RObust Header Compression WG (ROHC)

61st IETF
Washington DC, November 8, 2004

Chairs:

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- **We assume people have read the drafts**

- **Meetings serve to advance difficult issues by making good use of face-to-face communications**

- **Be aware of the IPR principles, as stated by RFC 3668**

  ✓Blue sheets
  ✓Scribe(s)

60th IETF: ROHC WG Agenda, 1(2)

09:00 - Chair admonishments and agenda   Jonsson (10)

09:10 - WG and document status update   Jonsson (20)

09:30 - SigComp towards Draft Standard   Bormann (15)

09:45 - ROHC TCP and Formal Notation   Pelletier (30)

60th IETF: ROHC WG Agenda, 2(2)

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    10:15 - Introduction   Jonsson (5)

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10:55 - ROHC over Channels that can
        Reorder Packets   Pelletier (5)

11:00 - ROHC over 802 networks   Bormann (30)

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Document status update, 1(3)

- **Old**
  - **RFC 3095: Framework and four profiles** (was: draft-ietf-rohc-rtp-09.txt)
  - **RFC 3096: RTP requirements** (was: draft-ietf-rohc-rtp-requirements-05.txt)
  - **RFC 3241: ROHC over PPP** (was: draft-ietf-rohc-over-ppp-04.txt)
  - **RFC 3242: LLA RTP** (was: draft-ietf-rohc-rtp-lla-03.txt)
  - **RFC 3243: 0-byte RTP reqís** (was: draft-ietf-rohc-rtp-0-byte-requirements-02.txt)
  - **RFC 3320: SigComp** (was: draft-ietf-rohc-sigcomp-07.txt)
  - **RFC 3321: SigComp extended** (was: draft-ietf-rohc-sigcomp-extended-04.txt)
  - **RFC 3322: SigComp Req.** (was: draft-ietf-rohc-signaling-req-assump-06.txt)
  - **RFC 3408: LLA R-mode** (was: draft-ietf-rohc-rtp-lla-r-mode-03.txt)
  - **RFC 3409: ROHC RTP LLG** (was: draft-ietf-rohc-rtp-lower-guidelines-03.txt)
  - **RFC 3759: ROHC Terminology & channel mapping examples**
  - **RFC 3816: Definitions of managed objects for ROHC**
  - **RFC 3843: A ROHC profile for IP** (was: draft-ietf-rohc-ip-only-05.txt)

Document status update, 2(3)

- **New since IETF 60**
  - **NONE!**

- **In RFC editor queue**
  - **draft-ietf-rohc-udp-lite-04.txt (Proposed Standard)**

- **Submitted to IESG**
  - **draft-ietf-rohc-sigcomp-nack-02 (Proposed Standard)**
  - **draft-ietf-rohc-context-replication-06.txt (Proposed Standard)**
  - **draft-ietf-rohc-tcp-requirements-08.txt (Informational)**
  - **draft-ietf-rohc-tcp-field-behavior-04.txt (Informational)**

Document status update, 3(3)

- **Passed WGLC**
  - NONE!

- **Current WG documents**
  - RTP/Framework,
    3 drafts (impl.guide/LLA impl.guide, interop.status)
  - General, 1 draft (ROHC over reordering)
  - TCP profile, 5 drafts (profile/notation)
  - SigComp, 2 drafts (sigcomp-sip/impl.guide)

SIP over SigComp

- **Remaining issues:**
  - **State memory size**
    - ï RFC 3320 default: 0; mandate more for SIP?
  - **Definition of compartments**
    - ï Need to be well-defined so there are not accidental push-outs
  - **TCP ì step-upî ?**
    - ï Should it be possible to start SigComp compression in the middle of a SIP TCP connection?

State memory size

- **RFC 3320 default: 0; mandate more for SIP?**
- **Observation: there is little gain (~ 20 %) from stateless SIP/SDP compression**
  - **Donít do it, then**
- **Result: Advertising SigComp capability implies setting aside 2K/compartment**
  - **But what about server failover etc.?**
- **Proposed Mitigation: Require NACK support for a compressor that wants to make use of the 2K SMS**

Definition of compartments

- **Need to be well-defined so there are not accidental push-outs**
- **Original proposal: SIP dialogs**
- **Idea: Three different compartments for:**
    - **registration related messages**
    - **dialog-related messages**
    - **subscription-related messages**
- **Can this be clearly defined?**
- **Is $(n_r*R+n_d*D+n_s*S)$ in any way worse than $(n*D)$?**

TCP step-up?

