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Specifikacija Qi - Različica 2.3 - 5-1. del: Komunikacijski protokol MPP (hitri postopek)

Qi specification - Version 2.3 - Part 5-1: MPP communications protocol (Fast Track)

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29.240.99	Druga oprema v zvezi z omrežji za prenos in distribucijo električne energije	Other equipment related to power transmission and distribution networks
33.160.99	Druga avdio, video in avdiovizuelna oprema	Other audio, video and audiovisual equipment
35.200	Vmesniška in povezovalna oprema	Interface and interconnection equipment

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100/4543/CDV

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Qi Specification - Version 2.3 - Part 5-1: MPP Communications protocol (Fast Track)

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WIRELESS POWER

CONSORTIUM

Qi Specification

MPP Communications Protocol

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Contents

1. General 8

1.1 Structure of the Qi Specification 8

1.2 Scope 9

1.3 Compliance 9

1.4 References 9

1.5 Conventions 10

1.5.1 Notation of numbers 10

1.5.2 Tolerances 10

1.5.3 Fields in a data packet 10

1.5.4 Notation of text strings 11

1.5.5 Short-hand notation for data packets 11

2. Introduction 12

2.1 Overview 12

3. Magnetic Power Profile 13

3.1 Overview 13

3.1.1 Restricted Mode 13

3.1.2 15 W Full Mode 13

3.2 Power Receiver Requirements 14

3.2.1 Amplitude Shift Keying (ASK) 14

3.2.2 Startup Behaviour 14

3.2.3 Profile Activation 16

3.3 Power Transmitter Requirements 18

3.3.1 Frequency Shift Keying (FSK) 18

3.3.2 Timings Override 20

3.3.3 Startup Behaviour 21

3.4 Supporting EPP and MPP protocols 24

3.4.1 MPP/EPP Support on PRx 24

3.4.2 MPP/EPP Support on PTx 25

4. Negotiation Phase 26

4.1 Overview 26

4.2 Requirements 26

4.2.1 Negotiation Phase Timings 28

4.2.2 FSK Cycles 28

4.2.3 Entering Negotiation Phase With Error Status 28

4.2.4 Power Transfer Contract Extension 29

4.3 KEST Ecosystem Scaling and Error Handling 32

4.3.1 Introduction 32

4.3.2 Error Handling 32

4.3.3 Examples 33

4.4 Negotiation Phase - 128 kHz 35

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4.4.1 Nominal negotiation flow 35
4.4.2 Negotiation flow with PTx error status 37
4.4.3 Frequency Selection 38
4.5 Negotiation Phase - 360 kHz 39
4.5.1 PRx Extended Capabilities 41
4.5.2 PTx Extended Capabilities 41
4.5.3 Exchange Power Loss Accounting Parameters 41
4.5.4 Power Negotiation 41
4.5.5 Retrieve PTx Extended ID 41
4.5.6 Exchange Enabled Data Streams 42
4.5.7 Power Control Profile 42
4.5.8 Cloaking Duration 42
4.5.9 MPP Proprietary Requests / Packets 42
4.6 NFC Identification (Informative) 42
4.7 Changing the protocol version 43
4.7.1 Example 1 44
4.7.2 Example 2 44
5. Power Transfer Phase 45
5.1 Overview 45
5.2 Extended Control Error Packet 45
5.2.1 Handling 45
5.2.2 PTx Response 46
5.2.3 Example 47
5.3 Control Error Calculation Method 48
5.3.1 Changing the control method 48
5.3.2 Example 1 48
5.3.3 Example 2 48
5.4 Power Loss Accounting Packet 49
5.4.1 Handling 49
5.4.2 PTx Response 50
5.5 Control Status 51
5.6 GET Request 52
5.6.1 PRx Initiated 52
5.6.2 PTx Initiated 52
5.6.3 Examples 53
5.7 MPP-Restricted to Full Mode Transition 53
5.7.1 Transition with power interruption 54
5.7.2 Transition without power interruption 54
5.8 Power Modes 57
5.8.1 Overview 57
5.8.2 Definition 57
5.8.3 Design Guidelines for Power Modes 60
5.8.4 Identifying Power Modes Capabilities 60

