rohc
Robust Header Compression

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Pittsburgh

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48th IETF: Agenda (from 30000 feet)

- 1. AD and WG chair admonishments
- 2. Real agenda

- Blue sheets
- Scribe
Hello! This is an IETF Working Group

- We are here to make the Internet work (Fred Baker)
- Rough Consensus and Running Code (Dave Clark)
- Working Group is controlled by
  - IETF Process (RFC2026, RFC2418) – *read it*
  - Area Directors (ADs): Alison Mankin, Scott Bradner
  - Charter (http://www.ietf.org/html.charters/rohc-charter.html) -- *read it*
  - Working Group Chairs: Mikael Degermark, Carsten Bormann
  - Technical Advisor: Erik Nordmark

- Work is done on email list rohc@cdt.luth.se
  - And on IETF meetings, interim meetings, informal meetings, …
  - Mailing list is official channel, though
RFC 2026: Internet Standards Process

◆ Standards track RFCs:
  ▲ WG consensus (as judged by WG chairs)
  ▲ WG last call
  ▲ IESG approval (based on AD recommendation)
    ▲ Quality control!
  ▲ IETF last call

◆ Informational RFCs

◆ BCP (best current practice) RFCs
(10.2) No contribution that is subject to any requirement of confidentiality or any restriction on its dissemination may be considered […]

Where the IESG knows of rights or claimed rights […] the IETF Executive Director shall attempt to obtain from the claimant […] a written assurance that upon approval by the IESG of the relevant Internet standards track specification(s), any party will be able to obtain the right to implement, use and distribute the technology […] based upon the specific specification(s) under openly specified, reasonable, non-discriminatory terms.
RFC 2026: IPR issues (2)

♦ Contributions (10.3.1(6)):
  “The contributor represents that he has disclosed the existence of any proprietary or intellectual property rights in the contribution that are reasonably and personally known to the contributor.”

♦ i.e., if you know of a patent application for a technology you are contributing, you have to tell. Or just shut up entirely!
IPR issues: ROHC WG policy

- IETF IPR policy defined in RFC2026
- For expedience:
  - Include IPR statements in the contributions (I-Ds, slides)
    - Upon advancement to RFC, these IPR statements will be replaced by a pointer to http://www.ietf.org/ipr
  
- Unencumbered technologies facilitate interoperability and are therefore generally preferable
  - Of two roughly equal proposals, select the unencumbered one
  - Desirable: Default configuration is unencumbered
ROHC: Charter (1)

- Cellular links: expensive, limited bandwidth
- IP/UDP/RTP and IP/TCP packets benefit considerably from header compression
- Existing schemes (RFC 1144, RFC 2508)
  - do not perform well over cellular: high error rates and long link roundtrip times
  - do not compress TCP options such as SACK or Timestamps
- Goal of ROHC:
  - develop header compression schemes that perform well over links with high error rates and long roundtrip times.
  - must perform well for cellular links built using technologies such as WCDMA, EDGE, and CDMA-2000.
  - should also be applicable to other future link technologies with high loss and long roundtrip times
  - Ideally, it should be possible to compress over unidirectional links.
ROHC: Charter (2)

◆ Good performance:
  ▲ minimal loss propagation  And, of course, the size...
  ▲ minimal added delay

◆ Target:
  ▲ generic TCP and UDP/RTP compression
  ▲ applications of particular interest: voice and low-bandwidth video

◆ ROHC may develop multiple compression schemes
  ▲ e.g., for specific link layer technologies
  ▲ additional schemes may be added in consultation with the ADs.

◆ Must:
  ▲ assure that when a header is compressed and then decompressed, the
    result is semantically identical to the original;
  ▲ perform well when end-to-end path involves more than one cellular link;
  ▲ support IPv4 and IPv6.
ROHC: Charter (3)

- First task: Create more thorough requirements documents
- Maintain connections with other standardization organizations
devolving cellular technology for IP, such as 3GPP and 3GPP-2
  ▲ ensure that output fulfills their requirements and will be put to good use
- Develop a solid understanding of the impact that specific error patterns have on HC schemes, and document guidelines to L2 designers regarding what L2 features work best to assist L3/L4 HC
- Address interactions with IPSEC and other security implications.

