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SERIES F: NON-TELEPHONE TELECOMMUNICATION SERVICES

Multimedia services

Requirements for visual surveillance system interworking

Recommendation ITU-T F.743.3

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Recommendation ITU-T F.743.3

Requirements for visual surveillance system interworking

Summary

Recommendation ITU-T F.743.3 defines the interworking requirements for visual surveillance systems (VSSs). The visual surveillance system interworking (VSSI) mechanism can achieve cross-system scheduling of multimedia (such as video, audio and image) and enables resource and data sharing of different VSSs. Recommendation ITU-T F.743.3 provides the service scenarios and functional requirements for VSSI.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
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Keywords

Camera, interworking, playback, remote control, visual surveillance.

* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

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1 Scope

This Recommendation describes the service scenarios, functional requirements and reference model for visual surveillance system interworking (VSSI), based on the requirements and architectures defined by [ITU-T F.743], [ITU-T H.626], [ITU-T H.626.1] and [ITU-T H.627].

A visual surveillance (VS) service is a telecommunication service focusing on video (and audio) application technology, which is used to remotely capture multimedia (such as audio, video, image and various alarm signals), and present them to end users in a friendly manner (including accessibility aspects), based on a broadband network with ensured quality, security and reliability. The VSSI mechanism can achieve cross-system scheduling of multimedia (such as video, audio and image) and enables the resource and data sharing of different visual surveillance systems (VSSs).

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T F.743] Recommendation ITU-T F.743 (2009), *Requirements and service description for visual surveillance*.

[ITU-T H.626] Recommendation ITU-T H.626 (2011), *Architectural requirements for visual surveillance*.

[ITU-T H.626.1] Recommendation ITU-T H.626.1 (2013), *Architecture for mobile visual surveillance*.

[ITU-T H.627] Recommendation ITU-T H.627 (2012), *Signalling and protocols for visual surveillance*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 application [b-ITU-T Y.101]: A structured set of capabilities, which provide value-added functionality supported by one or more services.

3.1.2 customer [b-ITU-T M.60]: A customer is an entity which receives services offered by a service provider based on a contractual relationship. It may include the role of a network user.

3.1.3 customer unit [ITU-T H.626]: A device located at the customer part of a visual surveillance system and used to present multimedia information (such as audio, video, image, alarm signal, etc.) to the end user.

3.1.4 premises unit [ITU-T H.626]: A device located at the remote part of a visual surveillance system and used to capture multimedia information (such as audio, video, image, alarm signal, etc.) from a surveilled object.

3.1.5 service [b-ITU-T Y.101]: A structure set of capabilities intended to support applications.

3.1.6 visual surveillance [ITU-T H.626]: A telecommunication service focusing on video (but including audio) application technology, which is used to remotely capture multimedia (such as audio, video, image, alarm signals, etc.) and present them to the end user in a user-friendly manner, based on a managed broadband network with ensured quality, security and reliability.

3.2 Terms defined in this Recommendation

This Recommendation defines the following term:

3.2.1 visual surveillance system interworking platform: A series of devices and subsystems located at the centred part of the interworking visual surveillance systems. The platform is used to integrate the capabilities of different visual surveillance systems and enable the resource and data sharing of different visual surveillance systems.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

CMU Centre Management Unit

CU Customer Unit

PTZ Pan/Tilt/Zoom

PU Premises Unit

QoE Quality of Experience

QoS Quality of Service

NAT Network Address Translation

NVR Network Video Recorder

PC Personal Computer

SCU Service Control Unit

SIG System Interworking Gateway

VS Visual Surveillance

VSS Visual Surveillance System

VSSI Visual Surveillance System Interworking

5 Conventions

In this Recommendation:

– The keywords "is required to" indicate a requirement that must be strictly followed and from which no deviation is permitted if conformance to this recommendation is to be claimed.

– The keywords "is recommended" indicate a requirement that is recommended, but which is not absolutely required. Thus this requirement need not be present to claim conformance.

6 Scenarios

This clause describes typical service scenarios illustrating visual surveillance system interworking (VSSI) and deriving its service requirements. Each visual surveillance system (VSS) has its own centre management unit (CMU), and different VSSs have different CMUs.

6.1 Cross-system real-time surveillance

Case 1: Cross-system interoperation

Bus company A, traffic management department B and police department C have their own VSSs. The bus company installs its VSS in its buses and bus stations. The traffic management department installs its VSS on the main traffic roads of the city. The police department also installs its VSS on some streets of city. Those VSSs can be connected by the VSSI mechanism. Customer Li is a member of the police department. Li can directly view the real-time video of the VSSs of A, B and C so that he can find and handle any emergency by synthesizing a wide range of information.

Step 1: The VSSs of A, B and C are interconnected through a VSSI mechanism. The VSSs of A and B open the resource access privilege for the user from C.

Step 2: Li logs into the VSS of C. There, he can view a list that displays detailed information for each camera, including the camera name and position of the VSSs of A, B and C. To track a suspected target trajectory, Li watches the multiple real-time videos from the three VSSs by clicking the corresponding cameras.

