Push using SIP Architecture

Candidate Version 1.0 – 02 Dec 2008

Open Mobile Alliance

OMA-AD-SIP_Push-V1_0-20081202-C

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1. Scope (Informative)

This document defines the entities needed to implement the SIP Push protocol and how to integrate them to create a SIP Push based service. The architecture is based on the requirements in the SIP Push Requirement Document [PushSIP-RD].

The definition of SIP Push entities and the description of SIP/IP Core features needed to enable a SIP Push based service are in scope of this document.

In the definition of the entire OMA push solution this architecture specification co-exists and references the work of the OMA Push 2.1 Enabler Release [PUSH2.1].

In order to facilitate integration with other OMA enablers this document deals with entities of the general push architecture that are significantly affected by the introduction of a SIP based push mechanism.

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2. References

2.1 Normative References

[RFC2119] "Key words for use in RFCs to Indicate Requirement Levels". S. Bradner. March 1997. URL: http://www.ietf.org/rfc/rfc2119.txt

2.2 Informative References

[3GPP TS 23.228] “IP Multimedia Subsystem (IMS); Stage 2”, 3GPP TS 23.228

[3GPP2 X.S0013-002-A] "All-IP Core Network Multimedia Domain: IP Multimedia Subsystem - Stage 2", X.S0013-002-A Revision A, Version 2.0, 3GPP2, 2004

[IMSArch] "Utilization of IMS capabilities Architecture", Open Mobile Alliance™, OMA-AD-IMS-V1_0-20050204-C URL:http://www.openmobilealliance.org/

[OMA-UAProf] "User Agent Profile", OMA-TS-UAProf-V2_0. URL: http://www.openmobilealliance.org/

[PUSH2.1] "Push 2.1 Enabler Release ", Open Mobile Alliance™. URL:http://www.openmobilealliance.org/

[PushOTA] "Push OTA Protocol", Open Mobile Alliance™. , WAP-235-PushOTA, URL:http//www.openmobilealliance.org/

[PushSIP-RD] “OMA-RD-SIP_Push-V1_0” Open Mobile Alliance™. URL:http://www.openmobilealliance.org/

[RFC3261] "SIP: Session Initiation Protocol". J. Rosenberg et al. June 2002. URL :http://www.ietf.org/rfc/rfc3261.txt

[RFC4975] "The Message Session Relay Protocol (MSRP)", Campbell, B., Ed., Mahy, R., Ed., and C. Jennings, Ed., September 2007. URL:http://www.ietf.org/rfc/rfc4975.txt

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3. Terminology and Conventions

3.1 Conventions

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [**Error! Reference source not found.**].

All sections and appendixes, except “Scope” and “Introduction”, are normative, unless they are explicitly indicated to be informative.

3.2 Definitions

Application-Level Addressing	The ability to address Push Content between a particular user agent on a client and push initiator.
Application Server	A functional entity that implements the service logic for SIP sessions.
Push Access Protocol	A protocol used for conveying content that should be pushed to a client, and push related control information, between a Push Initiator and a Push Proxy Gateway.
Push Content	Content, metadata and application level control information that has a shared interpretation by both Push Sender Agent and Push Receiver Agent.
Push Proxy Gateway	A proxy gateway that provides push proxy services.
Push Receiver Agent	A logical entity that uses the SIP Push procedure to receive Push Content, and generate a response to the Push Sender Agent request.
Push Sender Agent	A logical entity that creates a push request, and then uses the SIP Push procedure to send Push Content.

3.3 Abbreviations

IMS	IP Multimedia Subsystem
MMD	Multimedia Domain
OMA	Open Mobile Alliance
SIP	Session Initiation Protocol
URL	Uniform Resource Locator
3GPP	3rd Generation Partnership Project
3GPP2	3rd Generation Partnership Project 2

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4. Introduction

In the "normal" client/server model, a client requests a service or information from a server, which then responds in transmitting information to the client. This is known as “pull” technology: the client “pulls” information from the server. Browsing the World Wide Web is a typical example of pull technology, where a browser submits a URL (the request) that is sent to a server, and the server answers by sending a Web page (the response) to the browser.

In contrast, the “push” technology, which is also based on the client/server model, does not require an explicit request from the client before the server transmits its content.

