

**SLOVENSKI STANDARD**  
**SIST EN ISO/IEC 13818-1:1997**

**01-december-1997**

---

**Information technology - Generic coding of moving pictures and associated audio information - Part 1: Systems (ISO/IEC 13818-1:1996)**

Information technology - Generic coding of moving pictures and associated audio information - Part 1: Systems (ISO/IEC 13818-1:1996)

**iTeh STANDARD PREVIEW**

Technologies de l'information - Codage générique des images animées et des informations sonores associées - Partie 1: Systèmes (ISO/IEC 13818-1:1996)

[SIST EN ISO/IEC 13818-1:1997](#)

Ta slovenski standard je istoveten z: [EN ISO/IEC 13818-1:1997](https://standards.iteh.ai/catalog/standards/sist/a4204d5c-d024-4f53-baa1-7400161600b7c/sist-en-iso-iec-13818-1-1997)

---

**ICS:**

35.040	Nabori znakov in kodiranje informacij	Character sets and information coding
--------	---------------------------------------	---------------------------------------

**SIST EN ISO/IEC 13818-1:1997**

**en**

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO/IEC 13818-1:1997](#)

<https://standards.iteh.ai/catalog/standards/sist/a4204d5c-d024-4f53-baa1-7f0016f60b7c/sist-en-iso-iec-13818-1-1997>

EUROPEAN STANDARD

EN ISO/IEC 13818-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 1997

ICS 35.040

Descriptors: See ISO document

English version

**Information technology - Generic coding of  
moving pictures and associated audio information  
- Part 1: Systems (ISO/IEC 13818-1:1996)**

Technologies de l'information - Codage  
générique des images animées et des  
informations sonores associées - Partie 1:  
Systèmes (ISO/IEC 13818-1:1996)

**ITEH STANDARD PREVIEW  
(standards.iteh.ai)**

SIST EN ISO/IEC 13818-1:1997

<https://standards.iteh.ai/analog/standards/sist/a4204d5c-d024-4f53-baa1-7f08fc6677c/sist-en-iso-iec-13818-1-1997>

This European Standard was approved by CEN on 1997-01-19. CEN 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

## Foreword

The text of the International Standard from Technical Committee ISO/IEC/JTC 1 "Information technology" of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) has been taken over as an European Standard by the Technical Board of CEN.

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 August 1997, and conflicting national standards shall be withdrawn at the latest by August 1997.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

## Endorsement notice

The text of the International Standard ISO/IEC 13818-1:1996 has been approved by CEN as a European Standard without any modification.

# iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO/IEC 13818-1:1997](#)

<https://standards.iteh.ai/catalog/standards/sista4204d5c-d024-4f53-baa1-00016160b7c/sist-en-iso-iec-13818-1-1997>



INTERNATIONAL  
STANDARD

**ISO/IEC  
13818-1**

First edition  
1996-04-15

---

---

**Information technology — Generic coding  
of moving pictures and associated audio  
information: Systems**

**iTeh STANDARD PREVIEW**

*(Catalog.iteh.ai)*  
*Technologies de l'information — Codage des images animées et du son  
associé: Systèmes*

[SIST EN ISO/IEC 13818-1:1997](#)

[https://standards.iteh.ai/catalog/standards/sist/a4204d5c-d024-4f53-baa1-  
7f0016f60b7c/sist-en-iso-iec-13818-1-1997](https://standards.iteh.ai/catalog/standards/sist/a4204d5c-d024-4f53-baa1-7f0016f60b7c/sist-en-iso-iec-13818-1-1997)



Reference number  
ISO/IEC 13818-1:1996(E)