Sample Document
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5.8.5 Power Mode Selection 62
5.8.6 State Diagram 68
5.8.7 Power Modes Capability Change Notification 69
5.8.8 Power Modes Selection Notification 70
5.8.9 Handling Communication Failures 71
5.8.10 Examples (Informative) 72
5.9 DPLOSS Calibration 79
5.9.1 Overview 79
5.9.2 Choosing not to begin Calibration (PRx) 79
5.9.3 Performing Mated-Q FOD before starting Calibration (PTx) 79
5.9.4 Calibration Procedure 79
5.9.5 Example 1 81
5.9.6 Example 2 82
5.9.7 Timing 83
5.9.8 Extending Calibration 83
5.9.9 Example 1 83
6. Cloak Phase 85
6.1 Overview 85
6.2 Cloak Ping Requirements 85
6.3 Cloak Entry 85
6.3.1 PRx Initiated 85
6.3.2 PTx Initiated 87
6.4 Cloak Exit 88
6.5 Detect ping 89
6.6 State Diagram 90
6.7 Cloak Timings 93
6.8 Examples 95
7. Extended Data Streams 99
7.1 Overview 99
7.2 Simultaneous Data Stream Extension 99
7.2.1 Error Handling 100
7.2.2 Timings 100
7.2.3 Cloaking Compatibility 101
7.3 Data Integrity Extension 101
7.4 Examples 101
8. Power Receiver data packets 110
8.1 CAL_CAPTURE - Calibration Capture (0x96) 112
8.2 CAL_ENTER - Enter Calibration (0x2C) 114
8.3 CAL_EXIT - Exit Calibration (0x2D) 115
8.4 CAL_OP - Calibration Operation (0x23) 116

Sample Document
get full document from standards.iteh.ai

oSIST prEN IEC 63758-5-1:2026

8.5 CLOAK - Cloak (0x18) 117
8.6 ECAP - Extended Power Receiver Capabilities (0x84) 118
8.7 EDS - Enabled Data Streams (0x29) 119
8.8 EPT - End Power Transfer (0x02) 120
8.9 GET - Get Request (0x28) 122
8.10 KEST_COEFF - KEST Coefficients (0x50) 123
8.11 MATEDQ_COEFF - Mated-Q Coefficients (0xA8) 125
8.12 MPP-XID - Qi MPP Extended Identification (0x81) 126
8.13 MSR - Mode Select Request (0x13) 127
8.14 PLA - Power Loss Accounting (0x58:1) 128
8.15 PLA_2 - Power Loss Accounting 2 (0x88) 129
8.16 PLAP - Power Loss Accounting Parameters (0x78) 130
8.17 PLAP_2 - Power Loss Accounting Parameters 2 (0x90) 131
8.18 PROP - Proprietary (multiple headers; multiple types) 133
8.19 REPORT - Report [PRx Identification] (0x58:0) 134
8.20 SADC - Simultaneous Auxiliary Data Control (0x48) 135
8.21 SADT - Simultaneous Auxiliary Data Transport (multiple header codes) 137
8.22 SDSR - Simultaneous Data Stream Response (0x38) 138
8.23 SRQ - Specific Request (0x20) 139
8.23.1 SRQ/cloakh - Specific Request [Cloak Ping Delay - High Byte] (0x20/0xF7) 140
8.23.2 SRQ/cloakl - Specific Request [Cloak Ping Delay - Low Byte] (0x20/0xF5) 141
8.23.3 SRQ/detect - Specific Request [Cloak Detect Ping Delay] (0x20/0xF8) 142
8.23.4 SRQ/egpl - Specific Request [Power Level] (0x20/0xF3) 143
8.23.5 SRQ/freqsel - Specific Request [Frequency Selection] (0x20/0xF0) 144
8.23.6 SRQ/MppProp - Specific Request [Proprietary Parameters] (0x20/0xE0-0xEF) 145
8.23.7 SRQ/pcp - Specific Request [Power Control Profile] (0x20/0xF6) 146
8.23.8 SRQ/pla - Specific Request [PLA Format Selection] (0x20/0xA0) 147
8.23.9 SRQ/verSel - Specific Request [Version Select] (0x20/0xA7) 148
8.23.10 SRQ/xceGain - Specific Request [Control Gain] (0x20/0xA9) 149
8.23.11 SRQ/xceMethod - Specific Request [Control Error Calculation Method] (0x20/0xA1) 150
8.24 XCE - Extended Control Error (0x19) 151
9. Power Transmitter data packets 152
9.1 CAL_CAP - Calibration Capabilities (0x43) 154
9.2 CAL_CAPTURE_RSP - Calibration Capture Response (0x14) 155
9.3 CAL_ENTER_RSP - Enter Calibration Response (0x34) 156
9.4 CAL_OP_RSP - Calibration Operation Response (0x1B) 158
9.5 CHS - Charge Status (0x1F) 159
9.6 CLOAK - Cloak Request (0x1E:0) 160

