

# 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**



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2019 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

#### IEC publications search - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [sales@iec.ch](mailto:sales@iec.ch).

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

### A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

### A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

#### Recherche de publications IEC -

[webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

#### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [sales@iec.ch](mailto:sales@iec.ch).

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

#### Glossaire IEC - [std.iec.ch/glossary](http://std.iec.ch/glossary)

67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

# 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**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 13.320

ISBN 978-2-8322-7036-3

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD .....	6
INTRODUCTION.....	8
1 Scope .....	9
2 Normative references.....	9
3 Terms, definitions and abbreviated terms.....	10
3.1 Terms and definitions .....	10
3.2 Abbreviated terms .....	11
4 Overview.....	11
4.1 Interfaces.....	11
4.2 Storage model.....	12
4.3 Recording control .....	13
4.4 Search.....	14
4.5 Replay control.....	14
4.6 Export file format.....	14
4.6.1 Layout .....	14
4.6.2 Use case 1: Playback of chunked and oversize clips at remote site.....	15
4.6.3 Use case 2: Forensic analysis at court.....	16
4.6.4 Use case 3: Playback at players not equipped according to the present specification.....	16
4.7 Receiver .....	16
5 Recording control service.....	16
5.1 Overview .....	16
5.2 General requirements .....	18
5.3 Data structures.....	18
5.3.1 RecordingConfiguration .....	18
5.3.2 TrackConfiguration .....	18
5.3.3 RecordingJobConfiguration .....	18
5.4 CreateRecording .....	20
5.5 DeleteRecording .....	21
5.6 GetRecordings .....	21
5.7 SetRecordingConfiguration .....	22
5.8 GetRecordingConfiguration .....	22
5.9 CreateTrack .....	23
5.10 DeleteTrack .....	24
5.11 GetTrackConfiguration.....	24
5.12 SetTrackConfiguration .....	25
5.13 CreateRecordingJob.....	25
5.14 DeleteRecordingJob .....	26
5.15 GetRecordingJobs.....	27
5.16 SetRecordingJobConfiguration.....	27
5.17 GetRecordingJobConfiguration.....	28
5.18 SetRecordingJobMode.....	28
5.19 GetRecordingJobState.....	29
5.20 GetRecordingOptions .....	31
5.21 ExportRecordedData .....	31
5.22 StopExportRecordedData .....	32
5.23 GetExportRecordedDataState .....	33

5.24	GetServiceCapabilities .....	34
5.25	Events .....	35
5.25.1	General .....	35
5.25.2	Recording job state changes .....	35
5.25.3	Configuration changes .....	35
5.25.4	Data deletion .....	36
5.25.5	Recording and track creation and deletion .....	36
5.26	Examples .....	37
5.26.1	Example 1: setup recording of a single camera .....	37
5.26.2	Example 2: Record multiple streams from one camera to a single recording .....	38
6	Search service .....	38
6.1	General .....	38
6.2	Concepts .....	39
6.2.1	Search direction .....	39
6.2.2	Recording event .....	39
6.2.3	Search session .....	39
6.2.4	Search scope .....	40
6.2.5	Search filters .....	40
6.2.6	Time information .....	40
6.3	Data structures .....	40
6.3.1	RecordingInformation structure .....	40
6.3.2	RecordingSourceInformation structure .....	41
6.3.3	TrackInformation structure .....	41
6.3.4	SearchState Enumeration .....	42
6.3.5	MediaAttributes structure .....	42
6.3.6	FindEventResult structure .....	42
6.3.7	FindPTZPositionResult structure .....	42
6.3.8	PTZPositionFilter structure .....	42
6.3.9	MetadataFilter structure .....	43
6.3.10	FindMetadataResult structure .....	43
6.4	GetRecordingSummary .....	43
6.5	GetRecordingInformation .....	43
6.6	GetMediaAttributes .....	44
6.7	FindRecordings .....	45
6.8	GetRecordingSearchResults .....	45
6.9	FindEvents .....	46
6.10	GetEventSearchResults .....	47
6.11	FindPTZPosition .....	48
6.12	GetPTZPositionSearchResults .....	49
6.13	FindMetadata .....	50
6.14	GetMetadataSearchResults .....	51
6.15	EndSearch .....	52
6.16	GetServiceCapabilities .....	53
6.17	Recording event descriptions .....	53
6.18	XPath dialect .....	54
7	Replay control .....	55
7.1	Request replay URI .....	55
7.2	ReplayConfiguration .....	56

