

Forward Error Correction For IP Datagrams

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Improved delivery of IP Datagrams

WHY?

- Bad things happen to IP Datagrams in the Internet
 - They tend to get lost or trashed
 - RED is real
 - It is called “best effort” for a reason
 - Wireless links are amazing that they work as well as they do
- There are times when “The Mail MUST Go Through”!

WHY?

- Don't expect the Internet to fix your problem
 - It works well for everything else, why worry
 - Amazing things are done over wireless links!
 - What are you willing/able to pay?
 - Fast/Reliable/Cheap
 - Choose two
 - Or is it one?

Smart or Dumb Internet

- Can we do better (smart things) with a dumb Internet?
 - Cheaper for the Internet, pricier at the endpoints
 - In the apps 'cheaper' but never ending
 - Closer to IP better but how to change the stack?
- And somethings we do need to make the Internet smarter
 - Like RED!

Reliability through FEC

- Simple proposal: Provide IP datagram FEC
 - Compute FEC on datagram
 - Chop into pieces
 - Minimum of 3: 2 for datagram, 1 for FEC
 - Send these multiple pieces
 - Reconstruct datagram from pieces received
- At IP datagram level to limit total data sent
 - Manage cost to constrained links

Reliability through FEC

- Example
 - IP datagram is N bytes (even for simplicity here)
 - FEC is $N/2$ bytes
 - Each datagram is $40 + N/2$ bytes
 - Total is $120 + 3N/2$
 - ‘Cheaper’ to send datagram twice if $N < 80$!
 - $T = 240$ if $N = 80$, which = 2 non-FECed IP packets
- Smarter FEC might exist

Reliability through FEC

- But how?
 - SCHC to the rescue!
 - Apply SCHC rules to IP datagram
 - Then apply FEC and send with SCHC as IP Protocol NH
 - See my presentation in LPWAN next session
 - Use SCHC RuleID to encode block # (lower 2 bits)
 - App signals SCHC on needing MUST deliver

Ta Da!

- Easy to implement and test to prove
 - End points need SCHC support
 - Internet needs to respect SCHC as IP Protocol #
 - Hopefully not just dropping it
 - Select FEC and plug into SCHC
 - Help needed here
 - Run tests over questionably reliable links
 - Measure success improvements

Ta Da!

THANK YOU

QUESTIONS?
Nah, this is easy! :)