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oSIST prEN IEC 63758-5-1:2026

9.7 dPCAL_PARAM - Calibration Parameter (0x54) 161
9.8 ECAP - Extended Power Transmitter Extended Capabilities (0x8F:1) 162
9.9 EDS - Enabled Data Streams (0x2F) 164
9.10 EPTR - End Power Transfer Request (0x0A) 165
9.11 ERR - Error Status (0x01) 166
9.12 GET - Get Request (0x2E) 167
9.13 GMP - Gain Measurement Parameters (0x61) 168
9.14 INV - Inverter Voltage (0x3F:0) 169
9.15 KEST - Estimated K (0x3F:2) 170
9.16 MATEDQ_RES - Mated-Q Result (0x40) 171
9.17 MODECAP - Power Modes Capabilities (0x5A) 172
9.18 MODEXCAP - Power Modes Extended Capabilities (0xA0) 174
9.19 MSN - Mode Selection Notification (0x13) 176
9.20 MSS - Mode Select Status (0x23) 177
9.21 PLAP - Power Loss Accounting Parameters (0x5F) 178
9.22 PLAP_2 - Power Loss Accounting Parameters (0x88) 179
9.23 PROP - Proprietary (multiple headers; multiple types) 180
9.24 RCS - Regulation Control Status (0x1E:3) 181
9.25 SADC - Simultaneous Auxiliary Data Control (0x4F) 182
9.26 SADT - Simultaneous Auxiliary Data Transport (multiple header codes) 183
9.27 SDSR - Simultaneous Data Stream Response (0x3F:1) 184
9.28 XID - Extended Power Transmitter Identification (0x8F:0) 185
Annex A: Protocol for DPLOSS Compatibility with SWC PRx and Boost-Based PTx products 186
A.1 Protocol Carrying DPLOSS Calibration Across Power Modes 186
A.2 PRx-Initiated Re-Calibration Sequence 187

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1. General

The Wireless Power Consortium (WPC) is a worldwide organization that aims to develop and promote global standards for wireless power transfer in various application areas. An important application area comprises flat-surface devices such as mobile phones and chargers operating at power levels up to 25 W.

1.1 Structure of the Qi Specification

General documents

- Introduction
- Glossary, Acronyms, and Symbols
- Technical System Overview
- Power Profiles

System description documents

- Mechanical, Thermal, and User Interface
- Power Delivery
- Communications Physical Layer
- Communications Protocol
- Foreign Object Detection
- NFC Tag Protection
- Authentication Protocol
- MPP Communications Protocol
- MPP Magnetics Design
- MPP Power Delivery
- MPP Communications Physical Layer
- MPP Foreign Object Detection
- MPP Design Guidelines (Informative)
- Magnetic Covers
- Active Alignment System
- Thermal Management Protocol

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1.2 Scope

The *Qi Specification*, *MPP Communications Protocol* (this document) defines the messaging between a Power Transmitter and a Power Receiver specific to the Magnetic Protocol used for the MPP Power Profile. The primary purpose of this messaging is to set up and control the power transfer. As a secondary purpose, it provides a transport mechanism for higher level applications such as Authentication. The communications protocol comprises both the required order and timing relations of successive messages.

1.3 Compliance

All provisions in the *Qi Specification* are mandatory, unless specifically indicated as recommended, optional, note, example, or informative. Verbal expression of provisions in this Specification follow the rules provided in ISO/IEC Directives, Part 2.

Table 1 - Verbal forms for expressions of provisions

Provision	Verbal form
requirement	“shall” or “shall not”
recommendation	“should” or “should not”
permission	“may” or “may not”
capability	“can” or “cannot”

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1.4 References

For undated references, the most recently published document applies. The most recent WPC publications can be downloaded from http://www.wirelesspowerconsortium.com.

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1.5 Conventions

1.5.1 Notation of numbers

- Real numbers use the digits 0 to 9, a decimal point, and optionally an exponential part.
- Integer numbers in decimal notation use the digits 0 to 9.
- Integer numbers in hexadecimal notation use the hexadecimal digits 0 to 9 and A to F, and are prefixed by "0x" unless explicitly indicated otherwise.
- Single bit values use the words ZERO and ONE.

