

FM-Delta: Fault Management Packet Compression

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Active Fault Management (FM)

Periodic <u>keepalive</u> messages

Fault is detected when a keepalive message has not been received for a long period.

IEEE 802.1ag
Continuity Check

Message (CCM)

ITU-TY.1731
Continuity Check
Message (CCM)

IETF RFC 5880

Bidirectional Forwarding

Detection (BFD)

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The Problem: arge On-chip Memory

Large # of flows

~ 10s of thousands

High rate

~ 300 packets per second per flow

FM message transmission is implemented in hardware!

Real-life problem in today's switch silicons:

High FM message rate (~ 10 Gbps)

FM message transmission requires very large on-chip memory ~ 10s of Mbits

Packets are stored in <u>compressed</u> form in the on-chip memory.

Our Solution:

Jemory Compression

Software layer Hardware layer Packet FM packet memory Switch / Router

FM software module:

Responsible for compressing the FM packets and storing them in the on-chip memory of the packet generation engine.

Packet generation engine:

this hardware module sequentially reads the packets from the on-chip FM packet memory, decompresses them in real-time, and transmits them to the network.

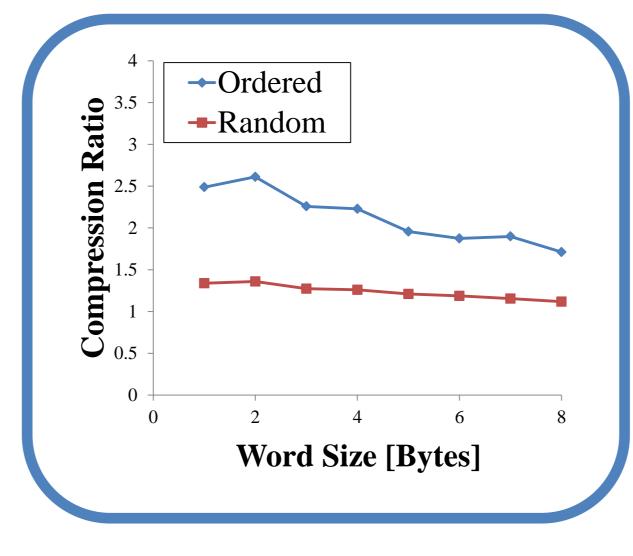
FM-Delta: a simple, hardware-friendly compression algorithm, based on delta encoding.

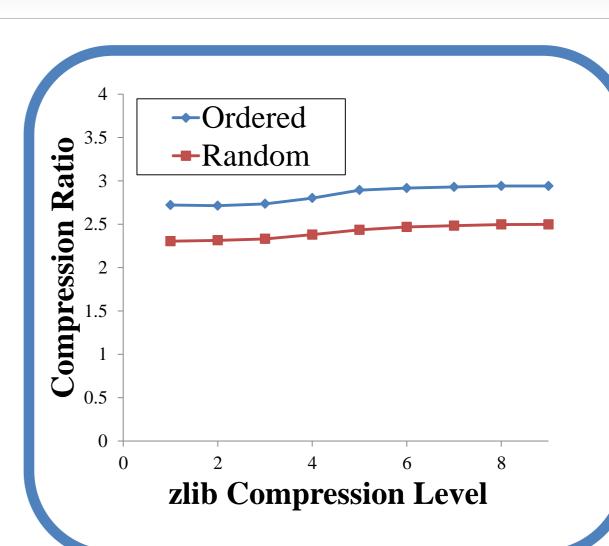
FM-Delta works well on FM messages due to 3 unique properties:

- FM packets have low entropy.
- The FM memory is accessed sequentially.
- We fully control the order of packets stored in the memory.

FM-Delta performance is similar to the state-of-the-art zlib library.

FM-Delta compression ratio: 2.6





Open source code, open data sets:

https://sites.google.com/site/fmdeltacompression/

FM-Delta: hardware-friendly, high compression ratio for FM.