- **Should it be possible to start SigComp compression in the middle of a SIP TCP connection?**

- **Observation: In many architectures, this requires SigComp shim layer to add SIP parser**

- **Result: too expensive**

- **Resolution:
  Open another TCP connection to start SigComp**

WG Status, Goals and Milestones

- **Focus is still on ROHC TCP, while the ROHC RTP DS advancement is mainly on hold**

- **Milestones to be updated after IETF 61**
    - Yes, we promised to do this after IETF 60, but we wanted to wait until ROHC TCP was submitted to the IESG

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SigComp implementation status

- **Interoperability test events have been held at SIPit**

- **Now need to collect interoperability test status**
  - **Result: Matrix document**
  - **Need to show two independent interoperable implementations for every feature**

SigComp for Draft Standard

- **Multiple interoperable implementations exist**
- **Base standard, RFC3320, could be advanced to DS**
- **Ancillary documents that might go with this:**
  - **draft-ietf-rohc-sigcomp-impl-guide-03**
  - **draft-ietf-rohc-sigcomp-user-guide-00 (expired)**
  - **draft-price-rohc-sigcomp-torture-tests-02 (expired)**
- **Resurrect the latter two**
- **What is the state of these documents?**

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61st IETF - ROHC WG

Status of the ROHC-TCP/CR/FN work

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Status of the ROHC-TCP work

➢ Drafts Status:

- draft-ietf-rohc-tcp-requirements-07.txt (Sent to IESG)
- draft-ietf-rohc-tcp-field-behavior-03.txt   (Sent to IESG)
- **draft-ietf-rohc-tcp-08.txt**   **(Updated Oct 04)**
- draft-ietf-rohc-context-replication-03.txt   (Sent to IESG)
- **draft-ietf-rohc-formal-notation-04.txt**   **(Updated Oct 04)**

➢ Work has progressed, are we nearing completion?

Recent changes: draft-ietf-rohc-tcp-08.txt

➢ New packet format definition, uses updated/simplified FN

➢ Most changes are related to the formal notatin

➢ We need somewhat to start doing a thorough review of the packet formats themselves

ANY VOLUNTEERS?

Recent changes: draft-ietf-rohc-fn-04.txt

➢ External coding methods (using underscore syntax) are gone; Profile-specific Encoding Methods are defined instead in section 4.9

➢ The formal meaning of annotations has been removed from FN, and moved as a note to the ROHC-TCP profile

➢ *short_crc*, *long_crc* and *compressed_crc* were removed.

  The signature of the coding method is changed to:

  field   ::=   crc (num_bits, bit_pattern, initial_value,

              block_data_value, block_data_length)

➢ The *environment* of the *let* statement has been clarified

➢ Control fields!

➢ List encoding!

List Compression

```
list_tcp_options(list_length_in_bytes) ===
  {
  % Length is not known a priori on decompressor,
  % so we use a sentinel.
          end_of_list_sentinel ::= uncompressed_value(8, 0);
          end_of_list_padding  ::= uncompressed_value(8, 1);
          mss               ::= tcp_opt_mss;
          wscale            ::= tcp_opt_wscale;
          tsopt             ::= tcp_opt_tsopt;
          sack              ::= tcp_opt_sack;
          sack_permitted ::= tcp_opt_sack_permitted;
          eol               ::= tcp_opt_eol;
          nop               ::= tcp_opt_nop;
          generic           ::= tcp_opt_generic;
```

In order for the format to not fail, notation needs to be capable of iteration for each option, and to select (or) one format for each single option.

Control Fields - Access within the right scope

```
co_baseheader ===
  {
      uncompressed_format_v4 = version,
                        header_length,
                              ...
control_fields  = msn,            % 16 bits
                  ecn_used,       % 1 bit
                  ip_id_behavior; % 2 bits
```

➢ We need to resolve:
  ➢ how to define control fields (in text, using FN syntax)
  ➢ how to access the control field (parameters VS definition w/in scope)

Control Fields - Using parameters

```
co_baseheader(msn, ecn_used, ip_id_behavior) ===
 {
    uncompressed_format_v4 = version,
                     header_length,
                         ...
```

➢ Note however that parameters to coding methods and structures must be a value, not a field:
  ➢ Parameters wonít work unless other coding methods get a new signature - at least one additional parameter
  ➢ Control fields would still need to be defined somewhere in a formal meaning

Moving forward with ROHC-TCP/FN

Work on the FN keeps us away from the actual compression of TCP

WG resources are at its lowest! Any volunteers to jump in?

Is it really possible to create a generic FN for ROHC Profiles?
Will it be something with fixes specific to TCP?

