[MS-RTASPF]:

RTP for Application Sharing Payload Format Extensions

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Revision Summary

Date	Revision History	Revision Class	Comments
12/12/2008	1.0		Initial version
2/13/2009	1.01		Revised and edited the technical content
3/13/2009	1.02		Revised and edited the technical content
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4/30/2010	1.08	Editorial	Revised and edited the technical content
6/7/2010	1.09	Editorial	Revised and edited the technical content
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Date	Revision History	Revision Class	Comments
			technical content.
4/30/2014	3.1	Minor	Clarified the meaning of the technical content.
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10/30/2014	3.1	No Change	No changes to the meaning, language, or formatting of the technical content.
3/30/2015	4.0	Major	Significantly changed the technical content.

Table of Contents

1 Introduction

The RTP for Application Sharing Payload Format Extensions protocol specifies a set of proprietary extensions for [MS-RTP]. This protocol is designed to transfer application sharing data over the Real-Time Transport Protocol.

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 [RFC2119]. Sections 1.5 and 1.9 are also normative but do not contain those terms. All other sections and examples in this specification are informative.

1.1 Glossary

The following terms are specific to this document:

Application Sharing Multipoint Control Unit (ASMCU): A **Multipoint Control Unit (MCU)** that supports application sharing conferencing.

encryption: In cryptography, the process of obscuring information to make it unreadable without special knowledge.

Multipoint Control Unit (MCU): A server endpoint (5) that offers mixing services for multiparty, multiuser conferencing. An MCU typically supports one or more media types, such as audio, video, and data.

participant: A user who is participating in a conference or peer-to-peer call, or the object that is used to represent that user.

peer: An additional endpoint (5) that is associated with an endpoint in a session. An example of a peer is the callee endpoint for a caller endpoint.

Real-Time Transport Protocol (RTP): A network transport protocol that provides end-to-end transport functions that are suitable for applications that transmit real-time data, such as audio and video, as described in [RFC3550].

Remote Desktop Protocol (RDP): A multi-channel protocol that allows a user to connect to a computer running Microsoft Terminal Services (TS). RDP enables the exchange of client and server settings and also enables negotiation of common settings to use for the duration of the connection, so that input, graphics, and other data can be exchanged and processed between client and server.

RTP packet: A data packet consisting of the fixed RTP header, a possibly empty list of contributing sources, and the payload data. Some underlying protocols may require an encapsulation of the RTP packet to be defined. Typically one packet of the underlying protocol contains a single RTP packet, but several RTP packets can be contained if permitted by the encapsulation method. See [RFC3550] section 3.

RTP payload: The data transported by **RTP** in a packet, for example audio samples or compressed video data. For more information, see [RFC3550] section 3.

Session Description Protocol (SDP): A protocol that is used for session announcement, session invitation, and other forms of multimedia session initiation. For more information see [MS-SDP] and [RFC3264].

Session Initiation Protocol (SIP): An application-layer control (signaling) protocol for creating, modifying, and terminating sessions with one or more participants. **SIP** is defined in [RFC3261].

Transmission Control Protocol (TCP): A protocol used with the Internet Protocol (IP) to send data in the form of message units between computers over the Internet. TCP handles keeping

track of the individual units of data (called packets) that a message is divided into for efficient routing through the Internet.

Uniform Resource Identifier (URI): A string that identifies a resource. The URI is an addressing mechanism defined in Internet Engineering Task Force (IETF) Uniform Resource Identifier (URI): Generic Syntax [RFC3986].

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

1.2 References

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.

[MS-CONFAS] Microsoft Corporation, "Centralized Conference Control Protocol: Application Sharing Extensions".

[MS-RDPBCGR] Microsoft Corporation, "Remote Desktop Protocol: Basic Connectivity and Graphics Remoting".

[MS-RDPEMC] Microsoft Corporation, "Remote Desktop Protocol: Multiparty Virtual Channel Extension".

