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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Video surveillance systems for use in security applications – Part 3: Analog and digital video interfaces

Systèmes de vidéosurveillance destinés à être utilisés dans les applications de sécurité – Partie 3: Interfaces vidéo analogiques et vidéo numériques

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CONTENTS

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VIDEO SURVEILLANCE SYSTEMS FOR USE IN SECURITY APPLICATIONS –

Part 3: Analog and digital video interfaces

FOREWORD

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International Standard IEC 62676-3 has been prepared by technical committee 79: Alarm and electronic security systems.

The text of this standard is based on the following documents:

FDIS	Report on voting
79/417/FDIS	79/429/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62676 series, published under the general title *Video surveillance systems for use in security applications*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

The IEC Technical Committee 79 in charge of alarm and electronic security systems together with many governmental organizations, test houses and equipment manufacturers has defined a common framework for video surveillance transmission in order to achieve interoperability between products.

The IEC 62676 series of standards on video surveillance systems is divided into four independent parts:

Part 1: System requirements

Part 2: Video transmission protocols

Part 3: Analog and digital video interfaces

Part 4: Application guidelines

Each part offers its own clauses on scope, references, definitions and requirements.

This IEC Standard Part 3 of IEC 62676 specifies physical, electrical interface and software specifications of analog and digital video interfaces in Video Surveillance Systems (VSS), so far called Closed Circuit Television (CCTV).

For analog video interfaces, analog video signal such as Composite Video is still the most commonly used interface among Video Surveillance Systems equipment. Though broadcast television industry has adopted composite video standards (e.g. NTSC, PAL), they have not been consistently applied for Video Surveillance Systems applications and it is important to standardize the interface to ensure interoperability between Video Surveillance Systems.

Also, as broadcast is moving towards digital, there are many possibilities to improve the performance with these new Video Interfaces compared to conventional Analog Video Interface, and thus it is important to standardize those new Analog Video interface and also Digital Video Interface to ensure interoperability among Video Surveillance Systems using these new interfaces.

For digital video interface, IEC 62676-1-2, IEC 62676-2-1, IEC 62676-2-2 and IEC 62676-2-3 focus on video transmission and compressed IP video transmissions by specifying internet (IP) and higher layers. IEC 62676-3 completes the communication layer specification by describing uncompressed digital video and two lowest layer protocols such as physical and network access.

VIDEO SURVEILLANCE SYSTEMS FOR USE IN SECURITY APPLICATIONS –

Part 3: Analog and digital video interfaces

1 Scope

This Part of IEC 62676 specifies physical, electrical and software interface (non-IP) specifications of analog and digital video interface in video surveillance systems (so far called CCTV) applications. Video interfaces are used both for connection and transmission of surveillance video, audio and control signals. Through video interfaces, video surveillance systems can be put together by connecting various components such as image capturing devices, image handling devices, etc. This International Standard ensures interoperability among various video surveillance components.

This International Standard applies strictly to Video Surveillance Systems. This standard is based on broadcast television standards and other standards, and it defines the minimum requirements for analog and digital video interfaces to meet VSS's requirements, interoperability and de facto practice.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*

IEC 62315-1:2003, *DTV profiles for uncompressed digital video interfaces – Part 1: General*

VESA Industry Standards & Guidelines for Computer Display Monitor Timing (DMT) Version 1 Revision 11

VESA Video Signal Standard (VSIS) Version 1, Rev. 2

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1
analog
a form of information that is represented by a continuous and smoothly varying amplitude or frequency changes over a certain range

3.1.2
analog bandwidth
the difference between the upper and lower frequencies in a contiguous set of frequencies

Note 1 to entry: It is expressed in cycles per second, or Hertz (Hz).

3.1.3
analog video
video signal made of a continuous electrical signal which contains the luminance (brightness) and chrominance (color) of the image

Note 1 to entry: This video signal may be carried in separate channels, as in component video (YPbPr) and S-Video, or combined in one channel, as in composite video and RF connector.

3.1.4
BNC jack
a type of connector used to input/output analog video signals, component video signals and serial digital video signals, with the female electrical contact or socket, and is the "more fixed" connector of a connector pair

Note 1 to entry: Relevant specifications can refer to IEC 61169-8.

