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Space engineering - Ranging and Doppler tracking

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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English version

Space engineering - Ranging and Doppler tracking

Ingénierie spatiale - Mesure de distance et suivi Doppler

Raumfahrttechnik - Entfernungsbestimmung und Dopplerverfolgung

This European Standard was approved by CEN on 1 March 2014.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN and CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Foreword

This document (EN 16603-50-02:2014) has been prepared by Technical Committee CEN/CLC/TC 5 “Space”, the secretariat of which is held by DIN.

This standard (EN 16603-50-02:2014) originates from ECSS-E-ST-50-02C.

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of an identical text or by endorsement, at the latest by March 2015, and conflicting national standards shall be withdrawn at the latest by March 2015.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.

Introduction

The purpose of this Standard is to:

- Ensure compatibility between space agencies' spacecraft transponders and the ranging and Doppler tracking facilities of the Earth stations for the Space Operation, Space Research and Earth Exploration Satellite services.
- Ensure, as far as possible, compatibility between space agencies' spacecraft transponders and other networks from which they request support.
- Ensure an adequate level of ranging and Doppler tracking accuracy for missions conforming to this standard.

Facilitate the early design of flight hardware and ensure that the resulting interfaces and system performances are compatible with given ranging and Doppler tracking configurations and specifications.

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Scope

This Standard is applicable to spacecraft that are supported for ranging or Doppler tracking by direct links to Earth stations and to all related Earth stations (therefore, this Standard is not applicable for spacecraft supported by data relay satellites) operating within the Space Operation, Space Research and Earth Exploration Satellite services (therefore, this Standard is not applicable to the Meteorological Satellite service) as defined in ECSS-E-ST-50-05 clause 1.

Other space telecommunication services are not covered in this issue.

This Standard applies to projects with unprocessed ranging accuracies of 2,5ns to 30 ns (for conventional projects with tracking accuracies less stringent than these, CCSDS 401.0-B recommendations may be sufficient) and Doppler tracking accuracies of 0,1 mm/s to 1 mm/s. The analysis of compatibility between systems compliant with this standard and with the CCSDS recommendations is given in Annexes A.2 and A.3.

This document:

- Defines the requirements concerning spacecraft transponder and Earth station equipment for the purposes of ranging and Doppler tracking.
- Provides criteria by which the extent to which the accuracy of the measurements is influenced by equipment effects can be determined. This accuracy is different to the accuracy of the overall orbit determination process, which is also influenced by effects outside the scope of the standards, i.e. modelling of gravitational and non-gravitational forces, modelling of propagation effects, pre-processing and screening of data.

This standard may be tailored for the specific characteristics and constraints 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 revisions 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 most 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	ECSS-E-ST-50	Space engineering – Communications
EN 16603-50-05	ECSS-E-ST-50-05	Space engineering – Radio frequency and modulation