



# SLOVENSKI STANDARD SIST ETS 300 142 E1:2003

01-december-2003

8 [[ ]HJbc`ca fYy`Y`n]bhY[ f]fUb]a ]`gkcf]hj Ua ]`fG8 Bk]b`Xfi [ UX][ ]HJbU  
h`Y`\_ca i b]\_UM`g\_ Uca fYy`U`E`JcXcj b]`dfYbcg`bYh`YZ`bg\_ ]`g][ bUcj `E`J]XYc  
\_cXY`\_nUuj X]cj ]ni U`bY`gkcf]hj Y`nU\ ]f`cgh]`d`l`\* ( `V]h`g`Qf]dcfc ]`c`#H !H`<`"&\*`%  
f]`% - ` l`z`gdfYa Yb`YbcQ

Integrated Services Digital Network (ISDN) and other digital telecommunications networks; Line transmission of non-telephone signals; Video codec for audiovisual services at p x 64 kbit/s [ITU-T Recommendation H.261 (1993), modified]

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

[SIST ETS 300 142 E1:2003](https://standards.iteh.ai/catalog/standards/sist/fd83c405-2610-45cb-a1ef-cf92e1dacd25/sist-ets-300-142-e1-2003)

<https://standards.iteh.ai/catalog/standards/sist/fd83c405-2610-45cb-a1ef-cf92e1dacd25/sist-ets-300-142-e1-2003>

**Ta slovenski standard je istoveten z: ETS 300 142 Edition 1**

**ICS:**

33.080	Digitalno omrežje z integriranimi storitvami (ISDN)	Integrated Services Digital Network (ISDN)
--------	---	--

**SIST ETS 300 142 E1:2003 en**

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

SIST ETS 300 142 E1:2003

<https://standards.iteh.ai/catalog/standards/sist/fd83c405-2610-45cb-a1ef-c92e1dacd25/sist-ets-300-142-e1-2003>



**E**UROPEAN  
**T**ELECOMMUNICATION  
**S**TANDARD

**ETS 300 142**

June 1998

Source: NA

Reference: DE/NA-051108

ICS: 33.020

**Key words:** Multichannel, codec, teleservice, ISDN, video

**Integrated Services Digital Network (ISDN) and  
other digital telecommunications networks;  
Line transmission of non-telephone signals;  
Video codec for audiovisual services at p x 64 kbit/s**

<https://standards.iteh.ai/catalog/standards/sist/fd83c405-2610-45cb-a1ef-cf92e1dacd25/sist-ets-300-142-e1-2003>

**[ITU-T Recommendation H.261 (1993), modified]**

**ETSI**

European Telecommunications Standards Institute

**ETSI Secretariat**

**Postal address:** F-06921 Sophia Antipolis CEDEX - FRANCE

**Office address:** 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE

**Internet:** secretariat@etsi.fr - <http://www.etsi.fr> - <http://www.etsi.org>

Tel.: +33 4 92 94 42 00 - Fax: +33 4 93 65 47 16

**Copyright Notification:** No part may be reproduced except as authorized by written permission. The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 1998. All rights reserved.

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

[SIST ETS 300 142 E1:2003](https://standards.iteh.ai/catalog/standards/sist/fd83c405-2610-45cb-a1ef-cf92e1dacd25/sist-ets-300-142-e1-2003)

<https://standards.iteh.ai/catalog/standards/sist/fd83c405-2610-45cb-a1ef-cf92e1dacd25/sist-ets-300-142-e1-2003>

## Foreword

This European Telecommunication Standard (ETS) has been produced by the Network Aspects (NA) Technical Committee of the European Telecommunications Standards Institute (ETSI).

Transposition dates	
Date of adoption of this ETS:	19 June 1998
Date of latest announcement of this ETS (doa):	30 September 1998
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	31 March 1999
Date of withdrawal of any conflicting National Standard (dow):	31 March 1999

## Endorsement notice

The text of ITU-T Recommendation H.261 (1993) was approved by ETSI as an ETS with agreed modifications as given below.

NOTE: New or modified text is indicated using sidebars. In addition, underlining and/or strike-out are used to highlight detailed modifications where necessary.