1.5.2 Tolerances

Unless indicated otherwise, all numeric values in the *Qi Specification* are exactly as specified and do not have any implied tolerance.

1.5.3 Fields in a data packet

A numeric value stored in a field of a data packet uses a big-endian format. Bits that are more significant are stored at a lower byte offset than bits that are less significant. Table 2 and Figure 1 provide examples of the interpretation of such fields.

Table 2 - Example of fields in a data packet (table)

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	b_7	b_6	b_5	b_4	b_3	b_2	b_1	b_0
B_0	(msb)							
B_1	16-bit Numeric Data Field							(lsb)
B_2	Other Field					(msb)		
B_3	16-bit Numeric Data Field						(lsb)	Field

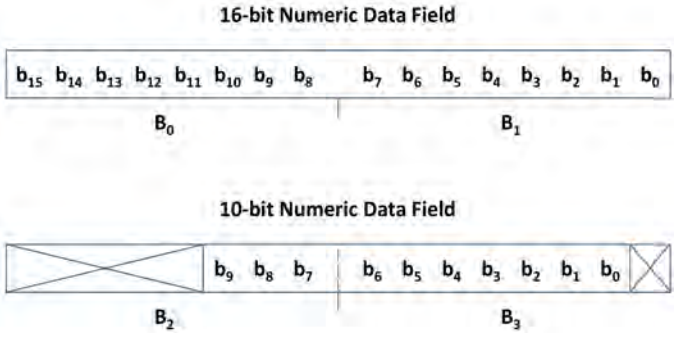


Figure 1 - Examples of fields in a data packet

1.5.4 Notation of text strings

Text strings consist of a sequence of printable ASCII characters (i.e. in the range of 0x20 to 0x7E) enclosed in double quotes ("). Text strings are stored in fields of data structures with the first character of the string at the lowest byte offset, and are padded with ASCII NUL (0x00) characters to the end of the field where necessary.

EXAMPLE: The text string “WPC” is stored in a six-byte fields as the sequence of characters 'W', 'P', 'C', NUL, NUL, and NUL. The text string “M:4D3A” is stored in a six-byte field as the sequence 'M', ':', '4', 'D', '3', and 'A'.

1.5.5 Short-hand notation for data packets

In many instances, the *Qi Specification* refers to a data packet using the following shorthand notation:

<MNEMONIC>/<modifier>

In this notation, <MNEMONIC> refers to the data packet's mnemonic defined in the *Qi Specification*, *Communications Protocol*, and <modifier> refers to a particular value in a field of the data packet. The definitions of the data packets in the *Qi Specification*,*Communications Protocol*, list the meanings of the modifiers.

For example, EPT/cc refers to an End Power Transfer data packet having its End Power Transfer code field set to 0x01.

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2. Introduction

2.1 Overview

Magnetic power profile (MPP) is a protocol extension that provides additional messages, new power states/modes, new power transfer contract elements, and aims to provide the following functionalities:

- Operating Frequency Negotiation
- Cloaking (Power Pause)
- Generic Information Exchange
- Simultaneous Data Stream Transactions
- Fast PTx to PRx communication
- Maximum Power and Power Control Profiles Determination
- Extended Power Negotiation
- Extended PTx/PRx Identification and Capabilities
- Extended Control Error Packets and Received Power Packets
- Power Transmitter Battery Level Reporting
- Ecosystem Scalability

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A summary of differences between Magnetic Power Profile and EPP is listed below in Table 3.

MPP extension allows devices to operate under Restricted mode (no PTx communication) at 360 kHz without performing any explicit negotiation with the Power Transmitter. This flexibility enables devices with limited resources (e.g., devices with no FSK support) to take advantage of the frequency change feature.

Table 3 - MPP Specifications Departure from Qi EPP

Feature	EPP	MPP
PTx Handshake Message	EPP FSK ACK Message	MPP FSK ACK Message (*Section 3.3.1, Frequency Shift Keying (FSK)*)
FSK Parameters Negotiation	EPP allows FSK parameters negotiation	Fixed FSK parameters
Data Streams	Single Stream Transfer	Multiple Concurrent Transfer
Foreign Object Detection	FOD Packet, Calibration, RP	Replaced with MPP Power Loss Accounting Packet