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

**Part 1:  
Systems**

*Technologies de l'information — Codage générique des images  
animées et du son associé —*

*Partie 1: Systèmes*

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This document was prepared by ITU-T (as ITU-T H.222.0) and drafted in accordance with its editorial rules, in collaboration with Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This ninth edition cancels and replaces the eighth edition (ISO/IEC 13818-1:2022), which has been technically revised. It also incorporates the Amendment ISO/IEC 13818-1:2022/Amd 1:2023 and the Technical Corrigendum ISO/IEC 13818-1:2022/Cor 1:2023.

The main changes are as follows:

- updates references to ISO/IEC 14496-1 where clause numbering and field naming has changed;
- clarifies a reference to ISO/IEC 23008-3, where the field 3dAudioSceneInfoID is named differently;
- removes semantic definitions for fields that do not exist in the respective syntax table (Table 2-123);
- improves the semantic definition for HDR\_WCG\_idc equal to '0';
- corrects a mismatch in field size between syntax table and semantic definition of SubstreamOffset[k][j][i];
- corrects a misleading semantic definition of the media\_description\_flag for the Media\_service\_kind descriptor.

## ISO/IEC 13818-1:2023(E)

A list of all parts in the ISO/IEC 13818 series can be found on the ISO and IEC websites.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html) and [www.iec.ch/national-committees](http://www.iec.ch/national-committees).

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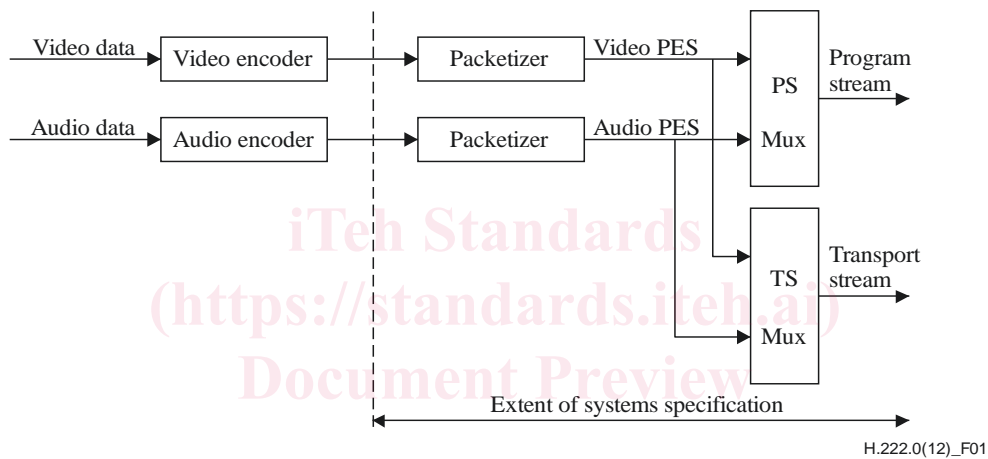
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**Introduction**

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 Rec. ITU-T 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 of the scope of this Recommendation | International Standard 18-1-2023**

The program stream is analogous and similar to the 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 that comprise a single program to be in separate streams that 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 time base. 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.