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

[SIST ETS 300 142 E1:2003](https://standards.iteh.ai/catalog/standards/sist/fd83c405-2610-45cb-a1ef-cf92e1dacd25/sist-ets-300-142-e1-2003)

<https://standards.iteh.ai/catalog/standards/sist/fd83c405-2610-45cb-a1ef-cf92e1dacd25/sist-ets-300-142-e1-2003>

Replace the scope clause with the following two clauses (scope and normative references):

## **1 Scope**

This ETS describes the video coding and decoding methods for the moving picture component of audiovisual services at the rates of  $p \times 64$  kbit/s, where  $p$  is in the range 1 to 30.

The standard includes conformance test specifications.

## **Normative references**

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendments or revision. For undated references the latest edition of the publication referred to applies.

- [1] ITU-T Recommendation H.120: "Codecs for videoconferencing using primary digital group transmission".
- [2] ITU-T Recommendation H.200: "Framework for Recommendations for audiovisual services".
- [3] ITU-T Recommendation H.221: "Frame structure for a 64 to 1 920 kbit/s channel in audiovisual teleservices".
- [4] ITU-T Recommendation H.230: "Frame-synchronous control and indication signals for audiovisual systems".
- [5] ITU-T Recommendation H.242: "System for establishing communication between audiovisual terminals using digital channels up to 2 Mbit/s".
- [6] ITU-T Recommendation T.81: "Information technology - Digital compression and coding of continuous-tone still images - Requirements and guidelines".

### **Page 19, subclause 5.2, second and third paragraphs**

When operating with CIF the number of bits created by coding any single picture shall not exceed 256 kbits ( $K = 1\ 024$ ).

When operating with QCIF the number of bits created by coding any single picture shall not exceed 64 kbits ( $K = 1\ 024$ ).

### **Page 25, clause D.5, third bullet**

- the maximum number of bits allowed per frame (sub-image) should not be exceeded (256 kbit/s for CIF and 64 kbit/s for QCIF, where  $K$  is equal to 1 024);

Addition of annex ZA

Add a new annex ZA as follows:

**Annex ZA (normative): Conformance testing of ITU-T Recommendation H.261 (March 1993)****ZA.1 General principles adopted for the ITU-T Recommendation H.261 conformance tests**

- 1) The conformance test should aim to test for compliance to the respective ETS to the extent which it is necessary to ensure compatible interworking of different suppliers equipment.
- 2) The only inputs and outputs of the equipment under test in the conformance verification are those normally provided to the user and the test shall not rely on directly accessing additional internal test modes in the equipment.
- 3) The specification is constrained to only testing the ITU-T Recommendation H.261 bitstream which can be assumed to have been correctly isolated from the ITU-T Recommendation H.221 framing, audio, etc.
- 4) The tests should be constructed to allow for devices which only have visual inputs and outputs (e.g. a video phone). The existence of composite (or other) electrical interfaces cannot be assumed.
- 5) If electrical video inputs and outputs do exist (e.g. composite interfaces) then they should be fully tested in respect of transmitted/received active picture area, etc.
- 6) The testing of decoders is likely to be more exhaustive than testing of the encoders due to the fact that decoders will always have a digital channel input. Assuming that the encoder and decoder of the same manufacturer perform well together, then advantages will be taken of sophisticated decoder tests. An indication of the correct behaviour of the decoder, will likely implicate that the complementary part in the encoder is correct as well.
- 7) Examples of input sequences (video stimulus etc.) will be given as annexes to the conformance specification. These examples will be given to aid the construction of conformance test suites. Tests will not be constrained to only using these examples.