SIP Push Enabler defines the protocol that will be used to implement a SIP Push based service. A SIP Push based service allows the client to receive content in a communication initiated by the server, or ‘pushed’ over the SIP/IP Core. The particular content being pushed is not defined by this enabler and is not restricted by this enabler.

This architecture document introduces the fundamental entities to build a SIP Push based service: the Push Sender Agent and Push Receiver Agent that act as the interface points to the SIP/IP Core as shown in Figure 1.

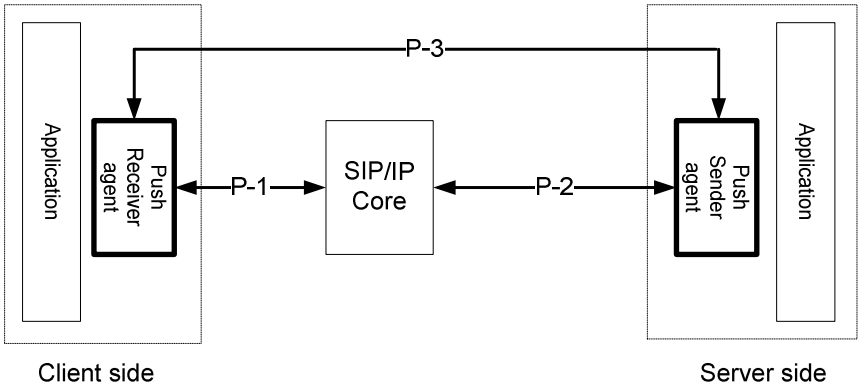

Figure 1: SIP Push Architectural model

Those entities need to be associated with or within another enabler to build a SIP Push based service and applications may run on top of those enablers utilising SIP Push as described below. The dotted box shown in Figure 2 as resources relates to a push resource of an implementing enabler:

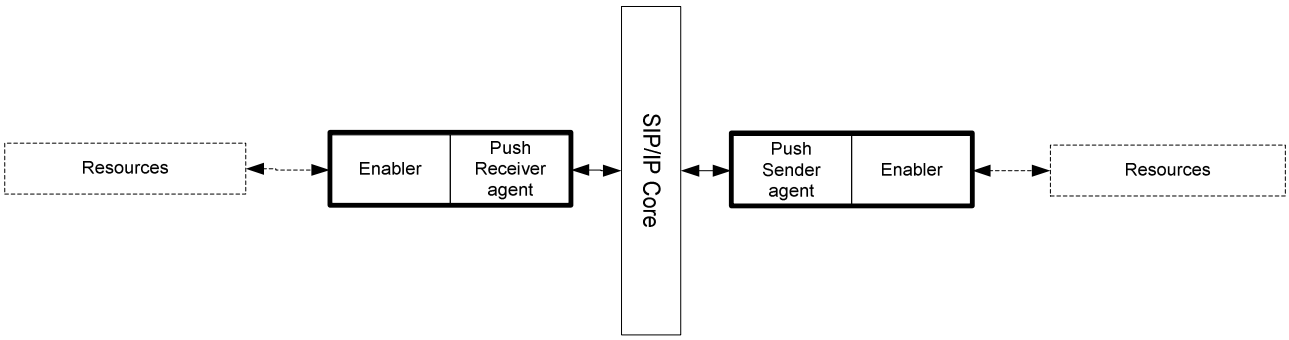

Figure 2: SIP Push based service

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In this example model, the Push Content is sent from the Push Initiator to the Push Proxy Gateway using the Push Access Protocol. The Push Proxy Gateway as Push Sender Agent sends the content to the Push Receiver Agent on the terminal which will forward the content to the Push application.

The application on the client side is primarily responsible for processing received Push Content based on specific application semantics.

In the scope of this architecture will be the functions required from the SIP/IP Core in order that the Push Sender Agent and Push Receiver Agent can provide the features required by applications on the server and client to enable a SIP Push based service. This architecture document identifies the functionality of the SIP/IP Core and the features of the Push Sender Agent and the Push Receiver Agent at a high level.

4.1 Planned Phases

No additional phases are planned beyond this architecture.

