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                  Media Server Control Protocol Requirements

Abstract

   This document addresses the communication between an application
   server and media server. The current work in IETF working groups
   shows these logical entities, but it does not address the physical
   decomposition and the protocol between the entities.

   This document presents the requirements for a Media Server Control
   Protocol (MCP) that enables an application server to use a media
   server. It will address the aspects of announcements, Interactive
   Voice Response, and conferencing media services.

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1. Introduction

   The IETF conferencing framework in RFC 4353 [CARCH] presents an
   architecture that is built of several functional entities. RFC 4353
   [CARCH] does not specify the protocols between the functional
   entities since it is considered out of scope.

   Based on RFC 4353 [CARCH], this document defines the requirements for
   a protocol that will enable one functional entity, known as an
   Application Server (AS), that includes the conference/media policy
   server, the notification server, and the focus, all defined in RFC
   4353 [CARCH], to interact with one or more functional entities,
   called Media Server (MS), that serves as mixer or media server.

   The media server can also be used for announcements and Interactive
   Voice Response (IVR) functions.

   Application servers host one or more instances of a communication
   application. Media servers provide real time media processing
   functions. An example of the decomposition of a media server and an
   application server is described in the media control framework
   document [MEDIACTRL-FW].

   This document presents the requirements for a Media Server Control
   Protocol (MCP) that enables an application server to control a media
   server. It will address the aspects of announcements, IVR, and
   conferencing media services.

   The requirements are for the protocol and do not address the AS or MS
   functionality discussed in the media control framework.

   Since the media server is a centralized component, the charter of the
   working group states that this work will not investigate distributed
   media processing algorithms or control protocols.

2. Terminology

   The media server work uses, when appropriate, and expands on the
   terminology introduced in the conferencing framework [CARCH] and
   Centralized Conferencing (XCON) framework [XCON-FRMWRK]. The
   following additional terms are defined:

   Application Server (AS) - A functional entity that hosts one or more
   instances of a communication application. The application server may
   include the conference policy server, the focus, and the conference
   notification server, as defined in [CARCH]. Also, it may include
   communication applications that use IVR or announcement services.

Media Server (MS) - The media server includes the mixer as defined in
[CARCH]. The media server plays announcements, it processes media
streams for functions like Dual Tone Multi-Frequency (DTMF) detection
and transcoding. The media server may also record media streams for
supporting IVR functions like announcing participants

Media Resource Broker (MRB) - A logical entity that is responsible
for both the collection of appropriate published Media Server (MS)
information and supplying of appropriate MS information to consuming
entities. The MRB is an optional entity and will be discussed in a
separate document.

Notification - A notification is used when there is a need to report
event-related information from the MS to the AS.

Request - A request is sent from the controlling entity, such as an
application server, to another resource, such as a media server,
asking that a particular type of operation be executed.

Response - A response is used to signal information, such as an
acknowledgement or error code in reply to a previously issued
request.

3. Requirements

3.1. Media Control Requirements

The following are the media control requirements:

REQ-MCP-01 - The MS Control Protocol shall enable one or more
   application servers to request media services from one or more
   media servers.

REQ-MCP-02 -   The MS Control Protocol shall use a reliable transport
   protocol.

REQ-MCP-03 - The applications supported by the protocol shall
   include conferencing and Interactive Voice Response media
   services.

Note: Though the protocol enables these services, the functionality
is invoked through other mechanisms.

REQ-MCP-04 - Media types supported in the context of the
   applications shall include audio, tones, text, and video. Tones
   media include in-band audio or RFC 4733 payload.

REQ-MCP-05 - The MS control protocol should allow, but must not
   require, a media resource broker (MRB) or intermediate proxy to
   exist with the application server and media server.

REQ-MCP-06 - On the MS control channel, there shall be requests to
   the MS, responses from the MS, and notifications to the AS.

REQ-MCP-07 - SIP/SDP (Session Initiation Protocol / Session
   Description Protocol) shall be used to establish and modify media
   connections to a media server.

REQ-MCP-08 - It should be possible to support a single conference
   spanning multiple media servers.

   Note: It is probable that spanning multiple MSs can be
   accomplished by the AS and does not require anything in the
   protocol for the scenarios we have in mind. However, the concern
   is that if this requirement is treated too lightly, one may end up
   with a protocol that precludes its support.

REQ-MCP-09 - It must be possible to split call legs individually, or
   in groups, away from a main conference on a given media server,
   without performing re-establishment of the call legs to the MS
   (e.g., for purposes such as performing IVR with a single call leg
   or creating sub-conferences, not for creating entirely new
   conferences).

