UMOBILE
… in a nutshell

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Tutorial Overview

UMOBILE in a nutshell - ATHENA, Alexandros Sarros

This session introduces the H2020 UMOBILE project, explaining its architecture, main functional blocks and applicability scenarios as well as current exploitation efforts.

The UMOBILE Lab - AFA, Angela D'Angelo

This session describes the UMOBILE Lab, a testbed for ICN/NDN experimentation, which includes, among others, IoT scenarios. The session provides a tutorial on how researchers will be able to use the testbed, both for experiments as well as for extending the testbed in the future. Currently, UMOBILE is interconnected to the worldwide Named Data Networking (NDN) testbed.

NDN-DTN integration - ATHENA, Alexandros Sarros

This session explains the effort developed in the project to assist a smooth transition between the current internet, and an NDN-DTN environment.

Coffee Break

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

This session addresses new concepts in NDN routing, namely, how to evolve the current routing and assist in supporting the topological variability inherent to opportunistic environments. The session shall start with a presentation on how current NDN routing proposals, such as NSLR, could be extended to support higher topological variability, that is inherent to opportunistic wireless environments. The session will end with a demo of NDN-Opp, an extension of the Network Forwarding Daemon for Android (NFD Android) created to support direct device-to-device communication in the context of opportunistic wireless environments.

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

This session shall present the contextual plane of UMOBILE, and explain how it can improve the network operation, being, for this session, a specific example provided for contextual-based routing. The session covers opportunistic capture, data classification (context), as well as inference aspects concerning roaming habits. The session will end with a demo of PerSense Mobile Light, a tool that has been developed by Senception in UMOBILE to perform contextualization derived from wireless data. The demo shall explain how researchers can install and use the data captured by PerSense Mobile Light.

Applications - COPELABS, Omar Aponte

This session is dedicated to the explanation of native applications being developed in UMOBILE for ICN/NDN opportunistic environments. The session shall end with the demo of Now@, a content sharing application over NDN.All applications can be downloaded via GoogleApps.

