

**SLOVENSKI STANDARD**  
**kSIST FprEN 16603-70-31:2014**  
**01-september-2014**

---

**Vesoljska tehnika - Zemeljski sistemi in delovanje - Nadzorovanje in krmiljenje nadzornih podatkov**

Space engineering - Ground systems and operations - Monitoring and control data definition

Raumfahrttechnik - Bodensysteme und Bodenbetrieb - Überwachung und Definitionen zu Steuerdaten

Ingénierie spatiale - Systèmes sol et opérations - Définition des données de commande et contrôle

**Ta slovenski standard je istoveten z: FprEN 16603-70-31**

---

**ICS:**

49.140 Vesoljski sistemi in operacije Space systems and operations

**kSIST FprEN 16603-70-31:2014 en,fr,de**



EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**FINAL DRAFT**  
**FprEN 16603-70-31**

May 2014

ICS 49.140

English version

**Space engineering - Ground systems and operations -  
Monitoring and control data definition**

Ingénierie spatiale - Systèmes sol et opérations - Définition  
des données de commande et contrôle

Raumfahrttechnik - Bodensysteme und Bodenbetrieb -  
Überwachung und Definitionen zu Steuerdaten

This draft European Standard is submitted to CEN members for unique acceptance procedure. It has been drawn up by the Technical Committee CEN/CLC/TC 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.

This draft European Standard was established by CEN and CENELEC 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.

CEN and CENELEC members are the national standards bodies and national electrotechnical committees of 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 United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

**Warning :** This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



**CEN-CENELEC Management Centre:  
Avenue Marnix 17, B-1000 Brussels**

## Table of contents

---

<b>Foreword .....</b>	<b>8</b>
<b>Introduction .....</b>	<b>9</b>
<b>1 Scope .....</b>	<b>10</b>
<b>2 Normative references .....</b>	<b>11</b>
<b>3 Terms, definitions and abbreviated terms .....</b>	<b>12</b>
3.1 Terms from other standards .....	12
3.2 Terms specific to the present standard .....	12
3.3 Abbreviated terms.....	14
<b>4 Background and context .....</b>	<b>15</b>
4.1 The space system model.....	15
4.2 Monitoring and control view of the SSM.....	16
4.2.1 Introduction .....	16
4.2.2 Standard SSM definitions .....	16
4.2.3 Product-specific SSM tailoring.....	19
<b>5 Conventions .....</b>	<b>20</b>
5.1 Data definition.....	20
5.2 Railroad diagrams.....	21
5.3 Case sensitivity .....	21
5.4 Names.....	22
5.5 Data types.....	24
5.5.1 General .....	24
5.5.2 Simple Data Types.....	24
5.5.3 Complex Data Types .....	37
<b>6 Monitoring and control data requirements .....</b>	<b>38</b>
6.1 Data exchange.....	38
6.2 Specification of complex data types .....	39
6.2.1 General .....	39
6.2.2 Activity call .....	39
6.2.3 Expression .....	40

6.2.4	Interpretation function .....	40
6.2.5	Procedure.....	41
6.2.6	Synthetic parameter.....	41
6.2.7	Value set.....	42
6.3	Product data .....	42
6.3.1	Introduction .....	42
6.3.2	Product configuration data.....	42
6.4	Data population.....	46
6.4.1	.....	46
6.4.2	.....	46
6.4.3	.....	46
6.4.4	.....	46
6.4.5	.....	46
6.4.6	.....	46
6.4.7	.....	47
6.4.8	.....	47
6.5	System element data.....	48
6.5.1	Introduction .....	48
6.5.2	System element generic data.....	49
6.5.3	System data .....	50
6.5.4	Application process data.....	51
6.5.5	Service data .....	53
6.5.6	MAP data .....	88
6.5.7	VC data .....	88
6.5.8	Functions.....	89
6.5.9	Memory data .....	90
6.5.10	Memory sub-block data .....	90
6.5.11	Store data.....	91
6.5.12	CPDU data.....	92
6.5.13	On/Off device data .....	92
6.5.14	Register load device data .....	92
6.5.15	Sensor data.....	93
6.6	Reporting data .....	94
6.6.1	Introduction .....	94
6.6.2	General .....	94
6.6.3	Parameters.....	96
6.6.4	Compound parameters .....	99
6.6.5	Synthetic reporting data.....	101
6.6.6	Checking data .....	101