## CONTENTS

	Page
Introduction .....	vi
Intro. 1 Transport Stream.....	vii
Intro. 2 Program Stream.....	ix
Intro. 3 Conversion between Transport Stream and Program Stream.....	x
Intro. 4 Packetized Elementary Stream .....	x
Intro. 5 Timing model .....	x
Intro. 6 Conditional access.....	xi
Intro. 7 Multiplex-wide operations .....	xi
Intro. 8 Individual stream operations (PES Packet Layer).....	xi
Intro. 8.1 Demultiplexing.....	xi
Intro. 8.2 Synchronization .....	xii
Intro. 8.3 Relation to compression layer.....	xii
Intro. 9 System reference decoder.....	xii
Intro. 10 Applications .....	xii
<b>SECTION 1 – GENERAL.....</b>	<b>1</b>
1.1 Scope.....	1
1.2 Normative references .....	1
1.3 Identical Recommendations / International Standards .....	1
1.4 Additional references .....	2
<b>SECTION 2 – TECHNICAL ELEMENTS.....</b>	<b>2</b>
2.1 Definitions .....	2
<a href="https://standards.iteh.ai/catalog/standards/sist/a4204d5c-d024-4f53-baa1-7f0016f60b7c/sist-en-iso-iec-13818-1-1997">https://standards.iteh.ai/catalog/standards/sist/a4204d5c-d024-4f53-baa1-7f0016f60b7c/sist-en-iso-iec-13818-1-1997</a>	
2.2 Symbols and abbreviations .....	5
2.2.1 Arithmetic operators .....	5
2.2.2 Logical operators .....	6
2.2.3 Relational operators .....	6
2.2.4 Bitwise operators .....	6
2.2.5 Assignment .....	6
2.2.6 Mnemonics.....	6
2.2.7 Constants.....	7
2.3 Method of describing bit stream syntax .....	7
2.4 Transport Stream bitstream requirements .....	8
2.4.1 Transport Stream coding structure and parameters.....	8
2.4.2 Transport Stream system target decoder .....	8
2.4.3 Specification of the Transport Stream syntax and semantics.....	17
2.4.3.2 Transport Stream packet layer .....	18
2.4.3.3 Semantic definition of fields in Transport Stream packet layer.....	18
2.4.3.4 Adaptation field .....	20
2.4.3.5 Semantic definition of fields in adaptation field .....	20
2.4.3.6 PES packet .....	29

© ISO/IEC 1996

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

ISO/IEC Copyright Office • Case postale 56 • CH-1211 Genève 20 • Switzerland  
Printed in Switzerland

2.4.3.7	Semantic definition of fields in PES packet.....	29
2.4.3.8	Carriage of Program Streams and ISO/IEC 11172-1 Systems streams in the Transport Stream.....	38
2.4.4	Program specific information.....	39
2.4.4.1	Pointer .....	41
2.4.4.2	Semantics definition of fields in pointer syntax.....	41
2.4.4.3	Program association Table .....	41
2.4.4.4	Table_id assignments .....	42
2.4.4.5	Semantic definition of fields in program association section .....	42
2.4.4.6	Conditional access Table .....	43
2.4.4.7	Semantic definition of fields in conditional access section.....	43
2.4.4.8	Program Map Table .....	44
2.4.4.9	Semantic definition of fields in Transport Stream program map section.....	44
2.4.4.10	Syntax of the Private section.....	46
2.4.4.11	Semantic definition of fields in private section.....	46
2.5	Program Stream bitstream requirements .....	47
2.5.1	Program Stream coding structure and parameters .....	47
2.5.2	Program Stream system target decoder .....	47
2.5.2.1	System clock frequency .....	48
2.5.2.2	Input to the Program Stream system target decoder .....	49
2.5.2.3	Buffering .....	49
2.5.2.4	PES streams .....	50
2.5.2.5	Decoding and presentation.....	51
2.5.3	Specification of the Program Stream syntax and semantics .....	51
2.5.3.1	Program Stream .....	51
2.5.3.2	Semantic definition of fields in Program Stream .....	51
2.5.3.3	Pack layer of Program Stream .....	51
2.5.3.4	Semantic definition of fields in program stream pack .....	52
2.5.3.5	System header .....	53
2.5.3.6	Semantic definition of fields in system header .....	53
2.5.3.7	Packet layer of Program Stream.....	55
2.5.4	Program Stream map.....	55
2.5.4.1	Syntax of Program Stream map .....	55
2.5.4.2	Semantic definition of fields in Program Stream map .....	56
2.5.5	Program Stream directory .....	57
2.5.5.1	Syntax of Program Stream directory packet .....	57
2.5.5.2	Semantic definition of fields in Program Stream directory.....	57
2.6	Program and program element descriptors .....	59
2.6.1	Semantic definition of fields in program and program element descriptors .....	59
2.6.2	Video stream descriptor .....	60
2.6.3	Semantic definitions of fields in video stream descriptor .....	60
2.6.4	Audio stream descriptor.....	61
2.6.5	Semantic definition of fields in audio stream descriptor.....	61
2.6.6	Hierarchy descriptor.....	61
2.6.7	Semantic definition of fields in hierarchy descriptor.....	62
2.6.8	Registration descriptor .....	62
2.6.9	Semantic definition of fields in registration descriptor .....	63
2.6.10	Data stream alignment descriptor.....	63
2.6.11	Semantics of fields in data stream alignment descriptor .....	63
2.6.12	Target background grid descriptor .....	64
2.6.13	Semantics of fields in target background grid descriptor .....	64
2.6.14	Video window descriptor .....	65
2.6.15	Semantic definition of fields in video window descriptor .....	65
2.6.16	Conditional access descriptor.....	65
2.6.17	Semantic definition of fields in conditional access descriptor .....	66
2.6.18	ISO 639 language descriptor.....	66
2.6.19	Semantic definition of fields in ISO 639 language descriptor .....	66

