

# ROHC: compress your VoIP traffic

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# Agenda

- 1 Header compression
- 2 The ROHC protocol
- 3 The ROHC library
- 4 Perspectives

# Me

- 2000-2001: newbie
- 2003-2005: diploma from ENSEEIHT
- 2005: daily job on Linux at Viveris Technologies  
<http://www.viveris.fr/>
- 2007: ROHC library <http://rohc-lib.org/>
- 2013: Open Source workgroup at Viveris  
<http://opensource.viveris.fr/>



- 1 Header compression
  - problem statement
  - existing protocols
- 2 The ROHC protocol
- 3 The ROHC library
- 4 Perspectives

# Header compression: why?

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## Is header compression still useful?

- An old idea...
  - designed for low-speed serial links in 1990
  - today network links are much larger
- ...but still useful
  - slow links still exists (GSM, UMTS...)
  - larger links are congested
  - data traffic may be expensive on links (satellite)

## existing protocols

### Protocols defined by the IETF

- RFC 1144, 1990: Compressing TCP/IP Headers for Low-Speed Serial Links
- RFC 2507, 1999: IP Header Compression (IPHC)
- RFC 2508, 1999: Compressing IP/UDP/RTP Headers for Low-Speed Serial Links (CRTP)
- RFC 3095, 2001: RObust Header Compression (ROHC)



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  - definition
  - protocol
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- efficient & robust on cellular links
- extensible framework IPv4, IPv6, UDP, UDP-Lite, RTP, TCP, ESP, GRE...

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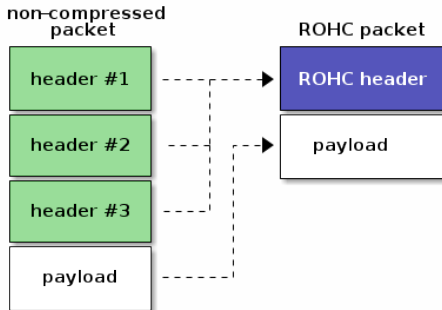
- efficient & robust on cellular links
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## Standard

- IETF standard <http://www.ietf.org/>
- ROHC Working Group (WG) <http://datatracker.ietf.org/wg/rohc/charter/>
- RFC 3095 and 22 others
- 2 versions: ROHCv1 and ROHCv2

# Main principles: headers only

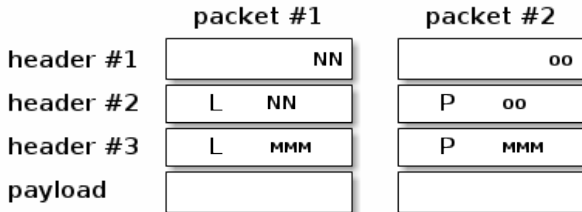
Only headers are compressed



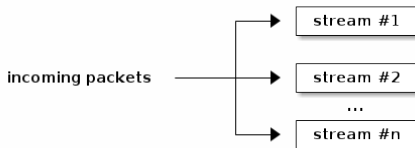
# Main principles: information redundancy

Information redundancy:

- within one single network packet, eg. IP/UDP lengths
- several network packets in one stream, eg. IP addresses



# Main principles: packet classification



Classify packets into streams:

- IPv4 / IPv6
- IP addresses
- UDP/TCP ports
- RTP SSRC
- ...

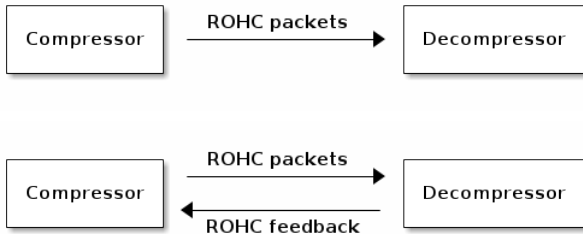
Exemples:

- RTP packets of a VoIP call,
- TCP packets of a TCP connection...

