WebSocket multiplexing compression and HTTP/2.0

Takeshi Yoshino
tyoshino at google dot com
HyBi WG IETF 84 Vancouver
Integration Issues

• Per-frame compression locks fragmentation
  → Multiplexor needs to decompress, re-fragment and re-compress to fit quota
  → So, per-message?

• Per-frame extension data based multiplexing interleaves messages
  → Per-message compression is not applicable after multiplexing
Handle Everything on Per-message Basis

• It’s time to give up …
  – Using extension data on per-frame basis
  – Using RSV bits on per-frame basis
  – Using frame boundary information

• Let’s use
  – Per-message compression
  – Multiplexing by encapsulation
Per-message compression

- Define how to compress “message”
- Friendly to multiplexing and intermediaries
  - Compressed messages are still safe to be re-fragmented
- Diff from the WG item is a little
  - draft-tyoshino-hybi-permessage-compression-00
Multiplexing by Encapsulation

• Changed on -03
• Encapsulate a frame into a binary message with channel ID
  – Only 1 byte additional overhead
• Friendly to intermediaries and post-mux compression
  – Encapsulating msgs are safe to be re-fragmented
  – Control frames can be inserted without interpreting multiplexing
All the information of a message

- **RSV**: Reserved
- **Opcode**: Operation code
- **Message body**

Multiplexor (re-)fragments it according to quota

- **RSV**: Reserved
- **Opcode**: Operation code
- **Body 0**, **Body 1**, **Body 2**, **Body 3**

Encapsulate the chunked bodies into messages

- **Ch ID**
- **F**: Fragmentation indicator
- **RSV**: Reserved
- **Opcode**: Operation code
- **Body 0**

- **F**: Fragmentation indicator
- **RSV**: Reserved
- **Opcode**: Operation code
- **Binary**: Binary data
- **M**: Message length
- **Len**: Length
- **Mask**: Mask
- **Payload data**
Other Update

• Flow control
  – Pre-handshake quota
  – NewChannelSlot: AddChannelRequest throttling

• Compression
  – Decoupled compression algorithm and framing
  – Simple negotiation by parameter echo back
Multiplexing TODO

• Quota
  – 1 byte penalty / message
  – Spend quota for control frames
• Define multiplex error codes
• Define how to fallback to another physical connection
Can HTTP be Layered over WebSocket multiplexing?

- From SPDY, incorporate
  - header encoding for efficient HTTP transfer
  - "scheme" header for protocol switching
- Unmask when safe
- ID space separation for server initiated stream
- Simplify number encodings
- Priority header