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Information technology — Telecommunications and information exchange between systems — Using ECMA-323 (CSTA XML) in a Voice Browser Environment

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Foreword

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The main task of the joint technical committee is to prepare International Standards. 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.

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— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

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Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

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

ISO/IEC TR 18057, which is a Technical Report of type 3, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*.

ISO/IEC 18057 was prepared by ECMA (as ECMA TR/85) and was adopted, under a special "fast-track procedure", by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

Introduction

This Technical Report illustrates how CSTA XML (ECMA-323) can be used in a Voice Browser environment. This TR is part of a suite of ECMA CSTA Phase III Standards and Technical Reports.

All of the Standards and Technical Reports in this Suite are based upon the practical experience of ECMA member companies and each one represents a pragmatic and widely based consensus.

Information technology — Telecommunications and information exchange between systems — Using ECMA-323 (CSTA XML) in a Voice Browser Environment

1 Scope

Services for Computer Supported Telecommunications Applications are defined by Standard ECMA-269 and the XML Protocol for those services are defined by Standard ECMA-323.

In many cases, applications require only a small subset of the features standardized in CSTA. In a voice browser environment, processing speech (not call control) is usually the major focus of the application. For example, from a CSTA feature perspective, an application may simply need to answer an incoming call and then later clear it. As these speech-centric applications evolve they can use additional, more advanced, features standardized by CSTA that are provided by CSTA-conformant communications platforms.

Since ECMA-269 and ECMA-323 are relatively large standards (combined over 1100 pages), it is a challenge for application developers without prior knowledge of the CSTA standards to know where to find basic concepts that they need to understand in order to implement basic CSTA features.

This TR illustrates how ECMA-323 can be used in a Voice Browser environment. These concepts illustrated in this TR can be applied to any Voice Browser environment that provides an XML-based read/write messaging interface (i.e. CSTA Service Boundary) that supports asynchronous events from a CSTA conformant communication platform. SALT enabled browsers that implement a ECMA-323 interface for call control using the SALT smex mechanism is an example of a browser with this capability.

Throughout this TR the term “ECMA-323 enabled voice browser” is used, in a generic sense, to refer to browser implementation that support a CSTA conformant ECMA-323 interface.

Examples are provided that show how ECMA-323 can be used in several different environments such as SALT-enabled browsers and CCXML.

2 Normative references

The following referenced documents are indispensable for the application 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.

This TR provides informative examples of how to use ECMA-323 in a Voice Browser environment. The following ECMA Standards should be used as the definitive references for CSTA:

ECMA-269:2002, *Services for Computer Supported Telecommunications Applications (CSTA) Phase III (ISO/IEC 18051:2003)*

ECMA-323:2002, *XML Protocol for Computer Supported Telecommunications Applications (CSTA) Phase III (ISO/IEC 18056:2003)*

ECMA CSTA Standards can be used for call control in many different environments. The following references provide additional information on using the ECMA CSTA Standards in different environments:

SALT Speech language Application Language Tags 1.0 Specification (SALT), SALT Forum, 15 July 2002, (http://www.saltforum.org).

CCXML Voice Browser Call Control: CCXML Version 1.0 - W3C Working Draft, W3C, 11 October 2002, (http://www.w3c.org/TR/ccxml/).

3 Brief Overview of ECMA-323

ECMA-323 consists of a set of XML Schemas based upon the W3C XML Schema Language Recommendation. The Standard includes schemas for many categories of services defined in ECMA-269 (Services for Computer Supported Telecommunications Applications (CSTA) Phase III).

Call control is just one category of services in ECMA-323. Examples of other categories of services are: capability exchange (feature discovery) services, call routing services, services to control a device (e.g. message waiting, writing to display, forwarding settings), and many others.

CSTA provides a protocol independent abstraction layer for applications. It provides a consistent, standards-based messaging interface that can be used with basic 1st party call control based platforms as well as more complex 3rd party call control (CTI) platforms, or a combination of both (1st party call control with some additional 3rd party call control features).

CSTA modelling and concepts are also compatible with many procedural and object models such as the SALT CallControl object (chapter 3 of the SALT specification).

4 Fundamental Concepts

This section introduces some informative modelling concepts that are useful to illustrate how ECMA-323 enabled voice browsers can use ECMA-323 messages. The actual ECMA CSTA standards should be used for the definitive descriptions.

4.1 CSTA Connection

CSTA call control services are applied to CSTA connections. A CSTA connection refers to a relationship between a call and a telephony endpoint. A CSTA connection is referenced via a CSTA connection identifier. A CSTA connection identifier consists of a call identifier and a device (endpoint) identifier.

In a typical 1st party call control implementation, a voice browser application manipulates only the CSTA connection directly associated with the voice browser platform. However, other call control implementations may also provide application control of other endpoints in the call using CSTA services (via 3rd party call control, for example). A device identifier is included in a CSTA connection identifier to allow any endpoint to be addressed by a voice browser application.