3.1.5
channel
one or more streams of video, audio and/or metadata that together constitute a unique entity for the purpose of surveillance

3.1.6
color depth
pixel depth
the number of bits used to represent the color of a single pixel in a bitmapped image or video frame buffer

3.1.7
component
a software or hardware object, meant to interact with other components, encapsulating certain functionality or a set of functionalities with clearly defined interfaces and conforming to a prescribed behaviour common to all components within a standard

3.1.8
component video
a type of analog video information which is transmitted or stored as three separate signals

3.1.9
composite video
one format of analog video which contains all required video information in a single line-level signal, including three source signals called Y, U and V with sync pulses

Note 1 to entry: It is usually in standard formats such as NTSC, PAL and SECAM.

3.1.10
composite video broadcast signal
one type of composite video signal which transfers data with analog waveform

3.1.11
DB9 connector
a common type of electrical connector used particularly in computers

3.1.12
DC voltage
the unidirectional flow of electric charge

3.1.13
differential gain
one kind of linearity distortion which affects the color saturation in TV broadcasting

3.1.14
differential phase
one kind of linearity distortion which affects the color hue in TV broadcasting

3.1.15
digital
information coded in discrete, separate pulses or signal levels

3.1.16
digital video
video is presented as a sequence of digital data in binary format, rather than in a continuous signal as analog information

3.1.17
displayPort
a digital display interface standard put forth by VESA which defines a digital audio/video interconnect used primarily between a computer and its display, or a computer and a home-theater system

3.1.18
equipment set-up
configuration and calibration of the equipment and operating software (if applicable)

3.1.19
fiber distributed data interface
one type of interface which provides a 100 Mbps optical standard for data transmission in a local area network

3.1.20
frame
full frame of video as combination of two image fields interlaced together

3.1.21
interoperability
the ability of systems and units to provide services and to accept services from other systems and units, in order to use the services for efficient operation.

Note 1 to entry: This term also refers to ability for information or services to be exchanged directly and smoothly between providers and consumers.

3.1.22
internet protocol
basic connectionless network-layer protocol

3.1.23
NTSC
national television standards committee
standardized video signal format used in North America and other parts of the world, delivering 29,97 frames per second and 525 scanlines

3.1.24
network interface
point of communication between a device and the network

3.1.25
open system interconnection
complete suite of network routing protocols developed by ISO including routing protocols between the different layers of the system

3.1.26
PAL
phase alternating line
analog color encoding system used in television systems in Europe and in many other parts of the world, defining the video signal, using 625 TV lines per frame, at a refresh rate equal to 25 frames per second

3.1.27
physical transmission path
combination of the transmission medium, necessary amplifiers and other equipment to form a transmission path with one or more transmission channels

3.1.28
picture aspect ratio
the aspect ratio of a picture is the ratio of the width of the image to its height

3.1.29
principle
fundamental rule applicable to a large number of situations and variations

3.1.30
RCA jack
a type of connector used to input/output analog audio/video signals, with the female electrical contact or socket, and is the “more fixed” connector of a connector pair

3.1.31
RJ45 jack
one type of registered jack which specifies the physical male and female connectors as well as the pin assignments of the wires in a network cable

3.1.32
serial digital interface
a family of video interfaces standardized by the Society of Motion Picture and Television Engineers (SMPTE)

Note 1 to entry: For example, ITU-R.BT.656 and SMPTE 259M define digital video interfaces used for broadcast-grade video.

3.1.33
transition of minimized differential signaling
one technology for transmitting high-speed serial data and is used by the DVI and HDMI video interfaces, as well as other digital communication interfaces

3.1.34
transmission channel
combination of the transmission medium and necessary amplifiers and other equipment to form a connection between video equipment in a VSS system

3.1.35
transmission system
combination of equipment and media that provide the transmission of video signals between various VSS equipment

3.1.36
video graphic array
a video interface standard used for computer monitors, where ability to transmit a sharp, detailed image is essential

3.1.37
video matrix
a unit for connecting several input video signals to several outputs

3.1.38
video surveillance system
a system consisting of camera equipment, storage, monitoring and associated equipment for transmission and controlling purposes

3.1.39
Y/C video
a type of analog video transmission scheme in which video information is encoded on two channels: luma (luminance, "Y") and chroma (color, "C")

3.2 Abbreviations

For the purposes of this document, the following abbreviations apply.