2.6.20	System clock descriptor .....	66
2.6.21	Semantic definition of fields in system clock descriptor .....	67
2.6.22	Multiplex buffer utilization descriptor .....	67
2.6.23	Semantic definition of fields in multiplex buffer utilization descriptor .....	67
2.6.24	Copyright descriptor .....	68
2.6.25	Semantic definition of fields in copyright descriptor.....	68
2.6.26	Maximum bitrate descriptor .....	68
2.6.27	Semantic definition of fields in maximum bitrate descriptor.....	68
2.6.28	Private data indicator descriptor .....	69
2.6.29	Semantic definition of fields in Private data indicator descriptor .....	69
2.6.30	Smoothing buffer descriptor .....	69
2.6.31	Semantic definition of fields in smoothing buffer descriptor .....	70
2.6.32	STD descriptor.....	70
2.6.33	Semantic definition of fields in STD descriptor .....	70
2.6.34	IBP descriptor .....	70
2.6.35	Semantic definition of fields in IBP descriptor.....	70
2.7	Restrictions on the multiplexed stream semantics .....	71
2.7.1	Frequency of coding the system clock reference .....	71
2.7.2	Frequency of coding the program clock reference.....	71
2.7.3	Frequency of coding the elementary stream clock reference .....	71
2.7.4	Frequency of presentation timestamp coding .....	71
2.7.5	Conditional coding of timestamps .....	71
2.7.6	Timing constraints for scalable coding .....	72
2.7.7	Frequency of coding P-STD_buffer_size in PES packet headers.....	72
2.7.8	Coding of system header in the Program Stream .....	72
2.7.9	Constrained system parameter Program Stream .....	73
2.7.10	Transport Stream.....	73
2.8	Compatibility with ISO/IEC 11172 .....	74
<b>Third STANDARD PREVIEW (standards.iteh.ai)</b>		
Annex A – CRC Decoder Model .....		75
A.0	CRC decoder model <a href="http://standards.iteh.ai/catalog/standards/sist/a4204d5c-d024-4f53-baa1-7f0016f60b7c/sist-en-iso-iec-13818-1-1997">http://standards.iteh.ai/catalog/standards/sist/a4204d5c-d024-4f53-baa1-7f0016f60b7c/sist-en-iso-iec-13818-1-1997</a>	75
Annex B – Digital Storage Medium Command and Control (DSM-CC).....		76
B.0	Introduction.....	76
B.0.1	Purpose.....	76
B.0.2	Future applications.....	76
B.0.3	Benefits .....	76
B.0.4	Basic functions.....	77
B.0.4.1	Stream selection .....	77
B.0.4.2	Retrieval .....	77
B.0.4.3	Storage .....	77
B.1	General elements.....	77
B.1.1	Scope.....	77
B.1.2	Overview of the DSM-CC application.....	77
B.1.3	The transmission of DSM-CC commands and acknowledgments .....	78
B.2	Technical elements.....	79
B.2.1	Definitions.....	79
B.2.2	Specification of DSM-CC syntax .....	80
B.2.3	Semantics of fields in specification of DSM-CC syntax.....	80
B.2.4	Control layer .....	81
B.2.5	Semantics of fields in control layer.....	81
B.2.6	Acknowledgment layer .....	82
B.2.7	Semantics of fields in acknowledgment layer.....	83
B.2.8	Time code.....	83
B.2.9	Semantics of fields in time code .....	84
Annex C – Program Specific Information .....		85
C.0	Explanation of Program Specific Information in Transport Streams.....	85
C.1	Introduction.....	85
C.2	Functional Mechanism.....	85