Step 3: While watching a surveillance video, Li can make a screenshot of it or begin to record it at any time.

Step 4: If Li is not satisfied with the positioning, he can click the direction buttons on the screen to pan/tilt/zoom (PTZ) the camera to meet his need.

Step 5: If an abnormal event occurs in the monitoring region, the corresponding VSS can send an alert message to Li. Then Li can switch to that real-time video to observe the developing situation.

Case 2: Multiple system unified access

The traffic management departments of city A, city B and city C have deployed their respective VSSs in the three cities. Administrator Bob of the provincial/state traffic management department wants to view the current traffic situations in all cities.

Step 1: The VSSs of A, B and C are connected to a VSSI platform, which provides a resource access privilege for the user of the platform.

Step 2: Bob logs into the VSSI platform via his PC. There, he can view a list that displays detailed information for each camera of the three VSSs. To view the current traffic situations in the three cities, Bob simultaneously watches the multiple real-time videos from different VSSs by clicking the corresponding cameras.

Step 3: If Bob is not satisfied with the positioning, he can click the direction buttons on the screen to pan/tilt/zoom (PTZ) the camera to meet his need.

6.2 Cross-system surveillance video download and playback

When a burglary happens in a community, the police officer will fetch the recorded surveillance video of the community and the nearby roads to find a clue about the suspicion.

Step 1: Li logs into the VSS of the police department via his computer.

Step 2: The VSS provides multiple query conditions for retrieving video recordings, e.g., camera position, video starting time and video duration. Li searches the related video recordings made before and after the incident time in the VSSs of the traffic management department and police department, and retrieves some relevant results. Li replays these video recordings

to checking for any suspicious behaviour. Li can play these recordings at normal speed or fast forward/backward, pause, search a specified position, stop, etc.

Step 3: To further investigate the evidence, Li downloads some key video records from the VSS of the traffic management department and send the video copies to other case investigation departments.

6.3 Alarm across different systems

Administrator Bob in system A needs to receive alarm signals when premises unit (PU) of system B is triggered by some kind of event, but the customer of system A and the PU of system B are not within the same system, this scenario can be realized with the interaction of the system interworking gateway (SIG). The simplified procedure for alarm across different systems is as follows (see clause 6.1, Case 2):

Step 1: Bob connects the service control unit (SCU) in system A to require an alarm signal when the PU of system B is triggered by some predefined event.

Step 2: The SCU in system A performs lookup process (with the interaction of the SIG) and finds the PU of system B.

Step 3: Bob sends a request to the SCU in system A to subscribe to the alarm service, the SCU in system A transports this request to the SCU in system B with the interaction of the SIG in system B, which returns a success response.

Step 4: The PU of system B sends an alarm signal to the SCU in system B when it detects a predefined event.

Step 5: The SCU in system B notifies Bob of the alarm event with the interaction of the SIG, SPU and SCU of system A, if necessary.

7 Requirements for visual surveillance system interworking

7.1 User requirements

There are two types of user. One is the interworking VSS type who can login to one of the VSSs connected to the VSSI platform. The other is the VSSI platform user who can login to the VSSI platform, but cannot directly login any VSS connected to the VSSI platform.

7.1.1 User level requirements

- USR-001: A VSSI platform is recommended to classify users into several levels. Users of different levels have different operational rights; high-level users have more operation privileges than low-level ones. Low-level users can do basic operations that meet the following basic requirements, and high-level users can do advanced operations that meet the following advanced requirements. For example, users of level 1 can only watch the cross-system real-time video, while users of level 2 can control the PUs of other system, as well as watch the cross-system real-time video.

7.1.2 Basic interworking visual surveillance system user requirements

– USR-002: An interworking VSS is required to support the VSS user view of information about a PU of other interworking VSS, including name, status, capabilities, location and other information about the PU.

– USR-003: An interworking VSS is required to support the presentation of real-time video captured by the PU of other interworking VSSs for its users.

– USR-004: An interworking VSS is required to support VSS users to order and cancel different services of other interworking VSS, including basic and value-added services.

7.1.3 Basic visual surveillance system interworking platform user requirements

– USR-005: A VSSI platform is required to support registration and de-registration of the platform user through the interface provided by the platform, while the platform user can view and modify personal information.

– USR-006: A VSSI platform is required to support platform user login and logout from the VSSI platform conveniently. A user name and password are required when a platform user logs on to the platform.

– USR-007: A VSSI platform is recommended to support a platform user view of the user access logs or other platform logs.

– USR-008: A VSSI platform is required to support a platform user view of information about the PU of an interworking VSS, including name, status, capabilities, location and other information about the PU.

– USR-009: A VSSI platform is required to support the presentation of real-time video captured by the PU of interworking VSSs for platform users.

– USR-010: A VSSI platform is required to support platform users to order and cancel different services, including basic and value-added services. The VSSI platform is also required to support platform users to view personal account information and operation logs conveniently.

