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What is CSTA?

CSTA Overview

Updated by TG11
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CSTA History

CSTA Standards Suite

CSTA Features (ECMA-269)

ECMA-323 (CSTA XML)

Call Control Details

Voice Browsers & ECMA-323

CSTA Web Services (ECMA-348)

Current CSTA Standardization Activities

Abstraction Layer for telecommunication applications:

- *Independent of underlying signaling protocols*
  - **H.323, SIP, Analog, T1, ISDN, etc.**
- *Independent of devices*
  - **intelligent endpoints, low-function/stimulus devices, SIP Signaling models - 3PCC vs. Peer/Peer**

Operates equally well in different environments:

- *3rd party call control*
- *1st party call control*

Basic call model standardized in 1992 – continually refined and enhanced based upon significant industry implementation experiences, new protocols, etc.

Design goal to enhance application portability across CSTA implementations:

- *Specifies normalized call model and behavior*
- *Complete functional definition of each service*
- *Specific conformance criteria*

- personal telephone support, dialers, phone control, soft-phone, etc.
- multi-media messaging (IM, SMS, MMS, Email, voice mail)
- inbound & outbound telemarketing, call centers
- conferencing & collaboration
- user/agent statistics/reporting
- personal assistant, rules based routing
- auto-attendant
- voice browsers, advanced speech, DTMF
- presence, availability, device context
- location services
- call logging, accounting, billing
- phone as UI for apps (button press, displays) for hospitality
- routing/distributing calls (ACD)
- enterprise & residential deployments
- *and many, many more….*

Phase I

- *published June '92*
- *40 features, 66 pages (Services Specification)*
- *focus on call control*

Phase II

- *published Dec. '94, 77 features, 145 pages (Services Specification)*
- *I/O & Voice Unit Services, more call control services*

Phase III - CSTA Phase II Features & versit CTI Technology

- *Published Services Specification - 136 features, 650 pages (ECMA-269) Dec 1998*
- *Published ECMA-269 as an ISO Standard July 2000*
- *Published CSTA XML (ECMA-323) June 2004*
- *Published "Using CSTA with Voice Browsers" (TR/85) December 2002*
- *Published CSTA WSDL (ECMA-348) June 2004*
- *Published Designing an Object Model for CSTA (TR/88) June 2004*
- *Published "Using CSTA for SIP Phone User Agents (uaCSTA)" (TR/87) June 2004*
- *Published "Application Session Services" (ECMA-354) June 2004*
- *Published "WS-Session – WSDL for ECMA-354" (ECMA-366) June 2005*
- *Published "Session Management, Event Notification, and Computing Function Services – Amendements for ECMA-348" (TR/90) December 2005*
- *.....New editions of ECMA-269, ECMA-323, ECMA-285, ECMA-366 in Dec. 2011*
- *Finalised 5th edition of ECMA-348 based upon WS-Eventing and WS-Interoperability*

Document Title	Ecma Publication	ISO/IEC Publication	ETSI Publication
Services for CSTA Phase III	ECMA-269	ISO/IEC 18051	ETSI TS 102 173
ASN.1 Protocol for CSTA Phase III	ECMA-285	ISO/IEC 18052	
XML Protocol for CSTA Phase III	ECMA-323	ISO/IEC 18056	ETSI TS 102 174
Web Services Description Language (WSDL) for CSTA Phase III	ECMA-348		
Definitions & Terms for CSTA Ph. III	ECMA TR/72	ISO/IEC TR 18053	
Migrating to CSTA Phase III	ECMA TR/80		
Scenarios for CSTA Phase III	ECMA TR/82		
Using Ecma-323 (CSTA XML) in a Voice Browser Environment	ECMA TR/85	ISO/IEC TR 18057	ETSI TR 102 171
Using CSTA for SIP Phone User Agents (uaCSTA)	ECMA TR/87	ISO/IEC TR 22767	ETSI TR 102 348
Designing an Object Model for ECMA-269 (CSTA)	ECMA TR/88		

Document Title	Ecma Publication	ISO/IEC Publication	ETSI Publication
Application Session Services (used in ECMA-269)	ECMA-354	ISO/IEC 22534	ETSI TS 102 344
WS-Session – (WSDL for ECMA-354)	ECMA-366	ISO/IEC 25437	ETSI TS 102 440
Session Management, Event Notification, and Computing Function Services - Amendments for ECMA-348	ECMA TR/90		

CSTA Features

27 Call Control features (making call, answering call, etc.)

6 Call Associated features (sending user data, etc.)

22 Logical Device features (do not disturb, forwarding, etc.)

23 Physical Device features (writing to device display, etc.)

6 Capability Exchange features (feature discovery, etc.)

4 Snapshot features (query existing calls at a device, etc.)

5 Monitor features (subscribing to event reports, etc.)

17 Voice Services (for Listener, DTMF, Prompt and message resources)

Other services for: Location, Routing, Media Attachment, Maintenance, Data Collection, Accounting, etc.