C.3	The Mapping of Sections into Transport Stream Packets .....	86
C.4	Repetition Rates and Random Access.....	86
C.5	What is a Program?.....	86
C.6	Allocation of program_number.....	87
C.7	Usage of PSI in a Typical System.....	87
C.8	The Relationships of PSI Structures .....	88
C.8.1	Program Association Table.....	88
C.8.2	Program Map Table .....	88
C.8.3	Conditional Access Table .....	88
C.8.4	Network Information Table .....	90
C.8.5	Private_section() .....	90
C.8.6	Descriptors .....	90
C.9	Bandwidth Utilization and Signal Acquisition Time .....	90
<b>Annex D – Systems Timing Model and Application Implications of this Recommendation   International Standard .....</b>		<b>93</b>
D.0	Introduction.....	93
D.0.1	Timing Model .....	93
D.0.2	Audio and Video Presentation Synchronization .....	94
D.0.3	System Time Clock recovery in the decoder .....	96
D.0.4	SCR and PCR Jitter.....	98
D.0.5	Clock Recovery in the Presence of Network Jitter .....	99
D.0.6	System clock used for chroma sub-carrier generation .....	100
D.0.7	Component video and audio reconstruction.....	101
D.0.8	Frame Slipping .....	101
D.0.9	Smoothing of network jitter.....	101
<b>Annex E – Data Transmission Applications (standards.iteh.ai)   International Standard 13818-1:1997 .....</b>		<b>103</b>
E.0	General considerations .....	103
E.1	Suggestion.....	103
<b>Annex F – Graphics of Syntax for this Recommendation   International Standard 13818-1:1997 .....</b>		<b>104</b>
F.0	Introduction.....	104
F.0.1	Transport Stream syntax .....	104
F.0.2	PES packet .....	105
F.0.3	Program Association Section .....	106
F.0.4	CA section.....	106
F.0.5	TS program map section .....	107
F.0.6	Private section .....	107
F.0.7	Program Stream .....	108
F.0.8	Program Stream map.....	109
<b>Annex G – General Information .....</b>		<b>110</b>
G.0	General Information .....	110
G.0.1	Sync Byte Emulation .....	110
G.0.2	Skipped picture status and decoding process.....	110
G.0.3	Selection of PID Values.....	110
G.0.4	PES start_code emulation .....	110
<b>Annex H – Private Data.....</b>		<b>111</b>
H.0	Private Data.....	111
<b>Annex I – Systems conformance and real-time interface .....</b>		<b>112</b>
I.0	Systems conformance and real-time interface .....	112
<b>Annex J – Interfacing Jitter-Inducing Networks to MPEG-2 Decoders.....</b>		<b>113</b>
J.0	Introduction.....	113
J.1	Network compliance models.....	113
J.2	Network specification for jitter smoothing .....	114
J.3	Example decoder implementations .....	115
J.3.1	Network adapter followed by an MPEG-2 decoder.....	115
J.3.2	Integrated decoder.....	115

Annex K – Splicing Transport Streams .....	117
K.0    Introduction.....	117
K.1    The different types of splicing point.....	117
K.1.1    Ordinary splicing points.....	117
K.1.2    Seamless splicing points .....	117
K.2    Decoder behaviour on splices .....	118
K.2.1    On non-seamless splices .....	118
K.2.2    On seamless splices.....	118
K.2.3    Buffer Overflow.....	118

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO/IEC 13818-1:1997](#)

<https://standards.iteh.ai/catalog/standards/sist/a4204d5c-d024-4f53-baa1-7f0016f60b7c/sist-en-iso-iec-13818-1-1997>

## Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 13818-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in collaboration with ITU-T. The identical text is published as ITU-T Recommendation H.222.0.

