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Information technology — Telecommunications and information exchange between systems — Guidelines for the implementation of ISO/IEC 17982:2012

Technologies de l'information — Téléinformatique — Lignes directrices pour la mise en application de l'ISO/IEC 17982:2012

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*.

Introduction

ISO/IEC 17982 specifies minimum requirements for interoperable CCCC PHY technology. This document provides guidance for the implementation of ISO/IEC 17982 in order to realize highly compatible CCCC PHY.

Information technology — Telecommunications and information exchange between systems — Guidelines for the implementation of ISO/IEC 17982:2012

1 Scope

This document provides guidance for the implementation of ISO/IEC 17982.

2 Normative reference

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 17982:2012, *Information technology — Telecommunications and information exchange between systems — Close Capacitive Coupling Communication Physical Layer (CCCC PHY)*

3 Terms and definitions

No terms and definitions are listed in this document. The abbreviated terms in ISO/IEC 17982 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

4 Implementation approach

4.1 TDS number and sequence number

ISO/IEC 17982:2012, 8.3 states "P-PDUs shall be transmitted byte-wise in the sequence specified in 9.1. Bytes shall be transmitted with least significant bit first.". This means that payload is transmitted as byte and the others are transmitted T by T as specified in ISO/IEC 17982:2012, Figure 6.

Table 1 represents the implementation of the TDS number.

Table 1 — TDS number

Decimal notation	Binary notation	t_{12}	t_{13}	t_{14}
1	(000)b	0	0	0
2	(001)b	1	0	0
3	(010)b	0	1	0
4	(011)b	1	1	0
5	(100)b	0	0	1
6	(101)b	1	0	1
7	(110)b	0	1	1
8	(111)b	1	1	1

Table 2 represents the implementation of the sequence number.

Table 2 — Sequence number

Decimal notation	Binary notation	t_{15}	t_{16}
1	(00)b	0	0
2	(01)b	1	0
3	(10)b	0	1
4	(11)b	1	1

4.2 CRC

The CRC value calculated by using the formula specified in ITU-T V.41 is set onto P-PDU so as to be transmitted with the order specified in ITU-T V.41. The corresponding bit settings of the CRC information field in a P-PDU is as follows.

$t_{49} = x^{15}, t_{50} = x^{14}, t_{51} = x^{13}, t_{52} = x^{12}, t_{53} = x^{11}, t_{54} = x^{10}, t_{55} = x^{9}, t_{56} = x^{8},$

$t_{57} = x^{7}, t_{58} = x^{6}, t_{59} = x^{5}, t_{60} = x^{4}, t_{61} = x^{3}, t_{62} = x^{2}, t_{63} = x^{1}, t_{64} = x^{0}$

16-bit CRC is expressed in binary as (**1**010101101101111)b where the furthest left-hand number '1' (underlined and bold) is the highest order bit of CRC, x^{15}, i.e., t_{49}=1, t_{50}=0, t_{51}=1, t_{52}=0, t_{53}=1, t_{54}=0, t_{55}=1, t_{56}=1, t_{57}=0, t_{58}=1, t_{59}=1, t_{60}=0, t_{61}=1, t_{62}=1, t_{63}=1, t_{64}=1. For an example, see Figure 1.

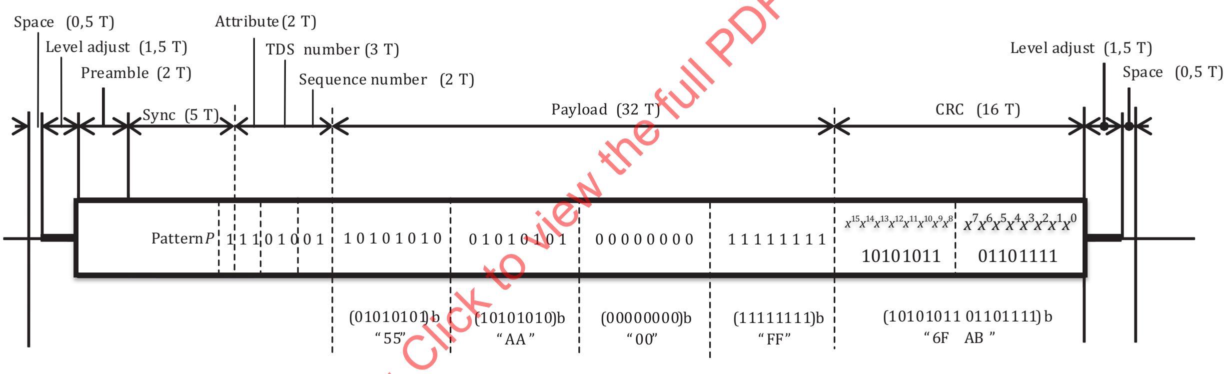

Figure 1 — Example of payload and CRC

4.3 Segmentation and reassembly

An example of segmentation and reassembly is illustrated in Figure 2.

