RTP Payload Format for Raptor FEC
draft-ietf-fecframe-rtp-raptor-01

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Abstract

This document specifies an RTP Payload Format for Forward Error Correction repair data produced by the Raptor FEC Schemes. Raptor FEC Schemes are specified for use with the IETF FEC Framework which supports transport of repair data over both UDP and RTP. This document specifies the Payload Format which is required for the use of RTP to carry Raptor repair flows.

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1. Introduction

The FEC Framework [I-D.ietf-fecframe-framework] defines a general framework for the use of Forward Error Correction in association with arbitrary packet flows, including flows over UDP and RTP. Forward Error Corrections operates by generating redundant data packets ("repair data") which can be sent independently from the original flow. At a receiver the original flow can be reconstructed provided a sufficient set of redundant data packets and possibly original data packets are received.

The FEC Framework provides for independence between application protocols and FEC codes. The use of a particular FEC code within the framework is defined by means of an FEC Scheme which may then be used with any application protocol compliant to the framework.

Repair data flows may be sent directly over a transport protocol such as UDP, or they may be encapsulated within RTP. In the latter case, an RTP Payload Format must be defined for each FEC Scheme.

This document defines the RTP Payload Format for the Raptor FEC Schemes defined in [I-D.ietf-fecframe-raptor].
2. Conventions, Definitions and Acronyms

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].
3. Media Format Background

The Raptor code is an efficient XOR-based block-based fountain code, meaning that from any group of source packets (or 'source block') an arbitrary number of repair packets may be generated. The Raptor code has the property that the original group of source packets can be recovered with very high probability from any set of packets (source and repair) only slightly greater in number than the original number of source packets.

[I-D.ietf-fecframe-raptor] defines three FEC Schemes for the use of the Raptor code with arbitrary packet flows: the first scheme is fully applicable to arbitrary packet flows. The second scheme is a slightly optimised version of the first scheme which is applicable in applications with relatively small block sizes. The third scheme is a variant of the second scheme which is applicable to a single source flow which already has some kind of identifiable sequence number. The presence of a sequence number in the source flow allows for backwards compatible operation (the source flows do not need to be modified in order to apply FEC). In this case, in the language of the FEC Framework, there is no explicit FEC Source Payload Id.
4. Payload Format

The RTP Payload contains a FEC Repair Payload as defined in [I-D.ietf-fecframe-raptor].

4.1. RTP Header Usage

The rules SHALL be followed for the RTP header used with FEC repair packets:

- Marker bit: The marker bit SHALL be set 1 for the last protection RTP packet sent for each source block, and otherwise set to 0.
- Timestamp: The timestamp SHALL be set to a time corresponding to the packet’s transmission time. The timestamp value has no use in the actual FEC protection process. It may be used for packet arrival timing and jitter calculations.

4.2. Payload Header

There is no Payload Header in this Payload Format.

4.3. Payload Data

The RTP Payload contains a FEC Repair Payload as defined in [I-D.ietf-fecframe-framework] and [I-D.ietf-fecframe-raptor].
5. Congestion Control Considerations

See [I-D.ietf-fecframe-framework].
6. Media Types

6.1. Registration of the application/raptorfec media type

This RTP payload format is identified using the application/raptorfec media type which is registered in accordance with [RFC4855] and using the template of [RFC4288].

6.1.1. Media Type Definition

Type name: application

Subtype name: raptorfec

Required parameters:

raptor-scheme-id: The value of this parameter is the FEC Scheme Id for the specific Raptor FEC Scheme that will be used as defined in [I-D.ietf-fecframe-raptor].

max-sbl: The value of this parameter is the FEC Object Transmission Information element "Maximum Source Block Length" as defined in [I-D.ietf-fecframe-raptor] encoded as a decimal integer.

symbol-size: The value of this parameter is the FEC Object Transmission Information element "Encoding Symbol Size" as defined in [I-D.ietf-fecframe-raptor] encoded as a decimal integer.

Optional parameters: none

Encoding considerations: This media type is framed and binary, see section 4.8 in [RFC4288]

Security considerations: Please see security consideration in [I-D.ietf-fecframe-framework]

Interoperability considerations:

Published specification: [I-D.ietf-fecframe-raptor]

Applications that use this media type:

Additional information:

Magic number(s): <none defined>
6.2. Registration of the video/raptorfec media type

This RTP payload format is identified using the video/raptorfec media type which is registered in accordance with [RFC4855] and using the template of [RFC4288].

6.2.1. Media Type Definition

Type name: video

Subtype name: raptorfec

Required parameters:

raptor-scheme-id: The value of this parameter is the FEC Scheme Id for the specific Raptor FEC Scheme that will be used as defined in [I-D.ietf-fecframe-raptor]

max-sbl: The value of this parameter is the FEC Object Transmission Information element "Maximum Source Block Length" as defined in [I-D.ietf-fecframe-raptor] encoded as a decimal integer.

symbol-size: The value of this parameter is the FEC Object Transmission Information element "Encoding Symbol Size" as defined in [I-D.ietf-fecframe-raptor] encoded as a decimal integer.

