[MS-SSRTP]:
Scale Secure Real-time Transport Protocol (SSRTP) 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		Revised and edited technical content
06/27/2008	1.0		Revised and edited technical content
08/15/2008	1.01		Revised and edited technical content
12/12/2008	2.0		Revised and edited technical content
02/13/2009	2.01		Revised and edited technical content
03/13/2009	2.02		Revised and edited technical content
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

Date	Revision History	Revision Class	Comments
			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	4.0	Major	Significantly changed the technical content.
04/11/2012	4.0	No change	No changes to the meaning, language, or formatting of the technical content.

Table of Contents

1 Introduction

This document specifies a proprietary extension to the Secure Real-Time Transport Protocol (SRTP) Extensions protocol, as described in [MS-SRTP].

This protocol provides the same functional capabilities as [MS-SRTP], which includes providing confidentiality, message authentication, and replay protection to the RTP traffic and to the control traffic for RTP. However, this protocol has one key additional motivation – to improve performance in scenarios where the same RTP payload is distributed to hundreds of recipients. To achieve this performance improvement, this protocol defines a new cryptographic transform that differs from [MS-SRTP] in packet format, encryption parameters, and message authentication processing.

This protocol and [MS-SRTP] share common components and constraints. Unless explicitly specified in this document, this protocol by default uses the parameters and algorithms as described in [MS-SRTP].

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-GLOS]:

Hash-based Message Authentication Code (HMAC)
salt

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

Advanced Encryption Standard (AES)
AES Counter Mode
dual-tone multi-frequency (DTMF)
master key

Real-Time Transport Protocol (RTP)
RTCP packet
RTP packet
RTP payload
RTP profile
Scale Secure Real-Time Transport Protocol (SSRTP)
Secure Real-Time Transport Protocol (SRTP)
session
Session Description Protocol (SDP)
session key
SHA-1
Synchronization Source (SSRC)

The following terms are specific to this document:

cryptographic context: A set of cryptographic state information that is maintained in a Secure Real-Time Transport Protocol (SRTP) stream.

encryption sequence number (ESN): An explicit sequence number that is embedded in each Scale Secure Real-Time Transport Protocol (SSRTP) packet by SSRTP.

SSRTP stream: A sequence of Scale Secure Real-Time Transport Protocol (SSRTP) packets from a sender and to a receiver who are identified by the same Synchronization Source (SSRC).

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 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-SRTP] Microsoft Corporation, "Secure Real-time Transport Protocol (SRTP) 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

[RFC3711] Baugher, M., McGrew, D., Naslund, M., et al., "The Secure Real-time Transport Protocol (SRTP)", RFC 3711, March 2004, http://www.rfc-editor.org/rfc/rfc3711.txt

1.2.2 Informative References

[MS-DTMF] Microsoft Corporation, "RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals Extensions".

[MS-GLOS] Microsoft Corporation, "Windows Protocols Master Glossary".

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

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

1.3 Protocol Overview (Synopsis)

This protocol is a proprietary extension to the **Secure Real-Time Transport Protocol (SRTP)** Extensions protocol, as described in [MS-SRTP]. The new **Scale Secure Real-Time Transport Protocol (SSRTP)** cryptographic transform specified by this protocol extends [MS-SRTP] in the following areas:

- Packet format. See section 2.2. This protocol introduces a new **encryption sequence number (ESN)** field in the SRTP packet.
- **Advanced Encryption Standard (AES)** Counter Mode encryption algorithm. See section 3.1.3.3.1. This protocol generates Initialization Vector (IV) for encryption based on encryption sequence number (ESN) instead of a **Real-Time Transport Protocol (RTP)** sequence number.
- Packet processing and padding in message authentication. See sections 3.1.3.3.2 and 3.1.5.1.3. This protocol rearranges the fields in SSRTP packets and authenticates them in an order different from the on-wire order. It pads buffers to a multiple of 64-bytes for message authentication. (**Note**: not on the wire).

