



**Implementation Agreement
for SIP Media Server Interface**

MSF-IA-SIP.009-FINAL

Multiservice Switching Forum Implementation Agreement

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Title: Implementation Agreement for SIP Media Server Interface

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Abstract: This document is an Interoperability Agreement (IA) for the SIP interface of an IP media server in the MSF architecture. This is part of the GMI2004 effort.

Keywords: interoperability agreement, IA, media server, SIP, Netann, VoiceXML, MSML, MOML

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It is envisaged that GMI2004 will provide an industry showcase that will:

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- Demonstrate a network scenario that can be managed to specific quality standards.

The MSF welcomes feedback and comment and would encourage interested parties to get involved in this work program. Information about the MSF and membership options can be found on the MSF website <http://www.msforum.org/>

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1. Multiservice Switching Forum

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2. Introduction

This document is an Interoperability Agreement (IA) for the SIP interface of an IP media server in the MSF architecture. It is intended for use in GMI2004.

The main focus of this IA is on the control interface, but the two other main interfaces of a media server, media and management, are also briefly covered.

3. Background

An IP media server is a slave media processing device that is connected uniquely to an IP network and controlled by a call agent of some kind, e.g., softswitch or application server. The media server performs media processing manipulations on RTP streams such as announcements, IVR, recording and playback, bridging/mixing, automatics speech recognition (ASR), text-t-speech (TTS), fax handling, and video processing (e.g., voice activated switching, multiple continuous presence). A media server does not contain any application logic and is therefore a multipurpose component reusable for all media processing tasks in the network.

A media server is controlled by a control agent using a control protocol. The control agents in the MSF architecture, as far as a media server is concerned, are applications server and service brokers.

This document deals only with the SIP media server control interface.

In addition to the control interface, a media server has four other interfaces: media (RTP), management (e.g., SNMP, HTTP, CORBA), file transfer (e.g., NFS, HTTP), and speech server (e.g., MRCP)

4. Applicability and Scope

The main focus of this IA is on the control interface, but the two other main interfaces of a media server, media and management, are also covered. In terms of importance to define for proper interworking of media servers and control agents, the priority order, based on complexity, risk, and need is: control interface, then media interface, then management interface.

Media Server Interface	Part of this IA	Protocol	Far End Device
Control	Yes	SIP	control agent: softswitch, application server, etc
Media	No	RTP	terminal: media gateway, access gateway, trunking gateway, IP telephone, etc
Management	No	SNMP	management agent: SNMP manager, EMS, NMS, OSS, etc
File transfer	No	NFS, HTTP, etc.,	file server: storage for announcements, voicemail, etc
Speech server	No	MRCP, etc.	external speech server: ASR server, TTS server, ASR/TTS server, etc.

This IA currently deals only with audio.

5. IA Definition

This section provides an overview of the primary public specifications dealing with the media server's three main interfaces, control, media, and management. Complete details on all these specifications are listed in the References section.

The "SIP MS IA" column lists some of the restrictions that are placed on each specification by this IA. This IA essentially defines a "profile" of each specification for use with GMI2004. Each limitation in the profile is either to limit GMI2004 functionality to a reasonable scope or because some piece of functionality does not make sense for a media server.

The terms used to describe IA functionality are:

- mandatory
- conditional mandatory
- optional
- not supported

5.1 Control Interface: SIP

SIP is a signaling protocol but can be used for media server control through one key restriction -- that the media server always receives INVITES, never sends them -- and by some clean extensions to allow media processing operations to be requested and notified, [NETANN], [MSML], and [MOML]. These three key specifications for media server control are highlighted below.