**iTeh STANDARD PREVIEW  
(standards.itech.ai)**  
ISO/IEC 13818 consists of the following parts, under the general title *Information technology — Generic coding of moving pictures and associated audio information*:

<https://standards.itech.ai/catalog/standards/sist/a4204d5c-d024-4f53-baa1-7f0068007e01-iso-iec-13818-1:1997>

- *Part 1: Systems*
- *Part 2: Video*
- *Part 3: Audio*
- *Part 4: Compliance testing*
- *Part 6: Extensions for DSM-CC*
- *Part 9: Extension for real time interface for systems decoders*

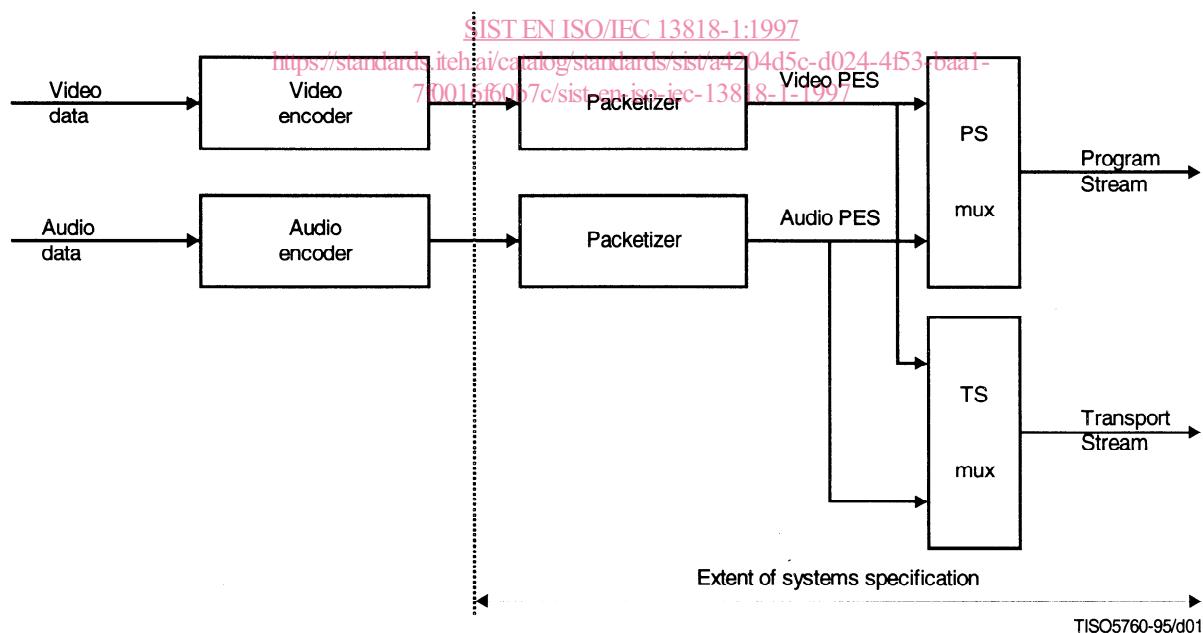
Annex A forms an integral part of this part of ISO/IEC 13818. Annexes B to K are for information only.

## Introduction

The systems part of this Recommendation | International Standard addresses the combining of one or more elementary streams of video and audio, as well as other data, into single or multiple streams which are suitable for storage or transmission. Systems coding follows the syntactical and semantic rules imposed by this Specification and provides information to enable synchronized decoding of decoder buffers over a wide range of retrieval or receipt conditions.

System coding shall be specified in two forms: the **Transport Stream** and the **Program Stream**. Each is optimized for a different set of applications. Both the Transport Stream and Program Stream defined in this Recommendation | International Standard provide coding syntax which is necessary and sufficient to synchronize the decoding and presentation of the video and audio information, while ensuring that data buffers in the decoders do not overflow or underflow. Information is coded in the syntax using time stamps concerning the decoding and presentation of coded audio and visual data and time stamps concerning the delivery of the data stream itself. Both stream definitions are packet-oriented multiplexes.

The basic multiplexing approach for single video and audio elementary streams is illustrated in Figure Intro. 1. The video and audio data is encoded as described in ITU-T Rec. H.262 | ISO/IEC 13818-2 and ISO/IEC 13818-3. The resulting compressed elementary streams are packetized to produce **PES packets**. Information needed to use PES packets independently of either Transport Streams or Program Streams may be added when PES packets are formed. This information is not needed and need not be added when PES packets are further combined with system level information to form **Transport Streams** or **Program Streams**. This systems standard covers those processes to the right of the vertical dashed line.



**Figure Intro. 1 – Simplified overview the scope of this Recommendation | International Standard**

The **Program Stream** is analogous and similar to ISO/IEC 11172 Systems layer. It results from combining one or more streams of PES packets, which have a common time base, into a single stream.

