# [MS-RTASPF]:

# RTP for Application Sharing Payload Format Extensions

---

### Intellectual Property Rights Notice for Open Specifications Documentation

- **Technical Documentation.** Microsoft publishes Open Specifications documentation ("this documentation") for protocols, file formats, data portability, computer languages, and standards support. Additionally, overview documents cover inter-protocol relationships and interactions.
- **Copyrights**. This documentation is covered by Microsoft copyrights. Regardless of any other terms that are contained in the terms of use for the Microsoft website that hosts this documentation, you can make copies of it in order to develop implementations of the technologies that are described in this documentation and can distribute portions of it in your implementations that use these technologies or in your documentation as necessary to properly document the implementation. You can also distribute in your implementation, with or without modification, any schemas, IDLs, or code samples that are included in the documentation. This permission also applies to any documents that are referenced in the Open Specifications documentation.
- **No Trade Secrets**. Microsoft does not claim any trade secret rights in this documentation.
- **Patents**. Microsoft has patents that might cover your implementations of the technologies described in the Open Specifications documentation. Neither this notice nor Microsoft's delivery of this documentation grants any licenses under those patents or any other Microsoft patents. However, a given Open Specifications document might be covered by the Microsoft Open Specifications Promise or the Microsoft Community Promise. If you would prefer a written license, or if the technologies described in this documentation are not covered by the Open Specifications Promise or Community Promise, as applicable, patent licenses are available by contacting iplg@microsoft.com.
- **Trademarks**. The names of companies and products contained in this documentation might be covered by trademarks or similar intellectual property rights. This notice does not grant any licenses under those rights. For a list of Microsoft trademarks, visit www.microsoft.com/trademarks.
- **Fictitious Names**. The example companies, organizations, products, domain names, email addresses, logos, people, places, and events that are depicted in this documentation are fictitious. No association with any real company, organization, product, domain name, email address, logo, person, place, or event is intended or should be inferred.

**Reservation of Rights**. All other rights are reserved, and this notice does not grant any rights other than as specifically described above, whether by implication, estoppel, or otherwise.

**Tools**. The Open Specifications documentation does not require the use of Microsoft programming tools or programming environments in order for you to develop an implementation. If you have access to Microsoft programming tools and environments, you are free to take advantage of them. Certain Open Specifications documents are intended for use in conjunction with publicly available standards specifications and network programming art and, as such, assume that the reader either is familiar with the aforementioned material or has immediate access to it.

## Revision Summary

| Date | Revision History | Revision Class | Comments |
|---|---|---|---|
| 12/12/2008 | 1.0 | New | Initial version |
| 2/13/2009 | 1.01 | Minor | Revised and edited the technical content |
| 3/13/2009 | 1.02 | Minor | Revised and edited the technical content |
| 7/13/2009 | 1.03 | Major | Revised and edited the technical content |
| 8/28/2009 | 1.04 | Editorial | Revised and edited the technical content |
| 11/6/2009 | 1.05 | Editorial | Revised and edited the technical content |
| 2/19/2010 | 1.06 | Editorial | Revised and edited the technical content |
| 3/31/2010 | 1.07 | Major | Updated and revised the technical content |
| 4/30/2010 | 1.08 | Editorial | Revised and edited the technical content |
| 6/7/2010 | 1.09 | Editorial | Revised and edited the technical content |
| 6/29/2010 | 1.10 | Editorial | Changed language and formatting in the technical content. |
| 7/23/2010 | 1.10 | None | No changes to the meaning, language, or formatting of the technical content. |
| 9/27/2010 | 2.0 | Major | Significantly changed the technical content. |
| 11/15/2010 | 2.0 | None | No changes to the meaning, language, or formatting of the technical content. |
| 12/17/2010 | 2.0 | None | No changes to the meaning, language, or formatting of the technical content. |
| 3/18/2011 | 2.0 | None | No changes to the meaning, language, or formatting of the technical content. |
| 6/10/2011 | 2.0 | None | No changes to the meaning, language, or formatting of the technical content. |
| 1/20/2012 | 3.0 | Major | Significantly changed the technical content. |
| 4/11/2012 | 3.0 | None | No changes to the meaning, language, or formatting of the technical content. |
| 7/16/2012 | 3.0 | None | No changes to the meaning, language, or formatting of the technical content. |
| 10/8/2012 | 3.0.1 | Editorial | Changed language and formatting in the technical content. |
| 2/11/2013 | 3.0.1 | None | No changes to the meaning, language, or formatting of the technical content. |
| 7/30/2013 | 3.0.1 | None | No changes to the meaning, language, or formatting of the technical content. |
| 11/18/2013 | 3.0.1 | None | No changes to the meaning, language, or formatting of the technical content. |
| 2/10/2014 | 3.0.1 | None | No changes to the meaning, language, or formatting of the technical content. |

| Date | Revision History | Revision Class | Comments |
|---|---|---|---|
| 4/30/2014 | 3.1 | Minor | Clarified the meaning of the technical content. |
| 7/31/2014 | 3.1 | None | No changes to the meaning, language, or formatting of the technical content. |
| 10/30/2014 | 3.1 | None | No changes to the meaning, language, or formatting of the technical content. |
| 3/30/2015 | 4.0 | Major | Significantly changed the technical content. |
| 9/4/2015 | 4.0 | None | No changes to the meaning, language, or formatting of the technical content. |
| 7/15/2016 | 4.0 | None | No changes to the meaning, language, or formatting of the technical content. |
| 9/14/2016 | 4.0 | None | No changes to the meaning, language, or formatting of 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 1.5, 1.8, 1.9, 2, and 3 of this specification are normative. All other sections and examples in this specification are informative.

## 1.1 Glossary

This document uses the following terms:

**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

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the Errata.

### 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 Lync Client 2013/Skype for Business

1. Microsoft Skype for Business 2016

2. Microsoft Skype for Business Server 2015

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

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

# 8 Index

## V