When is it time to restart considering Box Notation?

Anyway, we *still* need 2 committed reviewers for each document!

Quick updates and wglc -> end of November possible?

```
e(XXX) === {
    uncompressed_format = a;
    default_methods {
        let(msn:uncomp_value == XXX);
        let(msn:uncomp_length == 16);
    }
    compressed_format = a, msn {
        msn ::= lsb(4, 0);
    }
}
```

e is called with an XXX value that is derived from the previous value of the field msn....

```
e === {
    uncompressed_format = a;
    control_field = msn;
    compressed_format = a, msn {
        msn ::= lsb(4, 0);
    }
}
```

ROHC-FN remaining issues for TCP

- **List compression**
  - **FN defines a special shorthand for list compression**
  - **Used in one particular way in TCP**

- **Interfacing FN and the TCP machine**
  - **Creative use of compressed formats to generate different parts of the compressed packets**
  - **Kind of OK, describe it in English**

ROHC-FN remaining issues for TCP

- **Context use**
    - **Context is part of state machine**
    - **ROHC-FN does not attempt to define the state machine**
    - **How to interface?**
        - Special encoding methods (static, lsb)
        - Input: Use parameters for everything else
        - Output: Use English, based on field tree returned by FN

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ROHC RTP towards Draft Standard

RFC 3095 (PS)

The ROHC Framework

Profiles for
Uncompressed (0x0000)
IP/UDP/RTP (0x0001)
IP/UDP (0x0002)
IP/ESP (0x0003)

ROHC RTP towards Draft Standard

We believed RFC 3095 was problem free, plan A:

RFC 3095 (PS)

The ROHC Framework

Profiles for
    Uncompressed (0x0000)
    IP/UDP/RTP (0x0001)
    IP/UDP (0x0002)
    IP/ESP (0x0003)

RFC xxxx (DS)

The ROHC Framework

RFC zzzz (DS)

Profiles for
    Uncompressed (0x0000)
    IP/UDP/RTP (0x0001)
    IP/UDP (0x0002)
    IP/ESP (0x0003)
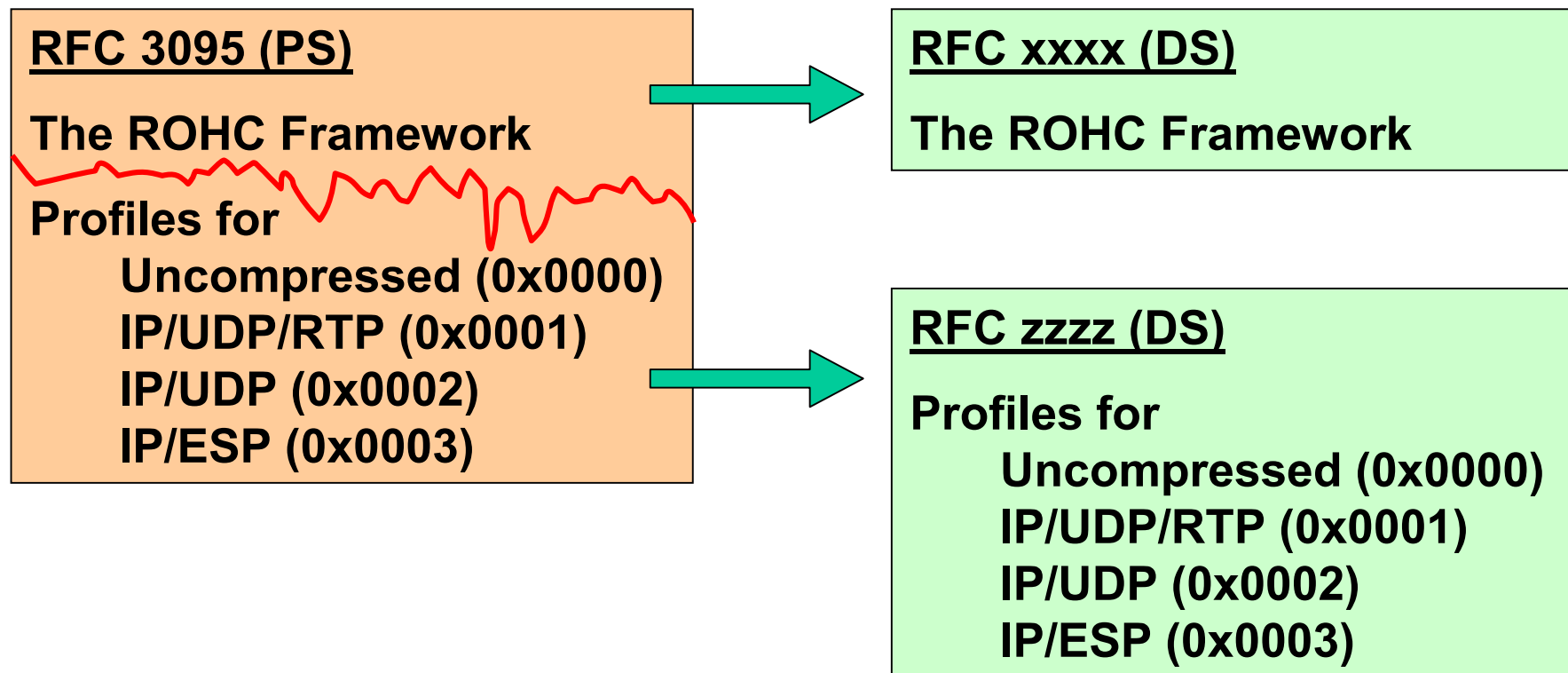
ROHC RTP towards Draft Standard

