

# ISO/IEC 14543-3-2 :2006-09 (E)

Information technology - Home Electronic Systems (HES) Architecture - Part 3-2: Communication layers - Transport, network and general parts of data link layer for network based control of HES Class 1

---

## CONTENTS

- FOREWORD..... 5
- INTRODUCTION..... 6
- 1 Scope..... 7
- 2 Normative references..... 7
- 3 Terms, definitions and abbreviations..... 7
  - 3.1 Terms and definitions ..... 7
  - 3.2 Abbreviations..... 9
- 4 Conformance..... 9
- 5 Requirements for the physical layer and independent data link layer..... 9
  - 5.1 Functions of the data link layer ..... 9
  - 5.2 Possible media and their impact on layer-2 ..... 10
  - 5.3 Data link layer services ..... 11
    - 5.3.1 Data link layer modes ..... 11
    - 5.3.2 L\_Data service..... 11
    - 5.3.3 L\_SystemBroadcast service ..... 15
    - 5.3.4 L\_Poll\_Data service and protocol ..... 16
    - 5.3.5 L\_Busmon service ..... 17
    - 5.3.6 L\_Service\_Information service ..... 17
  - 5.4 Data link layer protocol ..... 18
    - 5.4.1 Protocol..... 18
    - 5.4.2 Recommendations for duplication prevention ..... 18
  - 5.5 Parameters of layer-2 ..... 18
  - 5.6 Specific devices..... 19
    - 5.6.1 Layer-2 of a bridge..... 19
    - 5.6.2 Layer-2 of a router ..... 19
- 6 Requirements for the network layer..... 19
  - 6.1 Functions of the network layer ..... 19
  - 6.2 Network layer services and protocol..... 21
    - 6.2.1 Network layer protocol data unit (NPDU) ..... 21
    - 6.2.2 Network layer services ..... 21
  - 6.3 Parameters of the network layer..... 27
  - 6.4 Network layer state machines ..... 27
    - 6.4.1 Overview ..... 27
    - 6.4.2 State machine of network layer for normal devices ..... 27
    - 6.4.3 State machine of network layer for bridges ..... 27
    - 6.4.4 State machine of network layer for routers ..... 28
- 7 Requirements for the transport layer ..... 30
  - 7.1 Functionality of the transport layer ..... 30
  - 7.2 Transport layer Protocol Data Unit (TPDU)..... 30
  - 7.3 Overview communication modes ..... 31
    - 7.3.1 Point-to-multipoint, connection-less (multicast) communication mode ..... 31
    - 7.3.2 Point-to-domain, connection-less (broadcast) communication mode ..... 32
    - 7.3.3 Point-to-all-points, connection-less (SystemBroadcast) communication mode ..... 32
    - 7.3.4 Point-to-point, connection-less communication mode ..... 32

7.3.5	Point-to-point, connection-oriented communication mode .....	32
7.3.6	Algorithm for the identifier of communication .....	33
7.4	Transport layer services.....	33
7.4.1	General .....	33
7.4.2	T_Data_Group service .....	33
7.4.3	T_Data_Tag_Group service .....	34
7.4.4	T_Data_Broadcast service .....	36
7.4.5	T_Data_SystemBroadcast service.....	37
7.4.6	T_Data_Individual service .....	38
7.4.7	T_Connect service .....	39
7.4.8	T_Disconnect service.....	40
7.4.9	T_Data_Connected service .....	41
7.5	Parameters of transport layer.....	42
7.6	State machine of connection-oriented communication mode.....	43
7.6.1	General .....	43
7.6.2	States.....	43
7.6.3	Required actions.....	44
7.6.4	Transition table of the connection oriented transport layer state machine.....	46
7.6.5	State diagrams .....	53
Annex A (informative)	Examples of transport layer connection oriented state machine state diagrams .....	54
A.1	Connect and disconnect.....	54
A.1.1	Connect from a remote device .....	54
A.1.2	Connect from a remote device during an existing connection.....	54
A.1.3	Disconnect from a remote device .....	55
A.1.4	Connect from the local user to an existing device.....	55
A.1.5	Connect from the local user to a non existing device .....	55
A.1.6	Connect from the local user during an existing connection .....	56
A.1.7	Disconnect from the local user .....	56
A.1.8	Disconnect from the local user without an existing connection.....	56
A.1.9	Connection timeout.....	57
A.2	Reception of data .....	57
A.2.1	Reception of a correct N_Data_Individual.....	57
A.2.2	Reception of a repeated N_Data_Individual.....	58
A.2.3	Reception of data N_Data_Individual with wrong sequence number.....	58
A.2.4	Reception of data N_Data_Individual with wrong source address.....	58
A.3	Transmission of data .....	59
A.3.1	T_DATA-Request from the local user.....	59
A.3.2	Reception of a T_ACK_PDU with wrong sequence number.....	59
A.3.3	Reception of T_ACK_PDU with wrong connection address .....	60
A.3.4	Reception of T_NACK_PDU with wrong sequence number .....	60
A.3.5	Reception of T_NACK_PDU with correct sequence number.....	60
A.3.6	Reception of T_NACK_PDU and maximum number of repetitions is reached.....	61
A.3.7	Reception of T_NACK_PDU with wrong connection address.....	61
Bibliography	.....	62

Figure 1 – Individual address.....	8
Figure 2 – Group address.....	8
Figure 3 – Interaction of the data link layer .....	10
Figure 4 – Exchange of primitives for the L_Data-Service .....	11
Figure 5 – Frame_format Parameter.....	14
Figure 6 – Coding of Extended Frame Format .....	14
Figure 7 – Interaction of the network layer (not for Bridges or Routers) .....	20
Figure 8 – General functionality of a router or a bridge.....	20
Figure 9 – Format of the NPDU (Example).....	21
Figure 10 – Interaction of the transport layer.....	30
Figure 11 – Format of the TPDU (Example) .....	31
Figure 12 – Transport control field.....	31
Table 1 – Usage of priority .....	13
Table 2 – Actions of the connection oriented state machine .....	44
Table 3 – Transition table – Style 1 .....	46
Table 4 – Transition table – Style 1-rationalized.....	48
Table 5 – Transition table – Style 2 .....	50
Table 6 – Transition table – Style 3 .....	52