The details of these extensions are specified in sections 2 and 3.

This protocol reuses many components of [MS-SRTP]. These components include:

- Key derivation algorithms and parameters.
- The **master key**, **session key**, and **salt** format and sizes.
- Encryption and authentication primitives.
- RTCP encryption and authentication.

Unless explicitly noted, this protocol uses the same parameters and algorithms as described in [MS-SRTP].

1.4 Relationship to Other Protocols

This protocol is a proprietary extension to [RFC3711]. It shares common components with another SRTP extension described in [MS-SRTP].

This protocol relies on the Session Description Protocol (SDP) Version 2.0 Extensions as described in [MS-SDPEXT] to exchange master keys and key parameters.

This protocol encrypts and authenticates **RTP packet**s. It works with other **RTP profile**s, for example RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals Extensions as described in [MS-DTMF]. It encrypts and authenticates after these profiles on the sending side and

authenticates and decrypts before passing RTP and **RTCP packet**s to other profiles on the receiving side.

Secure Real-Time Transport Control Protocol (SRTCP) is considered to be a sub-protocol to SRTP and they are specified together in [RFC3711]. This protocol uses SRTCP to protect RTCP packets.

1.5 Prerequisites/Preconditions

This protocol has the following prerequisites:

- This protocol requires that encryption and authentication algorithms are negotiated through SDP Version 2.0 Extensions as described in [MS-SDPEXT].
- This protocol requires that master keys are exchanged through SDP Version 2.0 Extensions and that the keys are configured properly.
- This protocol only provides message confidentiality, authentication, and replay protection for RTP packets and RTCP packets.

1.6 Applicability Statement

This protocol is used in an environment where users require secure RTP traffic and the same **RTP payload** is distributed to multiple receivers. This protocol is required to be used with SDP Version 2.0 Extensions as described in [MS-SDPEXT] to set up the shared master key securely.

1.7 Versioning and Capability Negotiation

None.

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.

