



SLOVENSKI STANDARD
oSIST prEN IEC 62980:2021
01-marec-2021

Lažni komunikacijski protokol za brezžični radiofrekvenčni prenos električne energije (TA 15)

Parasitic communication protocol for radio-frequency wireless power transmission (TA 15)

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Protocole de communication parasite pour le transfert d'énergie sans fil par rayonnement radiofréquence (TA 15)

Ta slovenski standard je istoveten z: prEN IEC 62980:2021
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ICS:

33.160.01	Avdio, video in avdiovizualni sistemi na splošno	Audio, video and audiovisual systems in general
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100/3533/CDV

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OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING
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Parasitic communication protocol for radio-frequency wireless power transmission (TA 15)

PROPOSED STABILITY DATE: 2025

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1

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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133**PARASITIC COMMUNICATION PROTOCOL
FOR RADIO-FREQUENCY WIRELESS POWER TRANSMISSION**

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165 committee XX:

166 The text of this standard is based on the following documents:

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

167 Full information on the voting for the approval of this standard can be found in the report on voting
168 indicated in the above table.
169

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

171 The committee has decided that the contents of this publication will remain unchanged until the stability
172 date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific
173 publication. At this date, the publication will be

- 174 • reconfirmed,
- 175 • withdrawn,
- 176 • replaced by a revised edition, or
- 177 • amended.

178 The National Committees are requested to note that for this publication the stability date is

179 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE
180 PUBLICATION STAGE.

181

INTRODUCTION

182 The [IEC 62980 (Parasitic communication protocol for radio-frequency wireless power
183 transmission)] standard provides a parasitic backscatter communication protocol for battery-
184 less internet-of-things (IoT) devices and sensors for radio-frequency (RF) wireless power
185 transmission (WPT) without additional infrastructure.

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186 **Parasitic communication protocol for radio-frequency wireless power**
187 **transmission**
188

189 **1. Scope**

190 This standard defines procedures for transferring power to non-powered IoT devices using the
191 existing ISM band communication infrastructure and RF WPT and a protocol for a two-way,
192 long-distance wireless network in which IoT devices and APs communicate using backscatter
193 modulation of ISM-band signals. Three components are required for two-way, long-distance
194 wireless communication using backscatter modulation of ISM-band signals: an STA that
195 transmits wireless power and data packets to SSNs by forming ISM-band signal channels
196 between HIE-APs, a batteryless SSN that changes the sensitivity of the channel signals
197 received from the STA using backscatter modulation, and an HIE-AP that practically decodes
198 the channel signals whose sensitivity was changed by the SSN. In this standard, the
199 procedures for CW-type RF WPT using communication among these three components are
200 specified based on application of the CSI or RSSI detection method of ISM-band
201 communication.

202 This standard proposes a convergence communication protocol than can deploy sensors,
203 which can operate at low power (dozens of microwatts or less) without batteries, collect
204 energy, and perform communication, to transmit power to SSNs using RF WPT based on
205 parasitic communication. This method can be applied to application service areas such as
206 domestic IoT, the micro-sensor industry, and industries related to environmental monitoring in
207 the future

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209 **2. Normative references**

210 Not applicable. [https://standards.iteh.ai/catalog/standards/sist/a7f19d4a-b15d-419e-8af5-
211 da9445ec8924/osist-pren-iec-62980-2021](https://standards.iteh.ai/catalog/standards/sist/a7f19d4a-b15d-419e-8af5-da9445ec8924/osist-pren-iec-62980-2021)

212 **3. Definitions and terminology**

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

214 **3.1. Definitions**

215 **3.1.1.**

216 **BCU (Backscatter Communication Unit)**

217 A BCU is a device that responds to a command from an STA with backscatter through load
218 modulation and enables communication without power.

219 **3.1.2.**

220 **BU (Battery Unit)**

221 BUs are batteries and circuits capable of receiving wireless power to support the operations
222 of devices and sensors.

223 **3.1.3.**

224 **HIE-AP (Hybrid Information and Energy Access Point)**

225 An HIE-AP practically decodes the channel signals whose sensitivity was changed by the SSN
226 into digital signals of 0 or 1. It forms an STA and ISM-band channels for communication,
227 detects the CSI or RSSI level of the response using backscatter from the SSN, and transmits
228 the response data from the SSN to the STA. It also transmits CW-type power to the SSN for
229 RF WPT.

230 **3.1.4.**
 231 **Impedance modulation**
 232 A method of changing the sensitivity of the received signal from the channel between the STA
 233 and HIE-AP using backscatter modulation in the SSN according to the data.

