... in a nutshell

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Tutorial Overview

- UMOBILE in a nutshell - ATHENA, Christos-Alexandros Sarros

- The UMOBILE Lab - AFA, Angela D'Angelo

- NDN-DTN integration - ATHENA, Christos-Alexandros Sarros

Coffee Break

- Opportunistic wireless aspects in NDN - COPELABS - Paulo Mendes, Omar Aponte

- Social-aware metrics derived from contextualization - Senception/COPELABS - Rute Sofia, Paulo Mendes, Igor dos Santos

- Applications - COPELABS, Omar Aponte

- Closure - ATHENA
Main objectives

• Develop a consolidated information-centric and delay-tolerant communication platform

• Provide architectural support for the network edge, where mobility and connectivity disruptions are the norm

• Enable a tighter integration of opportunistic communications with the Internet

• Drive the Internet towards a communication platform for universal coverage

• Drive new application and services
UMOBILE
High-level perspective and novelty

• Exploitation of all communication opportunities and intelligent management of network capacity

• Inherent support of disruptive communications, even between devices that are disconnected in space at any point in time

• Facilitation of user and service mobility

• User, usage and network contextualization

• Social-based routing

• Application/computation sharing
UMOBILE proof-of-concept 1 (PoC1) Emergency and Civil protection scenario

- Opportunistic communications
- Service migration
- Delay-tolerant forwarding
- ICN forwarding
UMOBILE proof-of-concept 2 (PoC2)
Service announcement and social-routine

• Opportunistic communications
• Data collection and contextual inference
• Social-aware routing metrics validation
UMOBILE architecture

- Extending/modifying NDN for opportunistic and edge communications
Forwarding

- DTN tunneling
  - Reachability
  - Reliability

- Opportunistic off-path content discovery (OOCD)
  - Introduces a new routing table (D-FIB)
  - Points Interests towards the edge of the network, if Interests for same content recently received (=Data cached)
  - Cache hit increase through the discovery of locally available content

- NREP:
  - Introduces name-based push services with priorities (for disaster recovery)
  - Messages spread through the network of mobile devices, based on their name, related priorities TTL and the geographic area of dissemination
Routing

• NDN-Opp
  • Opportunistic communications (e.g. over Wi-Fi Direct)

Contextualization

• Improves data dissemination through social awareness
• Passes information to other modules/apps
Northbound APIs

- Keyword-based mobile application sharing (KEBAPP)
- Application-centric computation and communication model
- Information discovery through application-driven and application-defined, hierarchical namespaces
Quality of Service

- Edge service deployment
- Application-level mechanism to overcome latency and availability constraints
- UMOBILE hotspots
- Core network, isolated nodes
UMOBILE as a Whole
Main Elements, End-to-End Perspective

UMOBILE Gateway (1)
UMOBILE Service Manager (2)
UMOBILE End-user service (3)
UMOBILE Hotspot (4)

NDN Network
UMOBILE Network (UMOBILE Routers)

UMOBILE End-user service (3)
List of Apps (Oil, Now@, Route Planner)
NDN-Opn (background)
Contextual manager (background)
Kebapp (background)
NREP (background)
UMOBILE as a Whole
End-user Service

External application
PerSense Mobile Light

External application
Oi!

External application
routePlanner

External application
Now@

UMOBILE End-user Service

Contextual Manager

RIB

NDN-Opp

Face

Opp Face

FIB

Kebapp

Face

Kebapp Fwd

NREP

Router

Wi-Fi Direct

Bluetooth

LTE
UMOBILE as a Whole
Hotspot

• Interface between service/content providers and end-users
• Supports service migration
• Supports service execution
• Supports KEBAPP
• Supports NDN-Opp
• Supports DTN forwarding
UMOBILE as a Whole

Gateway

• Interface between the UMOBILE part of the network and IP
• Usually part of the service/content providers’ infrastructure
• Supports service migration
• Supports DTN forwarding
UMOBILE as a Whole
Service Manager

- Interface between the Service provider and the UMOBILE hotspots
- Usually part of the service/content providers’ infrastructure
- Supports service migration
UMOBILE Wholesale Model

- **Services**
  - Emergency
  - Civil protection
  - Commerce

- **Applications**
  - Local communications
  - News
  - Maps/schedules/routes

UMOBILE Service Provider devices
(Hotspots, Routers, Service Managers)

UMOBILE end-user devices
(Mobile phones)
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