3G-SDI	3-Gbps Serial digital interface
APL	Average Peaks Level
BNC	Bayonet Neill-Concelman
CAT5	Category 5 cable
CCIR	Consultative Committee of International Radio (International Consultative Committee for Radio)
CCTV	Closed Circuit Television – In the rest of the series called VSS (Video Surveillance Systems)
CRT	Cathode Ray Tube
CVBS	Composite Video Broadcast Signal
DC	Direct Current
DCE	Data Communications Equipment
DDC	Display Data Channel
DDWG	Digital Display Working Group
DIN	Deutsche Industrie für Normen
DP	DisplayPort
DMT	Display Monitor Timing
DTE	Data Terminal Equipment
DTV	Digital TeleVision
DVI	Digital Visual Interface
EDID	Extended Display Identification Data
FCC	Federal Communications Commission
FDDI	Fiber Distributed Data Interface
HDcctv	High Definition Closed Circuit Television
HD-SDI	High Definition Serial Digital Interface
HDMI	High-Definition Multimedia Interface
IP	Internet Protocol
LCD	Liquid Crystal Display
LED	Light Emitting Diode
NTSC	National Television Systems Committee
OSI	Open Systems Interconnection

PAL	Phase Alternating Line
PC	Personal Computer
PPP	Point-to-Point Protocol
PTZ	Pan/Tilt/Zoom
RCA	Radio Corporation of America
RF	Radio Frequency
RGB	Red, Green, Blue
SDI	Serial Digital Interface
SECAM	Sequential Couleur A Memoire
SMPTE	Society of Motion Picture and Television Engineers
S-Video	Separate Video
TCP	Transmission Control Protocol
TMDS	Transition of Minimized Differential Signaling
VESA	Video Electronics Standard Association
VGA	Video Graphic Array
VSIS	Video Signal Standard
VSS	Video Surveillance System
VTD	Video Transmission Device
Y/C	Luma (luminance, "Y") / Chroma (color, "C")

4 General information

4.1 General principles

This clause consists of informative general information about analog and digital video interfaces.

To achieve interoperability between analog and digital video devices connected to each other as well as the necessary auxiliary devices in video surveillance system, it is necessary to develop a basic standard of the analog/digital video interfaces based on existing correlative standards. Thus this standard prescribes the physical interface, electric interface, as well as the software/protocol interface among different devices. The scheme of interface hierarchy is shown in Figure 1 below.

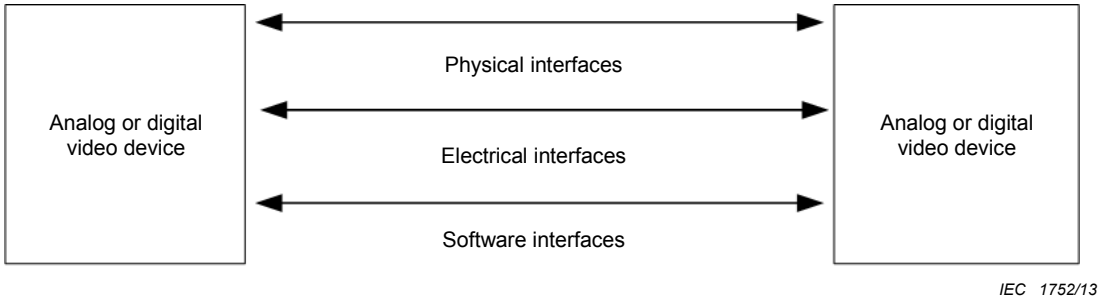

Figure 1 – Interface hierarchy of analog and digital video device

Manufacturers of both hardware and software system in video surveillance field should ensure that their products conform to the requirements specified in this standard.

Communication standards/protocols can be conceptually modelled by the ISO OSI reference model of seven layers: physical, data link, network, transport, session, presentation, and