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Vesolje - Nadzorovanje in spremljanje razmer v vesolju - 30-03. del: Sporočilo o podatkih opazovalnega sistema

Space - Space Situational Awareness Monitoring - Part 30-03: Observation System Data Message (OSDM)

Raumfahrt - Überwachung der Weltraumlageerfassung - Teil 30-03: Beobachtungssystembeschreibungs-Nachricht

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ICS:

35.240.99	Uporabniške rešitve IT na drugih področjih	IT applications in other fields
49.140	Vesoljski sistemi in operacije	Space systems and operations

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Space - Space Situational Awareness Monitoring - Part 30-03: Observation System Data Message (OSDM)

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/CLC/JTC 5.

If this draft becomes a European Standard, CEN and CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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SIST EN 16604-30-03:2019

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oSIST prEN 16604-30-03:2019

Contents

Page

iTeh STANDARD PREVIEW
(standards.iteh.ai)

oSIST prEN 16604-30-03:2019

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 16604-30-03:2020
https://standards.iteh.ai/catalog/standards/sist/ba7920be-29d9-4d82-bf1d-2b4bbfed33fc/sist-en-16604-30-03-2020

oSIST prEN 16604-30-03:2019

European foreword

This document (prEN 16604-30-03:2019) has been prepared by Technical Committee CEN/CLC/JTC 5 “Space”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 16604-30-03:2020
https://standards.iteh.ai/catalog/standards/sist/ba79205e-29d9-4d62-bf1d-2b4bbfed33fc/sist-en-16604-30-03-2020

oSIST prEN 16604-30-03:2019

1 Scope

1.1 Purpose:

The Observing System Data Message (OSDM) is a standard message format to be used in the exchange of optical telescope, laser ranging station, and radar (*observing systems*) information between Space situational Awareness (SSA) data providers, owners/operators of observing systems, and other parties. These messages can inform SSA data providers, which are the consumers of observing system output data, on the parameters of the observing systems.

The OSDM standard will:

a) enable consistent data exchange between observation data providers and SSA systems;

b) facilitate data exchange automation and ingestion of observation data from different providers;

c) facilitate SSA system architecture performance simulations; and

d) provide a quick way to estimate the expected performance from one observing system.

1.2 Applicability:

The Observing System Data Message standard is applicable to all SSA activities, especially Space Surveillance and Tracking (SST) and near-Earth objects (NEO), and other fields where the acquisition of astrometric and photometric data plays a role (e.g. space debris, observational astronomy). The standard contains a message designed to contain observing system parameters exchanged between producers and consumers of astrometric and/or photometric data. These data include observing system name, location, type (optical/radar), operator and tracking/survey performance.

The OSDM is suitable for both manual and automated interaction, but will not contain a large amount of data. The message is self contained and can be paired with several Tracking Data Messages (TDM – specified reference [1]), FITS images (specified in reference [2]), or other formats containing the observation data.

The OSDM standard only applies to the message format, structure and content. The exchange method is beyond the scope of the standard, and it is due to be specified in an ICD, though an ICD is not always required. The methods used to produce the data in the message are also beyond the scope of the standard.

1.3 Document structure:

Clause 5 provides an overview of the OSDM.

Clause 6 described the structure and content of the 'keyword = value' (KVN) version of the OSDM.

Clause 7 described the strucuture and content of the XML version of the OSDM.

Clause 8 describes the data and syntax of OSDM messages, in both KVN and XML.

Annex A lists agreed values for some of the OSDM keywords.

Annex B presents some examples of OSDMs.

oSIST prEN 16604-30-03:2019

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 11104:2011, *Space data and information transfer systems – Time code formats (CCSDS 301.0-B-4)*

ISO 17107, *Space data and information transfer systems – XML specification for navigation data messages (CCSDS)*

PAUL V. Biron and Ashok Malhotra, eds. *XML Schema Part 2: Datatypes*. 2nd ed. W3C Recommendation. N.p.: W3C, October 2004

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

NOTE For more information on terms and nomenclature, the CEN/CENELEC SST/NEO glossary of terms [3] will be consulted.

