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