

# **T** ELENOR **N** ETT **S** PECIFICATION

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## **Access to video-type leased circuits. Specification of the network side of the user-network interface**

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**Abstract** : Specification of the network interface of a broadcast type of video connection from point A to point B. This specification describes interfaces for PAL and digital video transmissions via fibre-optics; digitized PAL via 140 Mbit/s and video signals via ETSI codecs on 34 Mbit/s.

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## 1 Scope

This specification gives technical requirements for the network interface presentations of leased circuits used for the transmission of a broadcast type video signal from point A to point B. This specification covers interfaces for PAL and digital video transmission via fibre-optics, digitized PAL via 140 Mbit/s and video via ETSI codecs on 34 Mbit/s.

## 2 References

### 2.1 Normative references

- [1] ITU-R Report 624-4 (1990): "Characteristics of television systems".
- [2] IEC 60169-8 (1978-01) "Radio frequency connectors – Part 8: R.F coaxial connectors with inner diameters or outer conductor 6,5 mm (0,256 in) with bayonet lock – Characteristic impedance 50 ohms (Type BNC).
- [3] IEC 60268-12 (1987-08) "Sound system equipment. Part 12: Application of connectors for broadcast and similar use.
- [4] EN 300 386-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunication network equipment; Electromagnetic Compatibility (EMC) requirements; Part 2: Product family standard". V1.1.3 (1997-12).
- [5] EN 60950: "Safety of information technology equipment including electrical business equipment" (1992)
- [6] EN 41003: "Particular safety requirements for equipment to be connected to telecommunication networks" (1991-05)
- [7] ITU-T K31: "Bonding configurations and earthing of telecommunication installations inside a subscriber's building" (1993-03)
- [8] ITU-T K20: "Resistibility of telecommunication switching equipment to overvoltages and overcurrents" (1996-10)
- [9] ITU-T K15: "Protection of remote-feeding systems and line repeaters against lightning and interference from neighbouring electricity lines" (1988-11)
- [10] ITU-T K.21: "Resistibility of subscribers' terminal to overvoltages and overcurrents" (1996-10)
- [11] ETS 300 174: Network Aspects (NA); Digital coding of component television signals for contribution quality applications in the range 34-45 Mbit/s" (1992-11)
- [12] ETS 300 174 A1: Network Aspects (NA); Digital coding of component television signals for contribution quality applications in the range 34-45 Mbit/s" (1997-08)

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- [13] ITU-R Recommendation BT.601-5 "Studio encoding parameters of digital television for standard 4:3 and wide-screen 16:9 aspect ratios"
- [14] EBU Tech. 3250 (1992): "Specification of the digital audio interface"
- [15] ITU-T Recommendation J.57 (1990-06): "Transmission of digital studio quality sound signals over H1 channels"
- [16] ITU-R Recommendation BT.653-3: "Teletext systems".
- [17] ITU-R Recommendation BT.656-4: "Interfaces for digital component video signals in 525-line and 625-line television systems operating at the 4:2:2 level of Recommendation ITU-R BT.601 (Part A)"

## 2.2 Informative references

- [19] EG 201 147: "Equipment Engineering (EE); Interworking between Direct Current/Isolated (DC/I) and Direct Current/Common (DC/C) electrical power systems". V1.1.2 (1998-02).

## 3 Definitions and abbreviations

PAL - Acronym for Phase Alternate Line - a composite analogue colour transmission system

## 4 Interfaces

### 4.1 Analogue interfaces

#### 4.1.1 Analogue interfaces via fibre-optics

The analogue interfaces for video-type leased circuits via fibre-optics are specified in Annex 1

#### 4.1.2 Analogue interfaces for digitized, non-compressed video via 140 Mbit/s G.703

The analogue interfaces for digitized, non-compressed video transferred via 140 Mbit/s G.703 are specified in Annex 1.

### 4.2 Digital interfaces

#### 4.2.1 Digital interfaces for video signals transferred uncompressed via fibre-optics

The digital interfaces for video transferred uncompressed (270 Mbit/s) via fibre are specified in Annex 2.

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#### **4.2.1 Analogue and digital interfaces for video signals compressed in accordance with ETS 300 174**

The digital interfaces for video transferred via codecs based on ETS 300 174 [11] with Amendments ETS 300 174 A1 [12] are specified in Annex 3.

## **5 Safety, EMC, bonding and overvoltage requirements**

### **5.1 Safety**

Equipment connected to the interface shall be in accordance with [5] EN60950, and [6] EN 41003.

### **5.2 Overvoltage protection**

Equipment connected to the interface shall be in accordance with [8] ITU-T K20 and [9] ITU-T K15.

If the cables between the network termination point and the terminal equipment leave the building, protection of the terminal equipment may be required according to [10] ITU-T K21.