Bit t_{24}, t_{32}, t_{40}, t_{48} are msb and t_{17}, t_{25}, t_{33}, t_{41} are lsb in Payload of P-PDU.

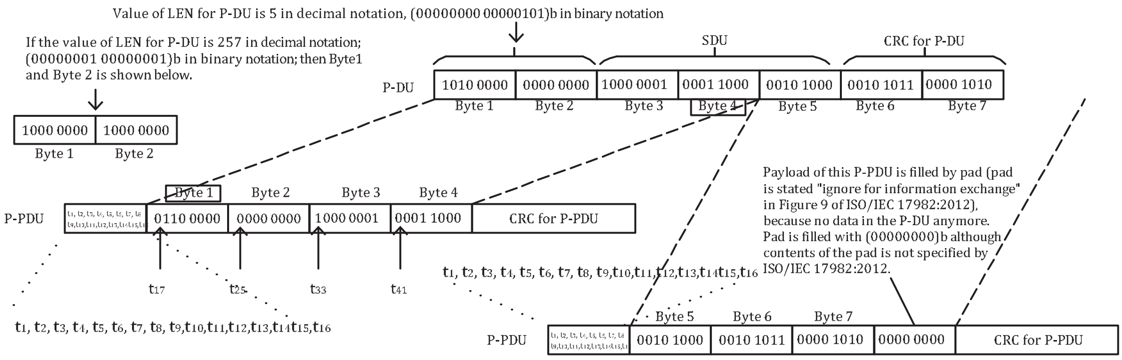

Figure 2 — Segmentation and reassembly

4.4 Random number

A PHY User may generate the random number and set it into the association P-PDU instead of CCCC PHY itself.

4.5 RFU handling standard way

The generic meaning of the term RFU (Reserved for Future Use) in ISO/IEC 17982 is that it is reserved for future standardized use; it does not mean it is free for proprietary use. Therefore, do not be concerned with the setting of RFU when sending because the RFU is ignored when received.

4.6 RFU handling proprietary way

In general, devices and modules that are fully compatible with ISO/IEC 17982 provide decent cost, quality and availability. From this point of view, it is not a good idea for the devices and the modules to provide the proprietary features by using RFU as if it was a part of ISO/IEC 17982.

The devices and the modules may have potential flexibility in the market, since customization is necessary for the optimized application systems. Customizing the standard devices and the standard modules is a realistic solution.

Under the customized application systems, do not be concerned with the RFU setting when sending and receiving even though the individual application systems require compatibility; this is only in the system and it does not require generic compatibility with the other relation-less systems.

4.7 Collision avoidance

See Figure 3. In this case, Talker-A starts sending Association Request 1 to TDS1 and both Listener-F and Listener-G receive it.

If both Listener-F and Listener-G start sending Association Response 1 on the same time-segment then collision occurs on TDS5.

If a Listener delays sending its Association Response by time-segment then the possibility of collision during Association procedure is reduced. The optimized amount of delay by time-segment(s) is dependent on the requirements of every application system. It may be either random or predesigned.

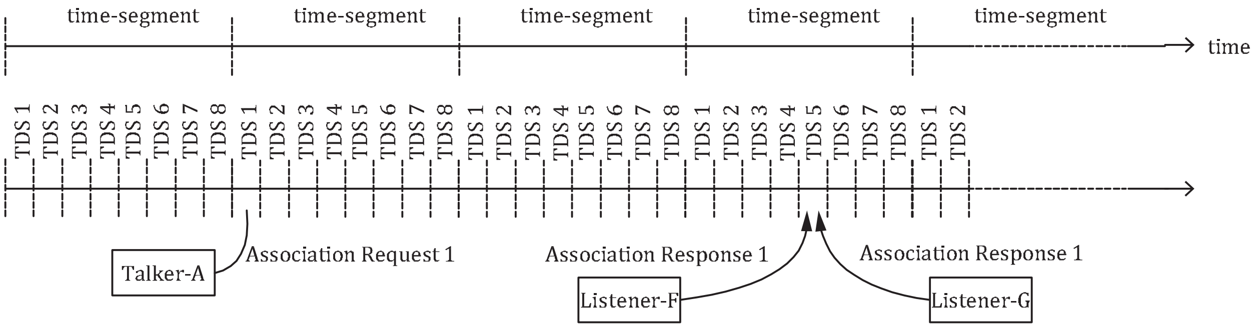

Figure 3 — Collision during association procedure

4.8 Identifying the P-PDUs

An entity uses the following 6 different types of P-PDUs:

— Association Request 1 or Association Response 2;

— Association Request 2 or Association Response 1;

— Null P-PDU;

— The last Data P-PDU;

— The first Data P-PDU;

— Data P-PDU between the first and the last Data P-PDU.