Closure - ATHENA

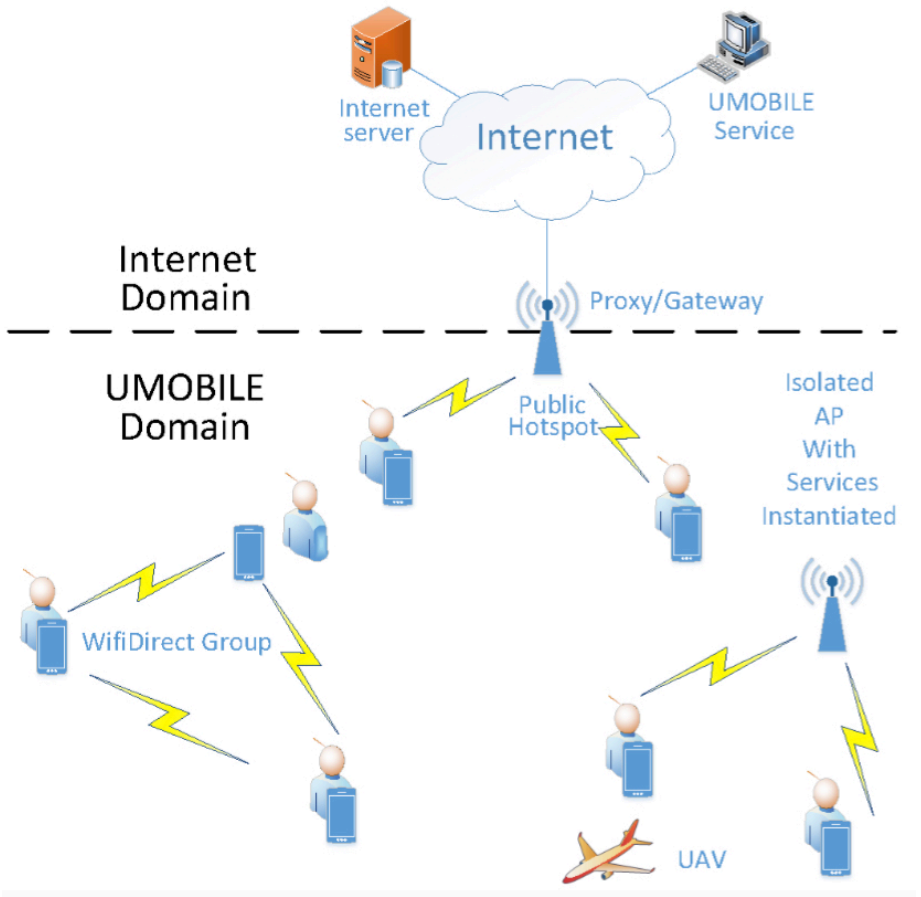
Main objectives

- 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

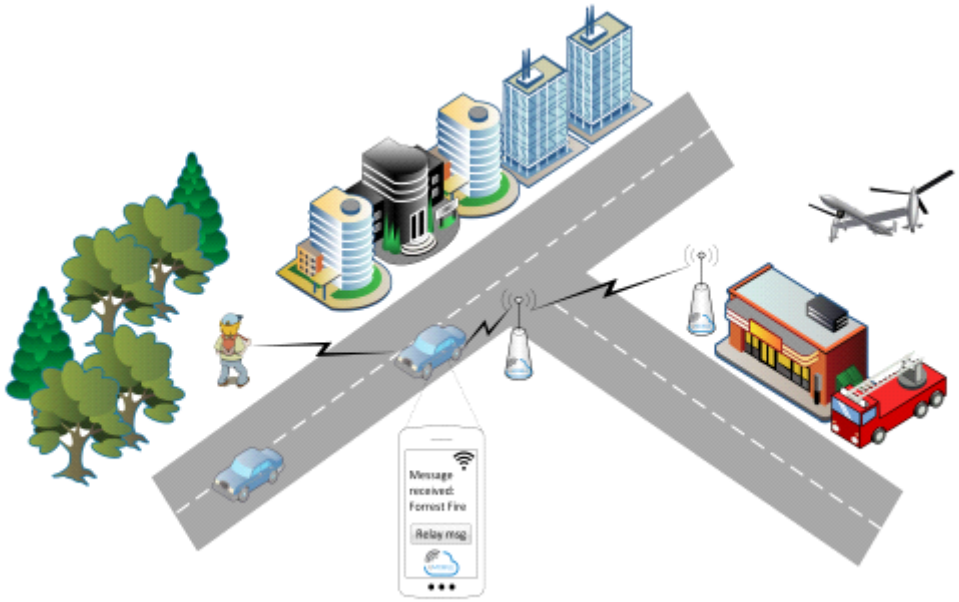
UMOBILE

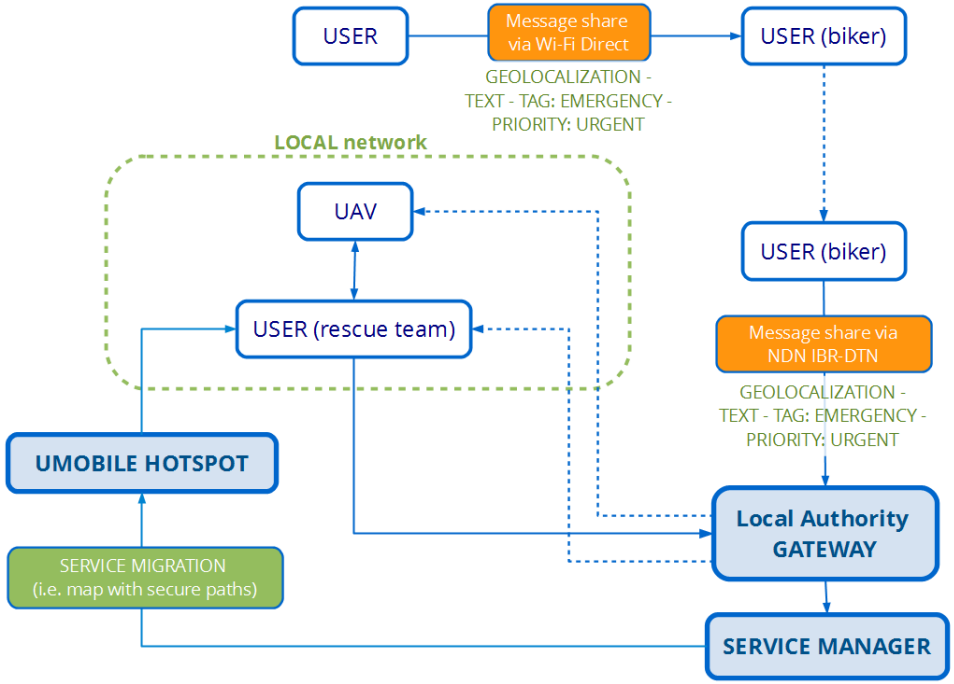
High-level perspective and novelty