Specification	Industry Status	"SIP MS IA" Restrictions
SIP Signaling		
[SIP] Session Initiation Protocol (SIP)	Widely used	UDP is <u>mandatory</u> , TCP is <u>optional</u> REGISTER method is <u>optional</u> Support for forking and redirection of outgoing requests is <u>optional</u> Media server as target of REFER is <u>not supported</u>
[SIPLOC] Locating SIP Servers	Widely used	
[SIPSTIM] SIP Extension for Session Timer	Widely used	Session Timer is <u>optional</u>
[SIPREAS] Reason Header Field for SIP	Widely used	
[SIP3PCC] Third Party Call Control in SIP	Widely used	
[SIPINFO] SIP INFO Method	Widely used	(Note: SIP INFO is used by MSML, MOML) (Note 2)
Media Server SIP		
[NETANN] Basic Network Media Services with SIP	Widely used	SIP security is <u>optional</u>
[NETANN5] Basic Network Media Services with SIP -- Section 3.3 "Early Media Announcement" only (Note 1)	Somewhat used	Early Media is <u>optional</u>
[MSML] Media Sessions Markup Language (MSML)	Recently introduced	
[MOML] Media Objects Markup Language (MOML)	Recently introduced	
Other		
[VOICEXML] Voice Extensible Markup Language (VoiceXML)	Widely used	ASR and TTS are <u>optional</u> <transfer> element is <u>optional</u> (Note: VoiceXML is invoked using Netann or MSML)

Legend and Notes

Note 1: Early Media was removed from Netann after issue -05. Use of Early Media and Netann-05 will be deprecated at some point.

Note 2: The use of SIP INFO by MSML/MOML is temporary. SIP INFO will be replaced at some point by a TCP connection set up by SIP and used to carry MSML/MOML in both directions.

5.2 Control Interface: SDP

Specification	Industry Status	"SIP MS IA" Restrictions
[SDP] Session Description Protocol (SDP)	Widely used	
[SDPOA] Offer/Answer Model with SDP	Widely used	

6. NAT and Firewall Traversal

NAT and firewall traversal support is not required at this time.

7. QoS Aspects

QOS support is not required.

8. Security aspects

Security support is not required at this time.

9. Redundancy and Resilience

Redundancy and resilience has two aspects with respect to media servers: redundancy of the media server itself and redundancy of the media server's control agent.

Redundancy of the media server means that any failure of a media server component results in a transparent recovery by the media server. For a hardware failure, the media server switches transparently and immediately to a hot standby component, which then behaves to the outside world like the previous component did (e.g., takes over IP addresses, etc.). Redundancy of the media server is optional.

Redundancy of the media server's control agent means that the control agent (e.g., softswitch or application server) controlling the media server may fail. There are two cases. In the first case, a hot standby control agent takes over transparently (e.g., takes over IP addresses, etc.) and immediately and the media server is not aware of the failure. In the second case, the switchover to the new control agent is not transparent to the media server and the new control agent must explicitly inform the media server of the handover. The media server must provide support only for the second case, the feature for which is called "control agent failover support".

The Internet Draft [MGCPRED] addresses this second case by providing the control agent with a command that tells the media server to transfer ownership of resources (e.g., endpoints, connections) from one control agent to another.

There is currently no equivalent for SIP. However, one will likely be introduced for SIP as an extension to MSML.

10. Management Information Model

Because a media server is unaware of particular applications or services in the network, it is in general a plug and play component, with little initial network configuration or ongoing service provisioning required.

Initial network configuration includes IP addresses, netmasks, gateway addresses, host names, etc. Since this information is set one and then left alone, it makes sense to use the media server's built-in management interface to do this configuration, and there is little urgency to support configuration of this set of data from an external EMS or OSS.

Since media servers do not have configuration data for services, customer groups, and subscribers, service provisioning for a media server is composed only of media-related data such as audio and video files for playback (also known as announcements).

Additionally, storing these media files inside the media server is optional as they can be placed on an external file server and retrieved by the media server as required. In general, files that change infrequently can be stored internal storage, while those that change frequently should be stored externally. File downloaded to the media server are persistent, i.e., remain there through power failures and restarts, until explicitly replaced or deleted by management action.

At the simplest level of abstraction a media server has an internal directory structure for media files. The media server supports an automated management interface for downloading and deleting media files in internal storage. The download command takes as parameters an external, source URL and an internal, destination URL. The delete command takes as parameter an internal URL.