For applications that require the elementary streams which comprise a single program to be in separate streams which are not multiplexed, the elementary streams can also be encoded as separate Program Streams, one per elementary stream, with a common time base. In this case the values encoded in the SCR fields of the various streams shall be consistent.

Like the single Program Stream, all elementary streams can be decoded with synchronization.

The Program Stream is designed for use in relatively error-free environments and is suitable for applications which may involve software processing of system information such as interactive multi-media applications. Program Stream packets may be of variable and relatively great length.

The **Transport Stream** combines one or more programs with one or more independent time bases into a single stream. PES packets made up of elementary streams that form a program share a common timebase. The Transport Stream is designed for use in environments where errors are likely, such as storage or transmission in lossy or noisy media. Transport Stream packets are 188 bytes in length.

Program and Transport Streams are designed for different applications and their definitions do not strictly follow a layered model. It is possible and reasonable to convert from one to the other; however, one is not a subset or superset of the other. In particular, extracting the contents of a program from a Transport Stream and creating a valid Program Stream is possible and is accomplished through the common interchange format of PES packets, but not all of the fields needed in a Program Stream are contained within the Transport Stream; some must be derived. The Transport Stream may be used to span a range of layers in a layered model, and is designed for efficiency and ease of implementation in high bandwidth applications.

The scope of syntactical and semantic rules set forth in the systems specification differ: the syntactical rules apply to systems layer coding only, and do not extend to the compression layer coding of the video and audio specifications; by contrast, the semantic rules apply to the combined stream in its entirety.

The systems specification does not specify the architecture or implementation of encoders or decoders, nor those of multiplexors or demultiplexors. However, bit stream properties do impose functional and performance requirements on encoders, decoders, multiplexors and demultiplexors. For instance, encoders must meet minimum clock tolerance requirements. Notwithstanding this and other requirements, a considerable degree of freedom exists in the design and implementation of encoders, decoders, multiplexors, and demultiplexors.

## iTeh STANDARD PREVIEW

### Intro. 1      Transport Stream      ([standards.iteh.ai](https://standards.iteh.ai/catalog/standards/sist-en-iso-iec-13818-1-1997))

The Transport Stream is a stream definition which is tailored for communicating or storing one or more programs of coded data according to ITU-T Rec. H.262 [ISO/IEC 13818-2 and ISO/IEC 13818-3] and other data in environments in which significant errors may occur. Such errors may be manifested as bit value errors or loss of packets.

Transport Streams may be either fixed or variable rate. In either case the constituent elementary streams may either be fixed or variable rate. The syntax and semantic constraints on the stream are identical in each of these cases. The Transport Stream rate is defined by the values and locations of Program Clock Reference (PCR) fields, which in general are separate PCR fields for each program.

There are some difficulties with constructing and delivering a Transport Stream containing multiple programs with independent time bases such that the overall bit rate is variable. Refer to 2.4.2.2.

The Transport Stream may be constructed by any method that results in a valid stream. It is possible to construct Transport Streams containing one or more programs from elementary coded data streams, from Program Streams, or from other Transport Streams which may themselves contain one or more programs.

The Transport Stream is designed in such a way that several operations on a Transport Stream are possible with minimum effort. Among these are:

- 1) Retrieve the coded data from one program within the Transport Stream, decode it and present the decoded results as shown in Figure Intro. 2.
- 2) Extract the Transport Stream packets from one program within the Transport Stream and produce as output a different Transport Stream with only that one program as shown in Figure Intro. 3.
- 3) Extract the Transport Stream packets of one or more programs from one or more Transport Streams and produce as output a different Transport Stream (not illustrated).
- 4) Extract the contents of one program from the Transport Stream and produce as output a Program Stream containing that one program as shown in Figure Intro. 4.
- 5) Take a Program Stream, convert it into a Transport Stream to carry it over a lossy environment, and then recover a valid, and in certain cases, identical Program Stream.

Figure Intro. 2 and Figure Intro. 3 illustrate prototypical demultiplexing and decoding systems which take as input a Transport Stream. Figure Intro. 2 illustrates the first case, where a Transport Stream is directly demultiplexed and decoded. Transport Streams are constructed in two layers:

- a system layer; and
- a compression layer.

