NDN-Android: NDN Networking Stack for Android Platform

IoT over ICN Tutorial @ ACM ICN 2017
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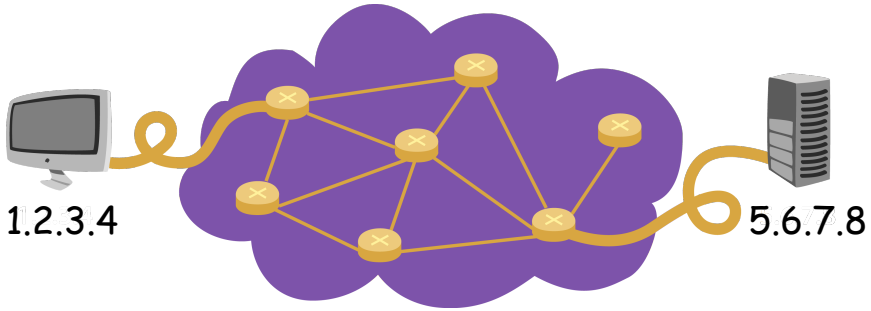
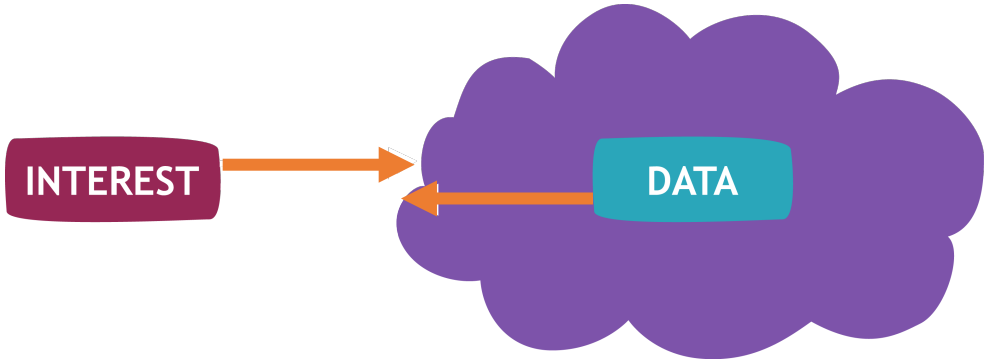
What is the difference with IP?