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

[RFC3550] Schulzrinne, H., Casner, S., Frederick, R., and Jacobson, V., "RTP: A Transport Protocol for Real-Time Applications", STD 64, RFC 3550, July 2003, http://www.ietf.org/rfc/rfc3550.txt

1.2.2 Informative References

[MS-ICE2] Microsoft Corporation, "Interactive Connectivity Establishment (ICE) Extensions 2.0".

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

1.3 Overview

This protocol extends the **Real-Time Transport Protocol (RTP)** Extensions protocol, a set of proprietary extensions to the base RTP, as described in [RFC3550], to transfer the application sharing payload encoded in the graphics format described by [MS-RDPBCGR].

1.4 Relationship to Other Protocols

This protocol uses the Real-time Transport Protocol (RTP) Extensions protocol described in [MS-RTP] and the **Transmission Control Protocol (TCP)** described in [MS-RTP] as its local transport protocol. This protocol is the transport protocol for the Remote Desktop Protocol: Basic Connectivity and Graphics Remoting Specification described in [MS-RDPBCGR] and the Remote Desktop Protocol: Multiparty Virtual Channel Extension described in [MS-RDPEMC]. **Remote Desktop Protocol (RDP)** is a stream protocol with no boundaries, which means that RDP defines the packet length inside the RDP packet ([MS-RDPBCGR] section 2) and the next RDP packet can immediately follow the previous RDP packet.

RTP is required to use TCP as its transport protocol when transporting payloads for this protocol. For details, see [MS-RTP] section 1.4 for other dependent protocols.

1.5 Prerequisites/Preconditions

This protocol requires all the prerequisites and preconditions of RTP, as described in [MS-RTP] section 1.5.

The RDP protocol is required to turn off **encryption** by setting the encryption level to "None" as described in [MS-RDPBCGR] section 5.3.6.

The RDP protocol is required to turn off Bulk Data Compression for the data between the Viewer and the **Multipoint Control Unit (MCU)**, and also to turn on Bulk Data Compression for the data between the Sharer and the MCU as described in [MS-RDPBCGR] section 3.1.8.

1.6 Applicability Statement

This protocol is used when the RDP payload is transferred over the RTP protocol. The protocol described in [MS-SRTP] is required to provide encryption for the transferred data.

1.7 Versioning and Capability Negotiation

This document covers versioning issues in the following areas:

- **Supported Transports:** This protocol only supports [MS-RTP] as its transport, as discussed in section 2.1 and [MS-ICE2] in TCP mode only.
- **Protocol Versions:** This protocol, as a payload format of RTP, 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.

  The current version is 0x00080004. The current RDP version number can be obtained as described in [MS-RDPBCGR] section 1.3.1.1.
- **Capability Negotiation**: Capability negotiation is done by non-RTP means, usually through a higher level application layer protocol such as **Session Initiation Protocol (SIP)** and **Session Description Protocol (SDP)**.

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.

2 Messages

2.1 Transport

This protocol is a payload for the [MS-RTP] transport protocol and therefore relies on RTP and TCP for providing means to transport its payload over the network.

2.2 Message Syntax

[MS-RTP] section 2.2.1 defines the **RTP packet** format and [MS-RDPBCGR] section 2 defines one **RTP payload** format for application sharing.

The total RTP packet size including the transport header, network header, link layer header, RTP header, and RTP payload MUST NOT exceed 1500 bytes, as specified in [MS-RTP] section 2.1; otherwise, the RTP connection will be disconnected. The RTP packets MUST be split so that this limit is not exceeded.

3 Protocol Details

3.1 Peer to Peer Details

The **peer** to peer scenario means that there are two **participants** in the application sharing session: one sharer and one viewer. As defined in [MS-RDPEMC] section 2.2.4.1, the **FriendlyName** that is sent on the Participant-Created PDU MUST be their local SIP **Uniform Resource Identifier (URI)**.