Implementation does not need to support all of these features to conform to CSTA! (See Slide on Profiles)

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Features: Call Control Overview

Exhaustive set of standardized call control features:

- *Services: Accept, Alternate, Answer, Call Back, Call Back Message, Camp On, Clear Call, Clear Connection, Conference, Consultation, Deflect, Dial Digits, Directed Pick up, Group Pick Up, Hold, Intrude, Join, Make Call, Make Predictive Call, Park, Reconnect, Retrieve, Send Message, Single Step Conference, Single Step Transfer, Transfer.*

- *Events: Bridged, Call Cleared, Conferenced, Connection Cleared, Delivered, Digits Dialed, Diverted, Established, Failed, Held, Network Capabilities Changed, Network Reached, Offered, Originated, Queued, Retrieved, Service Initiated, Transferred.*

(features included in Basic Telephony profile are underlined)

Each feature includes a complete operational model on how the feature works, from an application perspective.

- *Before/After conditions*

- *State transitions*

- *Event flow*

- *Textual behavior description*

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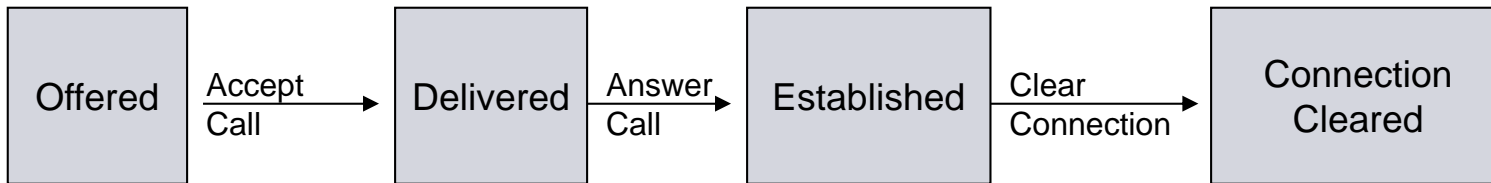
Held – Indicates that an endpoint is no longer actively participating in a call. For implementations that support multiple calls per endpoint (i.e. line), a connection could be Held while the line is used to place another call (consultation transfer on an analog line, for example).

Initiated – A transient state, usually indicating that the endpoint is initiating a service (e.g. dialtone) or the device is being prompted to go offhook.
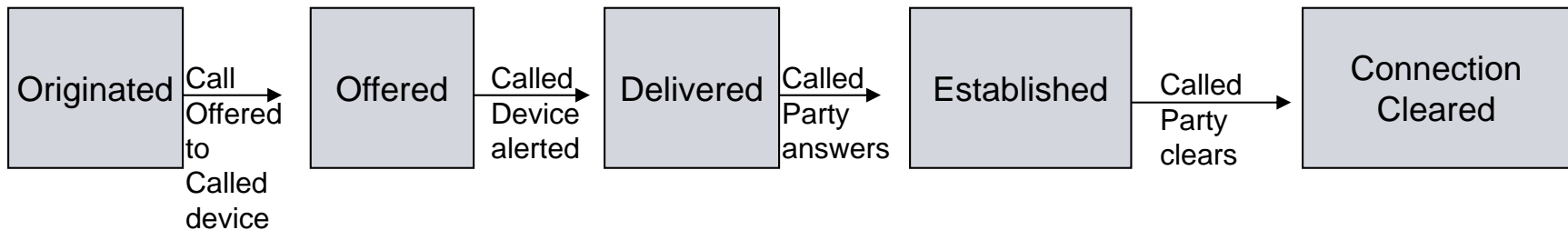
Null – There is no relationship between the call and the endpoint.