2 Messages

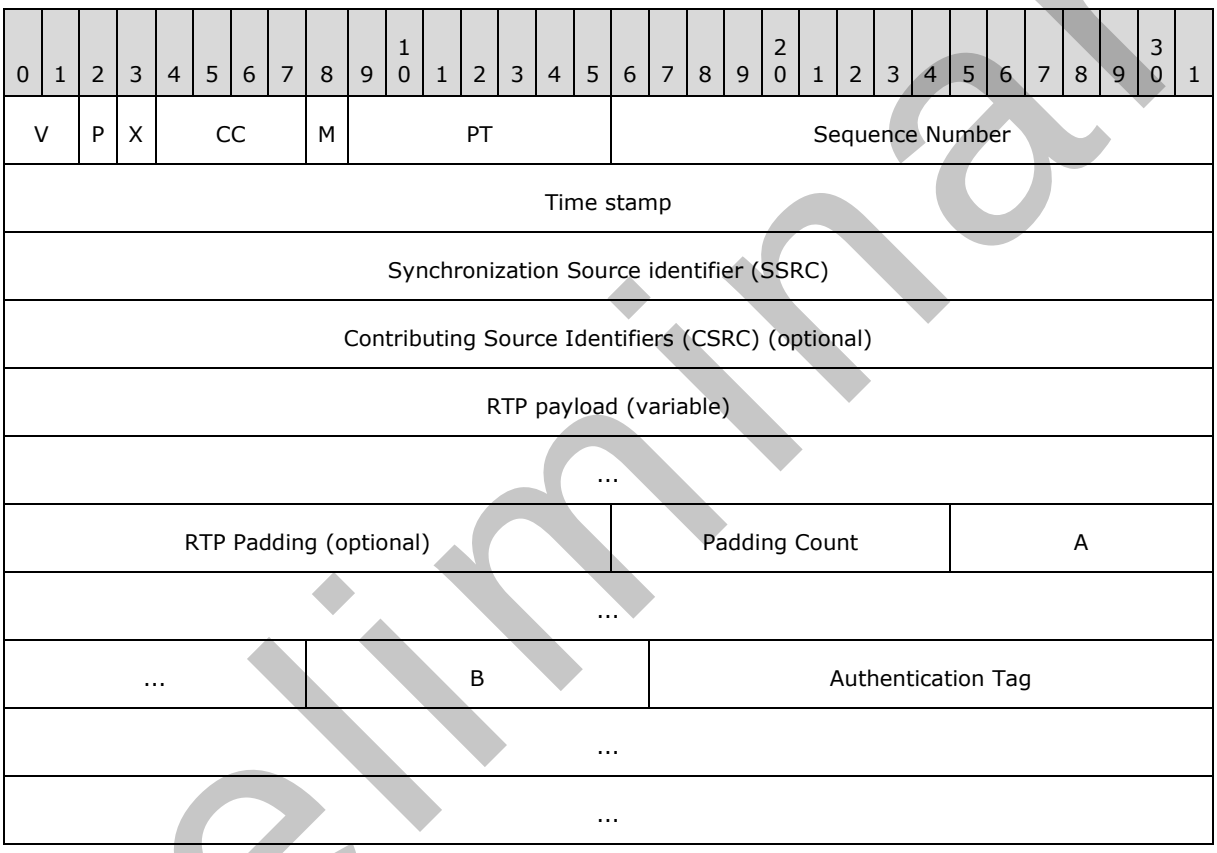
2.1 Transport

The Scale Secure Real-Time Transport Protocol (SSRTP) transforms RTP packets only. Refer to [MS-RTP] for transports that RTP uses.

2.2 Message Syntax

2.2.1 Scale Secure RTP Message Syntax

The following bit table shows the packet syntax on the wire for this protocol.



V, P, X, CC, M, PT, Sequence Number, Time stamp, SSRC, CSRC, RTP payload, RTP Padding, Padding Count: Standard RTP packet fields. For details, see [RFC3550] section 5.1.

A - Encryption Sequence Number (6 bytes): A 48-bit unsigned integer in network order. Alignment is not needed. This is the explicit sequence number SSRTP uses in encryption and authentication. The encryption sequence number (ESN) MUST continuously grow and is not required to be contiguous. Note that the ESN is only used in RTP packets.

B - MKI (1 byte): An unsigned SRTP master key identifier in network order. Alignment is not needed. For details, see [RFC3711] section 3.1. **MKI** MUST be used and the **MKI** length MUST be 1 byte.