4.2 Security Considerations

4.2.1 General

The SIP Push Enabler will rely on security features and mechanisms provided by the underlying SIP/IP Core, as identified in section 5.1.1 to e.g. secure the service environment and authenticate users. It is assumed that the security is provided by the SIP/IP Core to support the integrity and confidentiality protection of SIP signalling and to authenticate the address of Push Receiver Agent in order to prevent spoofing attacks.

The Push Sender Agent and the Push Receiver Agent will rely on the authentication and confidentiality mechanisms provided by the underlying SIP/IP Core to accomplish user identity verification.

In order to protect user communication against eavesdropping, modification and spoofing, the user plane for SIP Push communication between Push Receiver Agent and Push Sender Agent should be protected to support the integrity and confidentiality subject to service provider policies.

The SIP Push trust model may be service specific. The specific model may be based, for example, on the SIP/IP Core trusted network model for SIP signalling with hop-by-hop security and proxy authentication and/or based on an end to end model.

When the SIP/IP Core corresponds to 3GPP IMS/3GPP2 MMD in the case where the intra domain security is insufficient, Push Sender Agents will authenticate and secure communication to Proxies/Push Receiver Agents, as per IMS Network Security [IMSArch]. In the case of inter-domain security, Push Sender Agents will rely on communication channels that are protected according to IMS Network Security [IMSArch].

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5. SIP Push Architectural Model

The SIP Push Enabler leverages the SIP/IP Core by transferring the Push Content from the Push Sender Agent to the Push Receiver Agent using Session Initiation Protocol (SIP) [RFC3261] methods. The SIP Push Enabler provides analogous function as Push OTA [PushOTA], using SIP as the underlying transport mechanism. Support for SIP Push is dependent on the availability of SIP/IP Core capabilities in both the network and the client.

The Push Sender Agent and Push Receiver Agent are logical entities, which interact with the SIP/IP Core to fulfil SIP Push based service. In the case where SIP Push is utilized with [PUSH2.1], the Push Proxy Gateway acts as the Push Sender Agent when delivering SIP Push Content and the client acts as a Push Receiver Agent to receive SIP Push Content.

5.1 Dependencies

5.1.1 SIP/IP Core

The SIP/IP Core is a network of servers, such as proxies and/or registrars that perform a variety of services.

The SIP Push Enabler requires the SIP/IP Core to perform at least the following functions:

- Access level security
- Authentication and authorization of Push Sender Agent and Receiver Agent based on application and user's service profile
- Confidentiality protection of SIP signalling
- SIP registration and routing functionalities

The SIP/IP Core in the SIP Push enabler architecture is not limited to the 3GPP IMS and 3GPP2 MMD, and is open to other SIP/IP Cores. In the context of IMS [IMSArch], the the capabilities of 3GPP IMS and 3GPP2 MMD are utilized as specified in [3GPP TS 23.228] and [3GPP2 X.S0013-002-A]. Alternatively, other SIP/IP Cores may be utilized as long as they perform at least the aforementioned functionality.

In the context of IMS [IMSArch] (3GPP IMS and 3GPP2 MMD networks) SIP Push as defined in [**Error! Reference source not found.**] should be used for push-based services.

5.1.2 [OMA-UAProf] Enabler

This enabler may be used by the Push Sender Agent to retrieve the Push Receiver capabilities when applicable.

5.2 SIP Push Features

SIP Push Enabler utilises SIP for over-the-air communication between the Push Sender Agent and the Push Receiver Agent and is hence primarily to be used in conjunction with a SIP/IP Core, such as IMS [IMSArch].

The SIP Push Enabler supports the following features:

- Making the SIP/IP Core aware of the supported push resources at the Push Receiver Agent
- The Push Receiver Agent can provide its capability information
- The Push Sender Agent initiates push request to the Push Receiver Agent
- The Push Sender Agent and Receiver Agent can support large content delivery
- The Push Sender Agent and Receiver Agent can support Application-Level Addressing
- Exchanging push control information between the Push Sender Agent and Push Receiver Agent

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- Authorizing push request at Push Receiver Agent
- Providing SIP Push delivery status information

5.3 SIP Push Functional Components and Interfaces

5.3.1 Push Sender Agent Functional Component

The Push Sender Agent is part of an Application Server that supports various SIP Push features as described in Section 5.2. It creates push requests, and follows the SIP Push procedure to send them. It may receive a responses to those push requests and handle them accordingly.