Implementation revealed some ambiguities, plan B:

RFC 3095 (PS)

The ROHC Framework

Profiles for
    Uncompressed (0x0000)
    IP/UDP/RTP (0x0001)
    IP/UDP (0x0002)
    IP/ESP (0x0003)

draft-ietf-rohc-rtp-impl-guide

The RFC 3095 implementers guide

RFC xxxx (DS)

The ROHC Framework

RFC zzzz (DS?)

Profiles for
    Uncompressed (0x0000)
    IP/UDP/RTP (0x0001)
    IP/UDP (0x0002)
    IP/ESP (0x0003)
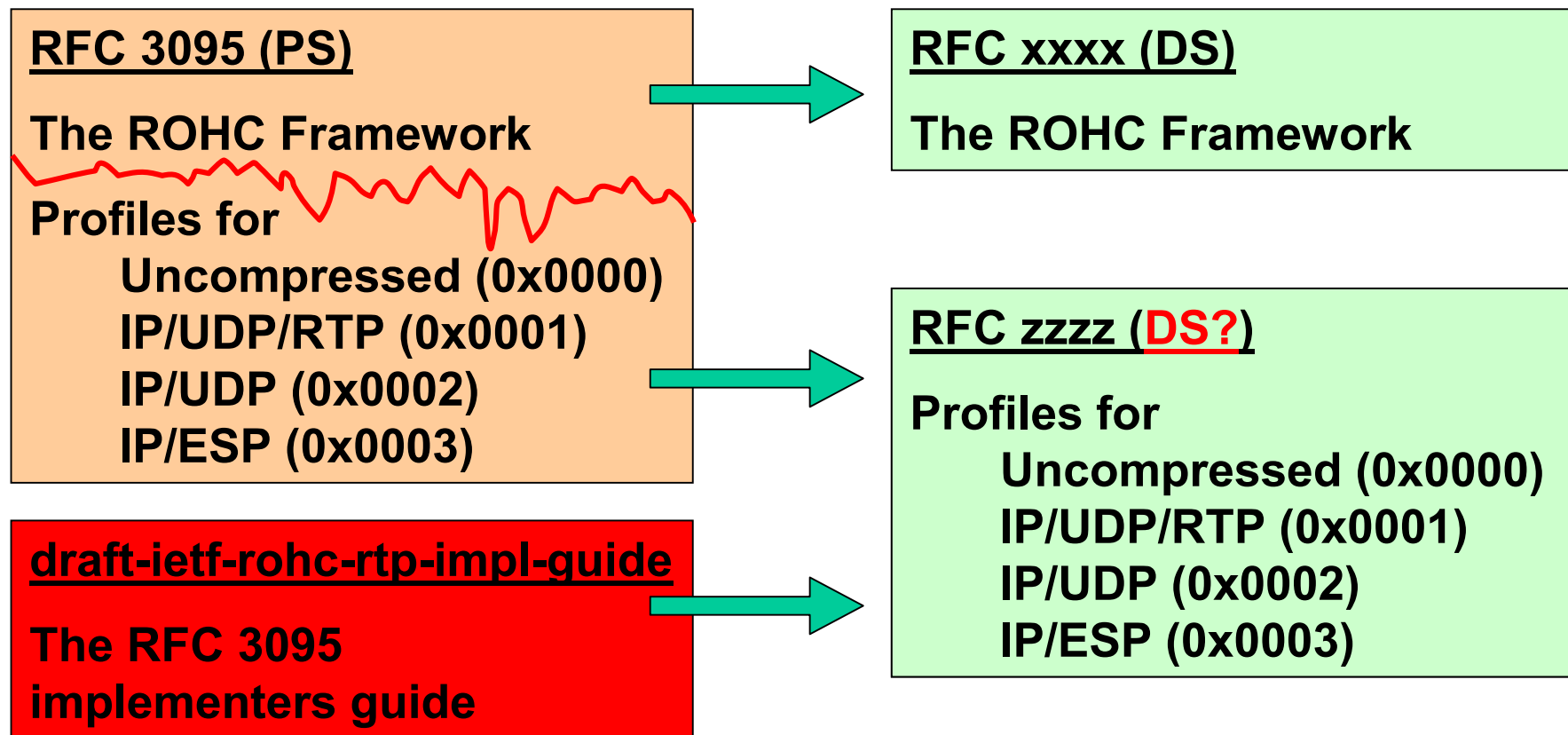
ROHC RTP towards Draft Standard