4.2 CSTA Connection State Model

A ECMA-323 enabled voice browser application is informed of connection state transitions (via ECMA-323 call control events) by placing a monitor on a telephony endpoint via an associated address (e.g. this is how an application “listens” for incoming calls).

Each CSTA connection in a call is associated with a connection state. CSTA specifies a connection state model (see ECMA-269, Figure 6-19) that consists of the following connection states:

- Alerting –Indicates an incoming call at an endpoint. Typically the connection may be ringing or it may be in a pre-alerting (e.g. offered) condition.

- Connected – Indicates that a connection is actively participating in a call. This connection state can be the result of an incoming or outgoing call.

- Failed – Indicates that call progression has stalled. Typically this could represent that an outgoing call attempt that encountered a busy endpoint.

- Held – Indicates that an endpoint is no longer actively participating in a call. For implementations that support multiple calls per endpoint (i.e. line), a connection could be Held while the line is used to place another call (consultation transfer on an analog line, for example).

- Initiated – A transient state, usually indicating that the endpoint is initiating a service (e.g. dialtone).

- Null – There is no relationship between the call and the endpoint.

- Queued – Indicates that the call is temporarily suspended at a device (e.g. call has been parked, camped on).

The CSTA Connection State is provided in ECMA-323 events.

4.3 Connection State Transitions for CSTA Calls

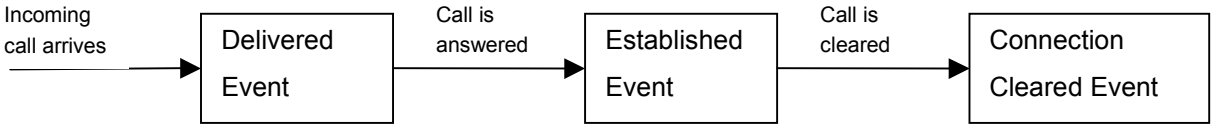
4.3.1 Incoming Call

The following figure illustrates the CSTA events for an incoming call. The connection state of endpoint on the voice browser platform (called connection) is indicated in parenthesis.

- Delivered Event (Alerting) – Indicates call is alerting. Calls that are “auto-answered” do not sent this event. A CSTA Answer Call service can be used to answer the call. This results in an Established event.

- Established Event (Connected) – indicates call has been answered. Media path has been established. The CSTA Clear Connection service can be used to clear the call. A Connection Cleared event is generated as the result of the Clear Connection service.

- Connection Cleared Event (Null) – indicates connection has cleared. This can be the result of the Clear Connection service or as the result of any party clearing from the call.



4.3.2 Outgoing Call

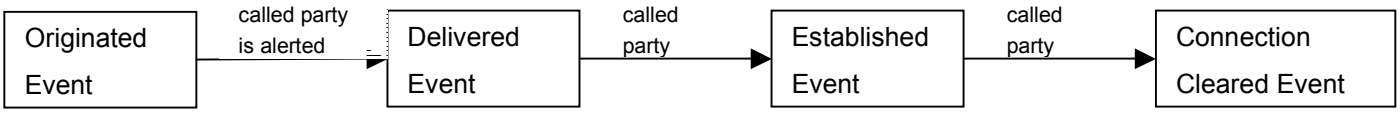
The following figure illustrates the CSTA events for an outgoing call. The connection state of the endpoint on the Voice Browser platform (originating connection) is indicated in parenthesis. This sequence could be the result of a CSTA Make Call service.

- Originated Event (Connected) – Indicates that the originating connection (an endpoint on the voice browser platform) is connected.

- Delivered Event (Connected) – Indicates the call is alerting the called party.

- Established Event (Connected) – indicates the called party has answered the call. Media path has been established.

- Connection Cleared Event (Null) – indicates connection has cleared.



5 CSTA Profiles

Since many CSTA features are optional, and to enhance application portability across different CSTA implementations, CSTA standards require a minimal subset of functionality as conformance criteria.

ECMA-269 specifies a set of Profiles. At least one profile is required to be supported. The following profiles most closely match the call control services and events needed by a Voice Browser application.

- Level 1a Voice Browser Profile (added in ECMA-269 5th edition) – provides support for answering an incoming call, clearing, and moving the call to another endpoint using the Single Step Transfer Call service. The Get Switching Function Capabilities Service is not required to be supported in this profile.

- Level 1b Voice Browser Profile (added in ECMA-269 5th edition) - provides support for answering an incoming call, clearing, and moving the call to another endpoint using the Deflect Call service. The Get Switching Function Capabilities Service is not required to be supported in this profile.

- Level 2 Voice Browser Profile (added in ECMA-269 5th edition) – provides support for making a call in addition to the services and events required in either the Level1a Voice Browser Profile of the Level 1b Voice Browser Profile. The Get Switching Function Capabilities Service is required to be supported in this profile.

- Basic Telephony Profile –provides support for answering an incoming call, creating an outgoing call, and clearing the call. The Get Switching Function Capabilities Service is required to be supported in this profile.

NOTE Telephony platforms that interface with networks and/or endpoints that do not expose the underlying network/device signalling are not expected to provide all of these CSTA events. For example, if the telephony network does not provide a busy indication, the Failed event is not required.