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



- Destination address
- Source address
- Meaningful static identifier

NDN: Focusing on retrieving *data*

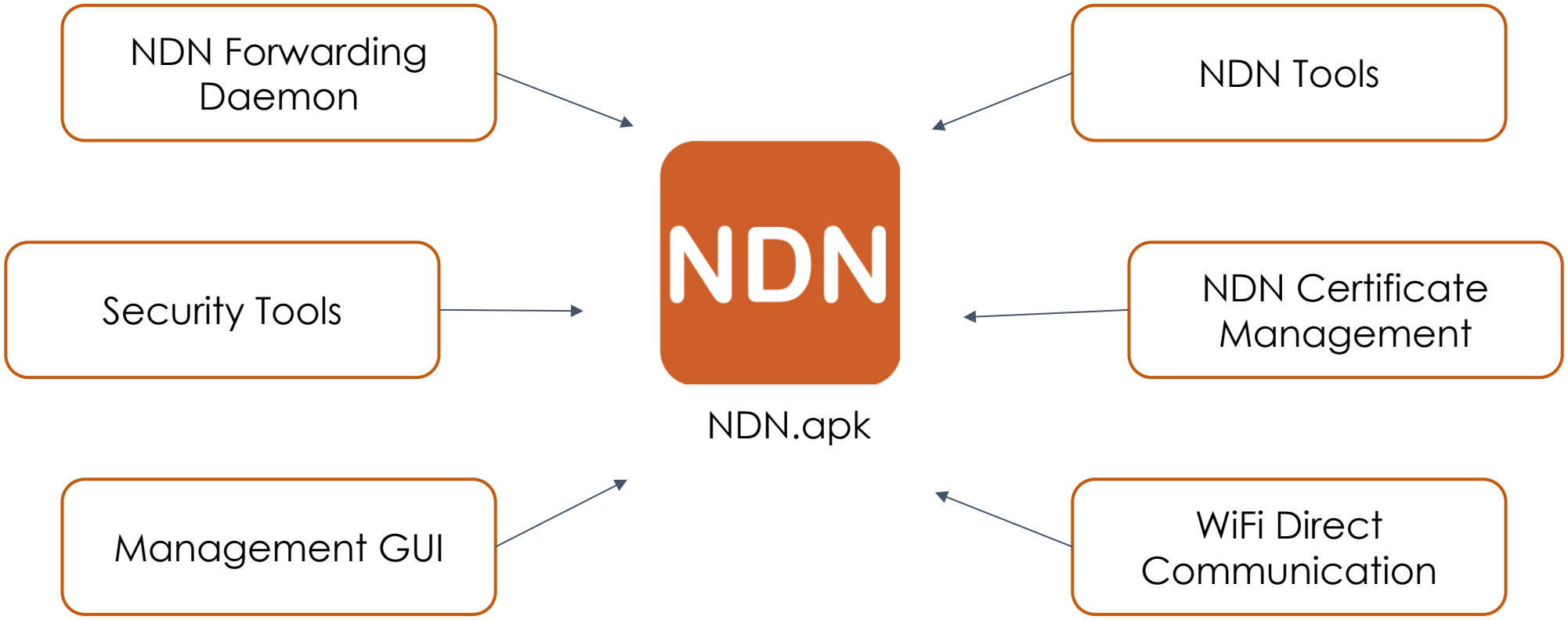


- Interest contains desired name
- Data has unique name
- Data has to be secured
  - Sign Data with certificate

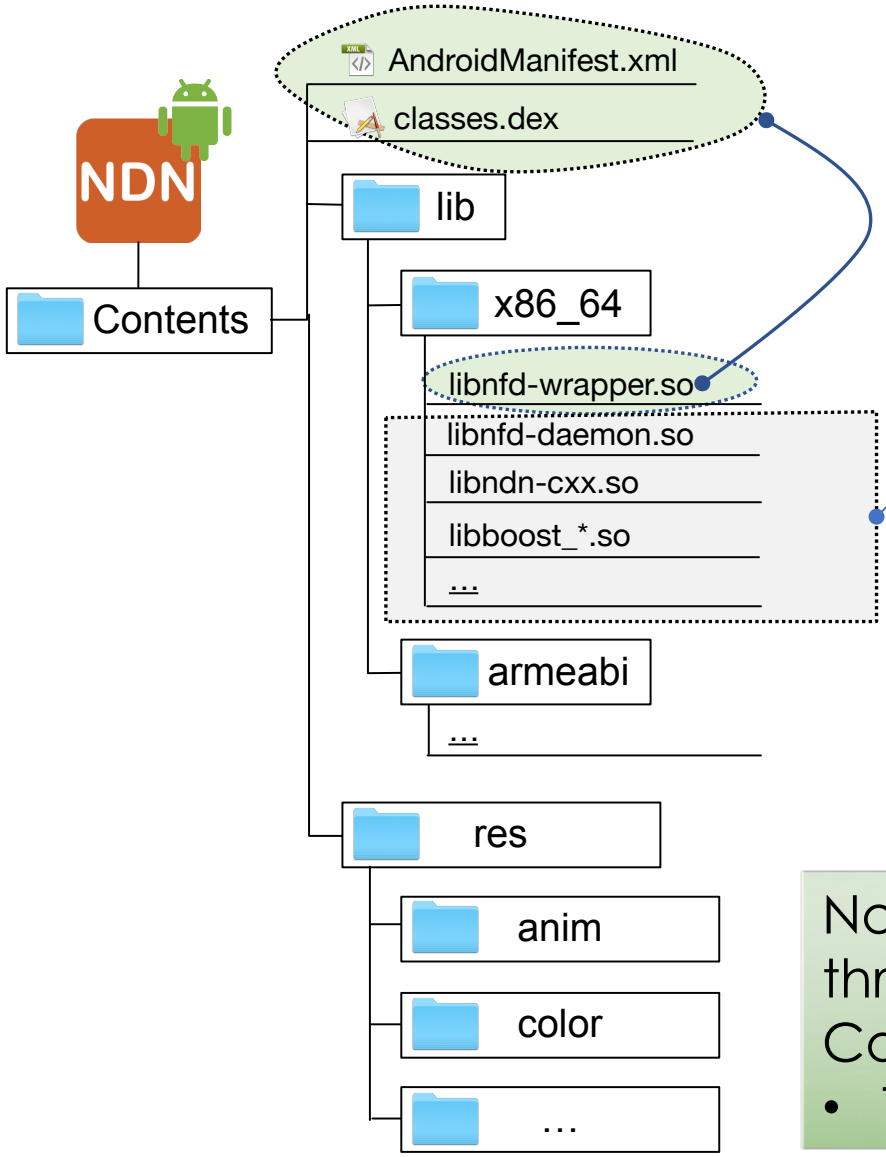
Example: enable a camera to publish data