Push Content delivery may be triggered by content subscription and may depend on the Push Receiver Agent's capabilities in the [OMA-UAProf].

The Push Sender Agent supports the following functions:

1. Discovering the Push Receiver Agent through its Registration with the SIP/IP Core.
2. Receiving, storing, and sharing the capabilities information of the Push Receiver Agent, such as application type or push characteristics.
3. Selecting the type of push mode to send Push Content to the Push Receiver Agent, depending on the supported capabilities and application push request.
4. Creating push request to deliver the Push Content to the Push Receiver Agent.
5. Requesting delivery reports from Push Receiver Agent.
6. Mapping of SIP Push delivery status to application level status information for communication to the initiator of the push.
7. Delivering Push Content to all or subset of the terminals associated with the same user.

When SIP Push is realized using 3GPP IMS/3GPP2 MMD the Push Sender Agent will follow [3GPP TS 23.228] and [3GPP2 X.S0013-002-A], respectively.

5.3.2 Push Receiver Agent Functional Component

The Push Receiver Agent is a logical entity that supports the various SIP Push features as described in Section 5.2. It receives Push Content according to the SIP push procedures from the Push Sender Agent.

Push Receiver Agent supports the following functions:

1. Registering with a SIP/IP Core.
2. Publishing its push capabilities information.
3. Sending the list of available push resources.
4. Receiving and acknowledging Push Content from Push Sender Agent.

When SIP Push is realized using 3GPP IMS/3GPP2 MMD, the Push Receiver Agent will follow [3GPP TS 23.228] and [3GPP2 X.S0013-002-A], respectively.

5.3.3 Reference Point P-1: Push Receiver Agent – SIP/IP Core

The P-1 reference point, as described in Figure 1, supports the communication between the Push Receiver Agent and the SIP/IP Core. The protocol for the P-1 reference point is SIP [RFC3261].

The P-1 reference point provides the following functions:

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- Asynchronous reception of Push Content representing a push event,
- Push session signaling between the Push Receiver Agent and the Push Sender Agent,
- Discovery and address resolution services,
- Authentication and authorization of the Push Receiver Agent ,
- Registration of the Push Receiver Agent,
- Making the SIP/IP Core aware of the supported push resources,
- Capability and resource negotiation with Push Sender Agent.

5.3.4 Reference Point P-2: Push Sender Agent – SIP/IP Core

The P-2 reference point supports the communication between the Push Sender Agent and the SIP/IP Core. The protocol for the P-2 reference point is SIP [RFC3261].

The P-2 reference point provides the following functions:

- Sending asynchronous Push Content representing push events,
- Reception of push capabilities and registration information of Push Receiver Agents,
- Push session signaling between the Push Sender Agent and the Push Receiver Agent,
- Provides discovery and address resolution services,
- Authentication and authorization of the Push Sender Agent,
- Provides the Push Sender Agent registration.

5.3.5 Reference Point P-3: Push Sender Agent – Push Receiver Agent

The P-3 reference point supports the direct communication between the Push Sender Agent and the Push Receiver Agent. The protocol for the P-3 reference point is MSRP [RFC4975].

The P-3 reference point provides the following functions:

- Direct Push of any non-streaming media independent of size
- Client having more then one push connection simultaneously.
- Sending asynchronous Push Content representing push events

5.3.6 Push Capability Discovery

The Push Receiver Agent may provide its SIP Push capabilities such as acceptable content types . This function is based on the OMA [OMA-UAProf] reference. When receiving this reference URL the Push Sender Agent will be able to retrieve the capabilities by downloading the [OMA-UAProf] document from the server as described in Figure 3