7.1.4 Advanced interworking visual surveillance system user requirements

– USR-011: An interworking VSS is recommended to simultaneously present video coverage from different channels captured by different PUs of other interworking VSSs. When watching video, VSS users can optionally choose to pause or continue watching.

– USR-012: An interworking VSS is recommended to support PTZ in the PUs of other interworking VSSs by the end user, with the restriction that a PU can only be controlled by one end user at a time.

– USR-013: An interworking VSS is recommended to support search and retrieval of recorded video coverage from other interworking VSSs by diverse means and to control various playing operations by the end user.

– USR-014: An interworking VSS is recommended to support sending the alarm messages of other interworking VSS to end users in cases of alarm events.

7.1.5 Advanced visual surveillance system interworking platform user requirements

– USR-015: A VSSI platform is recommended to simultaneously present video coverage from different channels captured in different PUs of interworking VSSs. When watching video, VSSI platform users can optionally choose to pause or continue watching.

– USR-016: A VSSI platform is recommended to support PTZ in the PUs of interworking VSSs by the end user, with the restriction that only one PU can be controlled by one end user at a time.

– USR-017: A VSSI platform is recommended to support search and retrieval of recorded video coverage from interworking VSSs by diverse means and to control various playing operations by the end user.

– USR-018: A VSSI platform is recommended to support forwarding of any alarm messages from other interworking VSSs to end users.

7.2 Service requirements

– SRV-001: A VSSI platform is required to support real-time video transfer from PUs to customer units (CUs) of interworking VSSs.

– SRV-002: A VSSI platform is required to support status and alarm information transfer from PUs to CUs of interworking VSSs.

– SRV-003: A VSSI platform is required to support remote PTZ control over PU by end users via a CU of interworking VSSs.
– SRV-004: A VSSI platform is recommended to support audio communication between a PU and the CU of interworking VSSs.
– SRV-005: A VSSI platform is required to provide the functionality for playing records, and to provide control functions, such as fast playing, fast rewinding, pausing, location of specific points, stopping and time-shift playing.
– SRV-006: A VSSI platform is recommended to provide electronic maps on which PUs are marked and displayed.
– SRV-007: A VSSI platform is recommended to provide intelligent video analysis functions by calling the related services of interworking VSSs.
– SRV-008: A VSSI platform is recommended to support searching, retrieval and management of recorded and stored images and other video metadata.

7.3 Security requirements

7.3.1 Authentication security requirements

– SEC-001: A VSSI platform is required to provide mechanisms for authentication and authorization; it is required to restrict access to the platform and use applications to authorized users only. A VSSI platform is required to forbid an unauthorized user to handle any resource on the platform.

7.3.2 Access security requirements

– SEC-002: A VSSI platform is required to ensure security when accessing and controlling PUs of interworking VSSs. Each PU has access attributes. Only authorized users can access PUs. The types of access include real-time surveillance, replaying video recordings and remote control. End users can access a PU according to their access privileges to it.
– SEC-003: A VSSI platform is required to be able to operate in environments where network address translation (NAT) or firewall devices are present at either or both ends between two communicating entities. It is recommended that the specified firewall, gatekeeper and other network devices be utilized to ensure security to access some special visual surveillance (VS) services.

7.3.3 System security requirements

– SEC-004: A VSSI platform is required to have the capability of resisting malicious attacks.
– SEC-005: A VSSI platform is required to provide mechanisms for troubleshooting and data backup. It is required that a structural single-node problem be avoided (i.e., a problem at one node should not cause failure of the whole platform).

7.4 Management requirements

– MAN-001: A VSSI platform is required to manage registration/de-registration, authentication, connection and troubleshooting of interworking VSS.
– MAN-002: A VSSI platform is required to support remote configuration management, capability management, status detection, trouble alarm management and security management for the various kinds of devices in the network. The management privilege is required to be divided into different levels.
– MAN-003: A VSSI platform is required to support platform user management.

7.5 Quality of service and quality of experience requirements

– QoS-001: A VSSI platform is required to comply with the quality of service (QoS) and quality of experience (QoE) requirements in [ITU-T F.743].

7.6 Scalability requirements

– SCA-001: A VSSI platform is required to support the scalability of the number of VSSs. A VSSI platform provides an efficient system interworking mechanism. A VSS can easily connect to the VSSI platform via the interworking device, and interoperate with other interworking VSSs.

– SCA-002: A VSSI platform is required to support the scalability of each VSS. Each VSS can optionally increase the number of cameras and network video recorders (NVRs), etc.

– SCA-003: A VSSI platform is required to support scalability of number of users, including interworking VSS users and VSSI platform users. A VSSI platform can ensure QoS with the increase in the number of users.

Bibliography

[b-ITU-T M.60] Recommendation ITU-T M.60 (1993), *Maintenance terminology and definitions*.

[b-ITU-T Y.101] Recommendation ITU-T Y.101 (2000), *Global Information Infrastructure terminology: Terms and definitions*.

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