REQ-MCP-10 - The MS control protocol should be extendable,
   facilitating forward and backward compatibility.

REQ-MCP-11 - The MS control protocol shall include an authentication
   component to ensure that only an authorized AS can communicate
   with the MS, and vice versa.

REQ-MCP-12 - The MS control protocol shall use some form of
   transport protection to ensure the confidentiality and integrity
   of the data between the AS and MS.

REQ-MCP-13 - Different application servers may have different
   privileges for using an MS. The protocol should prevent the AS
   from doing unauthorized operations on a MS.

REQ-MCP-14 - The MS control protocol requires mechanisms to protect
   the MS resources used by one AS from another AS since the solution
   needs to support multiple ASs controlling one MS.

   REQ-MCP-15 - During session establishment, there shall be a
      capability to negotiate parameters that are associated with media
      streams. This requirement should also enable an AS managing
      conference to specify the media streams allowed in the conference.

   REQ-MCP-16 - The AS shall be able to instruct the MS to perform
      stream operations like mute and gain control.

   REQ-MCP-17 - The AS shall be able to instruct the MS to play a
      specific announcement.

   REQ-MCP-18 - The AS shall be able to request the MS to create,
      delete, and manipulate a mixing, IVR, or announcement session.

   REQ-MCP-19 - The AS shall be able to instruct the MS to play
      announcements to a single user or to a conference mix.

   REQ-MCP-20 - The MS control protocol should enable the AS to ask the
      MS for a session summary report. The report may include resource
      usage and quality metrics.

   REQ-MCP-21 - The MS shall be able to notify the AS of events
      received in the media stream if requested by the AS. (Examples -
      STUN request, Flow Control, etc.)

3.2. Media mixing Requirements

   REQ-MCP-22 - The AS shall be able to define a conference mix; the MS
      may offer different mixing topologies. The conference mix may be
      defined on a conference or user level.

   REQ-MCP-23 - The AS may be able to define a custom video layout
      built of rectangular sub-windows.

   REQ-MCP-24 - For video, the AS shall be able to map a stream to a
      specific sub-window or to define to the MS how to decide which
      stream will go to each sub-window.

   REQ-MCP-25 - The MS shall be able to notify the ASs of who the
      active sources of the media are; for example, who the active
      speaker is or who is being viewed in a conference. The speaker
      and the video source may be different, for example, a person
      describing a video stream from a remote camera managed by a
      different user.

REQ-MCP-26 - The MS shall be able to inform the AS which layouts it
    supports.

REQ-MCP-27 - The MS control protocol should enable the AS to
    instruct the MS to record a specific conference mix.

3.3. IVR Requirements

REQ-MCP-28 - The AS shall be able to instruct the MS to perform one
    or more IVR scripts and receive the results. The script may be in
    a server or contained in the control message.

REQ-MCP-29 - The AS shall be able to manage the IVR session by
    sending requests to play announcements to the MS and receiving the
    response (e.g., DTMF). The IVR session flow, in this case, is
    handled by the AS by starting a next phase based on the response
    it receives from the MS on the current phase.

REQ-MCP-30 - The AS should be able to instruct the MS to record a
    short participant stream and play it back. This is not a
    recording requirement.

3.4. Operational Requirements

   These requirements may be applicable to the MRB, but they can be used
   by an AS if it has a one-to-one connection to the MS.

REQ-MCP-31 - The MS control protocol must allow the AS to audit the
    MS state during an active session.

REQ-MCP-32 - The MS shall be able to inform the AS about its status
    during an active session.

4. Security Considerations

   This document discusses high-level requirements for MCP. The MCP has
   some specific security requirements, which will be summarized here at
   a very high level.

   All of the operations and functions described in this document need
   to be authorized by an MS or an AS. It is expected that MS resources
   will be governed by a set of authorization rules defined as part of
   the AS / MS policy. In order for the policy to be implemented, the
   MS needs to be able to authenticate requests. Normal SIP mechanisms,
   including Digest authentication and certificates, can be used as
   specified in RFC 3261 [RFC3261]. These MCP security requirements
   will be discussed in detail in the framework and protocol documents.

5. Acknowledgments

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   a Media Server Control Protocol". The authors would like to
   acknowledge the work of Gary Munson from AT&T Labs, and James
   Rafferty from Cantata who helped write "Media Control Protocol
   Requirements", on which this work is based.

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