Implementers complain about unnecessary complexity, plan C?

RFC 3095 (PS)

The ROHC Framework

Profiles for
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RFC xxxx (DS)

The ROHC Framework

draft-ietf-rohc-rtp-impl-guide

**The RFC 3095
implementers guide**

RFC zzzz (PS)

Profiles for
    Uncompr. (0x0000)
    IP/UDP/RTP (0x0101)
    IP/UDP (0x0102)
    IP/ESP (0x0103)
    IP (0x0104)
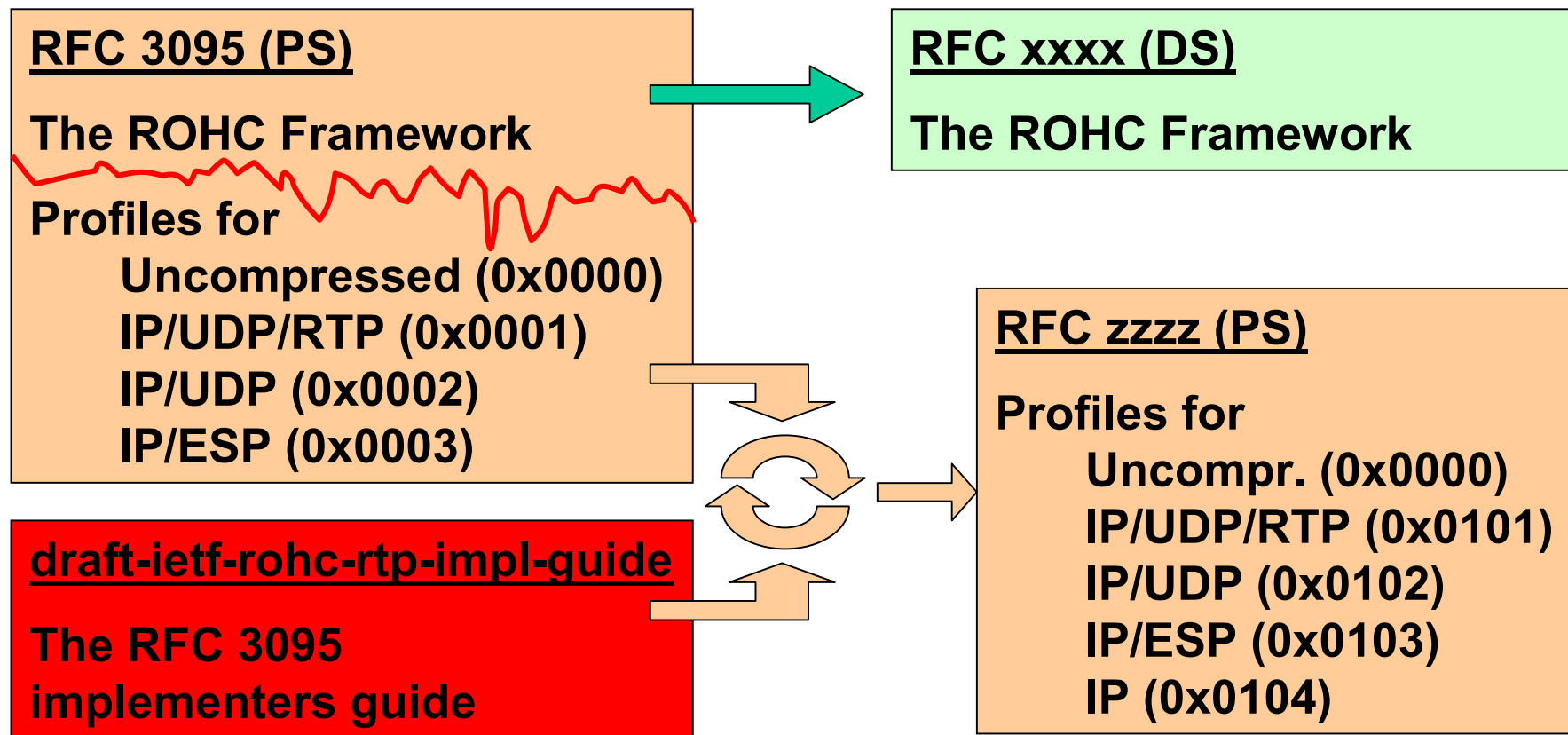
ROHC RTP towards Draft Standard

