

SLOVENSKI STANDARD
SIST EN 16603-50-53:2015
01-april-2015

Vesoljska tehnika - SpaceWire - Protokol za CCSDS-paketni prenos

Space engineering - SpaceWire - CCSDS packet transfer protocol

Raumfahrttechnik - SpaceWire - Protokoll zur CCSDS-Paketübertragung

Ingénierie spatiale - SpaceWire - protocole de transfert de paquets CCSDS

Ta slovenski standard je istoveten z: EN 16603-50-53:2015

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ICS:

33.040.40	Podatkovna komunikacijska omrežja	Data communication networks
49.140	Vesoljski sistemi in operacije	Space systems and operations

SIST EN 16603-50-53:2015

en

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EUROPEAN STANDARD

EN 16603-50-53

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2015

ICS 33.040.40; 49.140

English version

**Space engineering - SpaceWire - CCSDS packet transfer
protocol**Ingénierie spatiale - SpaceWire - protocole de transfert de
paquets CCSDSRaumfahrtproduktsicherung - SpaceWire - Protokoll zur
CCSDS-Paketübertragung

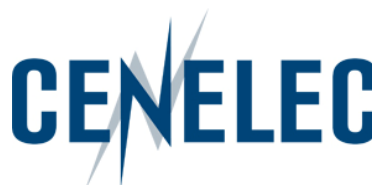
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Foreword

This document (EN 16603-50-53:2015) has been prepared by Technical Committee CEN/CLC/TC 5 "Space", the secretariat of which is held by DIN.

This standard (EN 16603-50-53:2015) originates from ECSS-E-ST-50-53C.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2015, and conflicting national standards shall be withdrawn at the latest by July 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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

This document has been developed to cover specifically space systems and has therefore precedence over any EN covering the same scope but with a wider domain of applicability (e.g. : aerospace).

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

There is a number of communication protocols that can be used in conjunction with the SpaceWire Standard (ECSS-E-ST-50-12), to provide a comprehensive set of services for onboard user applications. To distinguish between the various protocols a protocol identifier is used, as specified in ECSS-E-ST-50-51.

This Standard specifies the CCSDS packet transfer protocol, which is one of these protocols that works over SpaceWire.

The aim of the CCSDS Packet Transfer Protocol is to transfer CCSDS Packets across a SpaceWire network. It does this by encapsulating the CCSDS Packet in a SpaceWire packet, transferring it across the SpaceWire network and then extracting the CCSDS Packet at the target.

This standard may be tailored for the specific characteristic and constrains of a space project in conformance with ECSS-S-ST-00.

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Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this ECSS Standard. For dated references, subsequent amendments to, or revision of any of these publications do not apply. However, parties to agreements based on this ECSS Standard are encouraged to investigate the possibility of applying the more recent editions of the normative documents indicated below. For undated references, the latest edition of the publication referred to applies.

EN reference	Reference in text	Title
EN 16601-00-01	ECSS-S-ST-00-01	ECSS system - Glossary of terms
EN 16603-50-12	ECSS-E-ST-50-12	Space engineering - SpaceWire - Links, nodes, routers and networks
EN 16603-50-51	ECSS-E-ST-50-51	Space engineering - SpaceWire protocol identification
	CCSDS 133.0-B-1	Space Packet Protocol, Blue Book-

Terms, definitions and abbreviated terms

3.1 Terms defined in other standards

For the purpose of this Standard, the terms and definitions from ECSS-S-ST-00-01 and ECSS-E-ST-50-51 apply.

3.2 Terms specific to the present standard

None.

3.3 Abbreviated terms

The following abbreviations are defined and used within this standard:

Abbreviation	Meaning
CCSDS	Consultative Committee for Space Data Systems
EEP	error end of packet
EOP	end of packet
SpW	SpaceWire

3.4 Conventions

In this document hexadecimal numbers are written with the prefix 0x, for example 0x34 and 0xDF15.

Binary numbers are written with the prefix 0b, for example 0b01001100 and 0b01.

