

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Video surveillance systems for use in security applications –
Part 2-32: Recording control and replay based on web services**

**Systèmes de vidéosurveillance destinés à être utilisés dans les applications de sécurité –
Partie 2-32: Contrôle d'enregistrement et lecture en fonction des services Web**





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International Standard IEC 62676-2-32 has been prepared by IEC technical committee 79: Alarm and electronic security systems.

This first edition, together with IEC 60839-11-31 and IEC 62676-2-31, cancels and replaces IEC 62676-2-3:2013.

This edition includes the following significant technical changes with respect to IEC 62676-2-3:2013:

- a) an export file format has been added.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
79/621/FDIS	79/623/RVD

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

This document 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 document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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INTRODUCTION

The goal of this document is to provide a fully interoperable network video recording and reply implementation comprised of products from different vendors. This document describes the network video recording model, interfaces, data types and data exchange patterns. The document reuses existing relevant standards where available, and introduces new specifications only where necessary to support the specific requirements for network video recording and reply.

VIDEO SURVEILLANCE SYSTEMS FOR USE IN SECURITY APPLICATIONS –

Part 2-32: Recording control and replay based on web services

1 Scope

This part of IEC 62676 specifies the web service interface for the configuration of the recording of video, audio and metadata. Additionally, associated events are defined.

Clause 4 provides a definition of the storage model this document is based on.

Web service usage is outside the scope of this document. Please refer to the IEC 60839-11-31 for more information

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60839-11-31:2016, *Alarm and electronic security systems – Part 11-31: Electronic access control systems – Core interoperability protocol based on Web Services*

IEC 62676-2-31:2019, *Video surveillance system for use in security applications – Part 2-31: Live streaming and control based on web services*

Internet Assigned Numbers Authority (IANA), Media Types, *Media Types* [online]. Edited N. Freed et al. [viewed 2019-02-28]. Available at <https://www.iana.org/assignments/media-types/media-types.xhtml>

INTERNET ENGINEERING TASK FORCE (IETF). RFC 2326: *Real Time Streaming Protocol (RTSP)* [online]. Edited by H. Schulzrinne et al. April 1998 [viewed 2019-02-28]. Available at <http://www.ietf.org/rfc/rfc2326.txt>

INTERNET ENGINEERING TASK FORCE (IETF). RFC 3280, *Internet X.509 Public Key Infrastructure – Certificate and Certificate Revocation List (CRL) Profile* [online]. Edited by Housley, et. al. April 2002 [Viewed 2019-02-28]. Available at <http://www.ietf.org/rfc/rfc3280.txt>

INTERNET ENGINEERING TASK FORCE (IETF). RFC 3550, *RTP: A Transport Protocol for Real-Time* [online]. Edited by Schulzrinne, et al. Jul 2003 [viewed 2019-02-28]. Available at <https://www.ietf.org/rfc/rfc3550.txt>

INTERNET ENGINEERING TASK FORCE (IETF). RFC 4055, *Additional Algorithms and Identifiers for RSA Cryptography for use in the Internet X.509 Public Key Infrastructure – Certificate and Certificate Revocation List (CRL) Profile* [online]. Edited by Schaad, et al. June 2005 [viewed 2019-02-28]. Available at <https://www.ietf.org/rfc/rfc4055.txt>

The World Wide Web Consortium (W3C). SOAP12-PART1, *SOAP 1.2 – Part 1, Messaging Framework* [online]. Edited by M. Gudgin et al. Apr 2007 {Viewed 2019-02-28}. Available at <https://www.w3.org/TR/soap12-part1/>

The World Wide Web Consortium (W3C). XML-Schema 1, W3C XML Schema – Part 1: Structures Second Edition [online]. Edited by H. Thompson et al. Oct 2004 [viewed 2019-02-28]. Available at <https://www.w3.org/TR/xmlschema-1/>

The World Wide Web Consortium (W3C). XML-Schema 2, W3C XML Schema – Part 2: Datatypes Second Edition [online]. Edited by P. Biron et al. Oct 2004 [viewed 2019-02-28]. Available at <https://www.w3.org/TR/xmlschema-2/>

The World Wide Web Consortium (W3C). XPath 1.0, XML Path Language (XPath) Version 1.0 [online]. Edited by J. Clark et al. Nov 1999 [Viewed 2019-02-28]. Available at <https://www.w3.org/TR/1999/REC-xpath-19991116/>

Federal Information Processing Standard (FIPS), FIPS 180-4, *Secure Hash Standard (SHS)* [online]. [viewed 2019-02-28]
Available at <https://csrc.nist.gov/publications/detail/fips/180/4/final>

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1.1

access unit

one or more frames or samples of audio, video, or metadata, which are contained in a group of RTP packets having the same presentation time

3.1.2

certificate

data which binds a public key to a subject entity

Note 1 to entry: The certificate is digitally signed by the certificate issuer to allow for verifying its authenticity.

3.1.3

metadata

streaming data except video and audio, including video analytics results, PTZ position data and other metadata (such as textual data from POS applications)

3.1.4

recording

container for a set of audio, video and metadata tracks

Note 1 to entry: A recording can hold one or more tracks. A track is viewed as an infinite timeline that holds data at certain times.

3.1.5

recording event

event associated with a recording, represented by a notification message in the APIs