But even with plan C, it is still possible to also do plan B

RFC 3095 (PS)

The ROHC Framework

Profiles for
      Uncompressed (0x0000)
      IP/UDP/RTP (0x0001)
      IP/UDP (0x0002)
      IP/ESP (0x0003)

draft-ietf-rohc-rtp-impl-guide

The RFC 3095 implementers guide

RFC xxxx (DS)

The ROHC Framework

RFC zzzz (DS?)

Pr

RFC zzzz (PS)

Profiles for
      Uncompr. (0x0000)
      IP/UDP/RTP (0x0101)
      IP/UDP (0x0102)
      IP/ESP (0x0103)
      IP (0x0104)
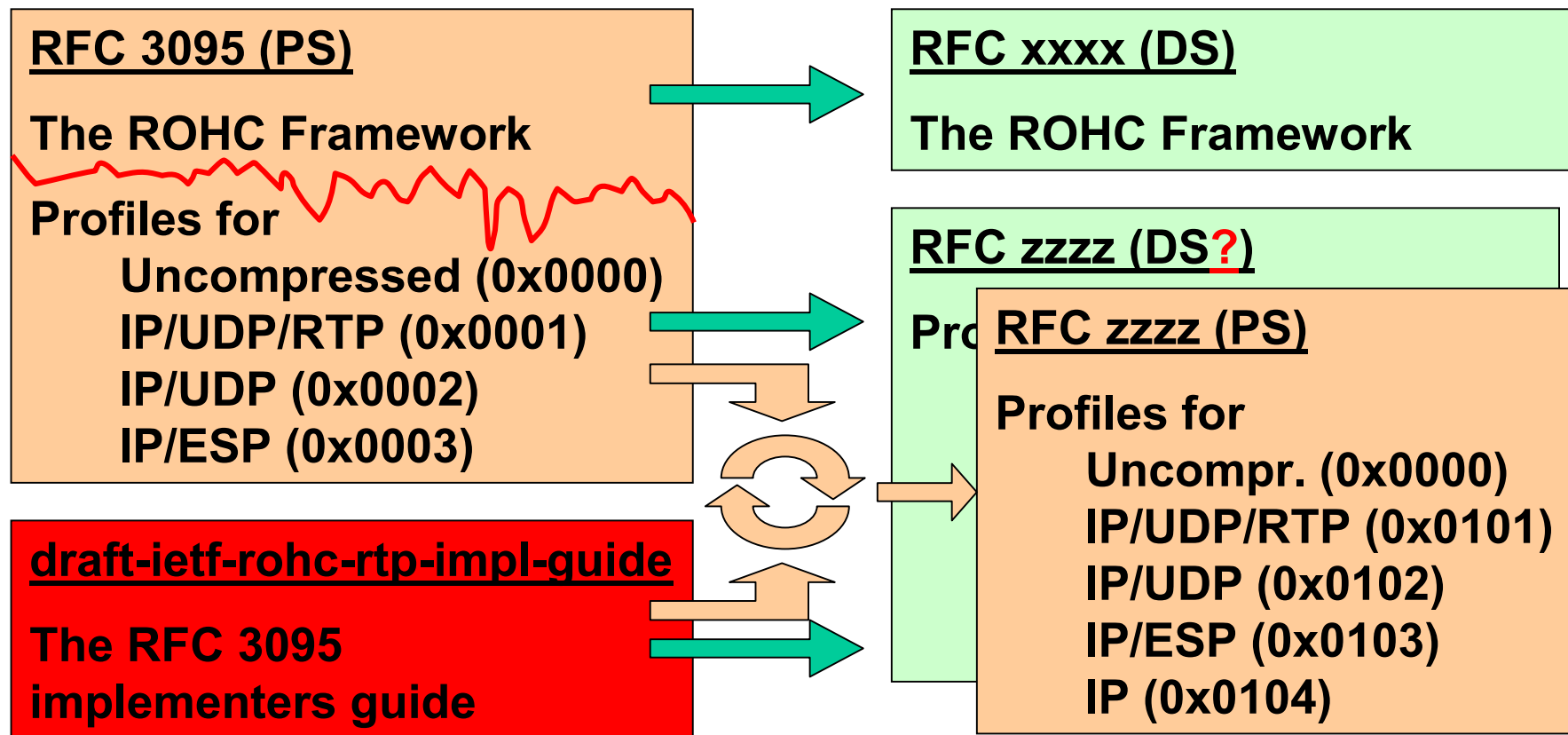
ROHC RTP towards Draft Standard

