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INTERNATIONAL STANDARD



**Information technology – Home electronic system (HES) architecture –
Part 3-10: Wireless short-packet (WSP) protocol optimised for energy harvesting –
Architecture and lower layer protocols**

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CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope	7
2 Normative references	7
3 Terms, definitions and abbreviations	8
3.1 Terms and definitions	8
3.2 Abbreviations	12
4 Conformance.....	12
5 Architecture.....	12
5.1 Generic protocol description	12
5.1.1 Overview	12
5.1.2 Physical layer	13
5.1.3 Data link layer.....	13
5.1.4 Network layer.....	13
5.1.5 Transport layer	14
5.1.6 Session layer.....	14
5.1.7 Presentation layer.....	14
5.1.8 Application layer	14
5.2 Data unit description.....	14
6 Layer 1 – Physical layer.....	15
6.1 Overview	15
6.2 General description	15
6.3 Requirements for the 315 MHz WSP protocol.....	18
6.4 Requirements for the 868,3 MHz WSP protocol.....	20
6.5 Frame Structure	22
7 Layer 2 – Data link layer.....	23
7.1 Overview	23
7.2 Subtelegram timing.....	23
7.3 Data integrity.....	25
7.3.1 General	25
7.3.2 4 bit summation hash function algorithm.....	25
7.3.3 8 bit summation hash function algorithm.....	25
7.3.4 8 bit Cyclic Redundancy Check (CRC) hash function algorithm.....	26
7.4 Listen before talk.....	26
8 Layer 3 – Network layer.....	26
8.1 Overview	26
8.2 Switch telegram.....	27
8.3 Repeater	28
8.3.1 General	28
8.3.2 Time response for collision avoidance	28
8.3.3 Bits of a repeater level in the STATUS byte	28
8.4 Addressing	29
8.4.1 General	29
8.4.2 Encapsulation	29
Annex A (informative) Examples of how to evaluate the hash values.....	31

Bibliography	33
Figure 1 – Structure of a subtelegram	14
Figure 2 – Illustration of an ASK envelope and various physical parameters.....	16
Figure 3 – Complete frame structure for the 868,3 MHz WSP protocol	22
Figure 4 – Encoded subframe	22
Figure 5 – TX maturity time divided into four 10 ms time ranges.....	24
Figure 6 – Conversion of a switch telegram to a normal telegram.....	28
Figure 7 – Example of an encapsulation	30
Figure A.1 – Example of a C code program of the 4 bit long summation hash value.....	31
Figure A.2 – Example of a C code program of the 8 bit long summation hash value.....	31
Figure A.3 – Efficient C code program for the evaluation of an 8 bit long CRC type hash value.....	32
Table 1 – WSP protocol stack structure (OSI).....	13
Table 2 – Transmitter requirements for the 315 MHz WSP protocol.....	18
Table 3 – Receiver requirements for the 315 MHz WSP protocol.....	19
Table 4 – Minimum required link budget for the 315 MHz WSP protocol	19
Table 5 – Maximum RX power for the 315 MHz WSP protocol.....	19
Table 6 – Transmitter requirements for the 868,3 MHz WSP protocol	20
Table 7 – Receiver requirements for the 868,3 MHz WSP protocol.....	21
Table 8 – Minimum required link budget for the 868,3 MHz WSP protocol	21
Table 9 – Maximum RX power for the 868,3 MHz WSP protocol.....	21
Table 10 – Frame definition for the 315 MHz WSP protocol.....	23
Table 11 – Frame definition for the 868,3 MHz WSP protocol.....	23
Table 12 – Maturity time parameters	24
Table 13 – Allocation of time slots to the different subtelegrams	24
Table 14 – Identification of the hash function used in the telegram.....	25
Table 15 – Conversion of the telegram type and STATUS fields from a switch telegram to a telegram	27
Table 16 – STATUS byte with repeater level bits	29
Table 17 – Repeating bits in STATUS byte.....	29

INFORMATION TECHNOLOGY – HOME ELECTRONIC SYSTEM (HES) ARCHITECTURE –

Part 3-10: Wireless short-packet (WSP) protocol optimised for energy harvesting – Architecture and lower layer protocols

FOREWORD

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The International Standard ISO/IEC 14543-3-10 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

The list of all currently available parts of the ISO/IEC 14543 series, under the general title *Information technology – Home electronic system (HES) architecture*, can be found on the IEC web site.

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the title page.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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INTRODUCTION

Various electrically controlled sensors and switches are used in homes and similar environments for many different applications. Examples of such applications are lighting, heating, energy management, blinds control, different forms of security control and entertainment (audio and video).

In most cases the device, e.g. a switch initiating an action, and the device, e.g., a lamp, are installed at different places. The distance can be bridged by wires, infrared or radio transmission. Presently equipment at both ends of a wireless transmission link needs to be powered by line or battery.

While wireless transmissions are especially attractive to retrofit homes, power maintenance of battery-driven devices is a burden. In addition, these batteries require scarce materials. Since the command and control messages sent by control and sensor devices in homes are very short, they can be powered using new techniques for energy harvesting, provided they use a wireless protocol that operates on relatively low power. Energy available in the environment of a device is captured and stored (harvested) to power operation of the device. Examples of energy sources are mechanical actuation, solar radiation, temperature differences, etc. If this is executed at least one device in the link neither needs a battery nor a wire. Energy harvesting devices need very limited power and use an energy efficient radio protocol to send data to other conventionally powered devices in the home. In order to ensure interoperability of such devices from different sources within a home, an international standard for a protocol is required that uses the little power that energy harvested devices can provide and at the same time spans distances to be bridged within a home environment.

Several such devices used within a home may come from different sources. They are required to interwork with each other using a common internal network (in this standard called a home network) and supporting a home automation system. When a home automation system meets ISO/IEC HES Standards, it is called a Home Electronic System (HES).

ISO/IEC 14543-3-10 specifies the Wireless Short-Packet protocol. The protocol is efficient enough to

- support energy harvested products for sensors and switches that do not require wires and batteries, and
- extend the life of battery-operated devices.

INFORMATION TECHNOLOGY – HOME ELECTRONIC SYSTEM (HES) ARCHITECTURE –

Part 3-10: Wireless short-packet (WSP) protocol optimised for energy harvesting – Architecture and lower layer protocols

1 Scope

This part of ISO/IEC 14543 specifies a wireless protocol for low-powered devices such as energy harvested devices in a home environment. This wireless protocol is specifically designed to keep the energy consumption of such sensors and switches extremely low.

The design is characterised by

- keeping the communications very short, infrequent and mostly unidirectional, and
- using communication frequencies that provide a good range even at low transmit power and avoid collisions from disturbers.

This allows the use of small and low cost energy harvesters that can compete with similar batteries-powered devices. The messages sent by energy harvested devices are received and processed mainly by line-powered devices such as relay switch actuators, repeaters or gateways. Together these form part of a home automation system, which, when conforming to the ISO/IEC 14543 series of standards, is defined as a home electronic system.

This part of ISO/IEC 14543 specifies OSI Layers 1 to 3 of the Wireless Short-Packet (WSP) protocol.

The WSP protocol system consists of two and optionally three types of components that are specified in this standard. These are the transmitter, the receiver and optionally the repeater. Repeaters are needed when the transmitter and the receiver are located in such a way that no good direct communication between them can be established.

Protection against malicious attacks is handled in the upper layers and thus not treated in this standard.

2 Normative references

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

ISO/IEC 7498-1, *Information technology – Open systems interconnection – Basic reference model – Part 1: The basic model*

EN 300 220-1, *Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW – Part 1: Technical characteristics and test methods*