<https://standards.iteh.ai/catalog/standards/sist/fd83c405-2610-45cb-a1ef-c92e1dacd25/sist-ets-300-142-e1-2003>  
**Table ZA.1: List of tests**

	Items	Encoder	Decoder
1	Video levels	E	D
2	Geometrical distortion	E	
3	Frame rates	E	D
4	QCIF support	E	D
5	Valid motion vectors	E	D
6	Loop filter		D
7	Inverse DCT		D
8	Clipping		D
9	Forced updating	E	
10	Video multiplex	E	
11	Video demultiplex		D
12	Scanning order		D
13	Freeze picture		D
14	Fast update request	E	
15	Maximum Bits per picture	E	D
16	Error correction	E	D
17	FEC stuffing (optional)	E	D
18	Arithmetic loop conformance		D
19	HRD compliance	E	D
20	Extra Insertion Information	E	D

## ZA.2 Description of tests

### ZA.2.1 Video levels (ITU-T Recommendation H.261 § 3.1)

#### PURPOSE:

As the way to produce digital input signals is not a part of ITU-T Recommendation H.261, the only purpose of this test is to verify that the encoder supports input values from 1 to 254 for luminance and the two colour difference components. This test can only be performed when digital I/O are available.

A complete test of the video levels should take place in a complete system quality conformance (black level/white level/linearity).

#### ZA.2.1.1 Encoder

#### METHOD:

Connect a digital source pattern which contains all the permitted values to the encoder under test and connect the output of the encoder under test to the reference decoder.

#### RESULTS:

Check the pictures decoded with the reference decoder. Inputs from black to white shall imply outputs to black to white.

#### ZA.2.1.2 Decoder

#### METHOD:

Encode the same digital source pattern with the reference encoder and decode the produced bitstream with the decoder under test. Digital source pattern: uniform picture with programmable values Y, CB and CR from 1 to 254.

#### RESULTS:

Check the pictures decoded with the decoder under test. Pattern values corresponding to black to white shall imply outputs to black to white. Value 128 shall give grey picture.

### ZA.2.2 Geometrical Distortion (ITU-T Recommendation H.261 § 3.1)

#### ZA.2.2.1 Encoder

#### PURPOSE:

A CIF encoder shall take luminance and colour difference samples in accordance with the requirements of ITU-T Recommendation H.261 § 3.2 and shall maintain an aspect ratio of 4:3. The purpose of this test is to verify that sampling and aspect ratio.

#### METHOD:

If the encoder under test is capable of operating at CIF, then, with the encoder operating at that resolution, provide an image containing a square, circle and cross all centred on the centre of the image (see figure ZA.1). Connect the output of the encoder under test to the reference decoder.

#### RESULT:

Check the pictures decoded with the reference decoder. Verify that there has been no geometrical distortion of the image.

iTeh STANDARD PREVIEW

(standards.iteh.ai)

[SIST ETS 300 142 E1:2003](https://standards.iteh.ai/catalog/standards/sist/fd83c405-2610-45cb-a1ef-c92e1dacd25/sist-ets-300-142-e1-2003)

<https://standards.iteh.ai/catalog/standards/sist/fd83c405-2610-45cb-a1ef-c92e1dacd25/sist-ets-300-142-e1-2003>



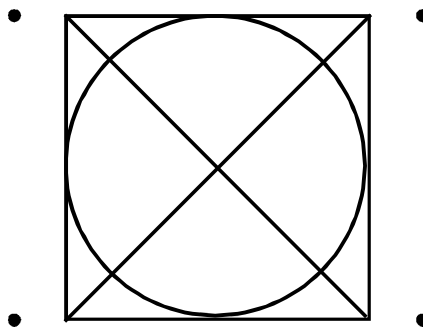


Figure ZA.1

### ZA.2.3 Frame rates (ITU-T Recommendation H.261 § 3.1)

#### ZA.2.3.1 Encoder

##### PURPOSE:

An encoder shall control its output bitstream to comply with the requirements of the Hypothetical Reference Decoder (HRD) defined in ITU-T Recommendation H.261, annex B.

In ITU-T Recommendation H.261 § 3.1 is stated: "*Means shall be provided to restrict the maximum picture rate of encoders by having at least 0, 1, 2 or 3 non-transmitted pictures between transmitted ones. Selection of this minimum number and CIF or QCIF shall be by external means (for example via ITU-T Recommendation H.221)*".

The purpose of the test is to verify that an encoder never sends more pictures per second than signalled by the decoder.

iTeH STANDARD PREVIEW  
(standards.iteh.ai)

##### METHOD:

At the encoder provide an image sequence which contains the following, low detail stills, long periods of high motion, panning, zooming, scene cuts, and high detail stills. The output bitstream (ITU-T Recommendation H.261) is stored for off-line analysis. A minimum of 55 minutes of picture data should be stored.