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

The RTP parameters for packet sequence number, RTP marker bit, CSRCCount, and SSRC MUST be set as specified in [MS-RTP] section 2.2.1 and [RFC3550] section 5.1. The RTP marker bit MUST be set to 0 for the message.

The RTP parameter for Payload Type MUST be set to 127 (0x7F) to denote an RDP payload.

When the RTP packets are received on the receiver side, the payload for each RTP packet MUST be assembled in ordered by the RTP sequence number, and the payload or assembled payloads are interpreted as specified in [MS-RDPBCGR] section 2.

The connection sequence specified in [MS-RDPBCGR] section 1.3.1.1 MUST omit the Security Exchange PDU defined in [MS-RDPBCGR] section 2.2.1.10.1.

3.1.6 Timer Events

None.

3.1.7 Other Local Events

When a packet loss event is detected from [MS-RTP], this protocol stops sending data.

The packet loss is specified in [MS-RTP] section 1.3.

3.2 Multiparty Details

The multiparty scenario means that there are more than two participants in the application sharing session: one sharer and multiple viewers. The sharer and viewers connect to the **Application Sharing Multipoint Control Unit (ASMCU)** using this protocol. For details, see [MS-CONFAS].

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

The RTP parameters for packet sequence number, RTP marker bit, CSRCCount, and SSRC MUST be set according to [MS-RTP] section 2.2.1 and [RFC3550] section 5.1. The RTP marker bit MUST be set to 0 for the message.

The RTP parameter for Payload Type MUST be set to 127 (0x7F) to denote an RDP payload.

When the RTP packets are received on the receiver side, the payload for each RTP packet MUST be assembled in ordered by the RTP sequence number, and the payload or assembled payloads are interpreted as specified in [MS-RDPBCGR] section 2.

The connection sequence specified in [MS-RDPBCGR] section 1.3.1.1 MUST omit the Security Exchange PDU specified in [MS-RDPBCGR] section 2.2.1.10.1.

3.2.6 Timer Events

None.

3.2.7 Other Local Events

When a packet loss is detected, this protocol stops sending data.

The packet loss is specified in [MS-RTP] section 1.3.

4 Protocol Examples

The following RTP Marker is the Payload Type of 127 (0x7F) which is described in [MS-RTP] section 2.2.1.

The following data is an example of one RTP packet that has an RDP payload:

Byte offset	Content	Comments
00	80	RTP Version: 2; Padding: 0; Extension: 0; CSRCCount: 0
01	7F	RTP Marker: 0; RTP payload type: 0x7F
02~03	49 14	RTP Sequence Number: 0x4914
04~07	6E 5D FB A0	RTP Timestamp: 0x6e5dfba0
08~0B	0F 3E 6B 58	RTP SSRC: 0x0F3E6B58
0C~	…	RTP payload (RDP packet)

5 Security

5.1 Security Considerations for Implementers

This protocol has no additional security considerations beyond what is described in [MS-RTP] and [MS-SRTP].

5.2 Index of Security Parameters

None.

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 R2
- Microsoft Office Communicator 2007 R2
- Microsoft Lync Server 2010
- Microsoft Lync 2010
- Microsoft Lync Server 2013
- Microsoft Skype for Business (formerly Lync 2013)

1. Skype for Business

2. Skype for Business Server

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.

7 Change Tracking

This section identifies changes that were made to this document since the last release. 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.
- The removal of a document from the documentation set.

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 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 changes were introduced. Minor editorial and formatting changes may have been made, but the technical content of the document is identical to the last released version.

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.
- Protocol syntax updated due to protocol revision.
- Protocol syntax removed due to protocol revision.
- 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 dochelp@microsoft.com.

Section	Tracking number (if applicable) and description	Major change (Y or N)	Change type
6 Appendix A: Product Behavior	Updated list of supported products.	Y	Content updated due to protocol revision.

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