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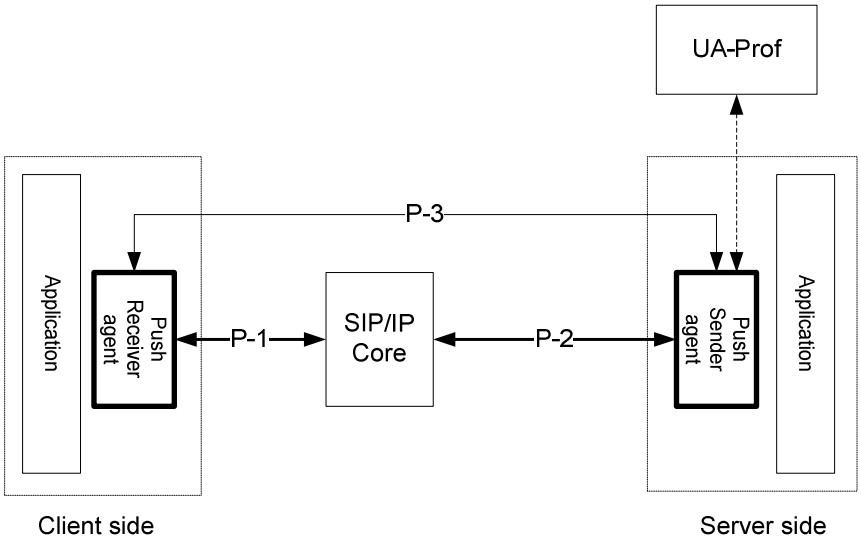

Figure 3: Interaction with OMA UA-Prof Enabler

The interface between the Push Sender Agent and the [OMA-UAProf] server is out of scope of the SIP Push Enabler. The application level semantics (presentation, storage and processing of Push Content) is also beyond the scope of this enabler.

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5.4 Flows

5.4.1 SIP Push flow for small content

The following example describes the interactions between the Push Sender Agent and the Push Receiver Agent for Push Sender Agent initiated small content

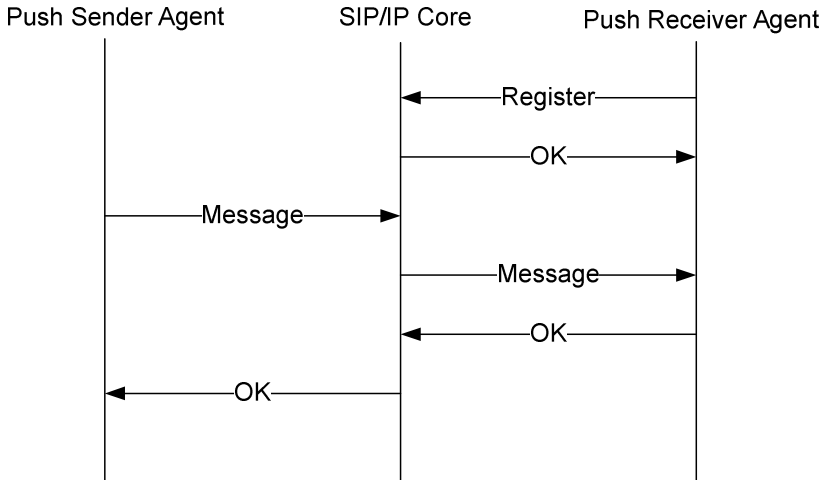

Figure 4: SIP Push flow for small content

1. The Push Receiver Agent (and the potential applications) registers with the SIP/IP Core
2. The SIP/IP Core sends an "OK" response to the Push Receiver Agent as a registration confirmation
3. When a new content is available, the Push Sender Agent sends a MESSAGE to the SIP/IP Core with the content or a reference to it
4. The SIP/IP Core forwards the MESSAGE to the appropriate Push Receiver Agent
5. The Push Receiver Agent sends an "OK" response to the SIP/IP Core
6. The SIP/IP Core forwards the "OK" response to the Push Sender Agent

5.4.2 SIP Push flow for large content

The following example describes how the Push Sender Agent pushes large content to a Push Recever Agent