11. Compliance to SIP Core IA

11.1 Main Table

This table shows how the SIP media server interface compares to the SIP Core interface [MSFCORE].

MSF2004.035.01	SIP Core IA Title	SIP MS IA
1	MultiService Switching Forum	n/a
2	Scope Of This Document	n/a
2.1	Network Components	n/a
2.2	Terminology	n/a
3	Definitions	n/a
3.1	SIP Transport	n/a
3.2	SIP Messages	n/a
3.3	SIP Request Methods	n/a
3.4	SIP Responses	n/a
3.5	SIP Headers	n/a
3.6	SIP Profiles	n/a
4	SIP Profile	n/a
4.1	SIP Requests	n/a
4.1.1	INVITE	Mandatory
4.1.2	ACK	Mandatory
4.1.3	PRACK (Provisional Response ACK)	Optional (Note 6)
4.1.4	CANCEL	Mandatory
4.1.5	BYE	Mandatory
4.1.6	INFO	Optional (Note 5)
4.1.7	UPDATE	Optional
4.1.7.1	Determining Support for UPDATES	Optional
4.1.7.2	Handling an UPDATE request	Optional
4.1.8	OPTIONS	Optional
4.1.9	REGISTER	Optional
4.1.10	SUBSCRIBE	Not supported
4.1.11	NOTIFY	Not supported
4.1.12	REFER	Not supported
4.2	Supported Responses	n/a
4.2.1	1xx Provisional Responses	n/a
4.2.1.1	100 Trying	Mandatory
4.2.1.2	180 Ringing	Not supported
4.2.1.3	183 Session Progress	Optional
4.2.1.4	Provisional Response Supported Headers	Optional
4.2.2	2xx Successful Responses	Mandatory
4.2.2.1	200 OK	Mandatory (Note 2)
4.2.2.2	202 Accepted	Not supported
4.2.3	3xx Redirection Responses	Not supported

MSF-IA-SIP.009-FINAL
Implementation Agreement for SIP Media Server Interface

MSF2004. 035.01	SIP Core IA Title	SIP MS IA
4.2.4	4xx Request Failure Responses	n/a
4.2.4.1	400 Bad Request	Mandatory
4.2.4.2	401 Unauthorized	Not supported
4.2.4.3	403 Forbidden	Not supported
4.2.4.4	404 Not Found	Mandatory
4.2.4.5	405 Method Not Allowed	Mandatory
4.2.4.6	406 Not Acceptable	Mandatory
4.2.4.7	407 Proxy Authentication Required	Not supported
4.2.4.8	408 Request Timeout	Not supported
4.2.4.9	410 Gone	Not supported
4.2.4.10	413 Request Entities Too Large	Mandatory
4.2.4.11	414 Request URI Too Long	Mandatory
4.2.4.12	415 Unsupported Media Type	Mandatory
4.2.4.13	416 Unsupported URI Scheme	Mandatory
4.2.4.14	420 Bad Extension	Mandatory
4.2.4.15	421 Extension Required	Not supported
4.2.4.16	422 Session Interval Too Small	Mandatory
4.2.4.17	423 Interval Too Brief	Not supported
4.2.4.18	480 Temporarily not available	Not supported
4.2.4.19	481 Call Leg/Transaction Does Not Exist	Mandatory
4.2.4.20	482 Loop Detected	Not supported
4.2.4.21	483 Too Many Hops	Mandatory
4.2.4.22	484 Address Incomplete	Mandatory
4.2.4.23	485 Ambiguous	Not supported
4.2.4.24	486 Busy Here	Mandatory
4.2.4.25	487 Request Cancelled	Mandatory
4.2.4.26	488 Not Acceptable Here	Mandatory
4.2.4.27	491 Request Pending	Mandatory
4.2.4.28	493 Undecipherable	Not supported
4.2.5	5xx Server Error Responses	n/a
4.2.5.1	500 Internal Server Error	Mandatory
4.2.5.2	501 Not Implemented	Mandatory
4.2.5.3	502 Bad Gateway	Not supported
4.2.5.4	503 Service Unavailable	Mandatory
4.2.5.5	504 Server Time-out	Not supported
4.2.5.6	505 Version Not Supported	Not supported
4.2.6	6xx Global Failure Responses	n/a
4.2.6.1	600 Busy Everywhere	Not supported
4.2.6.2	603 Decline	Not supported
4.2.6.3	604 Does Not Exist Anywhere	Not supported
4.2.6.4	606 Not Acceptable	Mandatory