Optional parameters: none
Encoding considerations: This media type is framed and binary, see section 4.8 in [RFC4288]

Security considerations: Please see security consideration in [I-D.ietf-fecframe-framework]

Interoperability considerations:

Published specification: [I-D.ietf-fecframe-raptor]

Applications that use this media type:

Additional information:

Magic number(s): <none defined>

File extension(s): <none defined>

Macintosh file type code(s): <none defined>

Person & email address to contact for further information: Mark Watson, watson@qualcomm.com

Intended usage: COMMON

Restrictions on usage: This media type depends on RTP framing, and hence is only defined for transfer via RTP [[RFC3550]]. Transport within other framing protocols is not defined at this time.

Author: Mark Watson, Qualcomm Inc.

Change controller: IETF Audio/Video Transport working group delegated from the IESG.

6.3. Registration of the audio/raptorfec media type

This RTP payload format is identified using the audio/raptorfec media type which is registered in accordance with [RFC4855] and using the template of [RFC4288].

6.3.1. Media Type Definition

Type name: audio

Subtype name: raptorfec

Required parameters:
raptor-scheme-id: The value of this parameter is the FEC Scheme Id for the specific Raptor FEC Scheme that will be used as defined in [I-D.ietf-fecframe-raptor]

max-sbl: The value of this parameter is the FEC Object Transmission Information element "Maximum Source Block Length" as defined in [I-D.ietf-fecframe-raptor] encoded as a decimal integer.

symbol-size: The value of this parameter is the FEC Object Transmission Information element "Encoding Symbol Size" as defined in [I-D.ietf-fecframe-raptor] encoded as a decimal integer.

Optional parameters: none

Encoding considerations: This media type is framed and binary, see section 4.8 in [RFC4288]

Security considerations: Please see security consideration in [I-D.ietf-fecframe-framework]

Interoperability considerations:

Published specification: [I-D.ietf-fecframe-raptor]

Applications that use this media type:

Additional information:

Magic number(s): <none defined>

File extension(s): <none defined>

Macintosh file type code(s): <none defined>

Person & email address to contact for further information: Mark Watson, watson@qualcomm.com

Intended usage: COMMON

Restrictions on usage: This media type depends on RTP framing, and hence is only defined for transfer via RTP [[RFC3550]]. Transport within other framing protocols is not defined at this time.

Author: Mark Watson, Qualcomm Inc.

Change controller: IETF Audio/Video Transport working group delegated
6.4. Registration of the text/raptorfec media type

This RTP payload format is identified using the text/raptorfec media type which is registered in accordance with [RFC4855] and using the template of [RFC4288].

6.4.1. Media Type Definition

Type name: text
Subtype name: raptorfec

Required parameters:

raptor-scheme-id: The value of this parameter is the FEC Scheme Id for the specific Raptor FEC Scheme that will be used as defined in [I-D.ietf-fecframe-raptor]

max-sbl: The value of this parameter is the FEC Object Transmission Information element "Maximum Source Block Length" as defined in [I-D.ietf-fecframe-raptor] encoded as a decimal integer.

symbol-size: The value of this parameter is the FEC Object Transmission Information element "Encoding Symbol Size" as defined in [I-D.ietf-fecframe-raptor] encoded as a decimal integer.

Optional parameters: none

Encoding considerations: This media type is framed and binary, see section 4.8 in [RFC4288]

Security considerations: Please see security consideration in [I-D.ietf-fecframe-framework]

Interoperability considerations:

Published specification: [I-D.ietf-fecframe-raptor]

Applications that use this media type:

Additional information:

Magic number(s): <none defined>
File extension(s): <none defined>

Macintosh file type code(s): <none defined>

Person & email address to contact for further information: Mark Watson, watson@qualcomm.com

Intended usage: COMMON

Restrictions on usage: This media type depends on RTP framing, and hence is only defined for transfer via RTP [[RFC3550]]. Transport within other framing protocols is not defined at this time.

Author: Mark Watson, Qualcomm Inc.

Change controller: IETF Audio/Video Transport working group delegated from the IESG.
7. Mapping to SDP

The mapping of the above defined payload format media type and its parameters SHALL be done according to Section 3 of [RFC4855].

When the RTP Payload Formats defined in this document are used, the Media Type Parameters defined above SHALL be used to specify the FEC Object Transmission Information in preference to the SDP attributes specified in [I-D.ietf-fecframe-sdp-elements].
8. Offer/Answer considerations

None.
9. Declarative SDP Considerations

None.
10.  IANA Considerations

This memo requests that IANA registers application/raptorfec as specified in Section 6.1.1, video/raptorfec as specified in Section 6.2.1, audio/raptorfec as specified in Section 6.3.1 and text/raptorfec as specified in Section 6.4.1. The media type is also requested to be added to the IANA registry for "RTP Payload Format MIME types" (http://www.iana.org/assignments/rtp-parameters).
11. Security Considerations

See [I-D.ietf-fecframe-framework]
12. References


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