- 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 apk : NDN Stack for Android



What's Inside NDN.apk (integrate NFD into apk)



- Platform-specific native-compiled NFD
  - (-) No "nfd" binary
    - No main() function as a starting point
  - (+) A bundled shared library
    - No starting point

- libnfd-wrapper.so adds starting point to create NFD thread from Android Java code via JNI interface
  - Runs as Android Service
- NFD management tools, other tools and UIs are implemented in Java

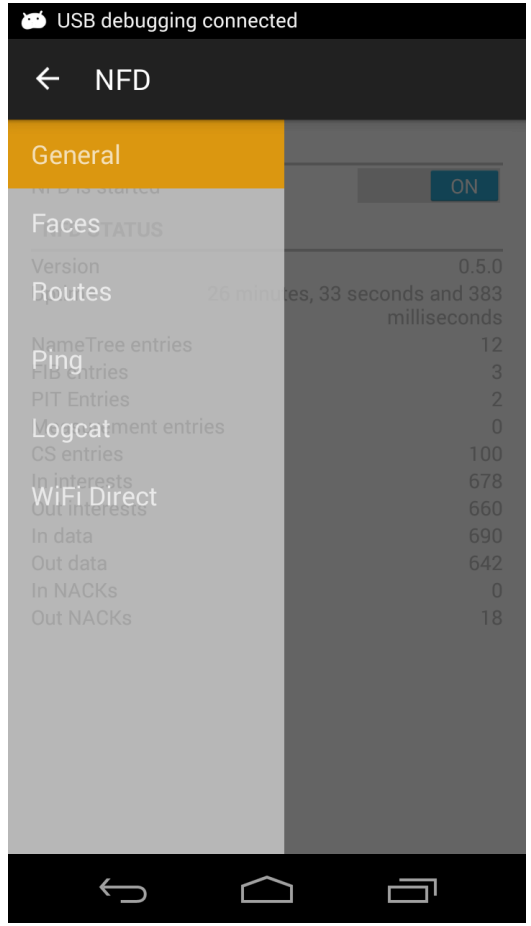
No need to root Android and can be deployed through GooglePlay store
Cannot have direct access to hardware
- TCP, UDP, WebSocket faces

Enabling NDN on Android

- Download and install NDN.apk from Google Play
  - https://play.google.com/store/apps/details?id=net.named_data.nfd
  - Or compile from source
    - https://github.com/named-data-mobile/NFD-android