### **5.3 Electromagnetic Compatibility (EMC)**

The EMC requirement for the equipment ports is given in [4] EN 300 386-2, subclause 5.2.3: "Other than telecommunication centres, ports for indoor signal lines". This requirement shall be interpreted as valid for the interface ports formed by the input/output sockets.

### **5.4 Bonding configuration and earthing of equipment using the specified interface**

Bonding configurations and earthing of telecommunication equipment connected to the interface shall be in accordance with [7] ITU-T K31.

Note:

As the outer coaxial conductor normally will be grounded in each end at the equipment ports, a connection between different ground levels and/or different current systems may be established. This may cause transmission noise and have a safety aspect in case of short-circuiting in one of the power feeding systems.

Guidelines to overcome those problems are given in [19] EG 201 147.



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## **ANNEX 1: Analogue interfaces for video connections via fibre-optics and for digitized, non-compressed video transferred via 140 Mbit/s G.703**

### **A.1 Analogue interfaces**

#### **A.1.1 Video interface**

The video interface will be a PAL (625/50) interface as specified in ITU-R report 624-4 [1]

##### **A.1.1.1 Video level**

The level of the video signal is nominally 1 V peak-to-peak.

##### **A.1.1.2 Video connector**

The connector for the video interface will be a BNC connector complying with IEC 60169-8 [2].

##### **A.1.1.3 Video impedance**

The impedance of the video interface will be 75 ohms.

##### **A.1.1.4 Return loss**

The video interface will have a return loss of at least 30 dB.

#### **A.1.2 Audio interface**

##### **A.1.2.1 Audio connector**

The connector for the audio interfaces will be a circular latching 3 pin connector described in IEC 60268-12 [3] (this type of connector is normally called “XLR”). The pin assignment for the connector will be complying with IEC 60268-12 [3].

##### **A.1.2.2 Audio input impedance**

The impedance of the audio input interface will be 600 ohms.

##### **A.1.2.3 Audio output impedance**

The impedance of the output interface will be low (i.e. < 20 ohms)

##### **A.1.2.4 Audio bandwidth**

The transferred bandwidth of the audio signal will be 40 Hz -15 kHz.



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## **ANNEX 2: Digital interfaces for video signals transferred uncompressed (270 Mbit/s) via fibre-optics.**

### **A.2 Digital interfaces**

#### **A.2.1 Digital video interface**

The video signal will be a digital signal encoded according to the 4:2:2 level of the Recommendation ITU-R BT.601-5 [13].

##### **A.2.1.1 Electrical interface**

The electrical interface for the video signal will be a serial interface complying with Recommendation ITU-R BT.656-5 [17].

##### **A.2.1.2 Signal level**

The peak-to-peak signal level will lie between 400 mV and 700 mV across a 75 Ohm resistive load directly connected to the output terminal without any transmission line.

##### **A.2.1.3 Video connector**

The connector for the video interface will be a BNC connector complying with IEC 60169-8 [2]. The electrical characteristics of the connector should permit it to be used up to 500 MHz in 75 Ohms circuits.

##### **A.2.1.4 Video impedance**

The impedance of the video interface will be 75 ohms.

##### **A.2.1.5 Return loss**

The video interface will have a return loss of at least 15 dB over a frequency range of 10 to 243 MHz.

### **A.2.2 Audio interface**

#### **A.2.2.1 Audio connector**

The connector for the audio interfaces will be a circular latching 3 pin connector described in IEC 60268-12 [3] (this type of connector is normally called "XLR"). The pin usage will be as described in EBU Tech 3250 [14]

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#### **A.2.2.2 Audio maximum input signal**

The maximum input level will be as described in EBU Tech 3250 [14] chapter 6.3.2.

#### **A.2.2.3 Audio minimum input signal**

The minimum input level shall be as described in EBU Tech 3250 [14] chapter 6.3.3.

#### **A.2.2.4 Audio input impedance**

The receiver impedance of the audio input interface will be substantially resistive 110 ohms  $\pm$  20 % to the interconnecting cable over the frequency band 0.1 to 6.0 MHz.

#### **A.2.2.5 Audio output signal amplitude**

The signal amplitude will be as described in EBU Tech 3250 [14] chapter 6.2.2.

#### **A.2.2.6 Audio output impedance**

The impedance of the output interface will be 110 ohms.

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## **Annex 3: Analogue and digital interfaces for video signals compressed in accordance with ETS 300 174 (“ETSI-codec”)**

### **A.3 General**

The analogue and digital interfaces for video and audio signals transferred via codecs based on ETS 300 174 [11] with Amendments ETS 300 174 A1 [12] are specified in this annex.

