Draft Agenda for ICN 2014 Tutorial

August 20, 2014

1 Architecture (40 mins) - Van
   • Architecture Basics (15 mins)
     – Interest/Data
     – Forwarding: CS, PIT, FIB, and strategy layer
     – Security Basics: signed Data, key locators in Data packets (keys are Data)
   • The SYNC concept and protocols (10 mins)
     – The concept of persistent, managed storage in the network
     – chrono sync, isync
   • Architecture Mechanisms (15 mins)
     – matching: why longest match
     – selectors: discovery, matching constraints
     – name-based scoping: why not use TTLs?
     – NACKs: various types (congestion, Data does not exist, Data not available here, etc.)
     – TLV packet spec: why TLV

2 NDN Applications Overview (10 mins) - Jeff B
   • Target NDN Applications: building automation, mHealth, climate, etc.

3 Application Support (50 mins) - Jeff B or Jeff T
   • Application Library Introduction (10 mins)
     – language support: C++, python, Javascript, Java, C#, more coming
     – consistent APIs between all languages
     – reusable software services (pervasive Interest/Data APIs)
     – placeholder: one slide each from authors on CCL and cxx
• Library Security Features (10 mins)
  – support for Interest signing and verification
  – cryptographic identity management
  – MAYBE: configurable trust model mechanisms and configuration-based validator (Alex A suggestion)
• Naming Conventions: application-defined Name markers (version, segments, etc.) (10 mins)
• Repo (10 mins)
  – insertion protocol
  – watch prefix protocol
  – deletion protocol
• Software Distribution (10 mins)
  – packages in the platform: NFD, libraries, repo, ndnSIM
  – licensing: GPLv3 apps and LGPLv3 libs, openness and strong patent protection
  – community support: public RedMine, per-component wikis, code review, mailing lists

4 Routing (15 mins) - Beichuan
• NLSR, hyperbolic

5 NFD - Beichuan (60 mins)
• NFD Introduction (15 mins)
  – principles: modularity
  – development model: Linux-kernel model
    * unit tests with new code
    * reviewed changes
    * regular releases
  – supported platforms: Raspberry pi, OpenWRT, webRTC
  – developer resources: wiki, issue tracker, extensive documentation and mailing lists
• Data Structures (Tables) (10 mins)
  – NameTree (multi-hash table): unified lookup structure for PIT, FIB, and Measurements
  – CS: combination of skip list and priority queues
• Forwarding Strategy Plugins (15 mins)
– model, scope
– what can it use? (measurements, PIT)
– discuss existing strategies
– examples/use cases

• Face System (5 mins)
  – key concepts: Faces and Channels
  – Protocol Factory

• Management API (5 mins)
  – signed Interests
  – data sets (MIB)
  – query protocols

• RIB Management Daemon (10 mins)
  – description: stores and maintains RIB, exports API for routing protocols (e.g. NLSR)
  – interaction with NFD/FIB management

6 Open Testbed (10 mins) - Patrick or John

• current deployment
• monitoring tools
• how to participate in the testbed

7 Open Problems (10 mins) - Lixia

8 Code Illustrations (55 mins) - Steve and Alex A

• ndnSIM (15 mins) - Alex A
  – brief intro to ndnSIM (ns-3 module)
  – ndnSIM support resources
  – brief example of how to extend ndnSIM

• simple producer/consumer application: create your own TLVs and Data protocols (i.e. in Data payload like NFD datasets)
  – typical application structure: asynchronous callbacks driven by Face.processEvents
  – verifying Data packets
  – creating TLVs, low-level library concepts (e.g. Buffer, Block)
- parsing information from Names (operator[], getPrefix, etc.)
- Data segmentation, requesting segments
- (time-based) versioning

- **adding a new forwarding strategy**: simple load balancer, similar to ECMP
  - **new strategy**: statelessly and randomly selects next hop
  - **iterate with scratch space**: use measurements table to store RTT information
  - **iterate with TLV**: add new TLV to Data or Interest that can be used by strategy