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Part 2: System dynamics, scenarios and protocol requirements

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Partie 2: Dynamique, scénarios et exigences de protocole des systèmes

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO/IEC 16500 may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 16500-2 was prepared by DAVIC (Digital Audio-Visual Council) and was adopted, under the PAS procedure, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

ISO/IEC 16500 consists of the following parts, under the general title *Information technology — Generic digital audio-visual systems*:

— *Part 1: System reference models and scenarios*

— *Part 2: System dynamics, scenarios and protocol requirements*

— *Part 3: Contours: Technology domain*

— *Part 4: Lower-layer protocols and physical interfaces*

— *Part 5: High and mid-layer protocols*

— *Part 6: Information representation*

— *Part 7: Basic security tools*

— *Part 8: Management architecture and protocols*

— *Part 9: Usage information protocols*

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Introduction

ISO/IEC 16500 defines the minimum tools and dynamic behavior required by digital audio-visual systems for end-to-end interoperability across countries, applications and services. To achieve this interoperability, it defines the technologies and information flows to be used within and between the major components of generic digital audio-visual systems. Interoperability between these components and between individual sub-systems is assured through specification of tools and specification of dynamic systems behavior at defined reference points. A reference point can comprise one or more logical (non-physical) information-transfer interfaces, and one or more physical signal-transfer interfaces. A logical interface is defined by a set of information flows and associated protocol stacks. A physical interface is an external interface and is fully defined by its physical and electrical characteristics. Accessible reference points are used to determine and demonstrate compliance of a digital audio-visual subsystem with this international standard.

A summary of each part follows.

ISO/IEC 16500-1 (DAVIC 1.3.1a Part 2) defines the normative digital audio-visual systems technical framework. It provides a vocabulary and a Systems Reference Model, which identifies specific functional blocks and information flows, interfaces and reference points.

ISO/IEC 16500-2 (DAVIC 1.3.1a Part 12) defines system dynamic behavior and physical scenarios. It details the locations of the control functional entities along with the normative protocols needed to support the systems behavior. It is structured as a set of protocol walk-throughs, or *"Application Notes"*, that rehearse both the steady state and dynamic operation of the system at relevant reference points using specified protocols. Detailed dynamics are given for the following scenarios: video on demand, switched video broadcast, interactive broadcast, and internet access.

ISO/IEC 16500-3 (DAVIC 1.3.1a Part 14) provides the normative definition of DAVIC Technology Contours. These are strict sets of Applications, Functionalities and Technologies which allow compliance and conformance criteria to be easily specified and assessed. This part of ISO/IEC 16500 contains the full details of two contours. These are the Enhanced Digital Broadcast (EDB) and Interactive Digital Broadcast (IDB). ISO/IEC 16500-3 specifies required technologies and is a mandatory compliance document for contour implementations.

ISO/IEC 16500-4 (DAVIC 1.3.1a Part 8) defines the toolbox of technologies used for lower layer protocols and physical interfaces. The tools specified are those required to digitize signals and information in the Core Network and in the Access Network. Each tool is applicable at one or more of the reference points specified within the Delivery System. In addition a detailed specification is provided of the physical interfaces between the Network Interface Unit and the Set Top Unit and of the physical interfaces used to connect Set Top Boxes to various peripheral devices (digital video recorder, PC, printer). The physical Delivery System mechanisms included are copper pairs, coaxial cable, fiber, HFC, MMDS, LMDS, satellite and terrestrial broadcasting.

ISO/IEC 16500-5 (DAVIC 1.3.1a Part 7) defines the technologies used for high and mid-layer protocols for ISO/IEC 16500 digital audio-visual systems. In particular, this part defines the specific protocol stacks and requirements on protocols at specific interfaces for the content, control and management information flows.

ISO/IEC 16500-6 (DAVIC 1.3.1a Part 9) defines what the user will eventually see and hear and with what quality. It specifies the way in which monomedia and multimedia information types are coded and exchanged. This includes the definition of a virtual machine and a set of APIs to support interoperable exchange of program code. Interoperability of applications is achieved, without specifying the internal design of a set top unit, by a normative Reference Decoder Model which defines specific memory and behavior constraints for content decoding. Separate profiles are defined for different sets of multimedia components.

