UMOBILE ACM ICN 2017 Tutorial
Now@ and Oi! Applications

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Now@ Overview

Now@ is an Android application which enables users to share data based on their interests over an NDN infrastructure.

With Now@, users can:

• Subscribe interest (e.g. Music, Restaurants,...).
• Receive text message and files directly from peers based on subscribed interests.
• Publish data across Named-Data Networking (NDN) environments.
  • NFD Android or NDN-OPP.
• Select and save content.
Now@ High-Level Design

Data Synchronization:
- Based on ChronoSync.
- Allows users to subscribe to more than one interest at the same time.

Naming:
- Prefixes are divided into four main components to specify: type of infrastructure; strategy to send data; prefix category; UUID.

Software design based on modular approach:
- Makes it easy to add new components.
Now@ Synchronization

- Uses ChronoSync for data dissemination.
- Functions within the NDN multicast namespace /ndn/multicast
- Now@ identifies user devices by means of a UUID 31550312-535a-4662-b048-e3e24061307b
- User selecting Interest triggers prefix registration /ndn/multicast/music /ndn/multicast/business
- ChronoSync starts sending Interest packets /ndn/multicast/music/<uuid>
- When the user creates content, an Interest is sent /ndn/multicast/music/<uuid>/45
- In response to receiving such Interest, another ChronoSync somewhere will send an Interest for /ndn/multicast/music/<uuid>/45

### Synchronization Prefixes

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ndn/multicast/music/&lt;uuid&gt;</td>
<td>Music</td>
</tr>
<tr>
<td>/ndn/multicast/business/&lt;uuid&gt;</td>
<td>Business</td>
</tr>
</tbody>
</table>

Prefix per category

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Sequence number</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ndn/multicast/music/&lt;uuid&gt;/1</td>
<td>1</td>
</tr>
<tr>
<td>/ndn/multicast/business/&lt;uuid&gt;/2</td>
<td>2</td>
</tr>
</tbody>
</table>

Prefix with sequence number
Now@ Segmentation

- Uses JSON notation to define the messages format.

- Files are segmented using Base64 scheme.

- Typical Now@ content message:

  ```json
  {
    "data": "fkajhfjkadnfadkjfhadhndcksdhkashdfjasdhabasdncjsdjkhcaksdhammasdklfamsdlfahsdkchsdhf
    asdhfasdnadshmasdcaslclahsdflasdfswhachjdhadnagdcakjd",
    "size": 25,
    "type": "text",
    "user": "90",
    "interest": "Music",
    "date": "3:40:53", "id": "521e55a7-d930-444e-b7cc-b02b47b4c9de2",
    "segment": 45
  }
  ```
The following functionalities are going to be available in the next version of Now@:

- Synchronization of specific files.
- Preservation of content based on user preferences.
- Exploitation of Wi-Fi infrastructure and direct communications by using only NDN-OPP.

Usability of Now@ will be improved by:

- Evaluating app performance in the UMOBILE Lab.
- Performing field trial with users to verify user requirements.
Prefixes list

/ndn/multicast/now/music
/ndn/multicast/music/323f6d65-479a-487b-982b-621e443a7844
/ndn/multicast/now/business
/ndn/multicast/business/20113763-2826-4c63-97b4-b86cfa9b63f4

#Music

Write your message

Now@ Demo

Interests Subscription

User: Peter

Prefixes list

/ndn/multicast/now/music
/ndn/multicast/music/323f6d65-479a-487b-982b-621e443a7844
/ndn/multicast/now/business
/ndn/multicast/business/20113763-2826-4c63-97b4-b86cfa9b63f4

#Music

Hello world
4:4:55

Peter

#Business

Nice job
4:5:28

Sending Content

User: Peter

Prefixes list

/ndn/multicast/now/music
/ndn/multicast/music/323f6d65-479a-487b-982b-621e443a7844
/ndn/multicast/now/business
/ndn/multicast/business/20113763-2826-4c63-97b4-b86cfa9b63f4

#Music

Write your message

Now@ Demo

Content Reception

User: John

Prefixes list

/ndn/multicast/now/music
/ndn/multicast/music/323f6d65-479a-487b-982b-621e443a7844
/ndn/multicast/now/business
/ndn/multicast/business/20113763-2826-4c63-97b4-b86cfa9b63f4

#Music

Write your message
**Now@ Poster**

**Now@**

**Content Sharing Application over NDN**

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**Motivation**
- Data sharing: Highly successful applications such as Twitter and Dropbox.
- Privacy issue - data stored by large corporations.

**Objectives**
- Contribute to the success of Named-Data Networking:
- Now@ brings value and usability from the perspective of the end user.
- Allow exchange of data via NDN without centralized services:
  - Exchange information such as text, images and documents over NDN.
- Support data sharing with or without Internet connectivity:
  - Operate on top of NFD Android allowing data exchange via wireless Internet.
  - Operate on top of NDN-Opp allowing data to be exchanged even in the presence of intermittent connectivity.

**NOW@ High-Level Design**
- Data synchronization:
  - Based on ChronoSync.
  - Allows users to subscribe to more than one interest at the same time.
- Naming:
  - Prefixes are divided into four main components to specify type of infrastructure, strategy to send data, prefix category, UUID.
  - Software design based on modular approach:
    - Makes it easy to add new components.

**Synchronization Prefixes**

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**NOW@ Operation**

**NOW@ poster**
To be presented during the poster section.
Wednesday 27th
Room: Foyer and SR055
Oi is an Android application that allows users can send short messages over NDN without relying on existing Internet access or wireless infrastructure.

With Oi, users can:
• Send or receive short text messages directly from wireless peers.
• Preserve data shared.
Oi! Overview

User interface design:

- Multiples Chats
- Contact information from contact list of the devices

High-level design:

- User interface: compose and read messages
- Content manager: handles sent and received messages
- Naming: prefixes are created with information of sender, receiver and conversation.
- jNDN library
- Contact list from the device is going to be used with the intention to identify the users
Oi! Next Steps

The following functionalities are going to be available in the next version of Oi!:

- Implementation of push model communication over NDN-OPP:
  - Long-lived interest.
  - Push data
- Messaging Acknowledge mechanism.
- Exploitation of Wi-Fi infrastructure and direct communications by using only NDN-OPP.

Usability of Oi! will be improved by:

- Evaluating app performance in the UMOBILE Lab.
- Performing field trial with users to verify user requirements.
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