Application Fields and Implementation of Network Coding

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• Header-less protocols for KODO
  – Communication
  – Storage

Diagram:
- Channel bundling
- Coded TCP
- Distributed storage
- Mesh
- SVC adaptation
- P2P
KODO & CO

• Header-less protocols for KODO
  – Communication
  – Storage

• Impact on IETF
  – Mobile Ad-hoc Networks
  – Multipath TCP
  – Real-Time Communication in WEB-browsers
  – Delay Tolerant Networking Research Group
  – etc …
Performace Evaluation KODO

• Performance depends on the platform
• KODO is cross-platform, and we test on several devices
• Main interest
  – Coding speed (from a couple of KB/s to 500 MB/s)
  – Resource allocation (CPU, memory)
  – Energy consumption
Performace Evaluation KODO
Performace Evaluation KODO: Energy

Remark: Coding performance is worst case scenario, as we did not use hardware support (SIMD), sparse codes, etc...
Mesh Implementation
Mesh Implementation

• Interflow network coding
  – Entering Linux Kernel 3.10 via B.A.T.M.A.N. routing
  – Testing at BATTLEMESH v6
  – Sensor network results
  – Medium Access and Inter NC

• Intraflow network coding
  – Using RLNC at the mesh routers

• Combination of Inter and Intra NC: CORE
Recoding RULES!

WiFi Relay Topology

Source

Relay

Destination

128 Packets

20% loss

70% loss

30% loss

End-to-End Coding Cannot Recode 39% Overhead

Required source transmissions

RLNC Coding Uses Recoding 17% Overhead

Slide by Kerim Fouli / Frank Fitzek (CodeOn/Steinwurf)
CORE: sophisticated signalling scheme, no retransmissions by the relay ...
CORE Demonstrator

- On youtube: [http://www.youtube.com/watch?v=mKiHKtZRFVU](http://www.youtube.com/watch?v=mKiHKtZRFVU)
- (Search for “CORE Network Coding”)
Distributed Storage

- Dropbox
- SkyDrive
- Google Drive
- box
Conclusion & Outlook

• NC has potential impact at many WG at IETF
• RLNC has unique properties over other E2E codes (sliding window, recoding, etc)
• KODO is easy to integrate in running projects

• Training session for NC plus KODO integration in Berlin and Palo Alto in 2013 (take a flyer)