- 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



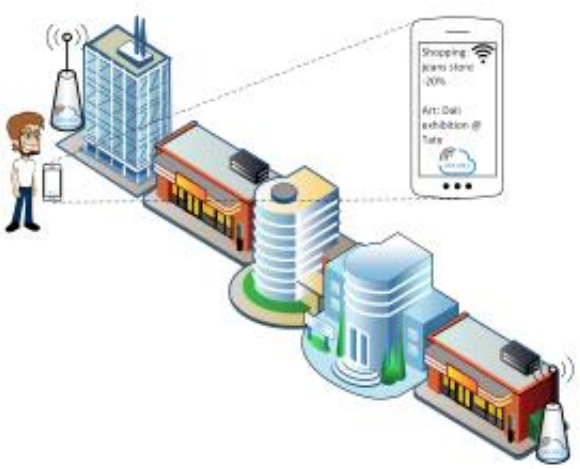
UMOBILE proof-of-concept 1 (PoC1)
Emergency and Civil protection scenario

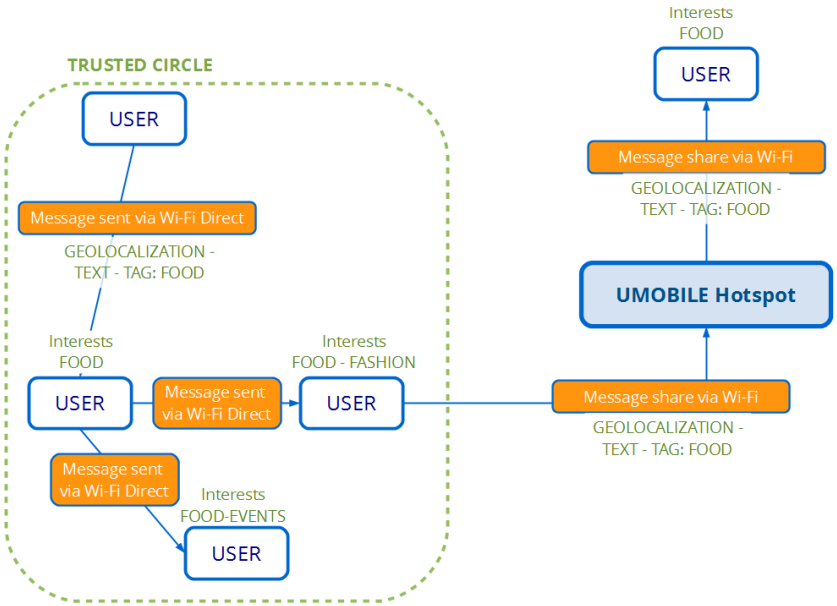




- Opportunistic communications
- Service migration
- Delay-tolerant forwarding
- ICN forwarding