MSF-IA-SIP.009-FINAL
Implementation Agreement for SIP Media Server Interface

MSF2004. 035.01	SIP Core IA Title	SIP MS IA
4.3	Supported Headers	n/a
4.3.1	Request Line	Mandatory
4.3.2	Via	Mandatory
4.3.3	From	Mandatory
4.3.4	To	Mandatory
4.3.5	Call-ID	Mandatory
4.3.6	CSeq	Mandatory
4.3.7	Content-Length	Mandatory
4.3.8	Content-Type	Mandatory
4.3.9	Contact	Mandatory
4.3.10	Session-Expires	Mandatory
4.3.11	Supported	Mandatory
4.3.12	Record-Route	Mandatory
4.3.13	Route	Mandatory
4.3.14	Resource-Priority	Optional (Note 8)
4.4	Event Notification	Not supported
4.5	Resource Management (QOS)	Not supported
4.6	SIP 100rel Extension	Optional (Note 6)
4.6.1	RSeq Header	Optional
4.6.2	RAck Header	Optional
4.7	SIP Session Timer Extension	Optional
4.7.1	Supported Header	Optional
4.7.2	Require Header	Optional
4.7.3	Session-Expires Header	Optional
4.7.4	Min-SE Header	Optional
4.7.5	Behavior as a UAC	Optional
4.7.6	Behavior as a UAS	Optional
4.7.7	Periodic Refreshing Procedure	Optional
4.8	SIP Privacy Extension	Not supported
4.8.1	Privacy Header	Not supported
4.8.2	P-Asserted-Identity Header	Not supported
4.9	SIP Diversion HeaderOptional (Note 7)	
4.9.1	Diversion Header	Optional
4.9.2	UAS/C Behavior	Optional
4.10	Registration	Optional
4.11	Authentication	Not supported
4.12	SIP Signaling Security	Not supported
4.13	Failure detection through no-response	Mandatory
4.14	Symmetric Response Routing	Not supported
4.14.1	Via Header	Not supported
5	Management Information Model	n/a (Note 3)
6	References	See following table
7	Call Flows	n/a (Note 4)
8	Redundant Call Agent/SIP Server	n/a
8.1	Seamless 1:1 redundancy	Optional
8.2	Active/Standby Mechanism	Not supported
8.2.1	SIP Client Behavior	Not supported
8.2.2	Active SIP Server Behavior	Not supported
8.2.3	Standby SIP Server Behavior	Not supported

Legend and Notes

[] = Text added to SIP Core IA document headings

Note 2: RSeq is listed in the SIP Core IA as a header of 200 OK; this is probably a mistake.

Note 3: Marked as "TBD" in SIP Core IA.

Note 4: SIP Core IA does not contain call flows.

Note 5: SIP INFO is used only to carry MSML/MOML. The use of SIP INFO by MSML/MOML is temporary. SIP INFO will be replaced at some point by a TCP connection set up by SIP and used to carry MSML/MOML in both directions.

Note 6: Provisional responses and 100rel are used for Early Media only. Use of Early Media, Provisional responses, and 100rel will be deprecated at some point.

Note 7: The media server would receive, never transmit, diversion headers.

Note 8: A media server may, but is not required to, support Resource Priority. If it doesn't support it, it must not reject a SIP request because of the presence of the Resource-Priority header.

