" and "Group Value", "Individual Address" and "Physical Address", which are in fact sets of synonyms.

The EIB protocol is a **character-oriented**, i.e. **asynchronous protocol**. The **'messages'** exchanged between (data link-, network-, transport- and application-) layer **instances** are called **Protocol Data Units, PDU's.** PDU's are sequences of **octets**.

A PDU is a sequence of an integral number, n, of octets numbered 0 through n-1. Each octet may be viewed in turn as a sequence of 8 bits numbered 8 through 1. Throughout this document octet i-1 is shown to the left of octet i and bit j+1 to the left of bit j. Bit 8 is the most significant (MSB), bit 1 the least significant one (LSB).

For data link layer PDU's exists a synonymous notion: **frame**. Frames consist of **frame characters**. In this EIB context a distinction between data link layer PDU's and data link layer frames is made: if the sequence of 8-bit bytes in memory is meant then a message exchanged by EIB protocol stack instances is called PDU. If the character is meant as the basic unit of a message, this message is called frame.

For the EIB twisted-pair medium a mapping of every PDU octet to an 11-bit frame character is done by adding the start, stop and parity bit. The mapping in the opposite direction is done by removing start, stop and parity bit. Start, stop and parity bit can be regarded as a frame to the octet: the **character frame**. Other media may have a different mapping, and precede or follow the frame with medium specific sequences, according to its Link Layer needs.

Besides PDU's and frames there is another type of 'message': the messages exchanged by two neighboring layers. In "ISO-talk" they are called "interface data units, IDU's" and consist of

- the **service data unit, SDU**, which is the PDU produced by the upper layer and which is copied without changes to the PDU of the lower layer as **user data** to the **information field** of the lower layer PDU.

- the **interface control information, ICI** which is needed by the lower layer to produce the lower layer **PDU header** and trailer. The trailer exists only for the data link layer PDU and is called **frame check sequence, FCS.**

Finally there is a further type of EIB message, that does not correspond to messages exchanged by EIB protocol instances but to messages exchanged via the PEI in case the PEI has serial I/O characteristics. A more correct notion for this protocol stack based on the **serial PEI** is **periphery stack.** The periphery stack based on the serial PEI consists of 2 protocol layers which run at a several-wire hardware interface called **PEI**. At the interface of layer 2 to the internal or external user application there is a set of periphery interface data units called **External Messages** which build the **External Message Interface**.