[MS-DTMF]:
RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals Extensions

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Revision Summary

Date	Revision History	Revision Class	Comments
04/04/2008	0.1		Initial version
04/25/2008	0.2		Updated based on feedback
06/27/2008	1.0		Updated based on feedback
08/15/2008	1.01		Updated based on feedback
12/12/2008	2.0		Updated with latest template bug fixes (redlined)
02/13/2009	2.01		Updated with latest template bug fixes (redlined)
03/13/2009	2.02		Updated with latest template bug fixes (redlined)
07/13/2009	2.03	Major	Revised and edited the technical content
08/28/2009	2.04	Editorial	Revised and edited the technical content
11/06/2009	2.05	Editorial	Revised and edited the technical content
02/19/2010	2.06	Editorial	Revised and edited the technical content
03/31/2010	2.07	Major	Updated and revised the technical content
04/30/2010	2.08	Editorial	Revised and edited the technical content
06/07/2010	2.09	Editorial	Revised and edited the technical content
06/29/2010	2.10	Editorial	Changed language and formatting in the technical content.
07/23/2010	2.10	No change	No changes to the meaning, language, or formatting of the technical content.
09/27/2010	3.0	Major	Significantly changed the technical content.
11/15/2010	3.0	No change	No changes to the meaning, language, or formatting of the technical content.
12/17/2010	3.0	No change	No changes to the meaning, language, or formatting of the technical content.

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Date	Revision History	Revision Class	Comments
03/18/2011	3.0	No change	No changes to the meaning, language, or formatting of the technical content.
06/10/2011	3.0	No change	No changes to the meaning, language, or formatting of the technical content.
01/20/2012	3.1	Minor	Clarified the meaning of the technical content.

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1 Introduction

This document specifies the RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals Extensions. This protocol, which consists of a set of proprietary extensions to the protocol described in [RFC4733], specifies the payload format needed to carry **dual-tone multi-frequency (DTMF)** digits, tones, and signals in **Real-Time Transport Protocol (RTP)** packets over a network transport.

Any behavior not explicitly defined in this document is described in [RFC4733].

Sections 1.8, 2, and 3 of this specification are normative and contain RFC 2119 language. Sections 1.5 and 1.9 are also normative but cannot contain RFC 2119 language. All other sections and examples in this specification are informative.

1.1 Glossary

The following terms are defined in [MS-OFCGLOS]:

dual-tone multi-frequency (DTMF)
Real-Time Transport Protocol (RTP)
RTP packet
RTP payload
RTP session
Session Description Protocol (SDP)

The following terms are specific to this document:

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as described in [RFC2119]. All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

References to Microsoft Open Specification documents do not include a publishing year because links are to the latest version of the documents, which are updated frequently. References to other documents include a publishing year when one is available.

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information. Please check the archive site, http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624, as an additional source.

[MS-RTP] Microsoft Corporation, "Real-time Transport Protocol (RTP) Extensions".

[MS-RTPRADEX] Microsoft Corporation, "RTP Payload for Redundant Audio Data Extensions".

[MS-SDPEXT] Microsoft Corporation, "Session Description Protocol (SDP) Version 2.0 Extensions".

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, http://www.rfc-editor.org/rfc/rfc2119.txt

[RFC4733] Schulzrinne, H., "RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals", RFC 4733, December 2006, http://www.ietf.org/rfc/rfc4733.txt

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1.2.2 Informative References

[MS-OFCGLOS] Microsoft Corporation, "Microsoft Office Master Glossary".

1.3 Protocol Overview (Synopsis)

This protocol extends the protocol described in [RFC4733], which describes a mechanism for the transmission of in-band and out-of-band telephony signals.

An in-band telephony signal is where the events or tones are mixed directly into the media stream (typically, audio data). An out-of-band telephony signal is where the events or tones are transmitted through a separate band.

