NDN Control Center
NDN Networking Stack and Security Enabler for Desktop Systems

Qi Zhao, Alex Afanasyev, Lixia Zhang (UCLA)
NDNComm 2017
March 23-26, 2017
What is the difference with IP?

Internet Protocol (RFC791): Focused on delivering packets to destination node

- Destination address
- Source address
- Meaningful static identifier

NDN: Focusing on retrieving data

- Interest contains desired name
- Data has unique name
- Data must be secured
  - Carrying a crypto signature
Example: enable a camera to publish data

- NDN protocol stack
  - NFD: for network connectivity
- Routing configuration
  - Discovery of local hub & prefixes
  - Local data prefixes propagation
- Identity/Certificate
  - Sign Data with the certificate corresponded to identity
NDN.app: NDN Stack for macOS

NDN Forwarding Daemon

Security Tools

Management GUI

NDN Tools

NDN Certificate Management

WiFi Ad Hoc Communication
What’s Inside NDN.app?

Contents

Frameworks

libboost_*.dylib
Qt*.framework
...

MacOS

NDN Control Center

Helpers

nfd
ndn-autoconfig-server
ndnsec
...

Resources

etc/nfd.conf
bin/ndnsec-keygen
bin/nfd-status
...

...
Enabling NDN on macOS

- System automatically starts NDN-CC, NDN-CC starts NFD
- Monitor status & change parameters of local NFD
Enabling Local NDN communication

- NDN Control Center supports ad hoc WiFi communication
  - Click “Enable ad hoc WiFi” menu entry
  - Use multicast face as default
Enabling Global NDN Communication

- NDN-CC automatically starts NDN auto-configuration daemon to discover nearby NDN hub & maintain the connectivity
Enabling Command-line tools

- NDN Control Center bundles various command-line tools
  - NFD and supporting tools
  - NDN tools
  - Security tools

<table>
<thead>
<tr>
<th>NFD</th>
<th>NFD</th>
</tr>
</thead>
<tbody>
<tr>
<td>nfd</td>
<td>nfd-status-http-server</td>
</tr>
<tr>
<td>nfdc</td>
<td>nfd-autoreg</td>
</tr>
<tr>
<td>nfd-status</td>
<td>ndn-autoconfig</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NDN Tools</th>
<th>NDN Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>ndn-dissect</td>
<td>ndnpeek</td>
</tr>
<tr>
<td>ndncatchunks</td>
<td>ndnping</td>
</tr>
<tr>
<td>ndnputchunks</td>
<td>ndnpingserver</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Security Tools</th>
<th>Security Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>ndnsec</td>
<td>ndnsec-dump-certificate</td>
</tr>
<tr>
<td>ndnsec-cert-dump</td>
<td>ndnsec-export</td>
</tr>
<tr>
<td>ndnsec-cert-gen</td>
<td>ndnsec-get-default</td>
</tr>
<tr>
<td>ndnsec-cert-install</td>
<td>ndnsec-import</td>
</tr>
<tr>
<td>ndnsec-cert-revoke</td>
<td>ndnsec-install-cert</td>
</tr>
<tr>
<td>ndnsec-cert-toen</td>
<td>ndnsec-key-gen</td>
</tr>
<tr>
<td>ndnsec-delete</td>
<td>ndnsec-keygen</td>
</tr>
<tr>
<td>ndnsec-dsk-gen</td>
<td>ndnsec-list</td>
</tr>
<tr>
<td>ndnsec-dskgen</td>
<td>ndnsec-ls-identity</td>
</tr>
</tbody>
</table>
Managing identity & certificate

- Each NDN application has an identity (namespace) and the corresponding certificate for this namespace.
- Application also manages sub-identities and their certificates for highly granular security.
- NDN Control Center integrates NDNCERT to enable automatic certificate management.
Conclusions

- **NDN-CC**: Bring NDN, NFD and related tools to your desktop system without installing each one separately.

- **Ease NDN usage**, especially if you don’t like command-line tools.

- We will keep updating with latest ndn-cxx, NFD and NDN tools & will support other OS.

- Download and try NDN Control Center: [https://named-data.net/codebase/applications/ndn-control-center/](https://named-data.net/codebase/applications/ndn-control-center/)

See you at the NDN CC demo later today!

Join our hackathon group to improve it! 😊
THANK YOU!