- Remember: Only IESG can change the charter!
ROHC: Charter (4) Goals and Milestones

- Mar: I-D on Requirements for IP/UDP/RTP HC.
- May: I-D of layer-2 design guidelines.
- May: I-D(s) proposing IP/UDP/RTP HC schemes.
- May: I-D of Requirements for IP/TCP HC.
- Jun: Requirements for IP/UDP/RTP HC submitted to IESG (Inf.)
- Jul: Requirements for IP/TCP HC submitted to IESG (Inf.)
- Jul: Resolve possibly multiple IP/UDP/RTP HC schemes into a single scheme.
- Sep: Layer-2 design guidelines submitted to IESG (Inf.)
- Sep: IP/UDP/RTP HC scheme submitted to IESG (PS)
- Dec: IP/TCP HC scheme submitted to IESG (PS)
- Jan: Possible recharter of WG to develop additional HC schemes.
ROHC: Charter (5) Goals and Milestones

♦ Other standards bodies trust us to meet these timelines!
  ▲ Keep focus on our charter
  ▲ Stick to technologies that can be made to work now
  ▲ Explore complete general solution space later

♦ But stick to quality thinking, too!
  ▲ IESG won’t accept a shoddy solution
  ▲ Market won’t accept a shoddy solution, either
  ▲ 1 byte = $1,000,000,000
  ▲ Lack of forward thinking may be even more expensive
Liaisons

◆ We don’t do formal liaisons very well
  ▲ Liaisons should be people working in both bodies
  ▲ Task: ensure mutual flow of communication
◆ 3GPP: Krister Svanbro
◆ 3GPP2: (your name here)
Interim Meeting

◆ May 29, 30
  ▲ Organized by Nokia in Stockholm

◆ Results:
  ▲ Detailed requirements and lower-layer guidelines
  ▲ Merged RTP compression scheme
    ▲ Loose ends ➔ today!
  ▲ IPR approach
  ▲ Almost no interest on TCP work
IPR approach

- Free implementations can’t use licensing process
  - Neither can garage-based companies
- Base spec should be unencumbered
  - IPR players agree to waive license for standard-based implementations
48th IETF: Agenda (Thursday)

- Agenda bashing (5)
- WG document status
  - intro
  - draft-ietf-rohc-lower-layer-guidelines-00.txt Bormann (5)
  - draft-ietf-rohc-rtp-requirements-02.txt Degermark (5)
  - (continued on Friday)
- New work: Context Status Transfer
  - draft-koodli-rohc-hc-relocate-00.txt Koodli (10)
  - discussion (10)
- Experimental data from WCDMA trial Svanbro (15)
- 1) unidirectional/optimistic SO format
  - Keyword Burmeister (20)
  - checksum experience Jonsson (20)
  - discussion (30)
48th IETF: Agenda (Friday)

- WG document status (continued)
  - draft-ietf-rohc-rtp-01.txt

Issues (continued):
- 2) CIDs: nx8, 4, 4+nx8, streamlined 0?
- 3) negotiation and announcement
- (5 minutes space for additional issues)
- n) list-based compression
- Short term WG time schedule

Future:
- Multiple Solutions
- 0-byte solutions
  - draft-hiller-rohc-gehco-00.txt
  - discussion
- Medium term WG time schedule
WG document status

- draft-ietf-rohc-rtp-requirements-02.txt (Jun 15)
  ▲ Should go to WG last call now

- draft-ietf-rohc-lower-layer-guidelines-00.txt (May 24)
  ▲ Should have been updated ➞ Krister’s presentation Friday

- draft-ietf-rohc-rtp-01.txt: RTP ROHC
  ▲ Main deliverable
  ▲ 131 pages (should be < 100)
  ▲ Still requires considerable technical and editing work

- Negotiation specification? ➞ Friday

- Future additions? ➞ Friday
Optimistic/Unidirectional Analysis Results (1)

- Ad-hoc-Group* analyzed optimistic/unidirectional approaches (2000-08-03)