Telephony tones represent the DTMF tones mixed into the audio signal of the media stream. Telephony events represent the different call control events (such as an off-hook event or a specific digit being dialed).

The scope of this protocol is limited to telephony signals using out-of-band transmission. The in-band transmission of digits and tones is not supported by this protocol.

1.4 Relationship to Other Protocols

This protocol relies on RTP, as described in [MS-RTP], as its transport mechanism. This protocol can be used to communicate signaling DTMF telephony events between clients and gateways using the **RTP payload**.

1.5 Prerequisites/Preconditions

This protocol is a payload of the RTP; therefore, a valid **RTP session** is established between the client and the gateway.

Furthermore, because of the dynamic payload typing of the telephony events, some form of out-of-band negotiation to bind the payload type of the RTP payload to the telephony events is required.

1.6 Applicability Statement

This protocol is applicable wherever telephony digits, tones, or signals need to be sent or consumed either by remote clients or through gateways.

1.7 Versioning and Capability Negotiation

This document covers versioning issues in the following areas:

- **Supported Transports:** This protocol is sent using the RTP transport mechanism.
- **Protocol Versions:** This protocol, as a format of an RTP payload, does not provide versioning information within the scope of the protocol itself. However, as a part of the RTP payload, any versioning information about the RTP level applies.
- **Security and Authentication Methods:** This document does not describe any security or authentication methods. Security and authentication is dependent on the security method, authentication method, or both methods used by the RTP version 2 protocol and is beyond the scope of this document.

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1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.

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2 Messages

2.1 Transport

This protocol MUST be sent by using RTP, as specified in [MS-RTP], as its transport. This protocol assumes that a successful RTP session has been established with valid payload information.

The **SDP** MUST be used to negotiate the payload type information, as specified in [MS-SDPEXT] section 3.1.5.3 and [MS-SDPEXT] section 3.1.5.5.

2.2 Message Syntax

The structure and syntax of this protocol is specified in [RFC4733] section 2.3.

2.2.1 DTMF Telephony Event

The DTMF telephony event is specified in the **event** field, as specified in [RFC4733] section 2.3.1, of the DTMF message.

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3 Protocol Details

3.1 Common Details

This protocol conforms more to the "sender-receiver" paradigm, rather than the classic "client-server" paradigm. More specifically, it is appropriate to discuss in terms of the receiver of the telephony signals and the sender of the telephony signals.

This section covers the common details between the sender and receiver. Subsequent sections provide the specifics for the sender and the receiver.

Out-of-band negotiation of telephony signal information is required to establish a session as specified in [RFC4733]. During this negotiation, both payload types and the clock rate of the telephony signals are negotiated as specified in [RFC4733] section 2.5.1.1 using SDP for out-of-band negotiation. While dynamic payload type binding is required, both the sender and receiver of message blocks conforming to this protocol MUST fix the telephony signaling information at 8000 Hertz. Dynamic negotiation of the clock frequency of the DTMF payload MUST NOT be used.

Multiple payload type binding for different telephony events MUST NOT be used. There MUST be only one telephony event binding for a payload type. The payload type binding MUST be symmetrical. This means the received payload type and sent payload type MUST be the same. Asymmetrical payload type information MUST NOT be used.

This protocol supports only the out-of-band telephony event. An in-band telephony tone transmission MUST NOT be used.

3.1.1 Abstract Data Model

None.

3.1.2 Timers

None.

3.1.3 Initialization

None.

3.1.4 Higher-Layer Triggered Events

None.

3.1.5 Message Processing Events and Sequencing Rules

None.

3.1.6 Timer Events

None.

3.1.7 Other Local Events

None.

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3.2 Receiver Details

Redundant payload support, as specified in [MS-RTPRADEX], MUST NOT be used.

Multiple events per RTP block MUST NOT be used.

3.2.1 Abstract Data Model

None.

3.2.2 Timers

None.

3.2.3 Initialization

None.

3.2.4 Higher-Layer Triggered Events

None.