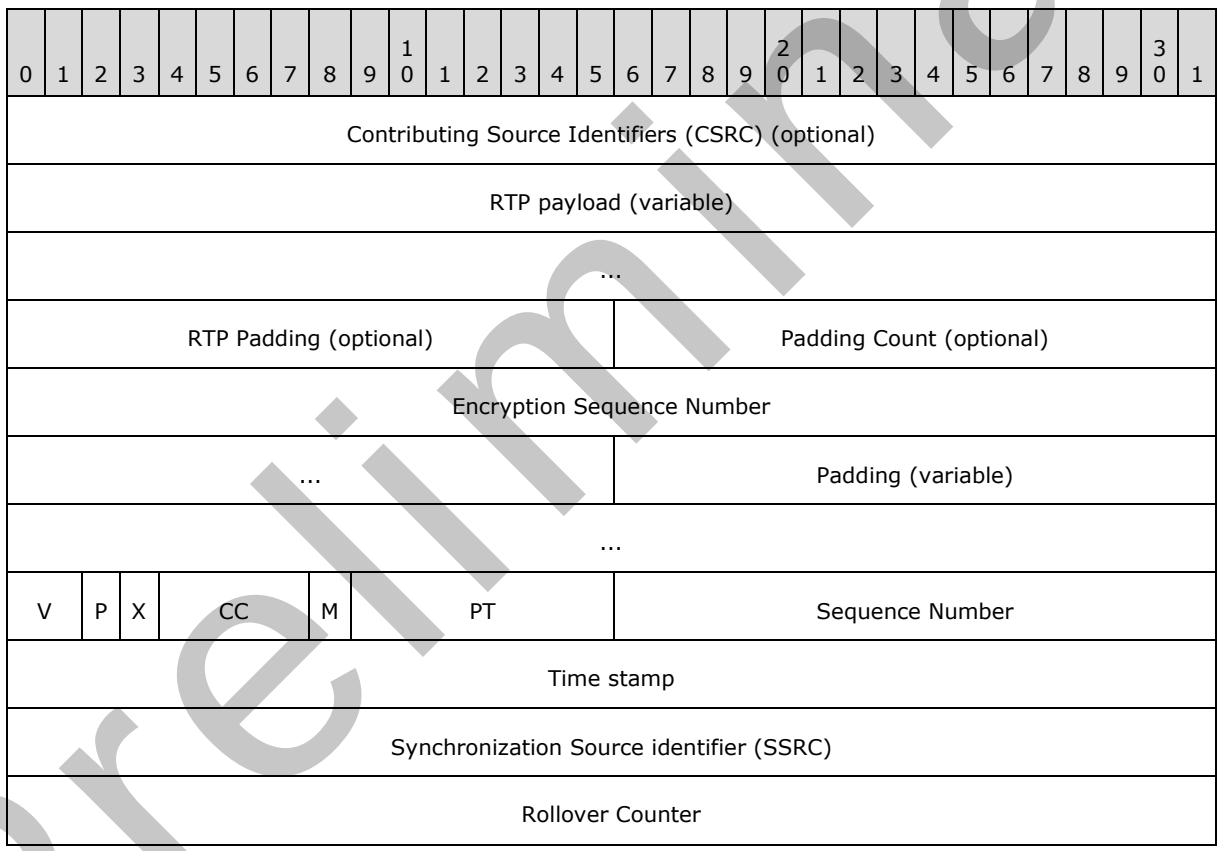
Authentication Tag (10 bytes): An array of unsigned chars where any element can have a value in the range of 0 to 0xff. The authentication tag size MUST be 10 bytes.

2.2.1.1 Encrypted Portion

This protocol concatenates RTP payload fields, RTP padding fields, and the padding count field and then encrypts them. The encryption algorithm is different from SRTP Extensions as specified in [MS-SRTP], and is specified in section 3.1.3.3.1.

2.2.1.2 Authenticated Portion

This protocol authentication rearranges the packet fields for this protocol as shown in the following bit table. The rearranged fields are concatenated to a virtual packet, and the authentication tag is calculated on it. Note that this rearrangement is only done to calculate the authentication tag and does not show up on the wire.



A new field Rollover Counter is included in authentication. It is the same as in SRTP.

V, P, X, CC, M, PT, Sequence Number, Time stamp, SSRC, CSRC, RTP payload, RTP Padding, Padding Count: Standard RTP packet fields. For details, see [RFC3550] section 5.1.

Encryption Sequence Number (6 bytes): A 48-bit unsigned integer in network order. Alignment is not needed. This is the explicit sequence number SSRTP uses in encryption and authentication. The encryption sequence number (ESN) SHOULD continuously grow and is not required to be contiguous. The last 8-bit of ESN SHOULD NOT be 0. Note that the ESN is only used in RTP packets.

Padding (variable): Added after the ESN field and the preceding fields are zero-padded to the 64-byte boundary. The RTP header, excluding CSRC, is added after the padding, and then followed by the rollover counter. The whole authenticated portion cannot be a multiple of 64-bytes in size, but field **V** MUST start at the 64-byte boundary.

Rollover Counter (4 bytes): A 4-byte unsigned integer in network order. Alignment is not needed. The rollover counter records how many times the RTP sequence number has been reset to 0 after passing 65535.