The input stream to the Transport Stream decoder has a system layer wrapped about a compression layer. Input streams to the Video and Audio decoders have only the compression layer.

Operations performed by the prototypical decoder which accepts Transport Streams either apply to the entire Transport Stream (“multiplex-wide operations”), or to individual elementary streams (“stream-specific operations”). The Transport Stream system layer is divided into two sub-layers, one for multiplex-wide operations (the Transport Stream packet layer), and one for stream-specific operations (the PES packet layer).

A prototypical decoder for Transport Streams, including audio and video, is also depicted in Figure Intro. 2 to illustrate the function of a decoder. The architecture is not unique – some system decoder functions, such as decoder timing control, might equally well be distributed among elementary stream decoders and the channel specific decoder – but this figure is useful for discussion. Likewise, indication of errors detected by the channel specific decoder to the individual audio and video decoders may be performed in various ways and such communication paths are not shown in the diagram. The prototypical decoder design does not imply any normative requirement for the design of a Transport Stream decoder. Indeed non-audio/video data is also allowed, but not shown.

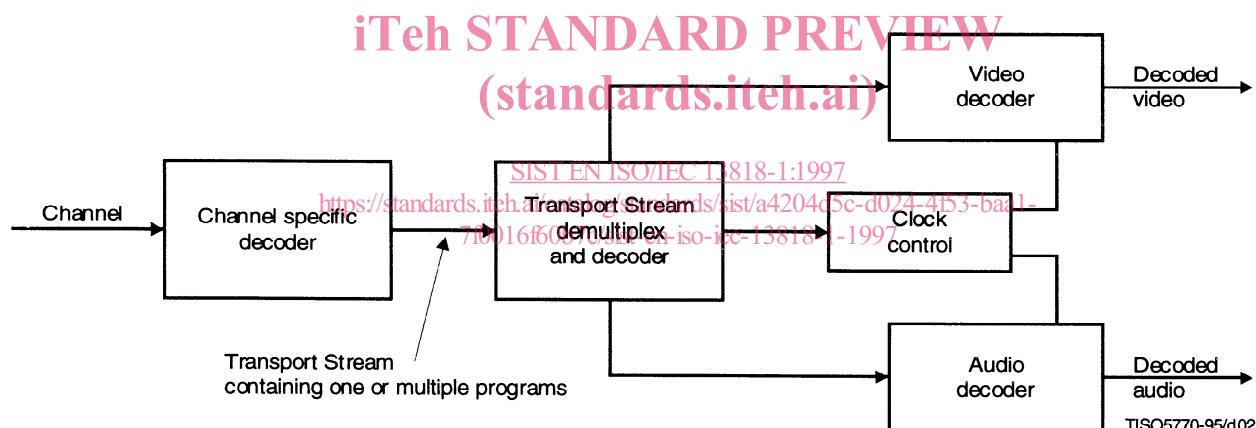


Figure Intro. 2 – Prototypical transport demultiplexing and decoding example

Figure Intro. 3 illustrates the second case, where a Transport Stream containing multiple programs is converted into a Transport Stream containing a single program. In this case the re-multiplexing operation may necessitate the correction of Program Clock Reference (PCR) values to account for changes in the PCR locations in the bit stream.

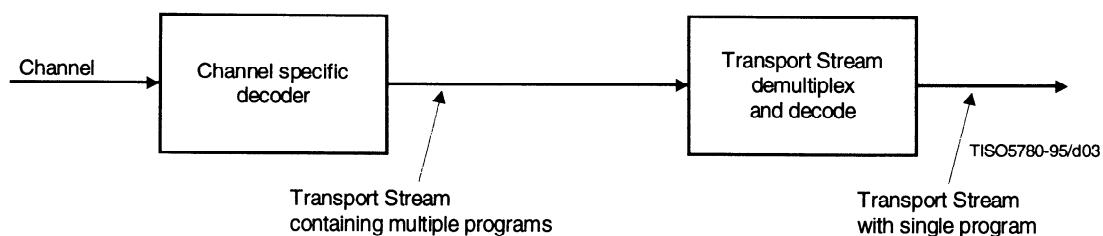
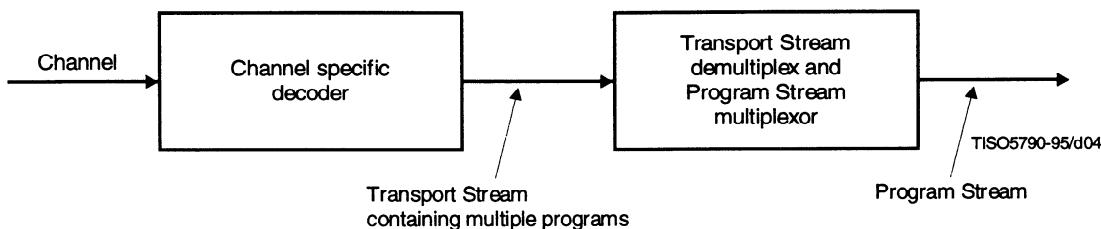


