Improved Rapid Acquisition of Multicast Sessions

draft-wang-avt-rtp-improved-rams-00

IETF#75, July 2009, Stockholm
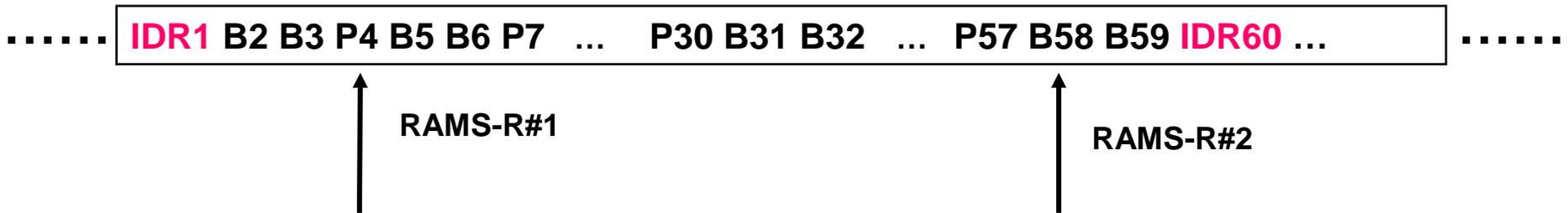
Ye-Kui Wang, Jinliang Dai, and Jiangping Feng

Huawei Technologies

{yekuiwang, daijinliang, fengjiangping}@huawei.com

Problem#1

Media stream $\longrightarrow$

IDR1 B2 B3 P4 B5 B6 P7 ... P30 B31 B32 ... P57 B58 B59 IDR60 ...

RAMS-R#1

RAMS-R#2

If the RR starts to request the acquisition close to the next random access point (RAP), e.g. RAMS-R#2 above, the acquisition delay will be lower if the receiver had chosen to directly join the multicast group.

However, the RR has no way to make the best choice, as it has no information on how close the joining location is to the next RAP.

Problem#2

The request (RAMS-R) for the unicast burst stream may be lost. If the request is retransmitted and finally received, the acquisition delay gets increased.

The acquisition delay could be lower if the receiver had chosen to directly join the multicast group.

However, the RR has no way to make the best choice, as it cannot know what loss would happen beforehand.

Problem#3

- Part or all of the Reference Information (RI) may be lost.
  - The lost information could be retransmitted, which increases the acquisition delay.
  - If the RI or part of it gets finally lost in any case, the received data in the unicast burst stream cannot be processed until the next random access point.
- The acquisition delay can be lower if the receiver had chosen to directly join the multicast group.
- However, again, the RR has no way to make the best choice, as it cannot know what loss would happen beforehand.

Solution (1/2)

- The receiver can simultaneously requests the unicast burst stream and joins the multicast group
  - The receiver SHOULD do this if the downlink bandwidth is equal to or higher than twice the media rate
    - When used, the unicast burst stream does not have to be transmitted at a rate higher than the media rate
  - After both the unicast and multicast streams are received, the receiver chooses to process whichever can be firstly processed

Solution (2/2)

- If the multicast stream is chosen, then the unicast stream is terminated immediately.
    - In this case, all received packets of the multicast stream are processed (depacketized and decoded).
- Otherwise (i.e. the unicast stream is chosen), the unicast stream is terminated when it catches the beginning of the received multicast stream, i.e. after the packet in the unicast stream having OSN equal to SNm-1 is received, where SNm is the SN of the first packet in the received multicast stream.
    - In this case, all received packets of the unicast stream having OSN equal to or greater than SNm are discarded, and other received packets of the unicast stream and all received packets of the multicast stream are processed.

Advantages of the proposal

- Enables the fastest acquisition when the downlink bandwidth is equal to or higher than twice the media rate
  - The receiver chooses to directly process the multicast stream
    - When the request point is close to the next RAP (e.g. RAMS-R#2 in page 2), or
    - When the RAMS-R gets lost, or
    - When the Reference Information (or part of it) gets lost
  - The receiver chooses to first process the unicast stream when neither of the above occurs

Why twice the media rate is possible

- A user who has a certain network accessing bandwidth can typically upgrade the access bandwidth without upgrade of the network accessing equipment.
  - As the acquisition process involving receiving both streams is short, network providers, which in many cases are also content providers and services providers, are willing to allow the momentary use of higher bandwidth than usual.
- In a digital home with multiple TVs and possibly other connected equipments such as PCs, more than one TV program on different TVs may be watched simultaneously in addition to other network uses under one network accessing contact. In such a common scenario, the bandwidth available can easily be as at least twice high as the media rate.

Thanks!