2.2.2 Scale Secure RTCP Message Syntax

The Scale Secure RTCP packet syntax is the same as the SRTCP packet. See [RFC3711] section 3.4.

3 Protocol Details

3.1 Endpoint Details

This protocol can be used to secure any RTP traffic. It does not have any role-specific behavior, such as for protocol client or server roles. All behavior described here applies to both protocol client and server roles.

3.1.1 Abstract Data Model

This section describes a conceptual model of possible data organization that an implementation maintains to participate in this protocol. The described organization is provided to facilitate the explanation of how the protocol behaves. This document does not mandate that implementations adhere to this model as long as their external behavior is consistent with that described in this document.

This protocol is an extension to SRTP as specified in [MS-SRTP]. It keeps all [MS-SRTP] states. Refer to [MS-SRTP] section 3.1.1 for these states.

In addition to states as specified in [MS-SRTP], this protocol keeps the last encryption sequence number (ESN) sent and received for each **SSRTP stream**.

3.1.2 Timers

None.

3.1.3 Initialization

This protocol keeps all the states, as specified in [MS-SRTP], and the initialization of these states is the same as in [MS-SRTP]. In addition, this protocol initializes the encryption sequence number (ESN) value.

3.1.3.1 Cryptographic Contexts

This protocol requires that each sender and receiver in a **session** maintain cryptographic contexts. A cryptographic context includes the master key, key parameters, and run time states.

This protocol maintains two cryptographic contexts per session: one for the send direction and one for the receive direction. This protocol supports multiple media streams sharing the same SSRTP session. Each media stream MUST be uniquely identified by one **Synchronization Source (SSRC)**. This protocol maintains per SSRC transform independent parameters in **cryptographic contexts**, as specified in section 3.1.3.2.

When sending or receiving an SSRTP packet, this protocol first uses the SSRTP session and direction to identify the cryptographic context, then uses the Synchronization Source (SSRC) in the packet to decide the per SSRC transform independent parameters in the cryptographic context.

3.1.3.2 SSRTP Parameter Settings

Where packets for this protocol inherit the state from [MS-SRTP], parameters settings MUST be the same.

For your convenience, see the following list of transform independent parameters. For details, see [MS-SRTP] section 3.1.3.2.

- The encryption algorithm MUST be **AES Counter Mode** and encryption MUST be used.
- The authentication algorithm MUST be **Hash-based Message Authentication Code (HMAC)-SHA-1** and authentication MUST be used.
- The replay list size MUST be 64 entries.
- The master key indicator MUST be used.
- The master key indicator length MUST be 1 byte.
- The key derivation rate MUST be 0.
- The master key length MUST be 128-bit.
- The master salt key length MUST be 112-bit.
- The encryption session key length MUST be 128-bit (AES_128).
- The encryption session salt length MUST be 112-bit.
- The authentication session key length MUST be 160-bit.
- The master key lifetime MUST be 2^{48}-1 packets for RTP and 2^{31}-1 for RTCP.
- SRTCP and SRTP MUST have the same parameter settings with the exceptions specified in [RFC3711] section 3.2.1.

This protocol maintains the following transform independent parameters per Synchronization Source (SSRC).

- The rollover counter
- The highest received RTP sequence number
- The highest received ESN on this SSRC
- The replay list

For information about transform dependent parameters, see sections 3.1.3.3.1 and 3.1.3.3.2.

In addition, this protocol MUST initialize the encryption sequence number (ESN) to a random number in the range of 0 to 2^{47}-1. The highest bit of the ESN is recommended to be 0 to avoid ESN wraparound too early at the beginning of the stream. ESN is shared among all media streams.

Unless explicitly noted, this protocol follows [RFC3711] to set other mandatory parameters.

3.1.3.3 SSRTP Cryptographic Transform

This protocol defines a new cryptographic transform. The new transform is based on the default SRTP transform with variations specified in this section.