234 **3.1.5.**
 235 **SSN (Smart Sensor Node)**
 236 An SSN is a device that changes the sensitivity of the received channel signals using
 237 backscatter modulation. SSNs include IoT devices, wearable devices, and micro-sensors. An
 238 SSN consists of a backscatter communication unit (BCU) that supports communication without
 239 power, smart sensor unit (SSU) that identifies various sensors, and battery unit (BU) that
 240 receives WPT.

241 **3.1.6.**
 242 **SSU (Smart Sensor Unit)**
 243 SSUs are various sensors that can be attached to SSNs. Each sensor requires a different
 244 amount of power.

245 **3.1.7.**
 246 **STA (Station)**
 247 An STA is a device that can perform communication by occupying an ISM-band channel. It
 248 transmits wireless power and data packets to SSNs by forming a channel and using the pulse
 249 interval encoding (PIE) method.

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251 **3.2. Abbreviations**
 252 For the purposes of this document, the following abbreviations apply:

253 **3.2.1.** [oSIST prEN IEC 62980:2021](https://standards.iteh.ai/catalog/standards/sist/a7f19d4a-b15d-419e-8af5-da9445ec8924/osist-pren-iec-62980-2021)
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256 **3.2.2.**
 257 **BCU**
 258 Backscatter Communication Unit

259 **3.2.3.**
 260 **BU**
 261 Battery Unit

262 **3.2.4.**
 263 **CRC**
 264 Cyclic Redundancy Check

265 **3.2.5.**
 266 **CSI**
 267 Channel State Information

268 **3.2.6.**
 269 **CW**
 270 Continuous Wave

271 **3.2.7.**
 272 **FCS**
 273 Frame Check Sequence

274

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275	3.2.8.		
276	HIE-AP		
277	Hybrid Information and Energy Access Point		
278	3.2.9.		
279	ISM		
280	Industrial scientific and medical equipment		
281	3.2.10.		
282	PIE		
283	Pulse interval encoding		
284	3.2.11.		
285	RFID		
286	Radio-Frequency Identification		
287	3.2.12.		
288	RFU		
289	Reserved for Future Use		
290	3.2.13.		
291	RSSI		
292	Received signal strength indicator		
293	3.2.14.		
294	RWP		
295	Response Waiting Packet		
296	3.2.15.		
297	SSN		
298	Smart Sensor Node		
299	3.2.16.		
300	SSU		
301	Smart Sensor Unit		
302	3.2.17.		
303	STA		
304	Station		
305			
306			
307			

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309 **4. Overview**

310 RF WPT includes WPT using energy harvesting, magnetic induction, or magnetic resonant
 311 methods and involves the wireless transmission of power to sensors and facilities for practical
 312 use by employing RF waves. This standard proposes a method of performing RF WPT to
 313 batteryless sensors or facilities. The overall structure of parasitic communication for RF WPT
 314 proposed in this standard is depicted in figure 1. Parasitic communication (or Ambient
 315 backscatter) uses existing radio frequency signals, such as radio, television and mobile
 316 telephony, to transmit data without a battery or power grid connection. Each such device uses
 317 an antenna to pick up an existing signal and convert it into tens to hundreds of microwatts of
 318 electricity. This standard defines procedures for bi-directional, long-distance wireless
 319 communication protocol for communication using backscatter modulation of industrial,
 320 scientific, and medical (ISM)-band frequency signals between stations (STA) and smart
 321 sensor nodes (SSNs), such as IoT devices, sensors, tags, and wearable devices, and for RF
 322 WPT from a hybrid information and energy access point (HIE-AP) to nearby SSNs.



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Figure 1 — Example/Application Usage of RF-WPT

325

326 Three components are required for the bi-directional, long-distance wireless communication
 327 protocol using backscatter modulation of ISM-band signals as shown in figure 2:

328

- 329
- 330 ■ STA: performing communication by occupying a communication channel and transmits wireless power and data packets for communication to the SSN in the PIE method.
 - 331 ■ HIE-AP: decoding the channel signals whose sensitivity was changed by the SSN into digital signals of 0 or 1. It forms a channel with the STA for communication, detects the CSI level of the response from the SSN that used backscatter, and transmits the response data from the SSN to the STA. It also transmits CW-type power to the SSN for RF WPT.
 - 332
 - 333
 - 334
 - 335
 - 336 ■ SSN: changing the sensitivity of the channel signals received from the STA using backscatter modulation and consists of a BCU, an SSU, and a BU.
 - 337
 - 338 ■ BCU: responding to a command from an STA with backscatter through load modulation and can respond with backscatter using the wireless power transmitted by the STA.
 - 339
 - 340
 - 341 ■ SSU: various sensors that can be attached to the SSN, each of which requires a different amount of power.
 - 342
 - 343 ■ BU: a battery or a circuit capable of receiving wireless power to support the operation of nodes and sensors.
 - 344

345