Robust Header Compression

Mikael Degermark <micke @ cs.arizona.edu>
Co-chair, ROHC WG (to be)
University of Arizona/ Ericsson Research
Robust header compression

Goal: Making IP-telephony as speech service economically viable compared to traditional circuit switched telephony.
Wireless cellular networks usually run at a point where there is around 1% frame loss.
- Raw bit-error rate $10^{-2}$ to $10^{-6}$.

Voice codecs can cope with such loss and still deliver reasonable service.

A loss event involves 1-2 packets. For some technologies 3. Longer events very rare.
- True for WCDMA, GSM, CDMA-2000, EDGE.
IP voice packet

20+8+12+24

IPv4 header

UDP header

RTP header

Payload
(Voice data)

40+8+12+24

IPv6 header

UDP header

RTP header

Payload
(Voice data)
HC exploits regularities in stream of headers. Schemes above suffer under high-loss & irregularities. “twice”
Requirements

- Complete transparency
- No production of erroneous headers
- No added packet loss due to header compr.
- IPv6, IPv4, RTP/UDP/IP, TCP/IP
  - Extension headers, TCP options
  - RTP for voice & video
- Compress headers of tunneled packets
- Should be possible to compress over simplex links.
Most loss due to context damage

- Large delay-bandwidth product over link
- Unrepaired context damage implies loss of entire “window”, i.e., 100-200 ms of voice.
- So, avoid context damage or repair without going across link.
  - ROCCO: repair without going across link
  - ACE: delta in compressed header is relative to hdr confirmed to have reached decompressor
Robust header compression

■ Avg. header size less than 2 bytes.
  – Minimal header is one byte
  – Both ROCCO and ACE
■ Neither add significantly to loss rate.
■ No reliance on transport checksums
  – May not be present.
  – Voice codecs might want data even if damaged.
■ Entirely possible to do similar things for TCP.
Tunneling & Security

- Encrypted or authentication data cannot be compressed. (AH adds significantly)
- Outer header in an encrypted tunnel can be compressed (IPHC, rfc2507)
- Inner headers could be compressed at tunnel entry point, but currently no defined way to do so for transport headers.
  - Reordering.
  - Work in AVT, but may not perform well enough when RTP stream subject to high loss.
Compression of inner headers
- for end-to-end encryption.
- for tunnels across “core network”
- Need robustness against reordering & loss & irregularities in packet stream.
- work in AVT, but may not produce robust solution

Compression of signaling packets?

Further information
- rohc @ cdt.luth.se
- draft-degermark-crtp-eval-01.{txt, ps}
- draft-degermark-robhc-requirements-00.txt
- draft-jonsson-robust-hc-03.{txt, ps}
- Rfcs 1144, 2507-2509