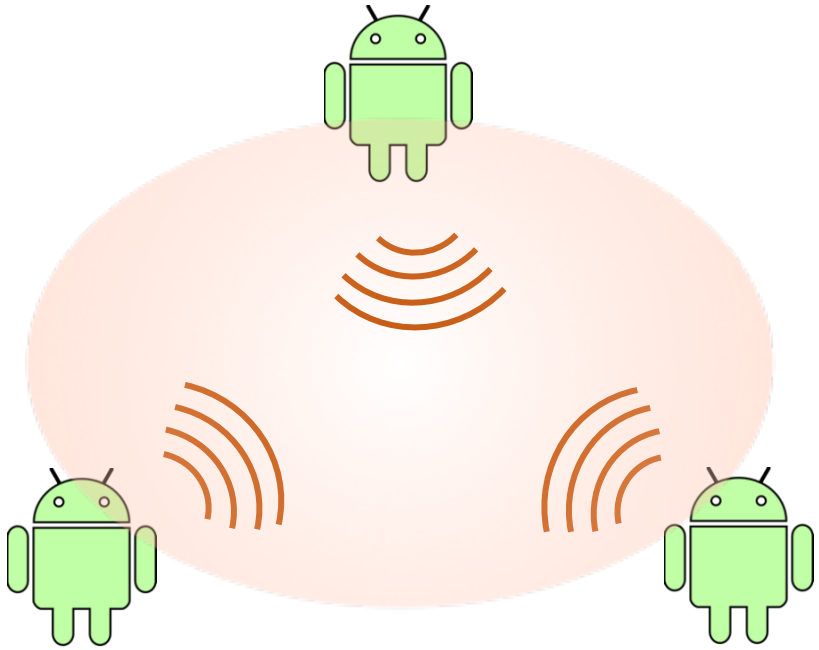
- Start the app
- Start NFD

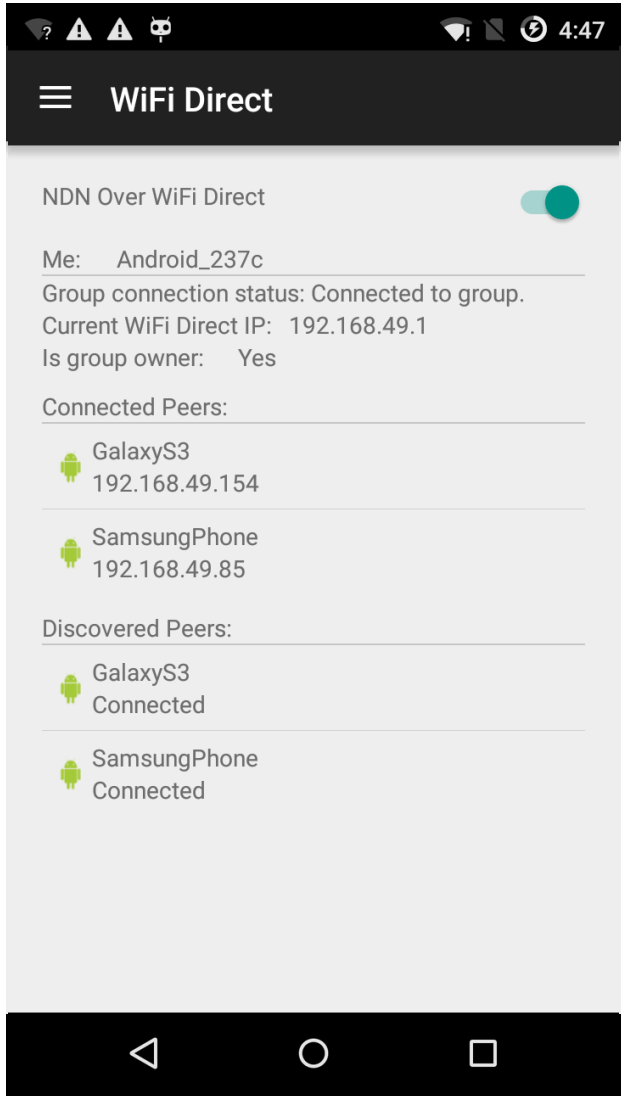
- + (Auto) Configure name reachability
- + Enable local or global NDN connectivity
- + (Auto) Configure security identities



Local NDN Communication

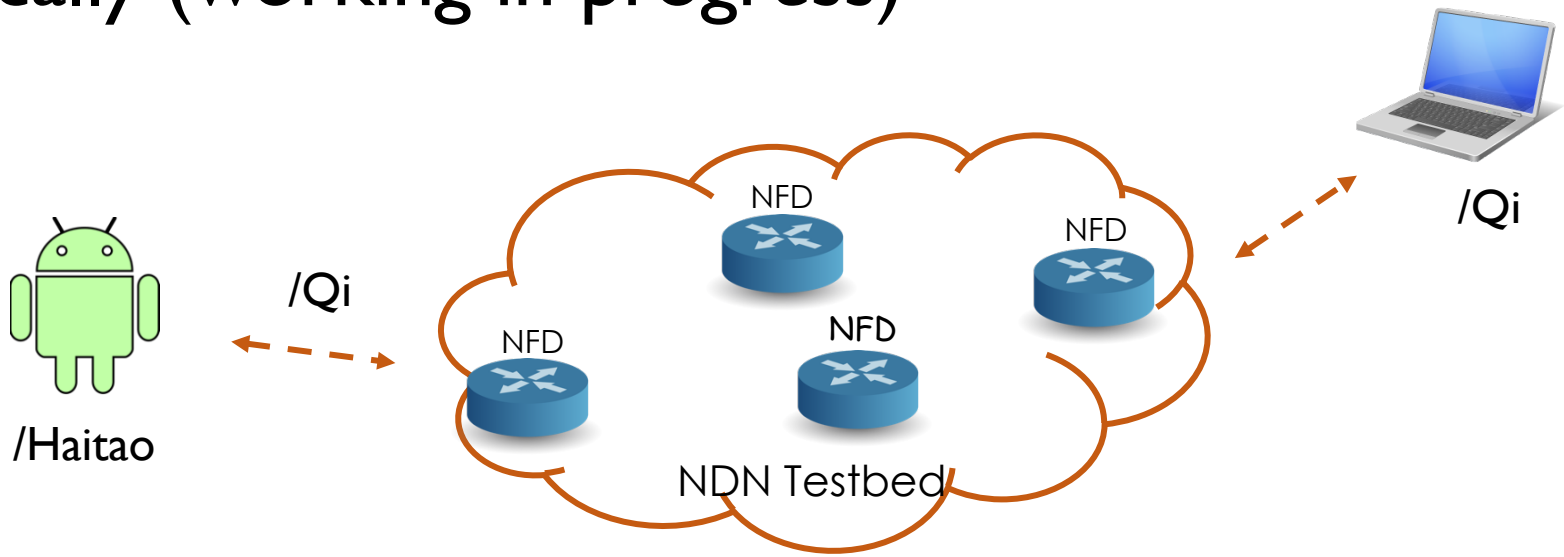
- Enables NDN communication over WiFi Direct
  - Faces and routes are configured and maintained automatically





