

ICS 49.140
CCS V 75



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 39345-2020

**Space data and information transfer systems. AOS(advanced
orbiting systems) space data link protocol**

Issued on: November 19, 2020

Implemented on: June 1, 2021

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

Table of Contents

1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Abbreviations	1
5 Protocol overview	2
5.1 Related concepts	2
5.2 Business Overview	4
5.3 Function overview	7
6 Business	10
6.1 Overview	10
6.2 Business Data Unit	10
6.3 Virtual Channel Package (VCP) Service	11
6.4 Bitstream business	12
6.5 Virtual Channel Access (VCA) Service	13
6.6 Virtual channel operation control domain (VC_OCF) business	14
6.7 Virtual Channel Frame (VCF) Service	14
6.8 Main Channel Frame (MCF) Service	15
6.9 Insert business	16
7 Data unit format	17
7.1 Convention of bit number	17
7.2 AOS transport frame	17
7.3 Transmission frame leading header	18
7.4 Transmission frame insertion field	20
7.5 Transmission frame data field	20
7.6 Operation Control Domain	23
7.7 Frame Error Control Field	23
8 Agreement process	25
8.1 Sender protocol flow	25
8.2 Receiver protocol flow	29
9 Management parameters	33
9.1 Overview	33
9.2 Physical channel management parameters	33

9.3 Main channel management parameters	34
9.4 Virtual channel management parameters	34
9.5 Packet transmission management parameters	34
10 Protocols and regulations supporting space data link security	35
10.1 Overview	35
10.2 SDLS protocol format specification	35
10.3 Data link security protocol flow	37
10.4 Management of data link security services	38
Appendix A (informative appendix) Structural changes of this standard compared with ISO 22666.2016	39
Appendix B (informative appendix) The technical differences between this standard and ISO 22666.2016 and the reasons	41
Figure 1 The hierarchical relationship between AOS spatial data link protocol and OSI	3
Figure 2 Relationship between channels	4
Figure 3 Asynchronous business model	5
Figure 4 Synchronous business model	6
Figure 5 The internal composition of the sender protocol entity	8
Figure 6 The internal composition of the receiving end protocol entity	9
Figure 7 AOS spatial data link protocol channel tree	9
Figure 8 The convention of the serial number	17
Figure 9 AOS transmission frame composition structure	18
Figure 10 Transmission frame leading header	18
Figure 11 M_PDU format	21
Figure 12 B_PDU format	22
Figure 13 Frame error control coding logic Figure	24
Figure 14 Frame error control decoding logic diagram	25
Figure 15 Packet processing function abstract model	26
Figure 16 Abstract Model of Bit Stream Processing Function	26
Figure 17. Abstract model of virtual channel generation function	27
Figure 18 Virtual channel multiplexing function abstract model	28
Figure 19 The abstract model of the main channel multiplexing function	28
Figure 20 The abstract model of all frame generation functions	29
Figure 21 Abstract model of all frame receiving functions	30
Figure 22. Main channel demultiplexing function abstract model	30
Figure 23 Abstract model of virtual channel demultiplexing function	31
Figure 24 Abstract model of virtual channel receiving function	32

Figure 25 Abstract model of bit stream extraction function	32
Figure 26 Abstract model of package extraction function	33
Figure 27 Comparison of frame without SDLS and frame with SDLS	36
Table 1 Services provided by AOS spatial data link protocol	6
Table 2 Physical channel management parameters	33
Table 3 Main channel management parameters	34
Table 4 Virtual channel management parameters	34
Table 5 Packet transmission management parameters	35
Table A.1 The comparison between this standard and ISO 22666.2016 chapter number	39
Table B.1 Technical differences between this standard and ISO 22666.2016 and their reasons	41

Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard uses the redrafting law to amend and adopt ISO 22666.2016 "Space Data and Information Transmission System Advanced On-orbit System".

Inter-Data Link Protocol.

Compared with ISO 22666.2016, this standard has many structural adjustments. Appendix A lists this standard and ISO 22666.2016

The chapter number comparison list.

Compared with ISO 22666.2016, this standard has technical differences, and the clauses involved in these differences have been passed on the outer margins.

The vertical single line (?) is marked, and the corresponding technical differences and their reasons are listed in Appendix B.

This standard also made the following editorial changes.

- Deleted part of the document structure and references in Chapter 1 of ISO 22666.2016;
- Changed Appendix A "Abbreviations" in ISO 22666.2016 to Chapter 4 of the main text;
- The informative appendix B "References" of ISO 22666.2016 was deleted.

This standard was proposed and managed by the National Aerospace Technology and Application Standardization Technical Committee (SAC/TC425).

Drafting organizations of this standard. Beijing Space Vehicle General Design Department, Nan'an Zhongji Institute of Standardization Co., Ltd., China Aerospace Standards

Chemical Research Institute, Xi'an Space Radio Technology Research Institute.

1 Scope

This standard specifies the business, data unit format, protocol process, and management parameters of the Advanced On-Orbit System (AOS) spatial data link protocol

And the protocol provisions supporting the security of the spatial data link.

This standard applies to the number of data link layers for space-to-ground and air-to-air communications using advanced on-orbit system space data link protocols

According to transmission business.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this article

Pieces. For undated references, the latest version (including all amendments) applies to this document.

GB/T 2900.54 Electrotechnical terminology radio communication. transmitter, receiver, network and operation

ISO 10537.2016 Spatial Data and Information Transmission System Packaging Business

ISO 22646.2005 Space Data and Information Transmission System Space Packet Protocol

3 Terms and definitions

The following terms and definitions defined in GB/T 2900.54 apply to this document.

3.1

Delimitation

The data has a known and finite length characteristic.

3.2

Mission phase

A period of time of a space mission, during which the mission process has a specific goal.

3.3

Space link

A communication link between a spacecraft and the corresponding ground system or between two spacecraft.