



# FEC Payload Format

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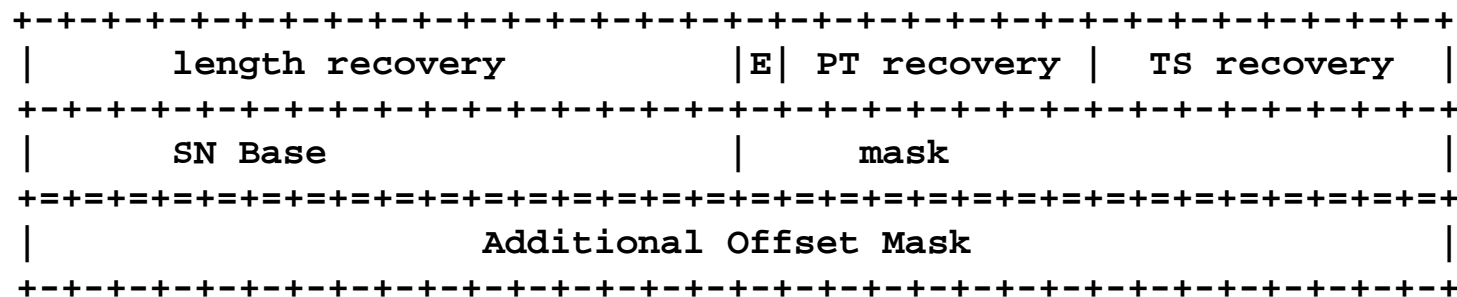


# Changes

- FEC packets a separate “stream”
  - Definition of stream can vary
  - Different port, multicast group, or redundant codec
- Advantages
  - Can only get FEC packets when needed
- Media stream completely unchanged - mixed FEC/non-FEC receivers
- SN and TS space in media behaves nicely; FEC SN is nice but TS can be strange
- Makes it clear which packets are FEC, and which are media - problem in old draft



# FEC Format



- Len Recovery: xor of lengths of associated packets
- E: presence of offset mask
- TS: xor of LSB's of TS of associated packets
  - remaining 24 bits via interpolation
  - 8 bits enough?
- SN Base: min SN of media packets associated with FEC
- Mask: Offsets from SN base





## Other Changes

- Extension, CSRC List protection
  - Just treat these as part of the payload, and apply FEC across them
- Concatenation
  - All the fields which are to be protected by FEC are concatenated together before the  $f()$  operator is applied
  - Useful for RS codes?



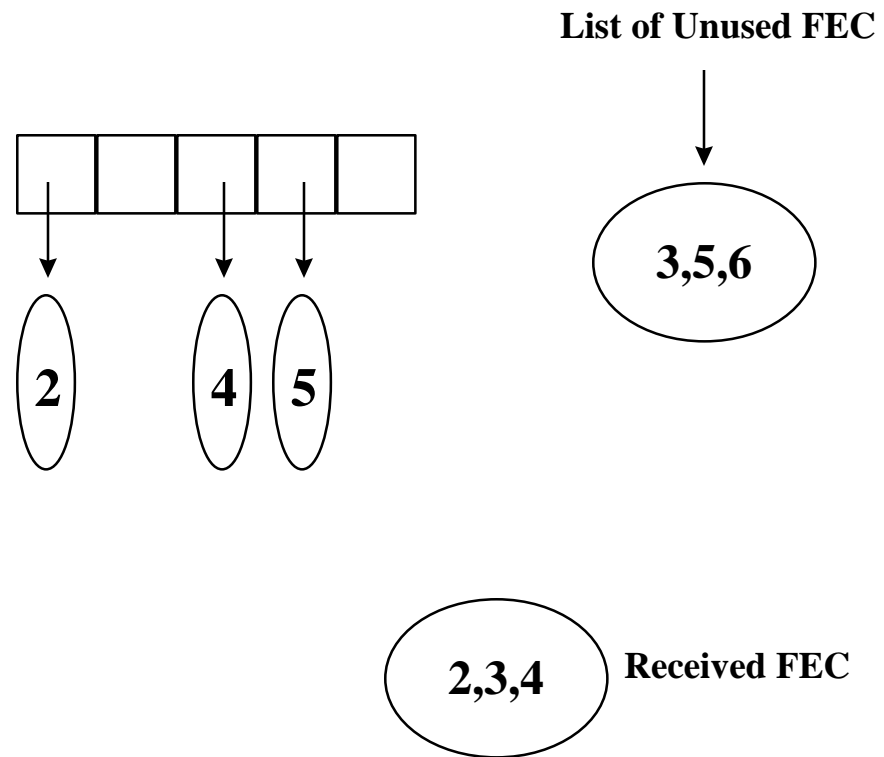
# Recovery Algorithm

- Detailed recovery procedure specified
- Problem:
  - How to know when to try and apply FEC recovery to get packet N?
  - How to then recover packet N?
- Solution
  - Keep an array of packets received
  - Array may actually be a ring buffer
  - When FEC packet arrives, check if all but 1 of associated packets is present
  - If so, recover
  - If not, store FEC packet
  - When a new packet arrives, check if we can now use FEC packets stored to recover



# Recovery Algorithm

- Other algorithms are possible
- Tradeoff between complexity and ability to recover a packet if theoretically possible given what's been received
- Simple proposed algorithm works pretty well



1. use new FEC to recover 3
2. Check list of unused FEC
3. We can now recover 6
4. Recover 6



# Issues to address

- Is 8 bits of TS recovery enough?
  - Full 32 bits is nice, but means a minimum 3 word header
- TS for FEC packets
  - Min of TS of media packets
  - jitter computes screwed up
  - RTP timestamp when FEC packet is *sent*
- Can we support RS codes?
  - How to transmit  $n, k, l, \text{position}$ ?
  - Do any coefficients need to be sent?
- Proposal
  - $n, l$  implicit from PT field
  - $k$ , location from mask