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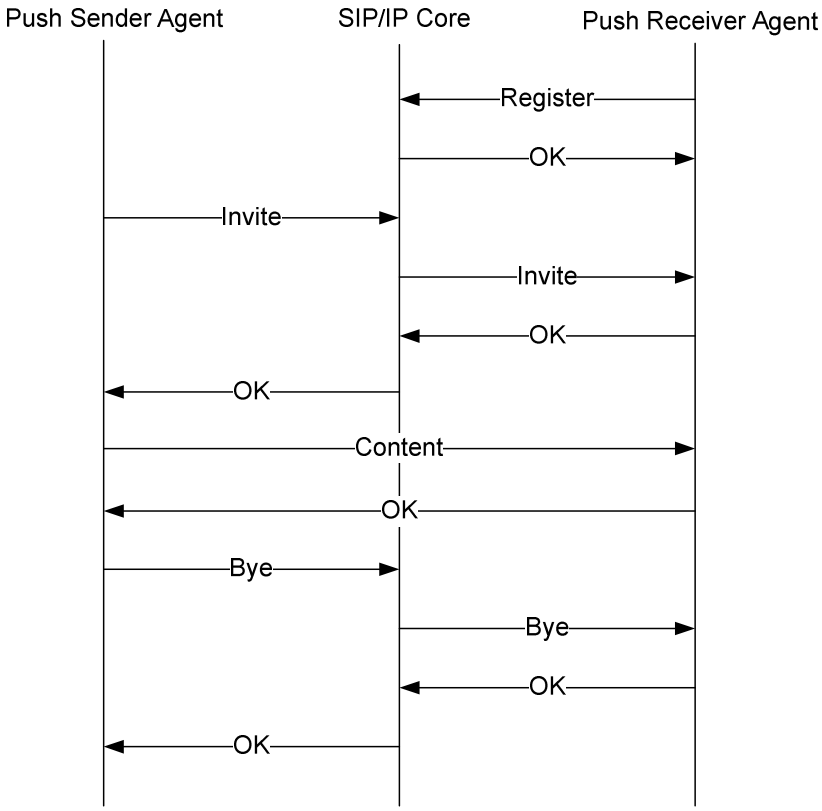

Figure 5: SIP Push flow for large content

1. The Push Receiver Agent (and the potential applications) registers with the SIP/IP Core
2. The SIP/IP Core sends an "OK" response to the Push Receiver Agent as a registration confirmation
3. The Push Sender Agent wants to push a large content to the Push Receiver Agent and thus sends an INVITE request to the SIP/IP Core to establish a MSRP session with the Push Receiver Agent to send this content.
4. The SIP/IP Core forwards the INVITE request to the Push Receiver Agent.
5. The Push Receiver Agent accepts the establishment of the MSRP session by sending an "OK" response back to the SIP/IP Core.
6. The SIP/IP Core forwards the "OK" response to the Push Sender Agent.
7. The Push Sender Agent sends the Push Content directly to the Push Receiver Agent through this MSRP session.
8. The Push Receiver Agent confirms with a “OK” to the Push Sender Agent through this MSRP session
9. When the Message session is not needed anymore, the Push Sender Agent sends a BYE to SIP/IP Core to end the MSRP session with the Push Receiver Agent.
10. The SIP/IP Core forwards the BYE request to the Push Receiver Agent.
11. The Push Receiver Agent confirms the Message session termination by sending a “OK” to the SIP/IP Core.
12. The SIP/IP Core forwards the “OK” response to the Push Sender Agent.

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Appendix A. Change History (Informative)

A.1 Approved Version History

Reference	Date	Description
n/a	n/a	No prior version –or- No previous version within OMA