7.3	SetReplayConfiguration .....	56
7.4	GetReplayConfiguration.....	56
7.5	GetServiceCapabilities .....	57
8	Playback .....	57
8.1	RTSP Usage .....	57
8.2	RTSP describe .....	58
8.3	RTP header extension .....	58
8.3.1	General .....	58
8.3.2	NTP timestamps.....	59
8.3.3	Compatibility with the JPEG header extension .....	59
8.4	RTSP feature tag.....	60
8.5	Initiating playback .....	60
8.5.1	General .....	60
8.5.2	Range header field .....	60
8.5.3	Rate-Control header field.....	61
8.5.4	Frames header field.....	61
8.5.5	Synchronization points.....	62
8.6	Reverse replay .....	62
8.6.1	Initiation.....	62
8.6.2	Packet transmission order.....	62
8.6.3	RTP sequence numbers.....	64
8.6.4	RTP timestamps.....	64
8.7	RTSP Keepalive .....	65
8.8	Currently recording footage.....	65
8.9	End of footage.....	65
8.10	Go To Time .....	65
8.11	Use of RTCP.....	65
9	Export file format .....	66
9.1	Required side information .....	66
9.2	Timing .....	68
9.3	Correction of start time .....	68
9.4	Signature .....	68
9.4.1	Preparing the signature input .....	68
9.4.2	Generating the signature .....	68
9.4.3	Include the generated signature in the file .....	69
9.5	Repeated signing .....	70
10	Receiver service .....	71
10.1	General .....	71
10.2	Synchronization points.....	72
10.3	Persistence .....	72
10.4	Receiver modes .....	72
10.5	Receiver commands .....	72
10.5.1	GetReceivers .....	72
10.5.2	GetReceiver.....	73
10.5.3	CreateReceiver .....	73
10.5.4	DeleteReceiver.....	73
10.5.5	ConfigureReceiver.....	74
10.5.6	SetReceiverMode .....	74
10.5.7	GetReceiverState .....	75

10.6	GetServiceCapabilitites .....	75
10.7	Events .....	76
10.7.1	General .....	76
10.7.2	ChangeState .....	76
10.7.3	Connection Failed .....	76
Annex A (informative)	Repeated signing .....	77
Annex B (normative)	Schema files .....	79
B.1	Recording control .....	79
B.2	Search .....	89
B.3	Replay control .....	96
B.4	Receiver .....	98
B.5	Common Schema .....	102
Bibliography	.....	110
Figure 1	– Storage model with tracks .....	13
Figure 2	– Sealing and examination in a nutshell (Source: Wikipedia).....	15
Figure 3	– Example of recordings and tracks .....	17
Figure 4	– RecordingJobConfiguration structure .....	19
Figure 5	– RecordingJobStateInformation structure .....	30
Figure 6	– Recording state chart.....	41
Figure 7	– Packet transmission during forward playback .....	63
Figure 8	– Packet transmission during reverse playback .....	64
Figure A.1	– Single signature box arrangement .....	77
Figure A.2	– Repeated signature box arrangement .....	77
Table 1	– Referenced namespaces (with prefix) .....	12
Table 2	– Track configuration .....	21
Table 3	– RTP packet layout .....	58
Table 4	– RTP packet with JPEG header layout.....	59

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**VIDEO SURVEILLANCE SYSTEMS FOR  
USE IN SECURITY APPLICATIONS –****Part 2-32: Recording control and replay based on web services**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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

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

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## 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