NOTE: To reduce storage requirements the following could be stored instead:

- accurate time stamps for the Picture Start Codes (PSCs);
- temporal reference count;
- the number of bits between each PSC.

All allowable bit rates which are within the encoders declared range should be tested.

Input this video sequence to an encoder. Signal to the encoder the decoder capabilities of 0, 1, 2, 3 non transmitted pictures between transmitted ones. Supervise the Temporal Reference in the picture layer. Supervise the hypothetical buffer verifier. Perform the test for QCIF and CIF (if the encoder claims to encode also CIF).

## RESULTS:

An encoder can only be said to be compliant if the mean rate of Picture Start Codes is  $29,97 \text{ Hz} \pm 50 \text{ ppm}$  and it satisfies the HRD.

- a) The exchange of decoder capabilities (ITU-T Recommendations H.221 and H.242) results in allowed values for the Temporal Reference (TR) in the picture layer.

The allowed maximum encoder picture rate is  $(29,97 \text{ Hz} \pm 50 \text{ ppm}) / (n+1)$ ;  $n = 0, 1, 2, 3$ .

Then the corresponding modulo 32 difference between an actual TR and the TR of the last encoded picture can have all integer values between  $n+1, n+2, \dots, 31$ .

- b) In all cases the buffer of the Hypothetical Reference Decoder (ITU-T Recommendation H.261, annex B) shall not overflow (the data stream shall conform to the hypothetical buffer verifier).

EXAMPLE: Signalled is  $n = 2$ ; then the maximum allowed picture rate is 29,97 Hz divided by 3 (approximately 10 Hz). The modulo 32 difference between an actual TR and the TR of the last received picture can have all values between 3 and 31.

**ZA.2.3.2 Decoder**

## PURPOSE:

Purpose of the test is to verify that a decoder which claims to have capability to decode sequences with encoded picture rates of:

$(29,97 \text{ Hz} \pm 50 \text{ ppm}) / (n+1)$ ;  $n = 0, 1, 2, 3$   
 really does it for all picture material. **(standards.iteh.ai)**

## METHOD:

[SIST ETS 300 142 E1:2003](https://standards.iteh.ai/catalog/standards/sist/83c405-3610-45cb-a1ef-9b2c14ae125/sist-ets-300-142-e1-2003)

Input a data stream conforming to ITU-T Recommendation H.261 describing a video sequence (as the one used in subclause ZA.2.3.1) to a decoder at the lowest claimed value of  $n$  for at least 55 minutes. Care should be taken to ensure the data stream describes a sequence encoded at the claimed value of  $n$  (i.e. there is no picture dropping).

## RESULTS:

The decoded pictures should be the same as on the reference decoder.

## EXAMPLE:

Most critical should be, e.g. the following sequence:

- a synthetic picture sequence consisting of pictures with diagonal stripes (high saturation, diagonal frequency corresponding to approx. 1 MHz), the stripes being unmoved for some time and then being moved with 1 pel per encoded frame both horizontally and vertically.

**ZA.2.4 QCIF Support (ITU-T Recommendation H.261 § 3.1)****PURPOSE:**

The ITU-T Recommendation H.261 indicates that two formats are allowed as input to the video coder: the Common Intermediate Format (CIF) and another format known as Quarter-CIF (QCIF) having half the number of pel and half the number of lines of the former. In the first format (CIF), the luminance sampling structure is 352 pels per line, 288 lines per picture in an orthogonal arrangement. Sampling of each of the two colour difference components is at 144 lines, 176 pixels per line, orthogonal.

ITU-T Recommendation H.261 also specifies that the picture area covered by this number of pixels and lines has an aspect ratio of 4:3. In addition ITU-T Recommendation H.261 also states that all codecs shall be able to operate using QCIF. This statement prevents the possibility for an encoder to always transmit the entire picture in the CIF form and leaving to a decoder, only able to operate on QCIF, the task of selecting from the video stream the portion corresponding to its need. From this consideration the need arises of testing the QCIF support for both encoder and decoder. In fact when an encoder operates with the QCIF format the decoder shall be able to show a correct picture and conversely if a decoder is only supporting the QCIF the encoder shall be able to transmit a coded bitstream containing only the information related to a QCIF picture.

