RTP Payload Format for Interleaved Packets

draft-huang-payload-rtp-interleave-01

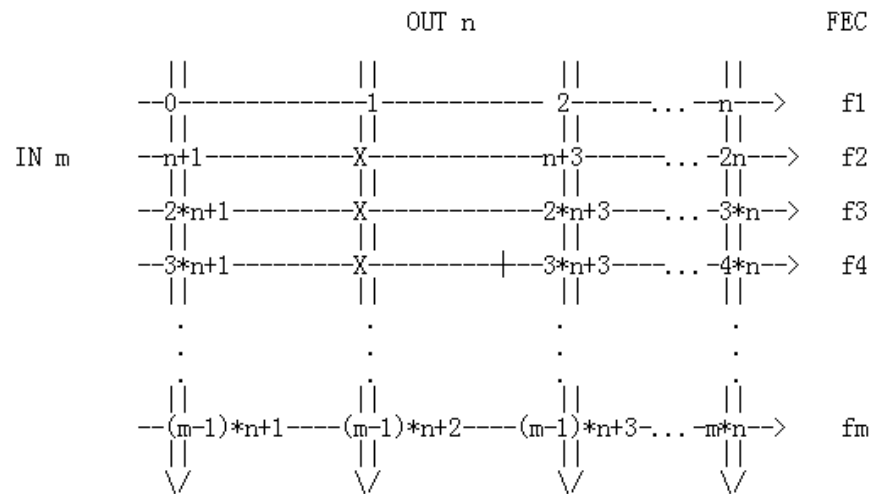ietf94@Yokohama

Recap: Interleaving Payload

- A proposed common RTP payload format for interleaved media.

- Independent of any codec.

- Useful for network environment where interference is an issue, e.g., DSL and wireless network.

  - some European operators are still using DSL because the cost of updating network is quite high. They are still considering to dig out the potentiality of their legacy network.

- Applicable for non-interactive applications where certain delay is allowable, e.g., IPTV.

Changes to Version 00

- Specified "interleaving length" and "interleaving depth".
  - Interleaving length is the packet number of an interleaving separation between packets or data originally adjacent.
  - Interleaving depth is the interleaving separation count of an interleaver output buffer.

- Specified "packet interleaving" and "data interleaving"
  - Packet interleaving simply permutes the RTP packets for transmission.
  - Data interleaving segments RTP packets into pieces, disarranging them, and reassembling into new RTP packets. The number of separations of one packet is equal to the interleaving depth.
  - Interleaving may change the number of RTP packets during transmission. But the number of RTP packets will be recovered after de-interleaving.

- IANA registration for Interleaving Payload.

- Some clarifications
  - Only the packets of the same on RTP stream are allowed to be interleaved in one interleaving stream.
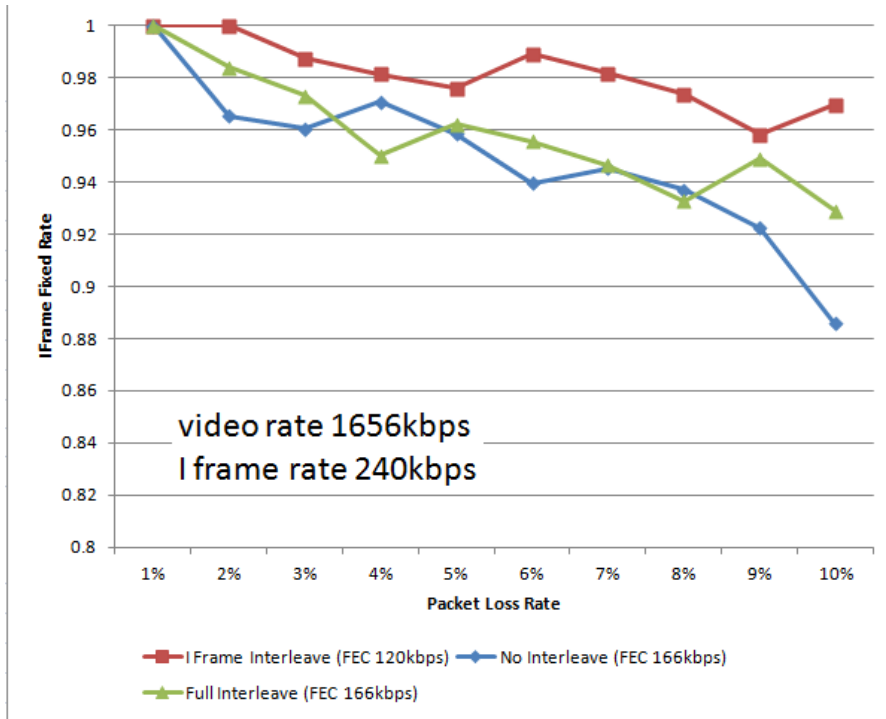
How does Interleaving Help

- It can work with FEC to increase the recovery possibilities.

```
                              OUT n                           FEC

              ||           ||           ||           ||
            --0-------------1----------- 2-------...--n-->      f1
              ||           ||           ||           ||
IN m        --n+1----------X-------------n+3------...-2n-->      f2
              ||           ||           ||           ||
            --2*n+1--------X-------------2*n+3----...-3*n-->     f3
              ||           ||           ||           ||
            --3*n+1--------X---------+---3*n+3----...-4*n-->     f4
              ||           ||           ||           ||
              .            .            .            .
              .            .            .            .
              ||           ||           ||           ||
            --(m-1)*n+1----(m-1)*n+2----(m-1)*n+3-...-m*n-->     fm
              ||           ||           ||           ||
              V            V            V            V
```

It disperses continuous packet losses into isolated ones so that FEC can work well to recovery these losses..

Interleaving Experiment Result (Quality)

video rate 1656kbps
I frame rate 240kbps

Legend:
- I Frame Interleave (FEC 120kbps)
- No Interleave (FEC 166kbps)
- Full Interleave (FEC 166kbps)

I frame interleaving (1% packet loss)

Full interleaving (1% packet loss)

Non-interleaving, only FEC (1% packet loss)

When working with FEC, I frame interleaving has better recovery performance than full interleaving and non-interleaving. It can get better quality.

Interleaving Experiment Result (Delay)

- Interleaving: m=5; n=5; RTP packet length= 1316(7*TS packets);

- The I frame percentage is 12%

	Maximum Delay(us)	Minimum Delay(us)	Average Delay(us)	Total time for interleaving(ms)	total time of video(ms)
Interleaving	44798	55	1241	59205	59205
Selective Interleaving (Only I frame)	18171	54	159	6092	65276

Selective interleaving reduces the processing delay by 90%.

Next Step

- Welcome reviews and suggestions.

THANK YOU