3.1.3.3.1 Message Encryption

The SRTP default encryption algorithms are specified in [RFC3711] section 4.1. The encryption algorithm for this protocol is based on these algorithms, with the difference in packet format and IV calculation.

This protocol requires that the encryption algorithm MUST be AES Counter Mode, with the following parameters. See [RFC3711] section 4.1 for details of the parameters.

- n_b (block cipher size) MUST be 128-bit (the AES algorithm's fixed cipher block size).
- n_e (encryption key size) MUST be 128-bit.
- The session salt key MUST be used and n_s MUST be 112-bit.
- SRTP_PREFIX_LENGTH MUST be 0.

This protocol requires that the packet MUST be in the format specified in section 2.2.1 and the encrypted fields MUST be arranged in the format specified in section 2.2.1.1.

IV calculation needs the run-time state. See section 3.1.5.1.2 for details.

3.1.3.3.2 Message Authentication and Integrity

The SRTP default authentication algorithm is Hash-based Message Authentication Code (HMAC)-SHA-1, specified in [RFC3711] section 4.2. The authentication algorithm in this protocol is the same, but the authenticated fields are different.

This protocol implements Hash-based Message Authentication Code (HMAC)-SHA-1 and requires the following parameters:

- *n_a* (authentication key size) MUST be 160-bit.
- *n_tag* (authentication tag size) MUST be 80-bit.

This protocol requires that the authenticated fields MUST be in the format specified in section 2.2.1.2.

3.1.3.4 Session Key Derivation

This protocol implements the session key derivation algorithm specified in [RFC3711] section 4.3. This protocol requires that the key derivation rate MUST be 0.

3.1.4 Higher-Layer Triggered Events

None.

3.1.5 Message Processing Events and Sequencing Rules

3.1.5.1 SSRTP Packet Processing

3.1.5.1.1 Packet Index Determination and Replay Protection

The RTP packet index is used in this protocol for replay protection, as specified in [RFC3711] section 3.3.2. Note that this protocol requires the key derivation rate to be 0, so that the RTP packet index is not used in key derivation.

The encryption sequence number (ESN) MUST NOT be used in replay protection because the ESN is not required to be contiguous in one protocol stream. The last received ESN can be used to help estimate the RTP packet index.

3.1.5.1.2 SSRTP AES Counter Mode IV Generation

This protocol requires that the encryption mode MUST be AES Counter Mode. With the exception of IV generation, this protocol's AES Counter Mode algorithm is identical to standard SRTP AES Counter Mode as specified in [RFC3711] section 4.1.

This protocol defines IV as:

IV = (k_s * 2^16) XOR ((ESN >> 16) * 2^64) XOR (ESN * 2^16)

Where:

k_s: encryption salt, specified in [RFC3711] section 4.1, generated by the key derivation procedure in section 3.1.3.4.

ESN: the encryption sequence number (ESN) embedded in protocol packets.

For security reasons, this protocol requires that the ESN MUST be different for any two pieces of different RTP payload content protected by the same master key.

3.1.5.1.3 Sending and Receiving SSRTP Packet

This protocol requires that RTP packets MUST be encrypted and authenticated. With some exceptions, the protocol implements steps similar to those SRTP uses, as specified in [RFC3711] section 3.3. The process is copied here for convenience and the exceptions are noted.

3.1.5.1.3.1 Sending an SSRTP Packet

1. Determine which cryptographic context to use, as described in section 3.1.3.1.
2. Determine the encryption sequence number (ESN) value as the last sent ESN incremented by 1. After the increment, if the last 8-bit of the ESN is 0 increment the ESN by 1 again. ESN is shared by all media streams using the same cryptographic context and it is not Synchronization Source (SSRC)-specific.
3. Determine the rollover counter per SSRC.
4. Determine the master key and master salt. This is done using the current MKI in the cryptographic context.

5. Determine the session keys and session salt as specified in [RFC3711] section 4.3, using the master key, master salt, key_derivation_rate, and session key-lengths in the cryptographic context with the ESN, determined in steps 2 and 3.

