Priority-aware Forward Error Correction for HTTP

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Motivation:

- Takeaway Message: To reduce page-load times, use **selective** Forward Error Correction (FEC) **only** for high-priority resources (e.g., HTML, CSS, JS) in HTTP/3.

- Previously:
  - HTTP had "complicated" dependency tree prioritization mechanism. Dropped.
  - Early QUIC had FEC for *all* data. Too expensive. Gone.
- Now:
  - HTTP/3 has simpler Extensible Prioritization Scheme
  - HTTP/3 *could* have **selective** FEC to reduce overheads

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Implementation and Evaluation

- Paper:
  - Evaluation over UDP-based Data Transfer (UDT) protocol using 2D FEC
- This talk:
  - Evaluation over ngtcp2/nghttp3 using OpenFEC library
    - Precompute repair data and send as an HTTP resource
    - Decode QUIC frames to recover lost ones
    - OpenFEC supports Reed-Solomon/LDPC FEC
- Two nodes in Emulab testbed
  - Using Netem-tc Linux tool to add RTT and loss rate

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Emulation Results:

- RTT: 100ms, packet loss: 10%
- Arrival **order** of QUIC frames at HTTP client w/o FEC

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Summary and Future Work

- Resource prioritization at HTTP server helps
    - Reduce FEC overhead by considering **only** high priority resources
    - Reduce the page load time by downloading essential resources **sooner**

- Improving our implementation over QUIC (ngtcp2)
- Studying the congestion control effects of FEC

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Thanks!

Questions/suggestions?

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