ICN Baseline Scenarios

draft-pentikousis-icn-scenarios-04

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Draft Goals

- Establish a common understanding about potential experimental setups (testbed and simulation)
- Provide equal ground for comparison, an agreed framework
- Scenarios should be general enough and “technology agnostic”
  - Scenario detail may vary
- Aim to get feedback from implementers, both on the scenario definition and level of detail
- All approaches need not implement all scenarios
  - but all scenarios should end up illustrated in a real demo

Draft Updates (1/2)

- Section 2: Toward Baseline Scenarios
  - Things that you can do with the host-centric approach today and things you cannot do (well)
  - ICN should *make easy things easy and difficult things possible*
- Updates since Orlando (-02)
  - Editorial: Social Networking, Infrastructure Sharing , Smart City
  - Updated: Real-time A/V Communications, Mobile Networking, Content Dissemination, Multiply Connected Nodes and Economics, Internet of Things
  - Major updates: Energy Efficiency , Delay and Disruption Tolerance
  - NEW: Vehicular Networking, Operation across Multiple Network Paradigms, Summary

Draft Updates (2/2)

- Section 3: Evaluation Methodology
  - Survey evaluation tools currently available
  - Provide suggestions regarding methodology and metrics
- Updates since Orlando (-02)
  - Editorial: Resource Equivalence and Tradeoffs
  - Updated: Topology Selection, Traffic Load
  - Major updates: ICN Simulators and Testbeds, Choosing Relevant Metrics
  - Technology Evolution Assumptions section needs input (?)
- Section 4: Security Considerations
  - NEW since Orlando

Community Document

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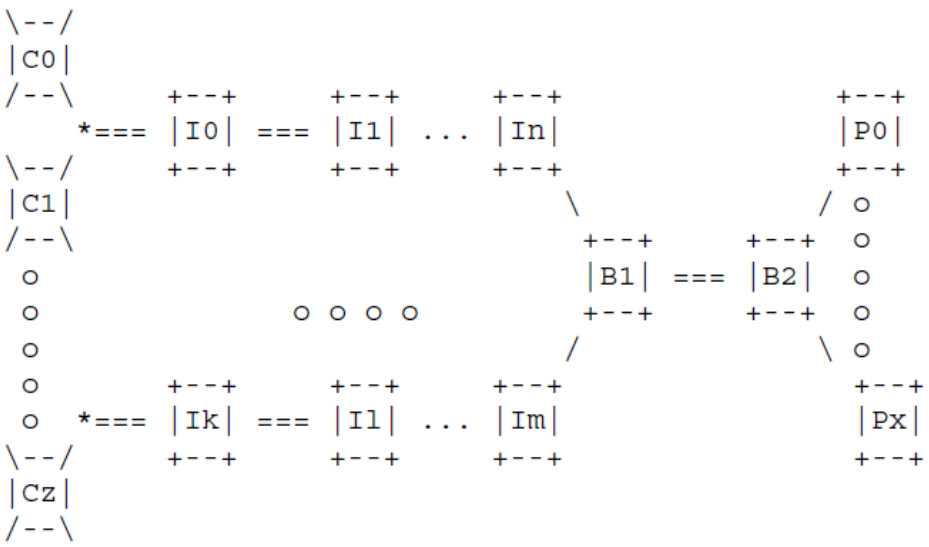
Please contribute

Toward ICN Baseline Scenarios

- Comprehensive review of ICN evaluations
  - First of its kind

Topologies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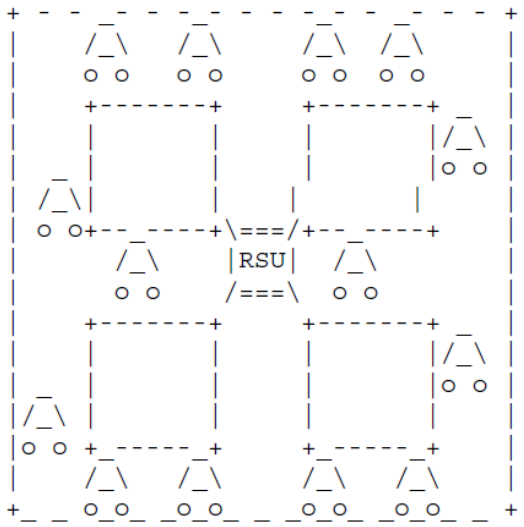
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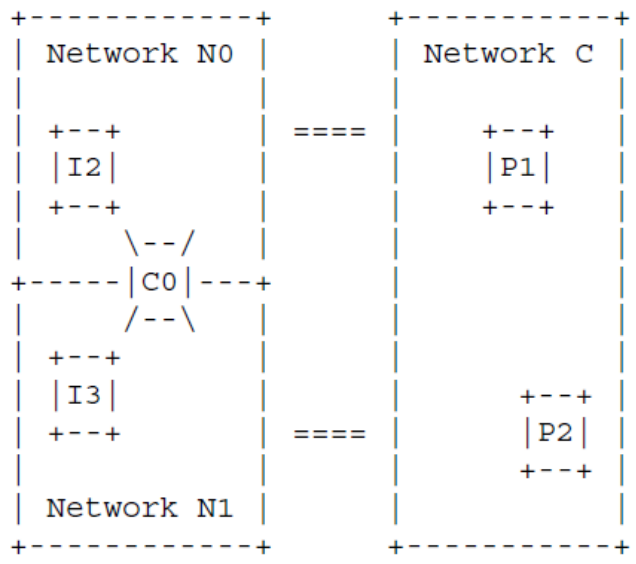
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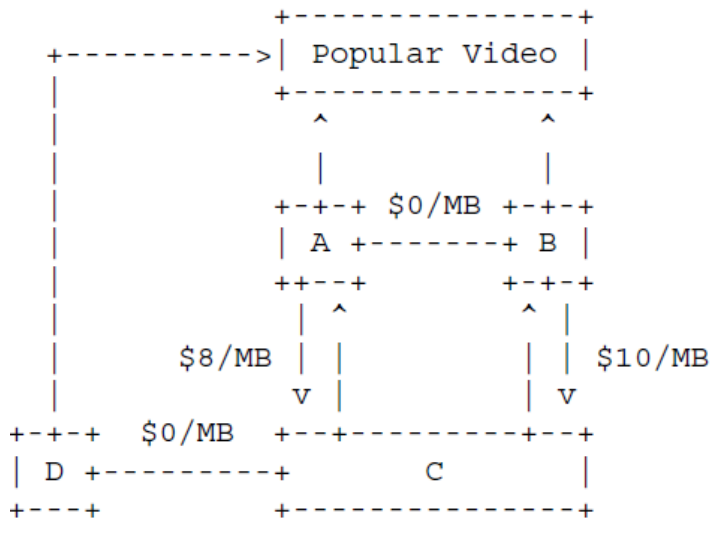
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Literature Review Summary (1/2)