6. Encrypt the RTP payload to produce the encrypted portion of the packet (see section 2.2.1.1). This step uses the encryption algorithm specified in section 3.1.3.3.1, the session encryption key, and the session salt found in step 4, together with the ESN found in step 2.

7. Append the ESN to the packet.

8. Append the MKI to the packet.

9. For message authentication, compute the authentication tag for the authenticated portion of the packet, specified in section 2.2.1.2. This step uses the current rollover counter, the authentication algorithm indicated in the cryptographic context, and the session authentication key found in step 5. Append the authentication tag to the packet.

10. If the RTP sequence number wraps around, update the rollover counter.

11. Record the current ESN as the last sent packet's ESN in cryptographic context.

3.1.5.1.3.2 Receiving an SSRTP Packet

1. Determine which cryptographic context and per Synchronization Source (SSRC) transform independent parameters to use, as described in section 3.1.3.1.

2. Determine the current encryption sequence number (ESN) from the packet. Estimate the packet index and rollover counter using the last ESN received on this SSRC, the current ESN, the highest received RTP packet sequence number of the media stream and the previous rollover counter of the media stream.

3. Determine the master key and master salt using the MKI in the packet.

4. Determine the session keys and session salt, as defined in [RFC3711] section 4.3, using the master key, master salt, key_derivation_rate, and session key-lengths in the cryptographic context with the ESN, as determined in steps 2 and 3.

5. For message authentication and replay protection, first check whether the packet has been replayed, as specified in [RFC3711] section 3.3.2, using the Replay List and the index as determined in step 2. If the packet is judged to be replayed, the packet MUST be discarded and the event SHOULD be logged.

6. Perform verification of the authentication tag, using the rollover counter from step 2, the authentication algorithm indicated in the cryptographic context, and the session authentication key from step 4. If the error audit message is "AUTHENTICATION FAILURE," as specified in [RFC3711] section 4.2, the packet MUST be discarded from further processing and the event SHOULD be logged.

7. Decrypt the Encrypted Portion of the packet using the decryption algorithm specified in section 3.1.3.3.1, the session encryption key, and salt found in step 4, with the ESN from step 2.

8. Update the rollover counter and highest sequence number, s_l, in the cryptographic context for this media stream, as specified in [RFC3711] section 3.3.1, using the packet index estimated in step 2. If replay protection is provided, also update the Replay List, as specified in [RFC3711] section 3.3.2.

9. Update the last received ESN in cryptographic context.

10. Remove the ESN, the MKI, and authentication tag fields from the packet.

3.1.5.2 SSRTCP Packet Processing

This protocol processes RTCP packets the same way as [MS-SRTP]. For details, see [MS-SRTP] section 3.1.5.2.

3.1.6 Timer Events

None.

3.1.7 Other Local Events

None.

4 Protocol Examples

The following annotations present examples of test vectors for this protocol. Binary data is described in format (length in bytes, HEX value) and only the RTP packet transform is included. The RTCP packet transform is identical to SRTCP, as described in [RFC3711]. An RTCP transform example is not provided.

4.1 Key Derivation

This section provides an example of test vector for key derivation.

Input:

Master key:

(16, CB4A3C93F3D587ABA1AB0BDF8C6AA0FB)

Master salt:

(14, 53EF4F4594296D0EB286D9CC96E4)

Derived keys:

SSRTP encryption key:

(16,C3FCC67BFBF17CFA2DC69F4B4CFC59CD)

SSRTP authentication key:

(20,23B8B2D911CF8C6416F4AAB94083E0CC32615694)

SSRTP session salt:

(14,929B3AD0FDB565FDBEAA50412C8D)

SSRTCP encryption key:

(16,122E3C94A0D945242AF0B79C6EDCE0BB)

SSRTCP authentication key:

(20,999BDAC078DBC12E7677AD05B9B2B54CBFDCBAA6)

SSRTCP session salt:

(14,839D270762975E43F6351493434E)

4.2 RTP Packet Transform

This section provides an example of test vector for encryption of a RTP packet. It shows a sample input RTP packet and the output of the RTP packet transform.