ISO/IEC 16500-7 (DAVIC 1.3.1a Part 10) defines the interfaces and the security tools required for an ISO/IEC 16500 system implementing security profiles. These tools include security protocols which operate across one or both of the defined conditional access interfaces CA0 and CA1. The interface CA0 is to all security and conditional access functions, including the high speed descrambling functions. The interface CA1 is to a tamper resistant device used for low speed cryptographic processing. This cryptographic processing function is implemented in a smart card.

ISO/IEC 16500-8 (DAVIC 1.3.1a Part 6) specifies the information model used for managing ISO/IEC 16500 systems. In particular, this part defines the managed object classes and their associated characteristics for managing the access network and service-related data in the Delivery System. Where these definitions are taken from existing standards, full reference to the required standards is provided. Otherwise a full description is integrated in the text of this part. Usage-related information model is defined in ISO/IEC 16500-9.

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ISO/IEC 16500-9 (DAVIC 1.3.1a Part 11) specifies the interface requirements and defines the formats for the collection of usage data used for billing, and other business-related operations such as customer profile maintenance. It also specifies the protocols for the transfer of Usage Information into and out of the ISO/IEC 16500 digital audio-visual system. In summary, flows of audio, video and audio-visual works are monitored at defined usage data collection elements (e.g. servers, elements of the Delivery System, set-top boxes). Information concerning these flows is then collected, processed and passed to external systems such as billing or a rights administration society via a standardised usage data transfer interface.

Additional Information

ISO/IEC TR 16501 is an accompanying Technical Report. Further architectural and conformance information is provided in other non-normative parts of DAVIC 1.3.1a (1999). A summary of these documents is included here for information.

ISO/IEC TR 16501 (DAVIC 1.3.1a Part 1) provides a detailed listing of the functionalities required by users and providers of digital audio-visual applications and systems. It introduces the concept of a contour and defines the IDB (Interactive Digital Broadcast) and EDB (Enhanced Digital Broadcast) functionality requirements which are used to define the normative contour technology toolsets provided in ISO/IEC 16500-3.

DAVIC 1.3.1a Parts 3, 4 and 5 are DAVIC technical reports. They provide additional architectural and other information for the server, the delivery-system, and the Service Consumer systems respectively. Part 3 defines how to load an application, once created, onto a server and gives information and guidance on the protocols transmitted from the set-top user to the server, and those used to control the set-up and execution of a selected application. Part 4 provides an overview of Delivery Systems and describes instances of specific DAVIC networked service architectures. These include physical and wireless networks. Non-networked delivery (e.g. local storage physical media like discs, tapes and CD-ROMs) are not specified. Part 5 provides a Service Consumer systems architecture and a description of the DAVIC Set Top reference points defined elsewhere in the normative parts of the specification.

DAVIC 1.3.1a Part 13 is a DAVIC technical report, which provides guidelines on how to validate the systems, technology tools and protocols through conformance and / or interoperability testing.

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Information technology — Generic digital audio-visual systems — Part 2: System dynamics, scenarios and protocol requirements

1 Scope

The purpose of this part of ISO/IEC 16500 is to specify normative protocols and associated dynamic system behavior, including session and connection manipulation, configuration and download, for an ISO/IEC 16500 system. The emphasis is on the significant dynamic system entities (e.g., session control, call/connection control), the behavior of these entities (e.g., information flows, entity actions, parameters passed) and the allowable physical placement(s) of these entities in a DAVIC system (i.e., physical instances). As such, this part of ISO/IEC 16500 complements the static systems reference model described in ISO/IEC 16500-1, specifying normative dynamic behavior as well as specifying the protocol(s) required to realize this behavior.

The protocols themselves are specified primarily through the use of "Protocol Network Architecture" diagrams which visually illustrate, for each of the defined physical instances and application scenarios, the various protocol stacks which are to be used. Detailed specification of the individual protocol tools themselves (e.g., the detailed protocol messages used to realize the DAVIC dynamic flow behavior) is provided in ISO/IEC 16500-5 (mid- and higher layers) and ISO/IEC 16500-4 (lower layers) of this specification.

This results in instance specifications made up of building blocks from the DAVIC tool set organized in a manner describing a system which performs DAVIC functions.

2 Normative references

Detailed bibliographic references for the normative protocols identified in this part of ISO/IEC 16500 (e.g. in Table 9.2-28 and Table 9.2-29) are provided in ISO/IEC 16500-2 Annex E.

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