RTP Payload Format for H.264 RCDO Video
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Abstract

This memo describes an RTP Payload format for the Reduced-Complexity Decoding Operation (RCDO) for H.264. RCDO reduces the decoding cost and resource consumption of the video processing. The RTP Payload format is based on the description in RFC 3984.
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1. Introduction

The Reduced-Complexity Decoding Operation (RCDO) for H.264 offers a solution to support higher resolutions at the same high framerates used in current implementations, but with reduced processing requirements, compared to today’s needs. This is achieved by reducing the complexity and thus the decoding cost/resource consumption of the video processing.

ITU-T H.264 [4] and ITU-T H.241 [5], its associated video procedures and signalling recommendation, continue to evolve. The IETF RTP payload formats and parameters need to be updated to include important new functionalities not covered in RFC 3984 [3]. The RCDO approach is already addressed in the latest version of H.241 [5]. This proposal defines media type parameters, a new H.264 media subtype for RCDO and allows use in SDP.

Editorial note: This memo refers to RFC 3984 [3] content in several sections. As the H264-RCDO RTP Payload format description (probably) should be a self-contained in one document, some text will be included verbatim from RFC 3984 in a later phase and thus reduce the number of references to RFC 3984 from this document.

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 [1].

3. Media Format Background

The Reduced-Complexity Decoding Operation (RCDO) for H.264 Baseline profile bitstreams is specified in Annex B of H.241 [5]. RCDO is specified as a separate H.264 mode, and is distinct from any profile defined in H.264. A RCDO bitstream obey to all the constraints of the Baseline profile.

The media format is based on the H.264 RTP Payload format as specified in RFC 3984 [3]. Therefore, RFC 3984 is referred to several times in this memo.

In order to signal H.264 additional modes the parameter AdditionalModesSupported is specified in Table 9f of H.241 [5]. Currently, the only mode defined is RCDO.
Informational note: Other additional modes may be defined in the future. However, as H.264 additional modes may or may not be distinct from the Profiles in H.264 - these modes would require separate extensions RFC 3984 [3].

To maintain backward compatibility with existing H.264 implementations, this memo proposes a separate media subtype for RCDO named H264-RCDO.

4. Payload Format


4.1. RTP Header Usage

Editorial note: Include verbatim or slightly modified version from Section 5 of RFC 3984 [3] in a later phase. Or simply refer to RFC 3984?

4.2. Payload Header

Editorial note: Include verbatim or slightly modified version from Section 5 of RFC 3984 [3] in a later phase. Or simply refer to RFC 3984?

5. Payload Examples

TBD or refer to RFC3984.

6. Congestion Control Considerations

Congestion control for RTP SHALL be used in accordance with RFC 3550 [6], and with any applicable RTP profile; e.g., RFC 3551 [7]. An additional requirement if best-effort service is being used is: users of this payload format MUST monitor packet loss to ensure that the packet loss rate is within acceptable parameters.

7. Payload Format Parameters

This RTP payload format is identified using the H264-RCDO media type which is registered in accordance with RFC 4855 [8] and using the template of RFC 4288 [9].
7.1. Media Type Definition

Editorial note: Complete formal media type specification TBD. Decide whether to include the RFC 2984 media type registration or simply refer to it. For now we mainly describe the changes and differences.

The media subtype for the ITU-T H.264 | ISO/IEC 14496-10 codec is allocated from the IETF tree.

The receiver MUST ignore any unspecified parameter.

Type name: video

Subtype name: H264-RCDO

Required parameters:

rate: Indicates the RTP timestamp clock rate. The rate value MUST be 90000.

Optional parameters:

The optional media type parameters specified in RFC 3984 [3] apply, with the following constraints:

profile-level-id: RCDO is distinct from any profile, this implies that the profile value 0 (no profile) and the profile_idc byte of the profile-level-id parameter are equal to 0. A RCDO bitstream MUST obey to all the constraints of the Baseline profile. Therefore, only constraint_set0_flag is equal to 1 in the profile-iop part of the profile-level-id parameter, the remaining bits are set to 0.

For example, if a codec supports level 2.1, the profile-level-id becomes 00800d, in which 00 indicates the "no profile" value, 80 indicates the constraints of the Baseline profile and 0d indicates level 1.3. When level 2.1 is supported, the profile-level-id becomes 008015.

If no profile-level-id is present, level 1 MUST be implied, i.e. equivalent to profile-level-id 00800a.

Encoding considerations: This type is only defined for transfer via RTP (RFC 3550).
Security considerations: See section X of RFC YYY. (TBD. Update when this memo becomes an RFC)

Interoperability considerations: None

Published specification: TBD. Update when this memo becomes an RFC. Also refer to H.264 and H.241 in an IANA way.

Applications that use this media type: None

Additional information: None

Magic number(s): None

File extension(s): None

Macintosh file type code(s): None

Person & email address to contact for further information:
Tom Kristensen <tom.kristensen@tandberg.com>

Intended usage: COMMON

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

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

8. Mapping to SDP

The mapping of the above defined payload format media type and its parameters SHALL be done according to Section 3 of RFC 4855 [8].

An example of media representation of a level 2 bitstream is as follows:

```
m=video 54321 RTP/AVP 101
a=rtpmap:101 H264-RCDO/90000
a=fmtp:101 profile-level-id=008014;max-mbps=60000;max-smbps=360000
```
8.1. Offer/Answer Considerations

When H264-RCDO is offered over RTP using SDP in an Offer/Answer model [2] for unicast and multicast usage, the limitations and rules described in Section 8.2.2 of RFC 3984 [3] apply. Note that the H264-RCDO profile-level-id parameter does only have the value 0 (no profile) for the profile part.

8.2. Declarative SDP Considerations

When H264-RCDO over RTP is offered with SDP in a declarative style, as in RTSP [13] or SAP [14], the considerations in Section 8.2.3 of RFC 3984 [3] apply. Note that the H264-RCDO profile-level-id parameter does only have the value 0 (no profile) for the profile part.

9. IANA Considerations

This memo requests that IANA registers H264-RCDO as specified in Section 7.1. 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).

10. Security Considerations

RTP packets using the payload format defined in this specification are subject to the security considerations discussed in the RTP specification [6], and in any applicable RTP profile. The main security considerations for the RTP packet carrying the RTP payload format defined within this memo are confidentiality, integrity and source authenticity. Confidentiality is achieved by encryption of the RTP payload. Integrity of the RTP packets through suitable cryptographic integrity protection mechanism. Cryptographic system may also allow the authentication of the source of the payload. A suitable security mechanism for this RTP payload format should provide confidentiality, integrity protection and at least source authentication capable of determining if an RTP packet is from a member of the RTP session or not.

Note that the appropriate mechanism to provide security to RTP and payloads following this memo may vary. It is dependent on the application, the transport, and the signalling protocol employed. Therefore a single mechanism is not sufficient, although if suitable the usage of SRTP [10] is recommended. Other mechanism that may be used are IPsec [11] and TLS [12] (RTP over TCP), but also other alternatives may exist.
Refer also to section 9 of RFC 3984 [3], as no reasons for separate considerations are introduced in this document.

11. Acknowledgements

The RTP Payload Formats HOWTO [15] was used for guidance and proved helpful in the process.

12. References

12.1. Normative References


12.2. Informative references


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