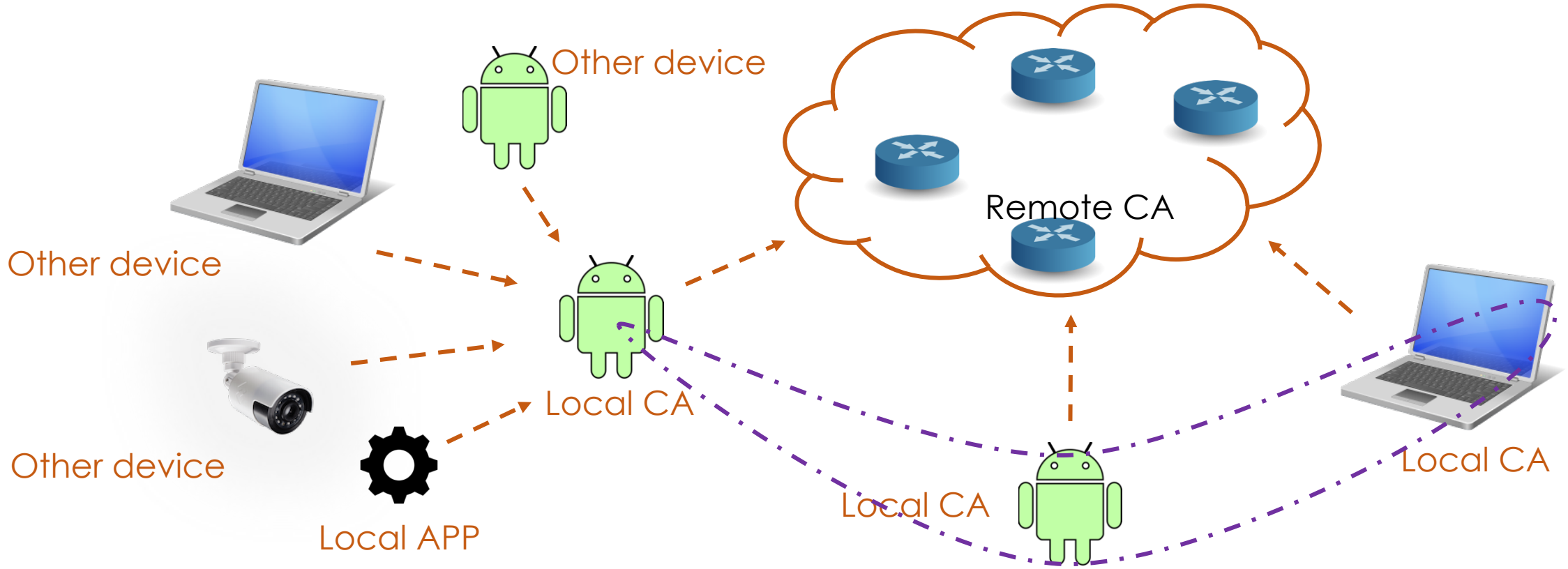
Global NDN Communication

- Create Faces and configure routes automatically (in progress) or manually
  - Face and route configuration recover automatically when network is disconnected and reconnected
- Discover nearby NDN hub & maintain the connectivity automatically (working in progress)



Identity Management

- Every application should have corresponding identity (namespace) and the corresponding certificate for this namespace
- Applications could to manage sub-identities and their certificates (working in progress)



Currently in progress

- Create GUI versions of other NDN tools
- Implement NDN over Bluetooth

NDN Android Development

- Install NDN.apk from Google Play
- Use jNDN as part of standard Android app development process
  - Template: https://github.com/cawka/ndn-skeleton-apps/tree/master/jNDN