Dynamic Network Coding

draft-montpetit-dynamic-NC-00

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March 27 2015

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What is Dynamic Network Coding

- A framework for “NC as a transport”
  - Integrate with network dynamics
  - Allow per hop coding policies (not end to end)
  - Integrate with novel Internet architectures (ICN/CCN)
  - Integrate with legacy NC while integrate novel features
  - Open source implementation to foster innovation
- DNC is not a *code* in the strictest sense but more a way to integrate network coding in Internet Transport (FECFRAME heritage)

Salient Features (1)

- DNC allows to:
  - Make coding decision based on policy
    - Recognize local IPR rules and network management decisions
  - Make coding decisions based on time and instantaneous network conditions:
    - Traffic conditions vary during the day
    - The time since stored in a cache may also influence how the coding is performed
  - Inherently use a per hop concept: “network code”
    - Code composition
  - Not transmit coding coefficients but a function to recreate the coding vector at each coding opportunity

Salient Features (2)

- Some header fields:
  - Time stamp
    - Capture the time the packet is created
    - Maybe refreshed at each coding opportunity
  - Codepoint
    - Indicates the path (like a route #) the packet has taken hence identify the potential re-encoding nodes and allow to recover the coding coefficients
  - Coding function/pointer
    - To identify the coding mechanism at each hop
    - Can be a pointer to an existing vector or to a new vector created from the time stamp, the codepoint and the local network management policies

Compatibility with the nwcrg Header Format

- Layered Coded Transport Header (RFC 5651) heritage
- Goal:
  - Common header for all packets
  - Allow for protocol specific sections
  - Use header extensions
- Also consider compatibility with existing ALC/ NORM header extensions

Known Issues

- Manage:
  - Code-points:
    - What they are
    - What happens at path merging
  - Timestamps
  - Policies
- Define signaling of coding vectors or mechanisms to regenerate them
- Link to nwcrg architecture

Still very early:
at the concept/research stage

Conclusion: Future Steps?

- Document:
  - Continue the development of the key concepts
  - Change to draft-nwcrg-dynamic-nc
- Concept:
  - Ensure compatibility with other nwcrg proposed frameworks and architecture
  - Start some software implementation
- Transport/architecture aspects:
  - Continue to monitor the work in TAPS and ICNRG to see how to further the framework
- IPR:
  - Goal is free and open source
  - Ensure it remains public domain
  - Monitor the IPR environment

Acknowledgements

- Tim Shepard
- IETF TAPS WG
- ICNRG
- Jérôme Lacan (ISAE)
- Emmanuel Lochin (ISAE)

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