5.1 Level 1a Voice Browser Profile

5.1.1 Services

The following CSTA services are included in the *Level 1a Voice Browser Profile*:

- Answer call – Answers an alerting call. In a voice browser, the answering device is an endpoint on the platform.

- Clear Connection – Clears a connection. In a voice browser environment, the clearing device is an endpoint on the voice browser platform.

- Single Step Transfer (of a connected call) – Transfers a call to another endpoint. In a voice browser environment, the transferring device is an endpoint on the voice browser platform and is no longer involved with the call after the single step transfer service is completed.

- Monitor Start – Establishes a device-type monitor on an endpoint. In a voice browser environment, the monitored device is an endpoint on the voice browser platform.

- Monitor Stop – Terminates an existing monitor.

5.1.2 Events

The following CSTA events are included in the *Level 1a Voice Browser Profile:*

- Connection Cleared – Indicates that an endpoint has disconnected from a call.
- Delivered – Indicates that a call is alerting an endpoint.
- Established – Indicates that an endpoint has answered or been connected to a call.
- Failed – Indicates that a call cannot be completed (e.g. call has encountered a busy endpoint).
- Transferred – Indicates that an existing call has been transferred from an endpoint (on the voice browser platform) to another endpoint and has been disconnected from the call. This implies that the transferring device connection state is Null – no Connection Cleared event is generated for the transferring device after the Transferred event.

5.2 Level 1b Voice Browser Profile

5.2.1 Services

The following CSTA services are included in the *Level 1b Voice Browser Profile*:

- Answer call – Answers an alerting call. In a voice browser, the answering device is an endpoint on the platform.
- Clear Connection – Clears a connection. In a voice browser environment, the clearing device is an endpoint on the voice browser platform.
- Deflect (of a connected call) – Moves a connection away from the deflecting device. In a voice browser environment, the deflecting device is an endpoint on the voice browser platform and is no longer involved with the call after the Deflect Call service is completed.
- Monitor Start – Establishes a device-type monitor on an endpoint. In a voice browser environment, the monitored device is an endpoint on the voice browser platform.
- Monitor Stop – Terminates an existing monitor.

5.2.2 Events

The following CSTA events are included in the *Level 1b Voice Browser Profile:*

- Connection Cleared – Indicates that an endpoint has disconnected from a call.
- Delivered – Indicates that a call is alerting an endpoint.
- Diverted – Indicates that the endpoint (on the voice browser platform) has redirected a call to another endpoint and is no longer involved with the call.
- Established – Indicates that an endpoint has answered or been connected to a call.
- Failed – Indicates that a call cannot be completed (e.g. call has encountered a busy endpoint).

5.3 Level 2 Voice Browser Profile

5.3.1 Services

In this profile, a CSTA implementation is required to provide its capabilities to applications via the ECMA-323 Get Switching Function Capabilities service. The capabilities include the list of ECMA-323 services and events supported by a telephony platform and the various types of behavior options supported by an implementation (the profile(s) supported, the types of digits that are allowed in the dialing string for an outbound call, etc.). Many of the parameters are optional and do not need to be provided in the ECMA-323 message.

The following CSTA services are included in the *Level 2 Voice Browser Profile*:

- Answer call – Answers an alerting call. In a voice browser, the answering device is an endpoint on the voice browser platform.
- Clear Connection – Clears a connection. In a voice browser environment, the clearing device is an endpoint on the voice browser platform.
- Make Call – Establishes a call between two devices. In a voice browser environment, the originating device is an endpoint on the voice browser platform.
- Monitor Start – Establishes a device-type monitor on an endpoint. In a voice browser environment, the monitored device is an endpoint on the voice browser platform.
- Monitor Stop – Terminates an existing monitor.

In addition, at least one of the following services must be supported in order to move a connected call away from an endpoint:

- Single Step Transfer (of a connected call) – Transfers a call to another endpoint. In a voice browser environment, the transferring device is an endpoint on the voice browser platform and is no longer involved with the call after the single step transfer service is completed.

- Deflect (of a connected call) – Moves a connection away from the deflecting device. In a voice browser environment, the deflecting device is an endpoint on the voice browser platform and is no longer involved with the call after the Deflect Call service is completed.

5.3.2 Events

The following CSTA events are included in the *Level 2 Voice Browser Profile:*

- Connection Cleared – Indicates that an endpoint has disconnected from a call.
- Delivered – Indicates that a call is alerting an endpoint.
- Established – Indicates that an endpoint has answered or been connected to a call.
- Failed – Indicates that a call cannot be completed (e.g. call has encountered a busy endpoint).
- Network Reached – For an outbound call, indicates that the call has been connected to an external network via a Network Interface Device.
- Originated – For an outbound call, indicates that the originating endpoint (on the voice browser platform) is connected to the call.

In addition:

- Diverted (if the Deflect Service was used to move a connected call).
- Transferred (if the Single Step Transfer Service was used to move a connected call)