## Modes of operation

Several way to operate:

- the Unidirectional mode (U-mode),
- the Bidirectional Optimistic mode (O-mode),
- the Bidirectional Reliable mode (R-mode).

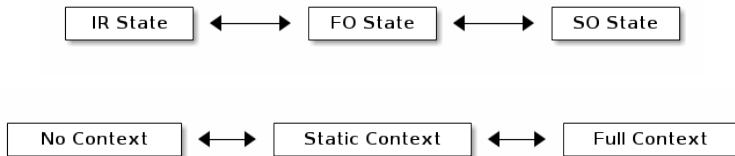




## Compression states

Stateful protocol:

- IR state: low compression, context establishment
- FO state: medium compression, transmit small irregular changes
- SO state: high compression, transmit only the sequence number



# Profiles

## Compression profiles:

- Uncompressed
- IP-only
- IP/UDP
- IP/UDP-Lite
- IP/UDP/RTP
- IP/UDP-Lite/RTP
- IP/ESP
- IP/TCP

IP = IPv4, IPv4/IPv4, IPv4/IPv6, IPv6, IPv6/IPv4, IPv6/IPv6  
IPv6 extension headers are handled

- 1 Header compression
- 2 The ROHC protocol
- 3 The ROHC library**
  - genesis
  - performances
  - applications
- 4 Perspectives

# Genesis

## History:

- 2003: initial version by Lulea University of Technologies  
<http://www.ltu.se/>
- 2007: internal fork by TAS, CNES, and Viveris Technologies
- 2009: public version of the fork (GPLv2+)
- 2014: LGPLv2+ license

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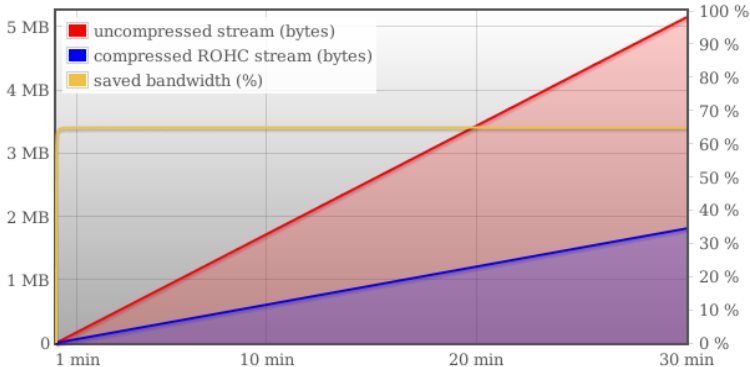
Latest version 1.7.0 released on June 2014:

- ROHCv1 mostly supported
- ROHCv2 not supported yet
- portable

# Performances

## 30-minute VoIP call

90000 60-byte IPv4/UDP/RTP packets every 20 ms



# Example

## Compressing one IP/UDP/RTP packet

```
struct rohc_comp *compressor;  
...  
compressor = rohc_comp_new2(ROHC_SMALL_CID, ROHC_SMALL_CID_MAX, gen_random_num, NULL);  
rohc_comp_enable_profile(compressor, ROHC_PROFILE_RTP);  
...  
rohc_compress4(compressor, ip_packet, &rohc_packet);  
...  
rohc_comp_free(compressor);
```

API documentation, tutorials and examples on  
<http://rohc-lib.org/support/documentation/>

# Applications using ROHC

- tools in sources:
  - stats
  - perf
  - sniffer
  - fuzzer
- IP/ROHC tunnel (on Launchpad)
- OpenSAND <http://opensand.org/>
- used for internal projects by large companies in telecommunications



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# Perspectives

## Perspectives

- new features:
  - stable TCP profile,
  - R-mode
  - GRE
  - ROHCv2
- better CPU performances
- wider usage: SIP phones? IPBX?

## Project resources

Website: <http://rohc-lib.org/>

Mailing-list: [rohc@lists.launchpad.net](mailto:rohc@lists.launchpad.net)

IRC: #rohc on freenode