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

typical call events for an incoming call

Offered	→(Accept Call)→	Delivered	→(Answer Call)→	Established	→(Clear Connection)→	Connection Cleared

typical call events for an outgoing call (Make Call)

Originated	→(Call Offered to Called device)→	Offered	→(Called Device alerted)→	Delivered	→(Called Party answers)→	Established	→(Called Party clears)→	Connection Cleared

Standard is extensible:

- *Additional features can be added to the standard via new editions of the standard*

- *New Parameters, new values to existing parameters can be added via new editions of the standard*

- *Backward compatibility must be maintained in any future editions*

- *Implementations can add proprietary features using built in CSTA extension mechanisms*

CSTA Includes a set of Profiles:

- *Specifies minimal set of features required to conform to CSTA*

- *At least one profile must be supported by an CSTA communication provider*

- *Applications can be developed with feature set in mind*

Existing Profiles:

- *Basic Telephony profile*

- *Routing profile*

- *3 Voice Browser profiles (new in ECMA-269, 5th ed.)*

- *6 SIP phone (uaCSTA) profiles (new in ECMA-269, 6th ed.)*

- *2 Speech profiles (new in ECMA-269, 7th ed.)*

XML Encoding for CSTA feature set

- *Set of W3C XML Schemas*

- *One schema per service/event*

Contains XML encoding for <u>all</u> CSTA features standardized in ECMA-269

CSTA XML facilitates use of CSTA features by Internet developers – when combined with Scripting languages such as ECMAScript, it becomes very easy to use the CSTA XML interface directly

```xml
<?xml version="1.0" encoding="UTF-8"?>
<MonitorStart xmlns="http://www.ecma-international.org/standards/ecma-323/csta/ed4">
    <monitorObject>
      <deviceObject>22343</deviceObject>
   </monitorObject>
</MonitorStart>
```

```xml
<?xml version="1.0" encoding="UTF-8"?>
<AnswerCall xmlns="http://www.ecma-international.org/standards/ecma-233/csta/ed4">
    <callToBeAnswered>
        <callID>1</callID>
        <deviceID>22343</deviceID>
    </callToBeAnswered>
</AnswerCall>
```

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ClearConnection xmlns="http://www.ecma-international.org/standards/ecma-323/csta/ed4">
        <connectionToBeCleared>
                <callID>1</callID>
                <deviceID>22343</deviceID>
        </connectionToBeCleared>
</ClearConnection>
```

Rich content — application "picks" info it needs