For distinguishing these 6 different types of P-PDUs, 3 bits of information-theoretical entropy are required. ISO/IEC 17982:2012, Table 2 defines 2 bits entropy as Attribute information for the Association procedure (on FDC2) and Communication (on FDC0, FDC1, FDC3 and FDC4).

An entity may have a state machine which maintains its states. Figure 4 illustrates the state machine. In this implementation, the Association P-PDUs are transferred only in the association state, and Null P-PDU and Data P-PDUs are transferred in the (Full duplex or Broadcast) Communication state. This process does not contradict with, and is possible to coexist with, that in ISO/IEC 17982:2012, Table 2.

It is possible for the Association, Null and Data P-PDUs to coexist on any of single FDC, if the entity has the state machine. If using single FDC with a state machine then the state transition from full duplex communication state to association state is never expected.

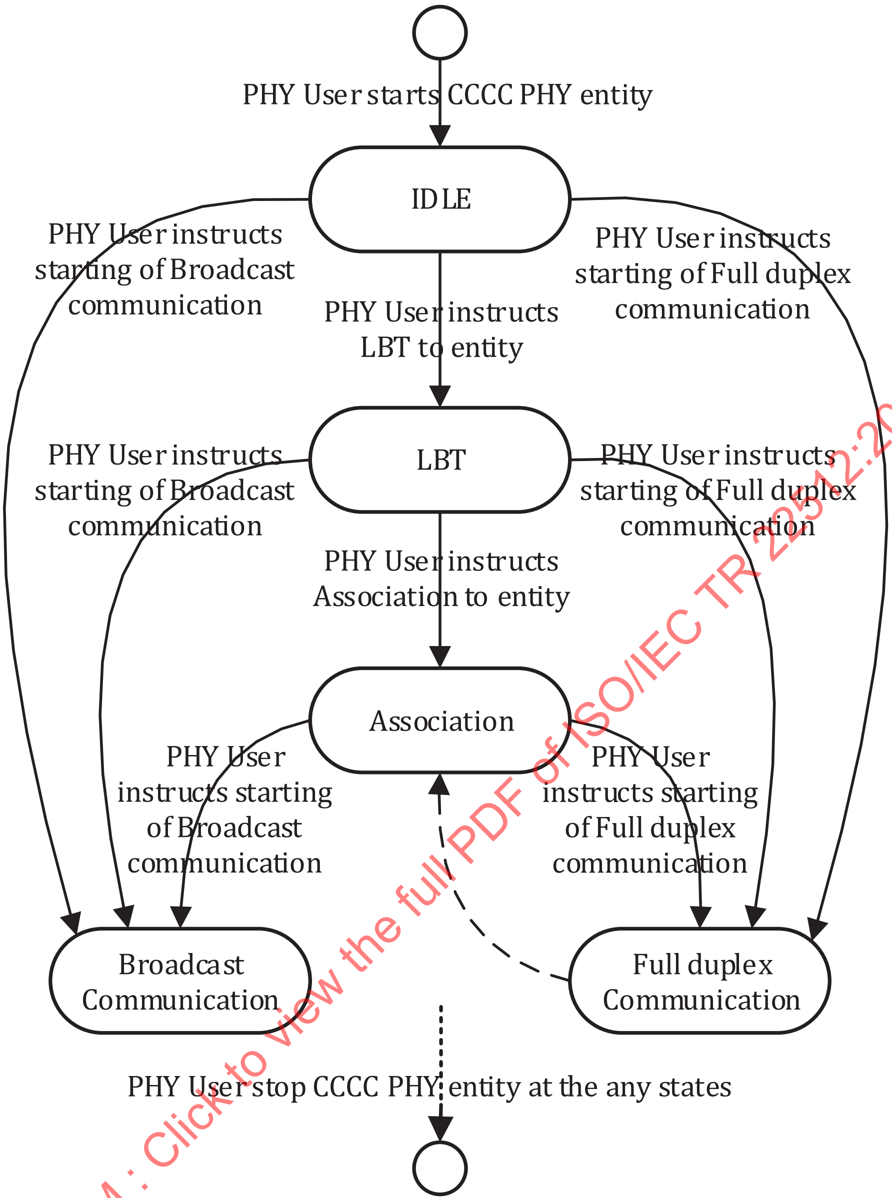

Figure 4 — Implementation as state machine

4.9 PHY User

The role of PHY User may be stated as the set of rules to manage SDU and control PHY.

P-DU specification is maintained keeping backward compatibility if the inter-industry common requirements are increased.