- Scalability
- Network, resource and energy efficiency
- Operational aspects
  - Network planning
  - Manageability
  - Reduced complexity and overhead
- Economics
- Design tradeoffs
  - Communication, Computation, Storage

Literature Review Summary (2/2)

- Support for
  - Multicast
  - Mobility
  - Caching
  - QoS (real-time A/V)
- Reliability and Resilience
- Migration and coping with different paradigms
- New applications
  - Key to sustained and increasing deployment

Evaluation Methodology

- Survey of evaluation tools, available data sets
- Evaluation guidelines, not a benchmark tool

Security Considerations

- ICN changes networking as we know it
  - What is the impact on network security?
- Lots of work on content authentication
  - What about other aspects?
- Towards a new/updated threat model?

Results of Working Meeting and Way Forward

Working Meeting (short) Report

- The Scenarios draft was discussed for >2 hours last Sunday (plus in the corridor and side discussions):
- In general we had agreement that Section 2
  - meets the original goals (common ground for comparison and evaluation of approaches)
  - it's complete in terms evaluation study scenarios
  - does include a significant set of references
  - can also serve as an entry point for newcomers in this area
- Short discussion on the pros/cons of making Sec. 2 a standalone document
  - Adopt by ICNRG and "finalize" by Vancouver
  - Proceed in the RFC publication path by the end of the year

Working Meeting (short) Report (2)

- Section 3
  - Will need further development
    - Traffic load
    - Relevant Metrics
    - Discussion about the traffic/system component metrics in the document
      - Agreed that it's a good first start, new revision(s) to address comments (see meeting minutes)
  - Aim to complete by London
- Section 4
  - This is not the mandatory "Security Requirements" in drafts, will re-title accordingly in the revised version

Way Forward

- Section 2 is near completion
- Section 3 will need more work in the coming months
- Two draft update releases planned till Vancouver
  - Comments, suggestions, text contributions more than welcome
  - Sec. 3 Tables to be reviewed and revised; text as well
- Looking for volunteers to implement in a simulator some/all of the proposed topologies/ traffic load/etc. and contribute them to the community

IEEE Network

Special Issue on

Information-Centric Networking Beyond Baseline Scenarios: Research Advances and Implementation

- Large scale scenarios, deployment, and experimentation
- Case studies of security attacks and solutions in ICN
- ICN development platforms (testbeds, simulators, open-source code) and tools
- Evaluation methodology challenges and advances
- ICN protocol design challenges in baseline scenarios
- ICN practice, including protocol implementation, empirical performance evaluation and enhancements
- ICN and Cloud computing

Paper submission deadline: 1 October 2013

Thank You

Backup

Example Traffic Load (Content Catalog)

Traffic Load	Catalog Size [L1] [L2] [L3] [L5]	Mean Object Size [L4] [L5] [L7] [L8] [L9] [L10]	Popularity Distribution [L3] [L5] [L6] [L11] [L12]
Web	10^12	Chunk: 1-10 kB	Zipf with 0.64 <= alpha <= 0.83
File sharing	5x10^6	Chunk: 250-4096 kB Object: ~800 MB	Zipf with 0.75 <= alpha<= 0.82
UGC	10^8	Object: ~10 MB	Zipf, alpha >= 2
VoD	10^4	Object: ~100 MB	Zipf, 0.65 <= alpha <= 1

Example: Traffic Metrics

	User	Application			Network	
	Download time	Goodput	Startup latency		Throughput	Packet delay
CCN	x	x			x	x
NetInf	x		x		x	x
PURSUIT			x		x	x
COMET			x		x	
Connect	x					
CONVERGENCE	x	x				

Example: Component Metrics

	Resolution		Routing		Cache	
	Resolution time	Request rate	FIB size	Path length	Size	Hit ratio
CCN	x		x	x	x	x
NetInf	x	x		x		x
PURSUIT			x	x		
COMET	x	x	x	x		x
CONVERGENCE		x	x		x	