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3.1
observation
unique measurement of an object's location from a single observing system at a single time (e.g. azimuth from a single radar at a single time)

SIST EN 16604-30-03:2020
https://standards.iteh.ai/catalog/standards/sist/ba79205e-29d9-4d62-bf1d-2b4bbfed33fc/sist-en-16604-30-03-2020

3.2
observing system
system (telescope, radar or SLR station) capable of acquiring observations (usually called 'sensor' in SST)

3.3
sensor track
set of at least three observations for the same object, from the same observing system, and with each observation withing a specified number of minutes of the other observations in the track (depends on the object's orbit)

4 Abbreviated terms and unit conventions

4.1 Abbreviated terms

The following abbreviated terms will be used in this document:

ASCII	American Standard Code for Information Exchange
CCSDS	Consultative Committee for Space Data Systems
ID	IDentifier

oSIST prEN 16604-30-03:2019

ISO	International Organization for Standardization
KVN	Keyword Value Notation
n/a	not applicable or not available
NEO	Near Earth Object(s)
OD	Orbit Determination
SANA	Space Assigned Numbers Authority
SLR	Satellite Laser Ranging
SSA	Space Situtational Awareness
SST	Space Surveillance and Tracking
TDM	Tracking Data Message
UTC	Coordinated Universal Time
XML	eXtensible Markup Language

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4.2 Unit conventions

The OSDM generally uses units that are part of the International System of Units (SI), either base, derived, or non-SI units that are accepted for use within the SI (see [4]). The following units are used in the OSDM:

SIST EN 16604-30-03:2020
ndards.iteh.ai/catalog/standards/sist/ba79205e-29d9-4d62-bf1d-2b4bbfed33fc/sist-en-16604-30-03-2020

— km: kilometres;

— m: metres;

— mm: millimetre;

— mcm: micrometre;

— nm: nanometre;

— h: hour (3600 s);

— s: second;

— ps: picosecond;

— K: kelvin;

— dB: decibel;

— Hz: hertz;

— kW: kilowatt;

— mJ: millijoule;

oSIST prEN 16604-30-03:2019

— deg: degree of arc; and

— arcsec: second of arc.

The following conventions are used for compound units:

— a single asterisk for multiplication: '*' (eg 'kg*s');

— a single forward slash for division: '/' (eg 'm/s'); and

— a double asterisk for exponents: '**' (eg 'mm**2').

The usual mathematical conventions for operation order apply.

5 Overview

The OSDM is an ASCII format file, encode as either plain text (referred to as KVN – Keyword Value Notation) or XML (see Paul V. Biron and Ashok Malhotra, eds. *XML Schema Part 2: Datatypes*, and also Bibliographical Entries [5] and [6]).

The OSDM contains information about one observing system:

— information about the message itself (creation date, creator, etc.);

— identification of the observing system (name, owner, operator, etc.);

— reference performance (success rate, MTBF, etc.);

— observing system location (whether ground-based or in orbit, x/y/z, etc.); and

— observing system performance parameters (max elevation, minimum Sun/Moon distance, etc.).

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SIST EN 16604-30-03:2020
https://standards.iteh.ai/catalog/standards/sist/2b4bbfed33fc/sist-en-16604-30-03-2020

This type of information is used by SSA operators, space agencies and spacecraft operators to determine proper OD configuration or to simulate observing system performance. The OSDM can be used for passive optical telescopes, SLR stations, and radars; both on ground and in orbit.

6 Observing System Data Message structure and content in KVN

6.1 General

6.1.1 OSDM contents

The OSDM shall be plain text consisting of information on one observing system. It shall be readable by both humans and computers.

6.1.2 OSDM KVN contents

The OSDM in KVN shall consist of digital data represented as ASCII text lines. The OSDM shall contain:

a) a header; and

b) a metadata/data section.

oSIST prEN 16604-30-03:2019

NOTE

1) KVN messages contain one keyword per line (see 8.2.1.4).