3.2.5 Message Processing Events and Sequencing Rules

None.

3.2.6 Timer Events

None.

3.2.7 Other Local Events

None.

3.3 Sender Details

Implementation for this protocol MUST NOT generate redundant blocks, as specified in [MS-RTPRADEX].

The sender MUST NOT pack multiple DTMF payloads into a single **RTP packet**.

The sender MUST NOT generate a DTMF event whose duration exceeds the maximum expressible duration, as specified in [RFC4733] section 2.3.5.

The sender MUST NOT generate a DTMF event payload with a zero duration.

3.3.1 Abstract Data Model

None.

3.3.2 Timers

None.

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3.3.3 Initialization

None.

3.3.4 Higher-Layer Triggered Events

None.

3.3.5 Message Processing Events and Sequencing Rules

None.

3.3.6 Timer Events

None.

3.3.7 Other Local Events

None.

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4 Protocol Examples

Examples of the DTMF telephony signal blocks are as specified in [RFC4733] section 5.

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5 Security

5.1 Security Considerations for Implementers

None.

5.2 Index of Security Parameters

None.

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6 Appendix A: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs:

- Microsoft® Office Communications Server 2007
- Microsoft® Office Communications Server 2007 R2
- Microsoft® Lync™ Server 2010
- Microsoft® Lync Server 15 Technical Preview
- Microsoft® Office Communicator 2007
- Microsoft® Office Communicator 2007 R2
- Microsoft® Lync™ 2010
- Microsoft® Lync 15 Technical Preview

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms SHOULD or SHOULD NOT implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that the product does not follow the prescription.

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7 Change Tracking

This section identifies changes that were made to the [MS-DTMF] protocol document between the June 2011 and January 2012 releases. Changes are classified as New, Major, Minor, Editorial, or No change.

The revision class **New** means that a new document is being released.

The revision class **Major** means that the technical content in the document was significantly revised. Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements or functionality.
- An extensive rewrite, addition, or deletion of major portions of content.
- The removal of a document from the documentation set.
- Changes made for template compliance.

The revision class **Minor** means that the meaning of the technical content was clarified. Minor changes do not affect protocol interoperability or implementation. Examples of minor changes are updates to clarify ambiguity at the sentence, paragraph, or table level.

The revision class **Editorial** means that the language and formatting in the technical content was changed. Editorial changes apply to grammatical, formatting, and style issues.

The revision class **No change** means that no new technical or language changes were introduced. The technical content of the document is identical to the last released version, but minor editorial and formatting changes, as well as updates to the header and footer information, and to the revision summary, may have been made.

Major and minor changes can be described further using the following change types:

- New content added.
- Content updated.
- Content removed.
- New product behavior note added.
- Product behavior note updated.
- Product behavior note removed.
- New protocol syntax added.
- Protocol syntax updated.
- Protocol syntax removed.
- New content added due to protocol revision.
- Content updated due to protocol revision.
- Content removed due to protocol revision.
- New protocol syntax added due to protocol revision.

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- Protocol syntax updated due to protocol revision.
- Protocol syntax removed due to protocol revision.
- New content added for template compliance.
- Content updated for template compliance.
- Content removed for template compliance.
- Obsolete document removed.

Editorial changes are always classified with the change type **Editorially updated.**

Some important terms used in the change type descriptions are defined as follows:

- **Protocol syntax** refers to data elements (such as packets, structures, enumerations, and methods) as well as interfaces.
- **Protocol revision** refers to changes made to a protocol that affect the bits that are sent over the wire.

The changes made to this document are listed in the following table. For more information, please contact protocol@microsoft.com.

Section	Tracking number (if applicable) and description	Major change (Y or N)	Change type
3.1 Common Details	Clarified description of supported telephony events.	N	Content updated.
4 Protocol Examples	Updated section number in normative reference.	N	Content updated.
6 Appendix A: Product Behavior	Updated products list.	N	Content updated.

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