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Komunikacijski sistemi za merilnike in daljinsko odčitavanje - 5. del: Brezžično odčitavanje

Communication systems for meters and remote reading of meters - Part 5: Wireless relaying

Kommunikationssysteme für Zähler und deren Fernablesung - Teil 5: Weitervermittlung

Systèmes de communication et de télérelevé des compteurs - Partie 5 : Transmission sans fil

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Systèmes de communication et de télérelevé des compteurs - Partie 5 : Transmission sans fil

Kommunikationssysteme für Zähler und deren Fernablesung - Teil 5: Weitervermittlung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 294.

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Foreword

This document (prEN 13757-5:2013) has been prepared by Technical Committee CEN/TC 294 “Communication systems for meters and remote reading of meters”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13757-5:2008.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

EN 13757 consists of the following parts, under the general title *Communication systems for meters and remote reading of meters:*

— *Part 1: Data exchange*

— *Part 2: Physical layer and link layer, twisted pair baseband (M-bus)*

— *Part 3: Dedicated application layer (M-bus)*

— *Part 4: Wireless meter readout*

— *Part 5: Relaying*

— *Part 6: Local bus (M-bus)*

1 Scope

This European Standard specifies the protocols to use when performing relaying in wireless meter readout networks. This European Standard is an extension to wireless meter readout specified in EN 13757-4. It supports the routing of modes P and Q, and simple single-hop repeating of modes S, T, C, F and N.

The main use of this standard is to support simple retransmission as well as routed wireless networks for the readout of meters.

NOTE Electricity meters are not covered by this standard, as the standardisation of remote readout of electricity meters is a task for IEC/CENELEC.

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.

EN 13757-1:2003, *Communication systems for meters and remote reading of meters — Part 1: Data exchange*

EN 13757-3:2013, *Communication systems for meters and remote reading of meters — Part 3: Dedicated Application layer (M-bus)*

EN 13757-4:2013, *Communication systems for meters and remote reading of meters — Part 4: Wireless meter readout*

EN 60870-5-1:1993, *Telecontrol equipment and systems — Part 5: Transmission protocols — Section 1: Transmission frame formats (IEC 60870-5-1:1990-02)*

EN 60870-5-2:1993, *Telecontrol equipment and systems — Part 5: Transmission protocols — Section 2: Link transmission procedures (IEC 60870-5-2:1992-06)*

EN 62054-21:2004, *Electricity metering (a.c.) — Tariff and load control — Part 21: Particular requirements for time switches*

RFC 1662 July 1994, *HDLC-like Framing, Appendix C. Fast Frame Check Sequence (FCS) Implementation*

EN ETSI 300 220-1:2012, *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*

CEPT/ERC/REC 70-03, *Relating to the use of short range devices (SRD)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
Bidirectional Single Hop Repeater
BSHR
repeater retransmitting original frames in upstream as well as downstream direction

Note 1 to entry: The 'R' bit in the Extended Link Layer shows whether or not frames are original or repeated.

3.2
block
sub-element of a frame

Note 1 to entry: For an EN 60870-5-1 based protocol, this will be up to 16 bytes of user data completed by a CRC check.

3.3
downstream
transmission of data in the direction from the Data Collecting Unit to the Meter

3.4
end node
Meter or Data Collecting Unit

Note 1 to entry: The Data Collecting Unit is named Other Device in EN 13757-4.

3.5
frame
set of user data encapsulated by a header and optionally a trailer

Note 1 to entry: For an EN 60870-5-1 based protocol this will be a start character followed by up to 16 blocks of data.

3.6
gateway
intermediate node in a data communications network, connected to two or more logical networks, where the protocols or modes used on the logical networks are different

3.7
hop
transfer of a set of data from one node to an adjacent node, as one of the steps in the transfer of data between end nodes

3.8
intermediate node
node in a network sitting in-between a Data Collecting Unit and a Meter

3.9
meter assignment
exclusively pairing a Meter to a repeater

Note 1 to entry: This is performed by Network Control. This allows access and downstream communication to the meter.

3.10
meter registration
registration of a meter in one or several repeaters

Note 1 to entry: This allows the repeater to repeat the transmissions from the Meter upstream.

3.11
Network control
NC
logical unit to control and supervise repeaters n the network

Note 1 to entry: Network Control may be located in a Data Collecting Unit, in a repeater or in a dedicated device outside the network.

3.12
node
unit in a network that is able to send and receive data

3.13
primary station
network node that controls all of the data exchange in a simple network with one central node, unbalanced data transfer and multiple remote nodes

Note 1 to entry: All data transfer will (normally) be controlled by the primary station. A Data Collecting Unit will be a primary station.

3.14
radio scan list
list of all Meters having sent unidirectional frames

Note 1 to entry: Entries in this list will be removed after a certain tie (time out).

3.15
relaying
forwarding of information from one logical network to another

3.16
repeated meters list
list of end nodes to repeat for

Note 1 to entry: The list is allocated to (and downloaded into) a repeater by Network Control. The list is generated from meter assignment and meter registration.

3.17
repeater
intermediate node in a data communications network, retransmitting data without modifying address information

3.18
router
intermediate node in a data communications network, connected to two or more logical networks with identical protocols and modes

3.19
secondary station
node in a hierarchical network, that is able to receive commands and requests from a central node, the primary station, and to send a response back to the central node

Note 1 to entry: A Meter will be a secondary station.

3.20
Uni-directional single hop repeater
USHR
repeater retransmitting original frames in upstream direction only

Note 1 to entry: The 'R' bit in the Extended Link Layer shows whether or not frames are original or repeated.

3.21
upstream
transmission of data in the direction from the Meter to the Data Collecting Unit

4 Symbols

The following symbols are used for timing parameters on drawings in Annex A.

t_{DRFS} Time delay repeater, fixed, start of message reference

t_{DRFE} Time delay repeater, fixed, end of message reference

$t_{DRSlotN}$ Time delay repeater, where NN may be 1 to 7

t_{DRR} Time delay repeater, randomized

t_{IA} Time delay Installation Announcement

t_{RO} Time for response from Other Device (default, fast)

t_{RO_slow} Time for response from Other Device(slow)

t_{RR} Time for response from repeater (default, fast)

t_{RR_slow} Time for response from repeater (slow)

t_{TxD} Time delay for transmission in Frequent Access Cycle (FAC)

5 Introduction

5.1 General

This clause is explanatory clause, and the specific requirements are to be found in the latter clauses of this European Standard.

5.2 Use of retransmission

The availability of low cost radio modules has made it feasible to use radio communication for the readout of meter data. Many meters are battery operated and have a very strict power budget and regulatory requirements are imposed as well. This limits the transmitting power levels and thereby the useful distance between transmitters and receivers. The use of reinforced concrete, conductive surface coatings and placement of meters below ground level like in pits and in the basement of the buildings aggravates the problem of directly communicating between a data collecting unit and a meter. This limits the useful size radio networks unless relaying or forwarding is used. By letting some of the nodes forward or relay data, the effective size of the network can be increased. This makes the radio based networks a more cost effective solution.

A relaying or forwarding concept will still have a number of constraints. The cost of adding this capability to the meters must be low, since meters are cost sensitive high volume products. The limited energy and computing power available in the individual nodes mandates a limited complexity of the software handling the communications protocol and the forwarding.

Operating and installation costs are important factors when planning for meter networks. The reconfiguration of the network when adding, replacing or removing meters must be automated to limit the operating cost.

The overhead due to relaying of data transmitted must be low to keep the transmission duty cycle within the limitations imposed by the authorities.