The encoding and transfer of the video signal will be according to the above mentioned ETS . That means that a PAL signal will be decomposed and encoded as a digital component signal at the encoder. The video signal will in this case be encoded back to PAL at the decoder. The coding process will remove several lines outside the active picture. As a result, the data rate available for the video lines that do not belong to the active picture is restricted (i.e. ITS, Teletext). The lines that are processed according the ETS 300 174 A1 [12] are lines 23-310 in Field no. 1 and lines 336 –623 in Field no. 2.

#### **A.3.1 Digital interfaces**

##### **A.3.1.1 Digital video interface**

The video signal will be a digital signal encoded according to the 4:2:2 level, 625 lines of the Recommendation ITU-R BT.601-5 [13]. The aspect ratio will be 4:3.

##### **A.3.1.2 Electrical interface**

The electrical interface for the video signal will a serial interface complying with Recommendation ITU-R BT.656-5 [17].

##### **A.3.1.3 Signal level**

The peak-to-peak signal level will lie between 400 mV and 700 mV across a 75 Ohm resistive load directly connected to the output terminal without any transmission line.

##### **A.3.1.4 Video connector**

The connector for the video interface will be a BNC connector complying with IEC 60169-8 [2]. The electrical characteristics of the connector should permit it to be used up to 500 MHz in 75 Ohms circuits.

##### **A.3.1.5 Video impedance**

The impedance of the video interface will be 75 ohms.

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#### **A.3.1.6 Return loss**

The video interface will have a return loss of at least 15 dB over a frequency range of 10 to 243 MHz.

### **A.3.2 Audio interface**

#### **A.3.2.1 Audio connector**

The connector for the audio interfaces will be a circular latching 3 pin connector described in IEC 60268-12 [3] (this type of connector is normally called “XLR”). The pin usage will be as described in EBU Tech 3250 [14]

#### **A.3.2.2 Audio maximum input signal**

The maximum input level shall be as described in EBU Tech 3250 [14] chapter 6.3.2.

#### **A.3.2.3 Audio minimum input signal**

The minimum input level shall be as described in EBU Tech 3250 [14] chapter 6.3.3.

#### **A.3.2.4 Audio input impedance**

The receiver impedance of the audio input interface will be substantially resistive 110 ohms  $\pm$  20 % to the interconnecting cable over the frequency band 0.1 to 6.0 MHz.

#### **A.3.2.5 Audio output signal amplitude**

The signal amplitude will be as described in EBU Tech 3250 [14] chapter 6.2.2.

#### **A.3.2.6 Audio output impedance**

The impedance of the output interface will be 110 ohms.

#### **A.3.2.7 Transmission of audio signals**

The transmission of the digital audio signal internally will be via a H1 channel as specified in ITU-T Recommendation J.57 (1990-06) [15].

### **A.3.3 Ancillary signals**

#### **A.3.3.1 Combination of digital video signals and ancillary signals.**

It is not possible to combine analogue ITS or teletext signals as specified in ITU-R Recommendation BT.643-3 [16] with a digital video signal.

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### **A.3.3.2 Capacity and transmission frame for teletext signals**

There will be a capacity for teletext signals of 384 kbit/s. The transmission frame for these lines will be as specified in ETS 300 174 [11] chapter 9.3

### **A.3.3.3 Capacity and transmission format for ITS signals**

There will be a capacity for Insertion Test Signals (ITS) signals of 128 kbit/s. The transmission format for these lines will be as specified in ETS 300 174 [11] chapter 9.4.

## **A.3.4 Analogue interfaces**

see also A.3 General for restriction of the transferred signals.

### **A.3.4.1 Video interface**

The video interface will be a PAL (625/50) interface as specified in ITU-R report 624-4 [1]

#### **A.3.4.1.1 Video level**

The level of the video signal is nominally 1 V peak-to-peak.

#### **A.3.4.1.2 Video connector**

The connector for the video interface will be a BNC connector complying with IEC 60169-8 [2].

#### **A.3.4.1.3 Video impedance**

The impedance of the video interface will be 75 ohms.

#### **A.3.4.1.4 Return loss**

The video interface will have a return loss of at least 30 dB.

### **A.3.4.2 Audio interface**

#### **A.3.4.2.1 Audio connector**

The connector for the audio interfaces will be a circular latching 3 pin connector described in IEC 60268-12 [3] (this type of connector is normally called "XLR"). The pin assignment for the connector will be complying with IEC 60268-12 [3].

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**A.3.4.2.2 Audio input impedance**

The impedance of the audio input interface will be  $>12$  kohms.

**A.3.4.2.3 Audio output impedance**

The impedance of the output interface will be low (i.e.  $< 20$  ohms)

**A.3.4.2.4 Audio bandwidth**

The transferred bandwidth of the audio signal will be 40 Hz -15 kHz.