Figure Intro. 3 – Prototypical transport multiplexing example

Figure Intro. 4 illustrates a case in which an multi-program Transport Stream is first demultiplexed and then converted into a Program Stream.

Figures Intro. 3 and Intro. 4 indicate that it is possible and reasonable to convert between different types and configurations of Transport Streams. There are specific fields defined in the **Transport Stream** and **Program Stream** syntax which facilitate the conversions illustrated. There is no requirement that specific implementations of demultiplexors or decoders include all of these functions.



**Figure Intro. 4 – Prototypical Transport Stream to Program Stream conversion**

## Intro. 2 Program Stream

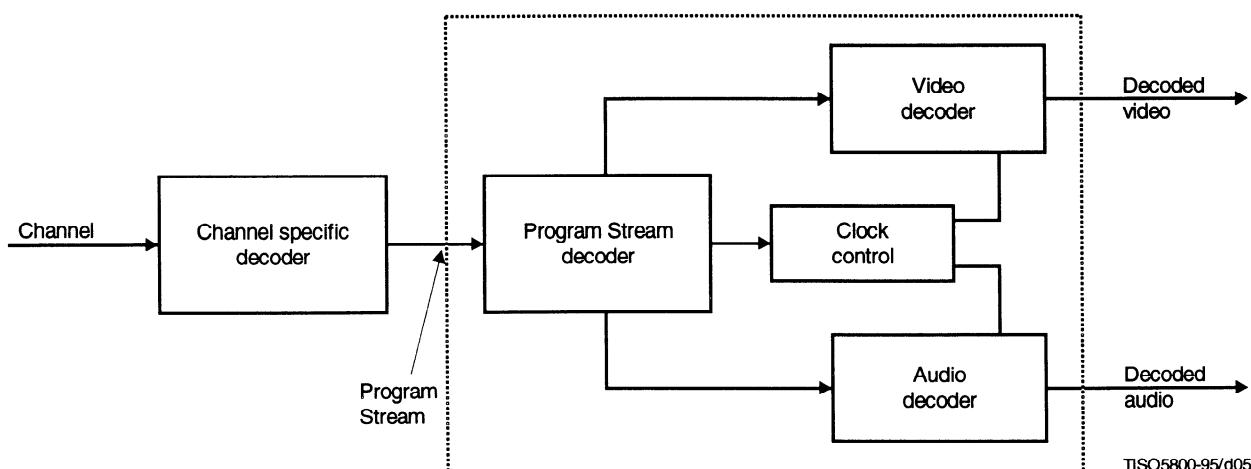
The Program Stream is a stream definition which is tailored for communicating or storing one program of coded data and other data in environments where errors are very unlikely, and where processing of system coding, e.g. by software, is a major consideration.

### THE STANDARD PREVIEW (standards.iteh.ai)

Program Streams may be either fixed or variable rate. In either case, the constituent elementary streams may be either fixed or variable rate. The syntax and semantics constraints on the stream are identical in each case. The Program Stream rate is defined by the values and locations of the System Clock Reference (SCR) and mux\_rate fields.

<https://standards.iec.ch/catalog/standards/sista/204d50d024-4f53-0aa1-7f0016f60b7c/sist-en-iso-iec-13818-1-1997>

A prototypical audio/video Program Stream decoder system is depicted in Figure Intro. 5. The architecture is not unique – system decoder functions including decoder timing control might equally well be distributed among elementary stream decoders and the channel specific decoder – but this figure is useful for discussion. The prototypical decoder design does not imply any normative requirement for the design of an Program Stream decoder. Indeed non-audio/video data is also allowed, but not shown.



**Figure Intro. 5 – Prototypical decoder for Program Streams**