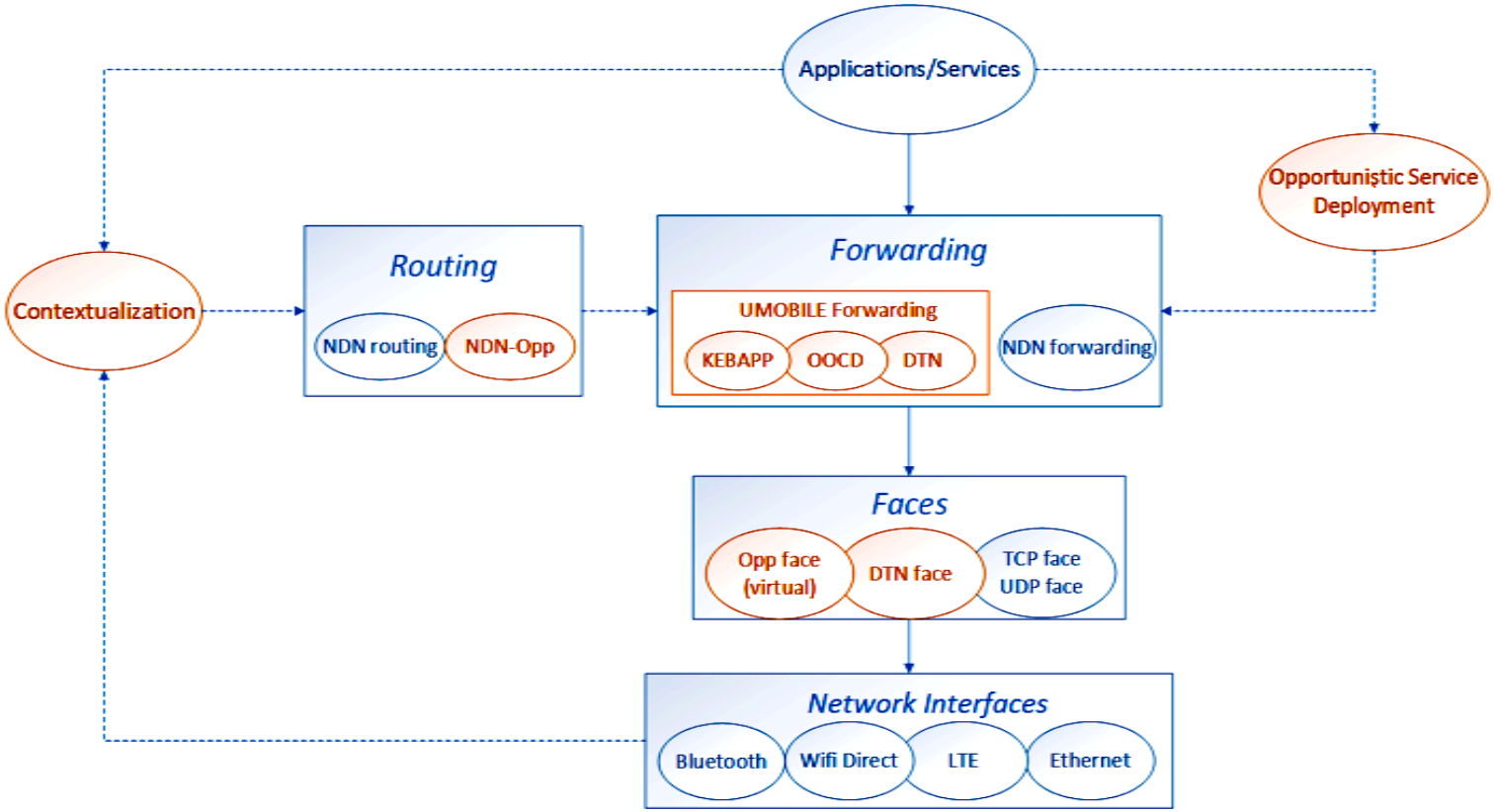
UMOBILE proof-of-concept 2 (PoC2)
Service announcement and social-routine