Input:

RTP header:

(12, 80728001AE773346DE1A3236)

Raw RTP payload:
(142,3F68B92587D38C18D22AFA3FCF30B63098BDB1213F30F91054911E0521EE3A8EE386794C5B
5FD4B9A6477719F27937B6A0C7E8221250A57C5A42E8A99565F7559F21998F2555003F4677DB4AF
CD359738B51D538B4BE1780CC618E686E9862343F0C65D5A86C334B1915B48D99FCAD8E39E9C8F
9BD6915FD7CBBFFD94A73F373615C5CC8C827B2E4C33EEB492D38)

Encryption sequence number (ESN):

(6, 5E1A32368001)

Rollover counter:

(4, 00000002)

Output:

Encrypted portion (raw data for encryption):

(142,3F68B92587D38C18D22AFA3FCF30B63098BDB1213F30F91054911E0521EE3A8EE386794C5B
5FD4B9A6477719F27937B6A0C7E8221250A57C5A42E8A99565F7559F21998F2555003F4677DB4AF
CD359738B51D538B4BE1780CC618E686E9862343F0C65D5A86C334B1915B48D99FCAD8E39E9C8F
9BD6915FD7CBBFFD94A73F373615C5CC8C827B2E4C33EEB492D38)

Encrypted payload:

(142,C1D49FFD5B845AAC755FCE604A2B9225D672DDB5A3C4664447F3D39D841B6C84373437FAE
D011C30AD1D91FB9CC7CF1796A97D99886EBB694E6C050ED100073D2526C9FC56AB08555B3A1A
2589D1491D0402EB79C1C1C6E439C815B4AB83421F57293008B70AB296DAFFD7E6E2E67E6A93FF
89FE8CDE14C49FBAB13E233793B1934AA8A5BDBC3BD6B0A91D520EC9)

Authenticated portion:

(208,C1D49FFD5B845AAC755FCE604A2B9225D672DDB5A3C4664447F3D39D841B6C84373437FAE
D011C30AD1D91FB9CC7CF1796A97D99886EBB694E6C050ED100073D2526C9FC56AB08555B3A1A
2589D1491D0402EB79C1C1C6E439C815B4AB83421F57293008B70AB296DAFFD7E6E2E67E6A93FF
89FE8CDE14C49FBAB13E233793B1934AA8A5BDBC3BD6B0A91D520EC95E1A323680010000000000
0000000000000000000000000000000000000000000000000000000000000000000000000080
728001AE773346DE1A323600000002)

Authentication tag:

(10,2FA5BAC13AC58423BE4A)

5 Security

5.1 Security Considerations for Implementers

- Master keys are randomly generated. The same master key is not used for the send and receive directions in the same SRTP session.
- Master key exchange is done through external mechanisms in **Session Description Protocol (SDP)**. SDP is transferred on a secure transport, such as TLS.
- The initial RTP sequence number is randomly generated. But it does not use a value close to 65535, because this could cause a rollover counter mismatch if there is packet loss at the beginning of session startup.
- SRTP does not terminate the connection when a replay attack is detected. Some RTP profiles intentionally send the same packet multiple times and the duplicated packets fail replay check. An example is **dual-tone multi-frequency (DTMF)**, as described in [MS-DTMF].

5.2 Index of Security Parameters

Security parameter	Section
Encryption algorithm	3.1.3.2
Authentication algorithm	3.1.3.2
Replay list size	3.1.3.2
Master key indicator length	3.1.3.2
Session key derivation rate	3.1.3.2
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Advanced Encryption Standard (AES) cipher block size	3.1.3.3.1
SRTP cipher prefix size	3.1.3.3.1
Authentication tag size	3.1.3.3.2

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

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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