

Network Coding Implementation

Life on the frontier



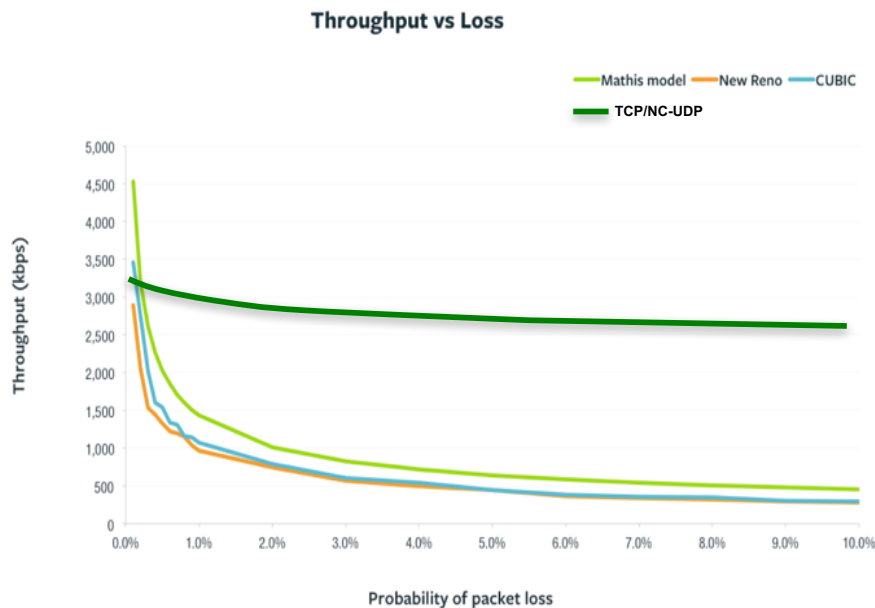
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My Background

- Over 30 years in network technologies
- Hardware/Software product development
- Product management
- System/Network architectures for carriers and enterprise
- Satellite, wire-line and wireless

NC Trials So Far



- NC based reliable UDP provides good put vs TCP, but so what?
- There are still some missing pieces for a full solution:
 - TCP Interworking (spoofing proxy)
 - Fairness with mixed traffic (congestion control)
 - Session control
- Full end-to-end reliable transport across any media

Packet error correction is still a just a feature for something bigger



A Complete Solution is Needed

- TCP Interworking
- Multiple Traffic Types
- Fairness In Open Environment (Congestion)
- Any Media and Noise Characteristics
- Dynamic Adaptation to Vary Network Characteristics
- Session Initiation and Control
- Simple, Stable, and Modular Code



Obstacles Encountered

- No 1. Objection: Reliable UDP is a road hog.
- Will it work seamlessly across my network?
- How will it integrate into my environment?
- Higher layer solutions already available.
- Reliability and robustness.



End User Adoption

- Key Phases:
 1. “Demonstrateable”
 - Can easily be shown to adopters for value and benefits
 - Stable enough for a live demo
 2. “Evaluateable”
 - Can be test driven by adopters so that they can run tests within pre-defined limits
 - Stable enough to work within known constraints
 3. “Deployable”
 - “Real world” solution ready for full deployment and operation
 - Fully stable and tested for all network conditions



Broad Market Adoption

- Remove friction (obstacles)
- Focus on applications, not technology
 - There is no such thing as one size fits all
 - Each application can be unique
- Learn why end users think differently: “It wasn’t designed to do that” will uncover opportunities
- Understand that better delivery execution beats out the “best” technology



Positives Encountered – Demonstrated and Observed

- Beats existing solutions in terms of performance
- Reduces bandwidth usage by reducing re-transmissions due to latency and bit errors
- Provides better response time – faster page hits



Summary

- NC looks promising, but can it be delivered before it withers on the vine?
- Need to quickly provide the missing pieces
- Need to make it easier for adoption
 - Reduce friction
 - Provide ease of use