```
<DeliveredEvent xmlns="http://www.ecma-international.org/standards/ecma-323/csta/ed4">
        <monitorCrossRefID>99</monitorCrossRefID>
        <connection>
                <callID>1</callID>
                <deviceID>22343</deviceID>
        </connection>
        <alertingDevice><deviceIdentifier>22343</deviceIdentifier></alertingDevice>
        <callingDevice><deviceIdentifier>14085551212</deviceIdentifier></callingDevice>
        <calledDevice><deviceIdentifier>22343</deviceIdentifier></calledDevice>
        <lastRedirectionDevice><notRequired/></lastRedirectionDevice>
        <localConnectionInfo>alerting</localConnectionInfo>
        <cause>newCall</cause>
        <networkCallingDevice><deviceIdentifier>14085551212</deviceIdentifier>
        </networkCallingDevice>
        <networkCalledDevice><deviceIdentifier>18001234567</deviceIdentifier>
        </networkCalledDevice>
        <associatedCallingDevice><deviceIdentifier>023</deviceIdentifier>
        </associatedCallingDevice>
</DeliveredEvent>
```

CSTA XML ideally suited for Voice Browser platforms that support a messaging interface w/ asynchronous events

CSTA support for Voice Browsers:

- *Added profiles optimized for Voice Browser applications.*

- *Published a Technical Report (TR/85) that shows how ECMA-323 can be used in a Voice Browser environment.*

TR shows how to tunnel CSTA using SIP:

- *Added profiles to ECMA-269 tailored to SIP environments*

- *Enhanced CSTA to better support SIP (e.g. URI addressing)*

- *TR illustrates deployment examples*

- *TR shows how relevant CSTA concepts map to SIP*

- *No changes to SIP, using existing SIP INFO method and registered CSTA MIME types*

- *Enables rich behavior of SIP phones*

- *Augments SIP features (e.g. SIP 3PCC)*

- **Specifies a Web Services Definition Language (WSDL) for all of the Features in ECMA-269 (CSTA Services)**

- **Leverages the XML Schema standardized in ECMA-323**

- **Facilitates use by Web-based applications**

- **ECMA-348:**

  - *Based upon WSDL 1.1, WS-Eventing and WS-Interoperability and TR/90*

- **Specifies a way to establish and maintain an application association.**
  - *Can be used with CSTA or any other protocol*
- **Alternative to using ACSE, for example**
- **ECMA-366 (WS-Session) specifies WSDL for the services in ECMA-354**

Recent Enhancements to CSTA Standards

- update definition of Character Set for Display

- added definition for PresenceState Parameter and new services Get Presence State, Set Presence State

- added parameter callLinkageData to call control services

- added new cause values for intercept for Delivered and Established and update definition of Recall - No Answer

- Make Connection service, Registrations service, Get Monitors service

- callCharacteristics, multiple destination, LocationInfoList, maxDestinationDevicesForDeflect, CalledDevice parameters

- Multiple Alerting cause code

- service descriptions for location services, location collection filters to Start Location Tracking, Conference to list of device categories, Capabilities for individual Location Services

- deviceID, privateNumber, privateName DeviceID tags

- conference modeling, location services modeling

- clarified Conference Call Service description

- New Basic Speech Service and Advanced Speech Service profiles

- added Agent attribute to Group Device Category

- added resourceID attribute to SFR DeviceID format

- modified definition of directAgent, added encryptedCall

- added reason parameter to clear Call and Make Call

- added deviceInfo parameter to Associate Data service

- added deviceInfo parameter to Call Information event

- added ringDuration parameter to logical device features

- New Get CallBack service

Support for non-voice media interactions (IM, Email, Chat)

- *CSTA call model applicable to non-voice media (Email, Chat, IM, etc.)*

- *CSTA "call" and "connection" objects are media independent*

- *chat can be modeled as an interactive "text call"*

- *Email can be modeled as an non-interactive "text call"*

- *Additional parameters for message information, subject of call, priority, sensitivity of calls, etc.*

Enhancements to improve SIP support

- *Features to improve control of media (connection information), support of SIP 3PCC, etc.*

- *Interactive voice features to support advanced speech applications*

- *Service to obtain a list of CSTA features*

- *Profiles for SIP user agents*

- *New methods for establishing CSTA applications sessions*

- *Internet URI device format*

- *Device ID character support for Intl. Numbers*

- *Removed size constraints for parameters*

- *Media Class types to support IM, SMS and MMS*

- *User model to support monitoring a User versus a Device*

Speech service enhancements to CSTA

- *For speech recognition/verification*

- *For speaker recognition/verification*

- *For text to speech synthesis*

- *For distributed speech services using:*

  - **ECMA-323 over SIP or TCP/IP**

  - **ECMA-348 for Web Services**

- *Added speech resources to CSTA:*

  - **Listener, Prompt, Prompt-Queue, DTMF, Message and Generic**

- *Added Interactive Speech Devices to CSTA*

  - **Enables seamless integration of speech and call control**

- *Profiles for Speech Applications*

- *New Get Call Back service*

- *Misc. Call Control Enhancements*

- *CSTA Over SIP Transport Mechanism (uaCSTA) added as a normative ECMA-323 option*

- *ECMA-323 Specified Short Tags added as a normative ECMA-323 option*

- *Dynamic Tags added as a normative ECMA-323 option*

- *WS-Eventing, WS-Interoperability, WS-Addressing for ECMA-348 and ECMA-366*

    - **Recast outbound operations into Operations in portType pairs for Switching and Computing functions**

    - **WS-Eventing used in the context of a CSTA association (such as ECMA-366 WS-Session)**

- *Monitoring Real Time Communications for web in W3C*

- ***Considering REST/JSON mappings for CSTA***

CSTA is an existing (Ecma, ETSI, ISO) Standard with an exhaustive feature set, comprehensive call model

CSTA supports range of application landscapes – from basic 1st party call control to advanced 3rd party call control with same standardized model

CSTA exposes advanced features of a communications platform to applications developers while insulating applications from underlying protocol specifics

CSTA XML facilitates use of call control features by Internet developers – when combined with Scripting languages such as ECMAScript, it becomes easy to program directly to the CSTA XML interface

CSTA XML ideally suited for Voice Browsers that support a messaging interface w/ asynchronous events for advanced Interactive Voice applications

CSTA supports voice and non-voice interactions (Email, Chat, IM, etc.) with the same call model.

CSTA complements SIP and enables developers to provide advanced features

With WS-Eventing, WSDL for CSTA is a mature means to access CSTA services