In either case, should we consider suing formal notation?
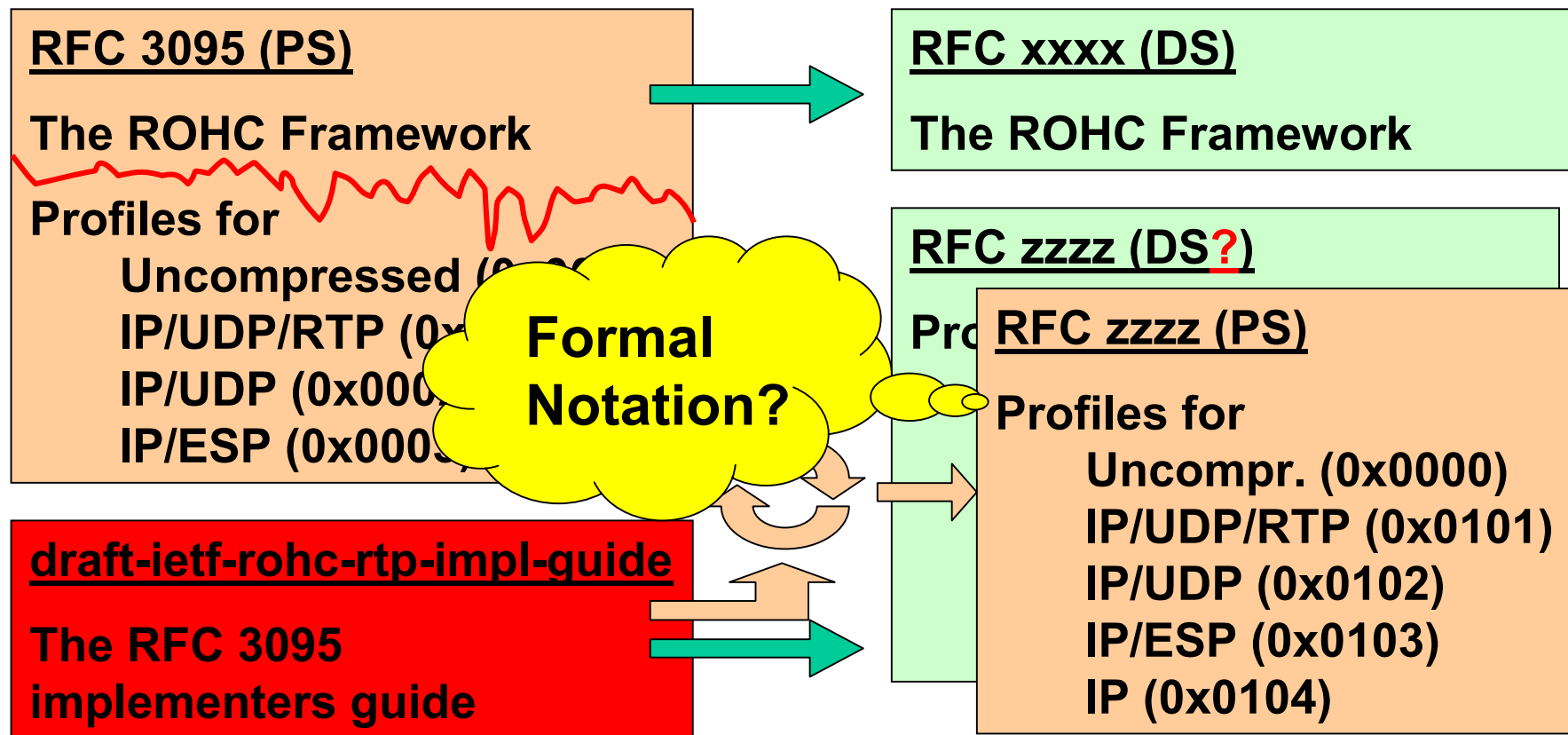
RFC 3095 (PS)

The ROHC Framework

Profiles for
   Uncompressed (0x0000)
   IP/UDP/RTP (0x...)
   IP/UDP (0x000...)
   IP/ESP (0x0003)

draft-ietf-rohc-rtp-impl-guide

The RFC 3095 implementers guide

RFC xxxx (DS)

The ROHC Framework

RFC zzzz (DS?)

