

# DIN EN 16603-50:2022-11 (E)

## Space engineering - Communications; English version EN 16603-50:2022

---

<b>Contents</b>	<b>Page</b>
<b>European Foreword</b> .....	<b>6</b>
<b>Introduction</b> .....	<b>7</b>
<b>1 Scope</b> .....	<b>8</b>
<b>2 Normative references</b> .....	<b>9</b>
<b>3 Terms, definitions and abbreviated terms</b> .....	<b>10</b>
3.1 Terms defined in other standards .....	10
3.2 Terms specific to the present standard .....	10
3.3 Abbreviated terms.....	13
<b>4 Space communications engineering principles</b> .....	<b>15</b>
4.1 Context .....	15
4.2 Overall space communication .....	16
4.3 Space communication domains .....	21
4.3.1 Overview .....	21
4.3.2 Space network .....	21
4.3.3 Space link .....	22
4.3.4 Ground network .....	23
4.4 Communications engineering process .....	24
4.4.1 Introduction .....	24
4.4.2 Communication engineering activities .....	24
4.4.3 Process milestones .....	26
4.5 Relationship with other standards .....	26
4.6 <<deleted>> .....	27
4.7 Spacecraft control considerations .....	27
<b>5 Requirements</b> .....	<b>28</b>
5.1 Introduction.....	28
5.2 Space communication system engineering process.....	28
5.2.1 Requirements engineering .....	28
5.2.2 Analysis .....	29
5.2.3 Design and configuration.....	30

5.2.4	Implementation .....	31
5.2.5	Verification .....	32
5.2.6	Operations .....	33
5.3	Space communication system .....	33
5.3.1	Bandwidth allocation .....	33
5.3.2	Congestion.....	34
5.3.3	Cessation of emission .....	34
5.4	Telecommanding .....	34
5.4.1	Commandability at all attitudes and rates.....	34
5.4.2	Telecommand delivery service.....	34
5.4.3	Erroneous telecommand rejection.....	34
5.4.4	Essential telecommand distribution .....	34
5.4.5	Command authentication .....	35
5.4.6	Command encryption .....	35
5.4.7	Commanding-in-the-blind.....	35
5.4.8	Telecommand acknowledgement.....	35
5.4.9	Hot redundancy of on-board telecommand chains .....	35
5.4.10	Telecommand destination identification.....	36
5.5	Telemetry .....	36
5.5.1	Telemetry at all attitudes and rates .....	36
5.5.2	Essential telemetry acquisition .....	36
5.5.3	Telemetry source identification.....	37
5.5.4	Telemetry-in-the-blind .....	37
5.5.5	Telemetry data time stamping .....	37
5.5.6	Simultaneous support of differing source rates.....	37
5.5.7	Telemetry authentication and encryption.....	37
5.6	Space link.....	38
5.6.1	Introduction .....	38
5.6.2	Directionality .....	38
5.6.3	Short contact periods .....	38
5.6.4	Interoperability .....	39
5.6.5	Orbits .....	39
5.6.6	Noise sources .....	39
5.6.7	Mission phases .....	39
5.6.8	Link setup times .....	39
5.6.9	Mixed isochronous and asynchronous traffic.....	39
5.6.10	Mixed housekeeping and payload data .....	40

5.6.11	Space link performance .....	40
5.6.12	Space link frequency .....	41
5.6.13	Space link protocol .....	42
5.6.14	Space link service .....	43
5.7	Space network .....	45
5.7.1	On-board network .....	45
5.7.2	On-board network services .....	46
5.7.3	Inter-spacecraft network .....	47
5.7.4	Inter-spacecraft network services .....	48
5.8	Ground network .....	48
5.8.1	Overview .....	48
5.8.2	Data labelling .....	49
5.8.3	Security .....	49
5.8.4	Error rates .....	49
5.8.5	Hot redundant operation of ground network nodes .....	49
5.8.6	Ground network availability .....	49
<b>Annex A (normative) Communication system requirements document (CSR) - DRD .....</b>		<b>50</b>
<b>Annex B (normative) Communication system baseline definition (CSBD) - DRD .....</b>		<b>54</b>
<b>Annex C (normative) Communication system analysis document (CSAD) - DRD .....</b>		<b>59</b>
<b>Annex D (normative) Communication system verification plan (CSVP) - DRD .....</b>		<b>62</b>
<b>Annex E (normative) Communication system architectural design document (CSADD) - DRD .....</b>		<b>65</b>
<b>Annex F (normative) Communication system detailed design document (CSDDD) - DRD .....</b>		<b>68</b>
<b>Annex G (normative) Communication system profile document (CSPD) - DRD .....</b>		<b>70</b>
<b>Annex H (normative) Communication system operations manual (CSOM) - DRD .....</b>		<b>72</b>
<b>Annex I (informative) Documentation summary .....</b>		<b>75</b>
<b>Bibliography .....</b>		<b>78</b>

**Figures**

Figure 4-1: Example configuration of a space communication system..... 16  
Figure 4-2: CCSDS and Internet space link protocols.....20

**Tables**

Table I-1 : ECSS-E-ST-50 DRD list .....76