NDN-Opp

NDN in Opportunistic Networks

Seweryn Dynerowicz (seweryn.dynerowicz@ulusofona.pt)
Omar Aponte (omar.aponte@ulusofona.pt)
Paulo Mendes (paulo.mendes@ulusofona.pt)

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Some links

- NDN-Opp in UMOBILE

- Port of NFD (0.5.0) to Android with modifications
  - [https://github.com/COPELABS-SITI/nfd-android](https://github.com/COPELABS-SITI/nfd-android)

- Now@ application (O. Aponte)
  - [https://github.com/COPELABS-SITI/NowAt](https://github.com/COPELABS-SITI/NowAt)
Opportunistic Networking

• Devices offer expanded array of means to communicate
  • WiFi
  • WiFi P2P
• Idea: leverage all those opportunities
• Think inclusively about them
• Factor all of them into the routing
NDN-Opp : Architecture

Routing

Face management:
WiFi Direct Groups are used for low-level communications. The router maintains the Opportunistic Faces up to date with their respective communication channel as the status of the Peer changes.

Route computation:
The first time a peer is detected, a new Opportunistic Face is created and it is introduced into the RIB into a namespace for which NDN uses a Multicast strategy (i.e. \ndn\multicast).

Oppportunistic Face (Opp Face)
Queuing and de-queuing based on whether the associated Peer is part of the same WiFi P2P Group.

Forwarding Daemon
Standard NDN forwarding of Interests based on names and breadcrumbs for Data.

Connection Manager
Provides channels for Opportunistic Faces which use TCP connections to transfer packets.

Peer Tracker
UMobile Peers use Service Discovery over WiFi Direct. The Peers form a WiFi Direct Group before starting to announce the IP and port they are using in that Group to run the Forwarding Daemon.
Opportunistic Face

Opportunistic Channel implemented in Android by means of TCP connections

Upon creation, added to RIB

/ndn/multicast

- Correspondence between UUID and “Channel”
- Forwarder of NDN unchanged
- Face queues pending packets
Opp. Channel – WiFi P2P Service Discovery

- Used to distinguish between peers and non-peers
- Device registers name & type
  - Name: <UUID>
  - Type: _wifip2ptracker._tcp
- Information exchanged during discovery phase when device found
One device must be Group Owner

A device initiates Group Formation

Approach: GO should be device with highest UUID

Out of all devices, pick

- GO if any
- Non-client with highest UUID

Initiate connection to it (unless it’s myself)

Suppose $A > B > C$
• GO acts as a DHCP server
• Routing listens on socket (16363)
• Registers its service
  • Name: <UUID>
  • Type: _nsdtracker._tcp
  • Host: <IPv4>
  • Port: 16363
• Advertise itself to others on this IP network