**FprEN 16603-70-31:2014 (E)**

6.7	Activities.....	106
6.7.1	General .....	106
6.7.2	Activity argument value set.....	108
6.7.3	Activity execution data .....	109
6.7.4	Telecommands .....	112
6.7.5	Procedures.....	117
6.8	Events.....	119
<b>Annex A</b>	<b>(informative) PUS service tailoring .....</b>	<b>120</b>
A.1	Introduction .....	120
A.2	Telecommand verification service .....	121
A.2.1	The PUS service model .....	121
A.2.2	Service tailoring data .....	122
A.2.3	Service requests and reports.....	123
A.3	Device command distribution service.....	124
A.3.1	The PUS service model .....	124
A.3.2	Service tailoring data .....	126
A.3.3	Service requests and reports.....	127
A.4	Housekeeping and diagnostic data reporting service .....	127
A.4.1	The PUS service model .....	127
A.4.2	Service tailoring data .....	129
A.4.3	Service requests and reports.....	134
A.5	Parameter statistics reporting service .....	140
A.5.1	The PUS service model .....	140
A.5.2	Service tailoring data .....	140
A.5.3	Service requests and reports.....	142
A.6	Event reporting service.....	143
A.6.1	The PUS service model .....	143
A.6.2	Service tailoring data .....	144
A.6.3	Service requests and reports.....	144
A.7	Memory management service .....	145
A.7.1	The PUS service model .....	145
A.7.2	Service tailoring data .....	146
A.7.3	Service requests and reports.....	148
A.8	Function management service .....	150
A.8.1	The PUS service model .....	150
A.8.2	Service tailoring data .....	150
A.8.3	Service requests and reports.....	151
A.9	Time management service .....	151

A.9.1	The PUS service model .....	151
A.9.2	Service tailoring data .....	151
A.9.3	Service requests and reports.....	152
A.10	On-board operations scheduling service.....	153
A.10.1	The PUS service model .....	153
A.10.2	Service tailoring data .....	154
A.10.3	Service requests and reports.....	156
A.11	On-board monitoring service .....	161
A.11.1	The PUS service model .....	161
A.11.2	Service tailoring data .....	161
A.11.3	Service requests and reports.....	165
A.12	Large data transfer service.....	169
A.12.1	The PUS service model .....	169
A.12.2	Service tailoring data .....	169
A.12.3	Service requests and reports.....	172
A.13	Packet forwarding control service .....	174
A.13.1	The PUS service model .....	174
A.13.2	Service tailoring data .....	174
A.13.3	Service requests and reports.....	176
A.14	On-board storage and retrieval service .....	179
A.14.1	The PUS service model .....	179
A.14.2	Service tailoring data .....	180
A.14.3	Service requests and reports.....	184
A.15	Test service .....	187
A.15.1	The PUS service model .....	187
A.15.2	Service tailoring data .....	187
A.15.3	Service requests and reports.....	187
A.16	On-board operations procedure service .....	188
A.16.1	The PUS service model .....	188
A.16.2	Service tailoring data .....	188
A.16.3	Service requests and reports.....	189
A.17	Event/action service .....	192
A.17.1	The PUS service model .....	192
A.17.2	Service tailoring data .....	192
A.17.3	Service requests and reports.....	194
<b>Annex B</b> (informative) <b>Data type definitions</b> .....	<b>196</b>	
B.1	Conventions.....	196
B.2	Comments .....	197

**FprEN 16603-70-31:2014 (E)**

B.3	Data types and data items.....	197
B.3.1	Definitions .....	197
B.3.2	EBNF Representation.....	197
B.4	Activity Call .....	205
B.5	EXPL - Expression Language .....	205
B.5.1	Definitions .....	205
B.5.2	EBNF Representation.....	207
B.6	IFL - Interpretation Function Language .....	209
B.6.1	Definition .....	209
B.6.2	EBNF Representation.....	211
B.7	SPEL - Synthetic Parameter Expression Language .....	213
B.7.1	Definitions .....	213
B.7.2	Bit-manipulation functions.....	219
B.7.3	EBNF Representation.....	219
B.8	PLUTO – Procedure Language.....	223
B.9	VAL – Value Language.....	223
B.9.1	Definition .....	223
B.9.2	EBNF Representation.....	225
<b>Bibliography</b>	.....	<b>226</b>

**Figures**

Figure 4-1:	Example product delivery system element hierarchy.....	16
Figure 4-2:	Monitoring and control knowledge associated with a system element .....	17
Figure 5-1:	Example railroad diagram.....	21
Figure A-1 :	Diagram convention for PUS packet structures .....	121
Figure A-2 :	Tailoring choices for the telecommand verification service .....	122
Figure A-3 :	Tailoring choices for the device command distribution service .....	126
Figure A-4 :	Tailoring choices for the housekeeping and diagnostic data reporting service (View 1).....	129
Figure A-5	Tailoring choices for the parameter statistics reporting service.....	141
Figure A-6 :	Tailoring choices for the event reporting service .....	144
Figure A-7 :	Tailoring choices for the memory management service (View 1).....	146
Figure A-8 :	Tailoring choices for the function management service .....	150
Figure A-9 :	Tailoring choices for the time management service .....	152
Figure A-10 :	Tailoring choices for the on-board operations scheduling service (View 1) .....	154
Figure A-11 :	Tailoring choices for the on-board monitoring service (View 1).....	162
Figure A-12 :	Tailoring choices for the large data transfer service (View 1).....	170
Figure A-13 :	Tailoring choices for the packet forwarding control service (View 1) .....	175