- Uncovered missing links in CRC approach:
  - Window reconsideration:
    1) after window update, save previous window
    2) if CRC fails, and SN LSBs would have had different interpretation in previous window, try that too
  - Local repair:
    When receiving SO packets after a time gap of ~n*16 packets, try updating MSBs accordingly
    If CRC matches for 3 packets, accept this update

*Generously sponsored by cisco
Optimistic/Unidirectional Analysis Results (2)

- KW overhead ~7/64 bytes higher for *long* talkspurts
  - ~14/64 bytes higher in unidirectional mode
- KW uses FO for short adjacent talkspurts (+ 2 bytes)
- CRC complexity: compute over 10-14 non-static bytes

Loss propagation estimates (# packets additionally lost):

- Hard handover scenario (4..10 packets lost on link):
  - CRC: 0, KW: 10/64 to 40/64 average (less in unidirectional)
- 12+ packet loss scenario:
  - CRC: 3, KW: 50/64 average ((n-2)*5/64)
- “Elevator event” long loss scenario (1 s +):
  - CRC: 3, KW: 5 (10.5 in unidirectional)
Issues: CIDs

- Probably need multiple contexts in one channel
  - Minimum: RTP and RTCP
  - Hack: provide packet types in RTP context for RTCP data
  - Audio, video, data?
- CRTP has 8 or 16 CID (context ID) bits
- Want 0 bits for streamlined voice
- 4 bits will suffice for many applications
- Proposal: 4 bits CID in all IR/FO packets, 0 bits in at least one SO format
- Need for additional bits?
  - (8 more bits could be negotiated channel property)
Issues: Negotiation and Announcement

◆ Son-of-2509 (PPP negotiation)
  ▲ Defines set of information needed by other types of negotiation
  ▲ Progress this independently of main document

◆ Channels vs. contexts
  ▲ PPP negotiation sets up channel
  ▲ Also may need per-context setup

◆ Announcement Protocols
  ▲ How does a stack know which flows are compressible?
  ▲ CRTP: guess…
  ▲ draft-ietf-intserv-compress-02.txt: hints for admission control
    ▲ In sender’s Tspec
List-based compression

- Section 7.2 of ROHC document: CSRC compression
  - General exposition: Appendix COMPLIST (needed?)
- Copy/remove/add CSRC elements wrt old packet
  - Generic: copy/add (remove implicit); can reorder
  - Insertion: n*add new SSRC at given position
  - Deletion: n*delete the SSRC at given position
  - Insertion/Deletion: adds and deletes
Short term time schedule

- Keep the September IESG submission deadline
- WG last call for RTP documents on Sep 13
- Fill in the missing parts till Aug 21
- Any need for editing meeting?
Multiple Solutions

- Charter allows us to generate multiple solutions
- ROHC RTP is optimized for:
  - Typical 3G style wireless voice links (allowing video, too)
    - (100 ms RTT, 20 ms frames, < 200 ms handover, 1 s avg talkspurt)
  - Good transparency
- Might want to change one or the other or both!
0-byte solutions

◆ Basic idea: in SO, use the tight radio frame timing to indicate SN/TS progress
◆ Needs separate channel for non-SO packets
  ▲ Can use ROHC framework here!
◆ Requires buffering at compressor (⇒ RTP playout!)
  ▲ Can the preprocessing done in a PEP-style box?
◆ Probably impossible to do entirely transparently
  ▲ UDP checksum, IP ID
  ▲ Needs announcement/negotiation
  ▲ Can’t lose SN, TS (e.g., for RTCP use)
Medium term time schedule

◆ 0-byte solutions
  ▲ Integrate into full ROHC framework
  ▲ Additional document ("Option" for ROHC RTP) in 2000

◆ ROHC TCP:
  ▲ The requirements for robustness are maybe less stringent
    ▲ Can do retransmission at link layer (see PILC)
  ▲ Less stringent time constraints on development
  ▲ New problems: Options like SACK, timestamps
  ▲ Solicit wider input wrt next generation TCP compression
    ▲ But is this maybe still a researchy topic?
  ➔ Solicit submissions for San Diego IETF