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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Industrial networks – Wireless communication network and communication profiles – WirelessHART™

Réseaux industriels – Réseau de communications sans fil et profils de communication – WirelessHART™

IEC 62591:2016-03(en-fr)

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INDUSTRIAL NETWORKS – WIRELESS COMMUNICATION NETWORK AND COMMUNICATION PROFILES – WirelessHART™

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62591 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial process measurement, control and automation.

This second edition cancels and replaces the first edition published in 2010. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- enhancements to the performance statistics using key performance indicators (KPI). These improvements result in expansion of statistics provided by Gateways. For example Read network device statistics service was expanded and Read network statistics service was added to provide a summary of network performance;
- "Stale Data" detection was added (see services Read stale data setpoints, Write stale data timer and Write stale data count setpoint). These standardize Gateway reporting should process data or events fail to arrive at the Gateway in a timely fashion. For

example, Host Applications will receive the "Update Failure" Response Code should the process data in the command response be stale;

- gateway commands were added;
- a Quarantined State was added;
- CCA Modes were extended to be more in-line with IEEE 802.15.4;
- clarifications on whitelist and blacklist management were added;
- clarifications on join (e.g. only require a single neighbor) were added;
- clarifications on use of join links, table management, and defaults were added;
- corrections and updates were made.

The reader's attention is drawn to the fact that Annex M lists all of the “in-some-country” clauses on differing practices of a less permanent nature relating to the subject of this standard.

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

FDIS	Report on voting
65C/835/FDIS	65C/842/RVD

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

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

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This International standard provides the specification, definitions, and profile for a Wireless communication network. It supplements IEC 61158-5-20, IEC 61158-6-20 where some services and commands are specified and it supplements IEC 61784-1 where a Communication Profile CP 9/1, universal command, is specified.

This document follows the structure and conventions of IEC 61158 series (for example separation of DL-service definitions and DL-protocol specification) and conventions of IEC 61784-1. IEC 61158 series specify different communication networks. These are structured in different Types. The Type 20 is assigned to technologies of Hart™[1] Communication Foundation (HCF). For other assignments of Type numbers see IEC 61158-1.

IEC 61784-1, and IEC 61784-2 provide Communication Profile Families (CPF), and, within a family, one to n Communication Profiles. The assigned CPF number for technologies of the HCF is CPF 9. For other assignments of CPF numbers see IEC 61158-1.

A new project number IEC 62591 was assigned to the Type 20 enhancements and the associated CP 9/2, so that this document contains the Type 20 specific equivalent to the IEC 61158 series and of CPF 9 specific profile using the same conventions as used in IEC 61784-1. The equivalent of 4 Type specific subparts and the profile are organized in this document in different clauses.

The Type 20 protocol supports two way digital communications for process measurement and control devices. Applications include remote process variable interrogation, cyclical access to process data, parameter setting and diagnostics. This document defines the specification that comprises the Type 20 field communications protocol for wireless devices. Specification of the Type 20 protocol is based largely on the OSI 7-layer Communication Model.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents concerning the claims of the patents listed below given in the normative clauses.

US 8676219 [HCF]	Combined Wired and Wireless Communications with Field Devices in a Process Control Environment
US 8798084 [HCF]	Increasing Reliability and Reducing Latency in a Wireless Network
US 8325627 [HCF]	Adaptive Scheduling in a Wireless Network
US 8660108 [HCF]	Synchronizing Timeslots in a Wireless Communication Protocol
US 8169974 [HCF]	Suspending Transmissions in a Wireless Communication Network
US 8670746 [HCF]	Enhancing Security in a Wireless Network
US 8670749 [HCF]	Enhancing Security in a Wireless Network
US 8451809 [HCF]	Wireless Gateway in a Process Control Environment Supporting a Wireless Communication Protocol
US 8570922 [HCF]	Efficient Addressing in Wireless HART Protocol
US 8942219 [HCF]	Support for Network Management and Device Communications in a Wireless Network

[1] HART™ and WirelessHART™ are the trade names of FieldComm Group. The FieldComm Group is a non-profit trade organization to support the HART™ Communication. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trade name holder or any of its products. Compliance to this document does not require use of the trade name. Use of the trade name HART™ and WirelessHART™ requires permission of the trade name holder, see http://www.fieldcommgroup.org.

US 8406248 [HCF]	Priority Based Scheduling and Routing in a Wireless Network
US 8892769 [HCF]	Routing Packets on a Network Using Directed Graphs
US 8230108 [HCF]	Routing Packets on a Network Using Directed Graphs
US 8356431 [HCF]	Scheduling Communication Frames in a Wireless Network

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The holder of these patent rights has assured IEC that she/he is willing to negotiate licenses either free of charge or under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of these patent rights is registered with IEC. Information may be obtained from:

[HCF] FieldComm Group
9430 Research Boulevard
Suite 1-120
Austin TX 78759, USA

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INDUSTRIAL NETWORKS – WIRELESS COMMUNICATION NETWORK AND COMMUNICATION PROFILES – WirelessHART™

1 Scope

This International Standard specifies a wireless communication network in addition to the Type 20 in IEC 61158-3-20, IEC 61158-4-20, IEC 61158-5-20, IEC 61158-6-20 and a Communication Profile CP 9/2 in addition to IEC 61784-1, CPF 9.

This standard specifies the following:

- Physical layer service definition and protocol specification,
- Data-link layer service and protocol,
- Application layer service and protocol,
- Network management,
- Security,
- Communication profile,
- Wireless procedures and
- Gateway.

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.

IEC 61158-1:2014, *Industrial communication networks – Fieldbus specifications – Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series*

IEC 61158-2, *Industrial communication networks – Fieldbus specifications – Part 2: Physical layer specification and service definition*

IEC 61158-3-20:2014, *Industrial communication networks – Fieldbus specifications – Part 3-20: Data-link layer service definition – Type 20 elements*

IEC 61158-4-20:2014, *Industrial communication networks – Fieldbus specifications – Part 4-20: Data-link layer protocol specification – Type 20 elements*

IEC 61158-5-20:2014, *Industrial communication networks – Fieldbus specifications – Part 5-20: Application layer service definition – Type 20 elements*

IEC 61158-6-20:2014, *Industrial communication networks – Fieldbus specifications – Part 6-20: Application layer protocol specification – Type 20 elements*

IEC 61784-1:2014, *Industrial Communication Networks – Profiles – Part 1: Fieldbus profiles*