2) The standard order of keywords in the KVN representation is fixed in this standard, as listed in Tables 1, 2, and 3 (see 8.2.1.7).

6.1.3 OSDM file naming

A naming scheme should be agreed on a case-by-base basis between the entities exchanging the message. The file name syntax and length shall not violate the computer environment contraints.

6.1.4 OSDM exchange method

The OSDM exchange method should be determined on a case-by-case basis and should be documented in an ICD.

6.2 OSDM Header

The header shall only consist of the KVN elements defined in Table 1, which specifies for each element:

a) the keyword;

b) a short description;

c) examples of allowed values; and

d) whether the keyword is mandatory (M) or optional (O).

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SIST EN 16604-30-03:2020
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oSIST prEN 16604-30-03:2019

Table 1 — OSDM KVN header

Keyword	Description of values	Example of values	M/O
CEN_OSDM_VERS	Format version in the form of 'x.y', where 'y' is incremented for corrections and minor changes, and 'x' is incremented for major changes.	0.6 1.0	M
COMMENT	Comments (allowed in the SDM Header only immediately after the SDM version number).	COMMENT This is a comment	O
CREATION_DATE	File creation date and time in UTC. For format specification see 8.2.2.5.	2001–11–06T11:17:33 2002–204T15:56:23	M
ORIGINATOR	Creating agency or operator. If the originator is listed in the SANA organizations registry [7], the value should be taken from the abbreviation column there. The country of origin should also be provided where the originator is not a national space agency.	CNES, ESOC, GSFC, GSOC, JPL, JAXA, INTELSAT/USA	M
MESSAGE_ID	ID that uniquely identifies a message from a given originator. The format and content of the message identifier value are at the discretion of the originator.	20170823AA456	M

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SIST EN 16604-30-03:2020
https://standards.iteh.ai/catalog/standards/sist/ba79203e-29d9-4d62-bf1d-2b4bbfed33fc/sist-en-16604-30-03-2020

6.3 OSDM Metadata

6.3.1 OSDM metadata lines

The OSDM metadata shall only consist of the KVN elements defined in Table 2, where the following are specified:

a) keyword;

b) a short description;

c) normative values or example of values;

d) whether the values listed are normative (N – all the values allowed are present in the third column) or examples (E); and

e) whether the keyword is mandatory (M) or optional (O).

6.3.2 OSDM metadata mandatory and optional keywords

Mandatory keywords shall appear in every OSDM's metadata section. Optional keywords may or may not appear, based on the message producer's requirements and the particular application.

oSIST prEN 16604-30-03:2019

Table 2 — OSDM KVN metadata

Keyword	Description of values	Examples	N/E	M/O
COMMENT	Comments (allowed only at the beginning of the OSDM metadata).	COMMENT This is a comment	E	O
SYSTEM_NAME	Observing system for which the information is provided.	OGS TELESCOPE SPADE	E	M
SYSTEM_ID	Observing system identifier (if any exists): — the COSPAR ID should be used for an orbiting sensor; — The Observatory ID from the IAU should be used for ground-based telescopes, if one exists.	IAC-80 2012–068A	E	O
SITE_NAME	Name of the site where the observing system is located.	TEIDE OBSERVATORY	E	O
SITE_ID	Identifier of the site where the observing system is located (if any exists).	OAM1	E	O
SYSTEM_TYPE	Type of the observing system: radar, optical telescope (passive optical), SLR station (active optical).	ACTIVE OPTICAL PASSIVE OPTICAL RADAR	N	M
SYSTEM_OWNER	Entity owning the observing system. If the originator is listed in the SANA Organizations Registry [7], the value should be taken from the abbreviation column there. The country of origin should also be provided where the originator is not a national space agency.	ESA IAC	E	M
SYSTEM_OPERATOR	Entity operating the observing system. If the	ESA NASA	E	M

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(standards.iteh.ai)
SIST EN 16604-30-03:2020
https://standards.iteh.ai/catalog/standards/sist/...-29d9-4d62-bf1d-2b4bb...-sist-en-16604-30-03-2020