11.2 References Table

	IETF RFC Identification	Document Title	Core SIP IA Mandatory/ Optional	SIP MS IA
1	RFC 3261	SIP: Session Initiation Protocol	Mandatory	Mandatory
2	RFC 2976	SIP Info Method	Optional	Optional
3	RFC 2327	SDP: Session Description Protocol	Mandatory	Mandatory
4	RFC 3264	An Offer/Answer Model with the Session Description Protocol (SDP)	Mandatory	Mandatory
5	draft-ietf-sip-session-timer-13	Session Timers in the Session Initiation Protocol (SIP)	Optional	Optional
6	RFC 3323	A Privacy Mechanism for the Session Initiation Protocol (SIP)	Mandatory	Not supported
7	RFC 3262	Reliability of Provisional Response in SIP	Mandatory	Optional
8	Draft-levy-sip-diversion-07	Diversion Indication in SIP	Conditionally Mandatory	Not supported
9	RFC 3581	An Extension to the Session Initiation Protocol (SIP) for Symmetric Response Routing	Optional	Not supported
10	RFC 3325	Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks	Conditionally Mandatory	Not supported
11	RFC 3311	SIP UPDATE Method	Optional	Optional
12	RFC 3312	Resource Management QOS	Optional	Not supported
13	RFC 3515	The Session Initiation Protocol (SIP) Refer Method	Conditionally Mandatory	Not supported
14	draft-ietf-sip-referredby-03	The SIP Referred-By Mechanism	Conditionally Mandatory	Not supported
15	RFC 3326	The Reason Header Field for the Session Initiation Protocol (SIP)	Optional	Optional
16	RFC 3420	Internet Media Type message/sipfrag	Conditionally Mandatory	Not supported
17	RFC 3265	Session Initiation Protocol (SIP)-Specific Event Notification	Optional	Not supported

MSF-IA-SIP.009-FINAL
Implementation Agreement for SIP Media Server Interface

	IETF RFC Identification	Document Title	Core SIP IA Mandatory/Optional	SIP MS IA
18	draft-ietf-sip-resource-priority-02	Resource priority	Conditionally Mandatory	Optional (Note 8 above)

	MSF Title	Document Title	Core SIP IA Mandatory/Optional	SIP MS IA
MSF-1	MSF-IA-SDP.001-FINAL (MSF2003-059)	SDP Usage & Codec Negotiation for GMI2004	Mandatory	Mandatory
MSF-2	MSF-IA-SIP.008-FINAL (MSF2003-116)	SIP Signaling Security for GMI 2004	Mandatory	Not supported
MSF-3	MSF-AF-QOS.001-FINAL (MSF2003-105)	MSF QoS Solution Framework	Mandatory	Not supported
MSF-4	MSF-IA-SIP.010-FINAL (msf2004.027)	SIP Call Agent to Bandwidth Manager	Conditionally Mandatory	Not supported
MSF-5	MSF-IA-SIP.004-FINAL	SIP Call Agent to Call Agent	Conditionally Mandatory	Not supported
MSF-6	MSF-IA-SIP.005-FINAL (MSF2003.064)	SIP Call Agent to Service Broker Interface	Conditionally Mandatory	Not supported
MSF-7	MSF-IA-SIP.003-FINAL	SIP Call Agent to User Agent interface	Conditionally Mandatory	Not supported
MSF-8	MSF-IA-SIP.009-FINAL (MSF2004.006)	SIP Media Server Interface	Conditionally Mandatory	Supported
MSF-9	MSF-IA-SIP.006-FINAL (MSF2003.063)	SIP Service Broker to Application Server	Conditionally Mandatory	Not supported
MSF-10	MSF-IA-SIP.007-FINAL (MSF2003.065)	SIP Service Broker to Service Broker	Conditionally Mandatory	Not supported
MSF-11	MSF-IA-SIP-T.001.02-FINAL (msf2004.030)	SIP-T Profile for Media Gateway Controller	Conditionally Mandatory	Not supported
MSF-12	msf2004.001	Use case for SIP terminals with NAT supported by separate SBCs	Recommended	Not supported ⁱ

12. References

12.1 MSF

12.1.1 VoIP Architecture

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12.2.2 SIP for Control of Media Processing

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