Decimal numbers have no prefix.

4 Principles

4.1 Purpose

The CCSDS Packet Transfer Protocol has been designed to encapsulate a CCSDS Space Packet into a SpaceWire packet, transfer it from an initiator to a target across a SpaceWire network, extract it from the SpaceWire packet and pass it to a target user application. This protocol does not provide any means for ensuring delivery of the packet nor is it responsible for the contents of the packet being a CCSDS Space Packet.

The CCSDS Space Packet Protocol is defined in the following document:

CCSDS 133.0-B-1 Space Packet Protocol. Blue Book. Issue 1. September 2003 or a later issue

Figure 4-1 illustrates the location of the CCSDS Space Packet transfer Protocol in a typical onboard protocol stack. The CCSDS Space Packet transfer Protocol provides a unidirectional data transfer service from a single source user application to a single destination user application through a SpaceWire network.

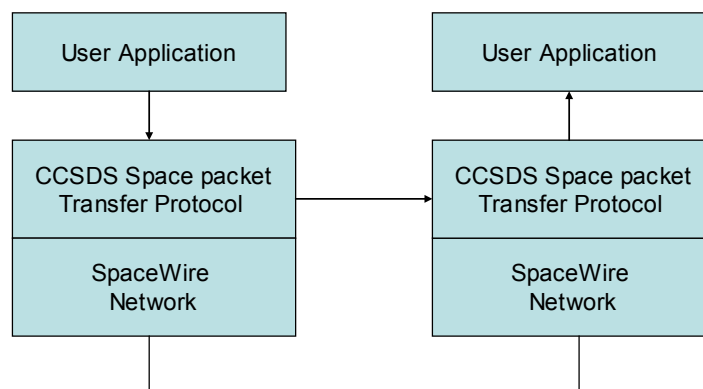


Figure 4-1: Protocol configuration

4.2 Protocol features

The CCSDS Space Packet transfer Protocol provides the capability to transfer CCSDS Space Packets between onboard users of a SpaceWire network. The CCSDS space packets may be of variable length or fixed size at the discretion of the user and may be submitted for transmission at variable intervals. The

composition of the CCSDS space packet is under the responsibility of the user application and is not checked by the CCSDS space packet transfer protocol.

4.3 Services

The CCSDS Space Packet Transfer Protocol provides users with data transfer services. The point at which a service is provided by a protocol entity to a user is called a Service Access Point. A Service Access Point of the Space Packet Transfer Protocol is identified by a SpaceWire address and each service user is also identified by a SpaceWire Address.

Service data units submitted to a Service Access Point are processed in the order of submission.

Implementations may be required to perform flow control at a Service Access Point between the service user and the service provider. However, this standard does not recommend a scheme for flow control between the user and the provider.

The followings features are offered by the data transfer service defined in this Standard:

- Unidirectional (one way) data transfer service.
- Asynchronous Service. There are no predefined timing rules for the transfer of service data units supplied by the service user. The user may request data transfer at any time it desires, but there may be restrictions imposed by the provider on the data generation rate.
- Unconfirmed Service: the sending user does not receive confirmation from the receiving end that data has been received.
- Incomplete Services. The services do not guarantee completeness, nor do they provide a retransmission mechanism.
- SDU format: the service does not check the format of the submitted CCSDS Space packet.
- Non sequence Preserving Service. The sequence of service data units supplied by the sending user may not be preserved through the underlying network

The end-to-end quality-of-service provided to service users is the one that is provided by the underlying SpaceWire network. The Space Packet Transfer Protocol does not provide any mechanisms for guaranteeing a particular quality-of-service; it is the responsibility of implementing organizations to ensure that the end-to-end performance of a particular service instance meets the requirements of its users.

Sequence preservation of packets in a SpaceWire network is dependent on the underlying network topology and configuration. Topologies and configurations which allow only a single route from the source to the destination, i.e. configurations that are not using group adaptive routing, are sequence preserving.