Pro...

Formal Notation?

RFC zzzz (PS)

Profiles for
   Uncompr. (0x0000)
   IP/UDP/RTP (0x0101)
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   IP/ESP (0x0103)
   IP (0x0104)

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ROHC RTP Implementers Guide, 1(2)

- **draft-ietf-rohc-rtp-impl-guide-08.txt (3 revs since SD)**

- **News in the updated version(s)**
  - **New chapter 7 on Context management and CID re-use**
  - **New section 8.12 on ack usage in O-mode**

- **Open issues**
  - **Slope used to compress/decompress RTP Timestamp**

Slope used to compress/decompress TS

- **On March 16th, a question entitled *Slope used to compress/decompress RTP Timestamp field* was sent to the ROHC mail list**

- **This triggered a long discussion that continued during March and April, but no agreeable solution was found**

- **It was a complex discussion based on various views on**
  - **intentions when writing RFC 3095**
  - **what is actually defined/described in RFC 3095**
  - **what would make sense technically**

- **This issue has not yet been closed, please contribute!**

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3095-FN

- **Specification effort**
  - **Describe 3095 (etc.) formats in ROHC-FN**

- **Implementation effort**
  - **Semantic checker for ROHC-FN**
    - ï Find typos, inconsistencies, missing pieces
  - **Compile ROHC-FN into executable Prolog code**
    - ï Objective:
      run PCAP traces through compressor/decompressor
    - ï Of course, state machine has to be hand-coded

3095-FN: Use FN for DS?

- **Document existing profiles, or:**

- **Define new profiles (very close to existing profiles)**

- **Define new profiles that are radically simpler**

- **Existing implementers are comfortable with box notation**

- Simpler profile could draw new implementers

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ROHC LLA Implementers Guide

Kristofer Sandlund, Effnet AB

What's in the document

- Bug in RFC 3242 which makes CSP packets non-interoperable.
  - The CRC is calculated over header length fields, but this field is inferred from packet length, and the payload is dropped for CSPs.
  - Solution: Add a two-byte payload length field to be able to verify CRC. Due to the expected use of CSPs, two byte overhead should not be an issue.
- Clarifications
  - CCP verification needs inferred length fields to be stored in context.

Next revision

- Clarification regarding actions taken on CCP CRC verification. Currently, it might be read as if local repair must be performed due to referencing to whole section in RFC3095, while only the parts related to feedback should be performed (I will mail this to the list).

EFFNET

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ROHC over 802

Many new forms of 802 networks could make use of header compression:

- **802.15.x (Bluetooth, Zigbee, UWB)**
- **802.16 (WiMax)**
- **802.11 (WiFi)**

Need to define:

- **Encapsulation**
- **Negotiation**

ROHC over 802 -- Encapsulation (1)

ROHC Encapsulation requirements:

- **Provide length information**
- **Try to minimize overhead**

- **Existing encapsulations were examined**
- **Most have more overhead than desirable**

ROHC over 802 -- Encapsulation (2)

Encapsulation issue: Minimum packet length

- **Ethernet requires padding for small packets**
- **Padding scheme needs to be known at bridges:**

- **Comp ➔ Ethernet ➔ Bridge ➔ Wireless ➔ Decomp**
  - ▪ **How to get the bridge not to send the padding?**
- **Comp ➔ Wireless ➔ Bridge ➔ Ethernet ➔ Decomp**
  - ▪ **Encapsulation must be robust against inserted padding**

ROHC over 802 -- Encapsulation (3)

- **Bridges (e.g., 802.11 access points) do exist today**
- **Legacy bridges donít know about ROHC**
- **How to put length information into packet?**

- **Zoom back 20 years: 802.2 LLC**
- **Length field instead of Ethertype**
- **Need to demux in payload (after 14 bytes)**
- **LLC demuxing: SSAP/DSAP**
  - **How to allocate one?**

ROHC over 802 -- Negotiation

(see draft)

- **Design when stumbling stone encapsulation is out of the way**

- **Might want to use same/similar encapsulation**
  - **Detect problems in bridging at negotiation phase**

- **Need to consider multicast/broadcast**
  - **Negotiation ➔ Announcement**

- **Some of this possibly out-of-band**
  - **E.g., XML config in IP/DVB**