[MS-RTPRADEX]:
RTP Payload for Redundant Audio Data 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.
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.
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Date	Revision History	Revision Class	Comments
07/16/2012	3.1	No change	No changes to the meaning, language, or formatting of the technical content.
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02/11/2013	3.1.1	No change	No changes to the meaning, language, or formatting of the technical content.
07/30/2013	3.1.1	No change	No changes to the meaning, language, or formatting of the technical content.

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Table of Contents

1 Introduction

The RTP Payload for Redundant Audio Data Extensions Protocol is a set of extensions for encoding redundant audio data for use with the Real-Time Transport Protocol (RTP) Extensions Protocol, as described in [MS-RTP]. This protocol is a proprietary extension of RTP Payload for Redundant Audio Data, as described in [RFC2198]. [RFC2198] describes a payload format for use with the Real-Time Transport Protocol (RTP).

Sections 1.8, 2, and 3 of this specification are normative and can contain the terms MAY, SHOULD, MUST, MUST NOT, and SHOULD NOT as defined in RFC 2119. Sections 1.5 and 1.9 are also normative but cannot contain those terms. All other sections and examples in this specification are informative.

1.1 Glossary

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

codec
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:

lossy network transports: A transport that cannot deliver a data payload reliably from a source to a destination.

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 Specifications documentation do not include a publishing year because links are to the latest version of the technical 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-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

[RFC2198] Perkins, C., "RTP Payload for Redundant Audio Data", RFC 2198, September 1997, http://www.ietf.org/rfc/rfc2198.txt

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1.2.2 Informative References

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

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

1.3 Overview

This protocol extends the **Real-Time Transport Protocol (RTP)** Payload for Redundant Audio Data protocol, as described in [RFC2198], by restricting an RTP audio payload to one block of redundant audio data. The redundant block of audio data is implemented in the **RTP payload** along with the primary block of audio data.

1.4 Relationship to Other Protocols

This protocol relies on the Real-Time Transport Protocol (RTP) Extension protocol, as described in [MS-RTP], as its transport.

This document only addresses the redundancy and thereby loss and error tolerance of audio data streams. Non-audio data redundancy is beyond the scope of this document.

1.5 Prerequisites/Preconditions

Because the Real-Time Transport Protocol (RTP) Extensions Protocol acts as a transport for this protocol, a valid **RTP session** is required to be established. Refer to [MS-RTP] for details.

It is further assumed that a valid **Session Description Protocol (SDP)** negotiation has been completed to bind the dynamic payload information for the redundancy data. For information about SDP, see [MS-SDPEXT].

1.6 Applicability Statement

This protocol is applicable for a real-time audio communication scenario where redundant data exchange is needed to mitigate **lossy network transports**.

This protocol does not cover all audio data redundancy. It is limited to in-band audio communication data. This protocol does not apply to redundancy for audio data such as out-of-band **dual-tone multi-frequency (DTMF)** tones. Out-of-band DTMF tones are defined as exchange of DTMF information in a separate band from the media stream.

1.7 Versioning and Capability Negotiation

Supported Transports: This protocol is implemented on top of the Real-Time Transport Protocol (RTP) Extension protocol as the transport mechanism.

Protocol Versions: This protocol, as a payload format of RTP, does not provide for versioning information within the scope of the protocol itself. However, as a part of the RTP payload, any versioning information on 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 Real-Time Transport Protocol (RTP) Extensions protocol.

Localization: None.

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.

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2 Messages

2.1 Transport

Because this protocol uses the Real-Time Transport Protocol (RTP) Extensions protocol as its transport, a successful RTP session MUST be established with valid redundancy payload information negotiated.

This MUST be done with the Session Description Protocol, as specified in [MS-SDPEXT].

2.2 Message Syntax

The structure and syntax of this protocol is defined within the RFC for RTP Payload for Redundant Audio Data, as specified in [RFC2198] section 3. This protocol does not cover all audio data redundancy. It is limited to in-band audio communication data. This protocol MUST NOT be used to carry audio data redundancy for audio data such as out-of-band DTMF tones.

The deviation from [RFC2198] is as follows:

[RFC2198] section 2 provides for one or more redundant audio blocks for each RTP payload. This protocol description allows for only one redundant block for every RTP payload. Therefore, each RTP payload MUST NOT contain more than two blocks total: one redundancy block and one primary block.

[RFC2198] section 2 describes the mechanism for including the redundancy information in the **RTP packet** header. This protocol does not support redundant information in the RTP header. The RTP header MUST NOT contain redundant information. It MUST be made part of a dynamic RTP payload type and negotiate as such during SDP negotiation.

While [RFC2198] section 2 allows for static typing of payload types, systems interoperating with implementation of this protocol MUST negotiate for dynamic redundancy payload type using SDP to enable redundancy.

2.2.1 Redundant Block

See [RFC2198] section 3 for a detailed description of the redundant block layout.

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3 Protocol Details

3.1 Receiver Details

This protocol can be described using a Sender and Receiver model. This section details the behavioral difference between the protocol specified by [RFC2198] and this protocol implementation.

The Receiver side of this protocol MUST negotiate using SDP for a dynamic payload type binding for the redundancy data. The payload type binding MUST be symmetrical. This means the receive payload type and send payload type MUST be the same. Asymmetrical payload type information MUST NOT be used.

3.1.1 Abstract Data Model

None.

3.1.2 Timers

None.

3.1.3 Initialization

Receivers MUST negotiate a dynamic payload type for the redundancy data as specified in [MS-SDPEXT] section 3.1.5.3. Receivers MUST NOT expect redundancy data to be part of the RTP extended header structure.

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.

3.2 Sender Details

This protocol can be described using a Sender and Receiver model.

This section details the behavioral difference between the protocol specified by [RFC2198] and this protocol implementation.

The Sender side of this protocol MUST negotiate using SDP for a dynamic payload type binding for the redundancy data.

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Distance is defined as the number of RTP packets succeeding the primary block for which the redundancy block applies. For example, if RTP packet X contains primary block A, and RTP packet X + n contains the redundancy block for primary block A, that redundancy block has a distance of n. The redundancy data block MUST NOT have a distance greater than 3.

There MUST NOT be more than one redundancy block per RTP packet. At most two blocks are allowed per RTP packet: one primary block and one redundancy block.

All redundant audio data from the Sender MUST be the same encoding, or **codec**, as the primary audio block. This requirement deviates from [RFC2198] where secondary, tertiary, and other codecs are supported.

The primary audio block and redundant audio block MUST use the same codec.

3.2.1 Abstract Data Model

None

3.2.2 Timers

None.

3.2.3 Initialization

The Sender MUST negotiate a dynamic payload type for the redundancy data.

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.

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4 Protocol Examples

Refer to [RFC2198] section 7 for examples of this protocol structure.

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5 Security

5.1 Security Considerations for Implementers

There are no additional protocol security considerations beyond what is described in [RFC2198].

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 Communicator 2007
- Microsoft Office Communications Server 2007 R2
- Microsoft Office Communicator 2007 R2
- Microsoft Lync Server 2010
- Microsoft Lync 2010
- Microsoft Lync Server 2013
- Microsoft Lync 2013

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

No table of changes is available. The document is either new or has had no changes since its last release.

8 Index

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