**ZA.2.4.1 Encoder****METHOD:**

The encoder is set in QCIF mode and the video encoder output is connected to a testing system implementing a reference decoder (either real time or not) enriched by the capability of analysing the bitstream at the Group Of Block (GOB) layer and at the picture layer. Bit 4 of the type information in the picture layer (PTYPE) may only have the value of 0. The range of permitted values for the Group Number (GN) is limited to 1, 3, 5. Other values of PTYPE or GN are not allowed.

Other features of the coded and displayed images shall be checked through the conformance testing involving the active picture area and the block structure.

[SIST ETS 300 142 E1:2003](https://standards.iteh.ai/catalog/standards/sist/fd83c405-2610-45cb-a1ef-cf92e1dacd25/sist-ets-300-142-e1-2003)

**RESULTS:** <https://standards.iteh.ai/catalog/standards/sist/fd83c405-2610-45cb-a1ef-cf92e1dacd25/sist-ets-300-142-e1-2003>

If analyzing the values of the GN contained in the coded bitstream, the presence of values different from 1, 3 or 5 is detected, this certainly reveals a non correct coding of the QCIF picture.

If the image obtained by a reference decoder which is decoding any image coming from the coder under test, doesn't appear as a rectangle and/or it doesn't have an aspect ratio of 4:3, this again emphasizes that the encoder is not correctly handling the QCIF picture.

**ZA.2.4.2 Decoder****METHOD:**

A suitable test pattern (e.g. a regular sequence of black MBs interlaced with white MBs), exactly covering an entire QCIF image, is transmitted by a reference encoder or by a test pattern generator to the decoder under test and a visual verification is performed.

The verification concerns the MBs which have been reconstructed. Their number shall exactly correspond to the number of MBs contained in a QCIF picture, while concerning content and position of each MB reference should be made to tests of those specific topics.

**RESULTS:**

The regular pattern transmitted by the reference encoder shall be reconstructed by the decoder under test with the same number of MBs (11 MBs per line, 9 MBs per row) forming a rectangle having an aspect ratio of 4:3.

## ZA.2.5 Valid motion vectors (ITU-T Recommendation H.261 § 3.2.2)

### ZA.2.5.1 Encoder

#### PURPOSE:

Differential motion vector test.

#### METHOD:

Input a sequence with increasing motion from left to right within GOB's.

#### RESULTS:

The MV's resulting from the differential MV's should not exceed  $\pm 15$ .

#### PURPOSE:

The motion estimation/motion vector range of the encoder.

#### METHOD:

The test input should include test of all 4 directions, that is a white macro-block moving on a dark background should enter and leave through the left, right, top and bottom edge of the picture. A criteria for when a vector is pointing outside the picture can be as follows:

- monitor the produced bitstream and extract the motion vectors, summing differential values to obtain absolute vectors. Eight different restrictions applies to vector magnitudes depending on which MB the vector belongs to, see figure ZA.2.

5	3	6	1: All MB along picture left edge
			2: All MB along picture right edge
			3: All MB along picture top edge
1	0	2	4: All MB along picture bottom edge
			5: Top left corner MB
			6: Top right corner MB
			7: Bottom left corner MB
7	4	8	8: Bottom right corner MB
			0: All other, no restrictions

#### Restrictions:

- |               |                         |
|---------------|-------------------------|
| 1: $x \geq 0$ | 5: $x \geq 0, y \geq 0$ |
| 2: $x \leq 0$ | 6: $x \leq 0, y \geq 0$ |
| 3: $y \geq 0$ | 7: $x \geq 0, y \leq 0$ |
| 4: $y \leq 0$ | 8: $x \leq 0, y \leq 0$ |

Figure ZA.2

#### RESULTS:

The motion estimator should never produce vectors pointing outside the active pixel area. Fail test if pels are referenced outside the coded picture area.