A.2 Draft/Candidate Version 1.0 History

Document Identifier	Date	Sections	Description
Draft Versions: OMA-AD-SIP_Push-V0_1	18 Jul 2005	0.1	Initial draft for input to committee. Input from OMA-PUSH-2005-0029 and OMA-PUSH-2005-0029 OMA-PUSH-2005-0029.
OMA-AD-SIP_Push-V0_2	02 Sep 2005	0.2	Input from Montreal 2005 meeting; update all the figures and text to match the figures.
	16 Sept 2005	0.3	Conference call September 06 conference call input, OMA-PUSH-2005-0042R02
OMA-AD-SIP_Push-V0_4	17 Oct 20 05	0.4	Incorporates OMA-PUSH-2005-0046R01, OMA-PUSH-2005-0054
	28 Oct 2005	All	Incorporates new AD template and clean up references, definitions, and abbreviations
OMA-AD-SIP_Push-V0_5	14 Nov 2005	3.2, 5, 5.5	Conference call November 03 conference call inputs, email Nov. 4, and OMA-PUSH-2005-0057R01
OMA-AD-SIP_Push —V0_6	14 Dec 2005	all	Input comments from formal AD review. See ADRR
	11 Jan 2006	2, 4, 5	Incorporate from OMA-PUSH-2005-0066R02; OMA-PUSH-2005-0067R01
OMA-AD-SIP_Push-V0_7	08 Feb 2006	All	Incorporate from OMA-PUSH-2006-0005R1
OMA-AD-SIP_Push-V0_8	08 Feb 2006	4, 5.5	Editorial changes
OMA-AD-SIP_Push-V0_9	17 Apr 2006	All	Except changes and create clean version of document.
OMA-AD-SIP_Push-V1_0	07 Jun 2006		Create a clean version 1.0 document
OMA-AD-SIP_Push-V1_2	29 Aug 2007	All	Fix of editorial inconsistencies as agreed in OMA-CD-PUSH-2007-0022R02-CR_SIP_Push_AD_updates
OMA-AD-SIP_Push -V1_3	25 Oct 2007	5	Incorporates OMA-CD-PUSH-2007-0046R02-CR_MSRP_additions
OMA-AD-SIP_Push-V1_0	3 Dec 2007	5.4	Incorportes OMA-CD-PUSH-2007-0069R01
	5 May 2008	All	Modifications based on OMA-CONRR-CD_SIPPush-V1_0-20080505
	11 Jun 2008	4	Incorporate from OMA-CD-PUSH-2008-0030R01-CR_Changes_requested_in_SIP_PUSH_AD__CableLabsEricsson
	11 Jun 2008	All	AI 20080605#3 Correct “Push Messages” as “Push Content”
	12 Jun 2008	2.2	Incorporated agreed change: OMA-CD-PUSH-2008-0029R02-CR_References_in_Chapter_2 Editorial fixes: - 2008 template and copyright - cross-references fixed - history box fixed
	24 Jul 2008	4	Incorporate OMA-CD-PUSH-2008-0071-CR_Proposed_changes_to_AD_resulting_from_comment_B238_in_CONRR
	24 Jul 2008	2, 5.3.5	Incorporate OMA-CD-PUSH-2008-0069-CR_Add_missing_references_to_section_2_of_AD
	24 Jul 2008	5.2, 5.3.3, 5.3.4, 5.3.6, 5.4.1	Incorporate OMA-CD-PUSH-2008-0067-CR_remove_config_framework_from_AD
	31 Jul 2008	5.3.1, 5.3.2	OMA-CD-PUSH-2008-0108R02-CR_Incorporate_section_5_of_the_TS_into_the_AD
	31 Jul 2008	3.3	OMA-CD-PUSH-2008-0109-CR_Remove_OMNA_from_AD_definitions_section
	31 Jul 2008	5	OMA-CD-PUSH-2008-0110-CR_Remove_reference_to_IMSArch_from_section_5_of_the_AD
	15 Aug 2008	4.2	OMA-CD-PUSH-2008-0073R01-CR_the_security_section_in_AD
	15 Aug 2008	5.3.2	OMA-CD-PUSH-2008-0114-CR_Remove_May_from_bullets_in_5.3.2_of_the_AD
	15 Aug 2008	5.2, 5.3.1	OMA-CD-PUSH-2008-0118-CR_AD_section_5_3_1

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Document Identifier	Date	Sections	Description
	15 Aug 2008	All	Editorial changes according to CONRR A-CR088-1: Push Receiver agent -> Push Receiver Agent A-CR088-2: Push Sender agent -> Push Sender Agent A-CR088-3: sender and receiver agents -> Push Sender Agent and Push Receiver Agent A-CR088-4: Push Proxy/Gateway -> Push Proxy Gateway A-CR088-5: Push Sender and Receiver agents -> Push Sender Agent and Push Receiver Agent, Push Proxy Gateway (PPG) -> Push Proxy Gateway A-CR088-6: Push Sender and Receiver agents -> Push Sender Agent and Push Receiver Agent A-CR088-7: Push Sender and Receiver agents -> Push Sender Agent and Push Receiver Agent A-CR088-8: push content -> Push Content A-CR088-9: Use SIP/IP Core consistently
	26 Aug 2008	All	Editorial changes based on OMA-CD-PUSH-2008-0126-CR-AD-update
	08 Sep 2008	5.4.1 5.4.2	Editorial fixes: Figure numbers in titles Figure index History box
Candidate Version: OMA-AD-SIP_Push-V1_0	02 Dec 2008	All	Status changed to Candidate by TP: OMA-TP-2008-0439-INP_SIP_Push_V1_0_ERP_for_Candidate_Approval

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