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

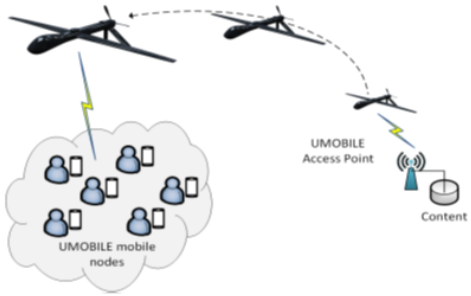
UMOBILE architecture



- 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

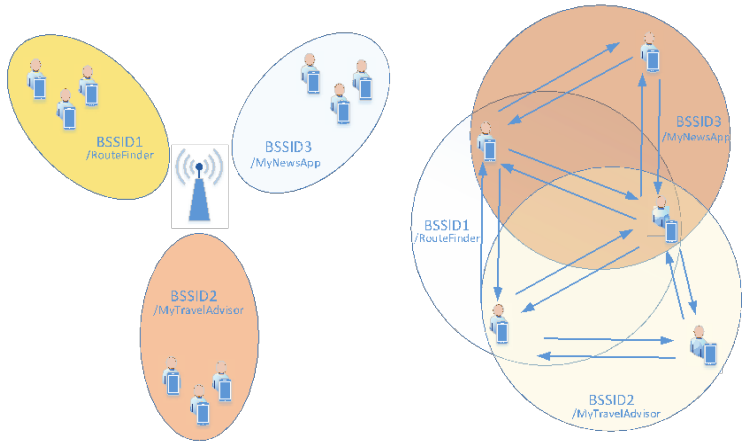
- NDN-Opp
  - Opportunistic communications (e.g. over Wi-Fi Direct)

Contextualization

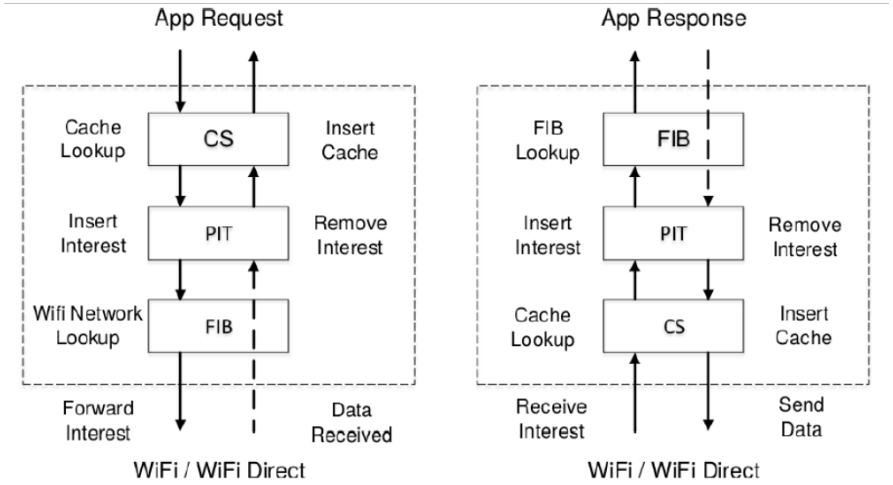
- Improves data dissemination through social awareness
- Passes information to other modules/apps

Northbound APIs

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

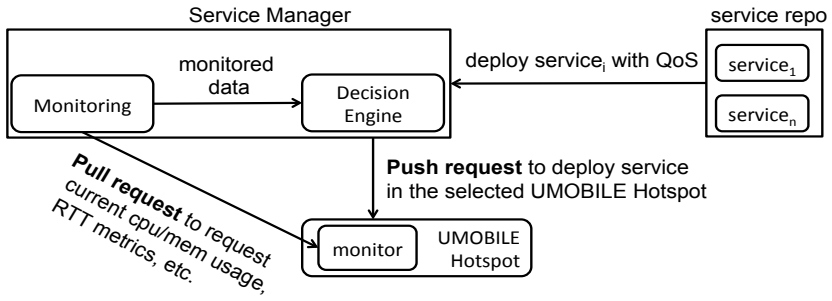


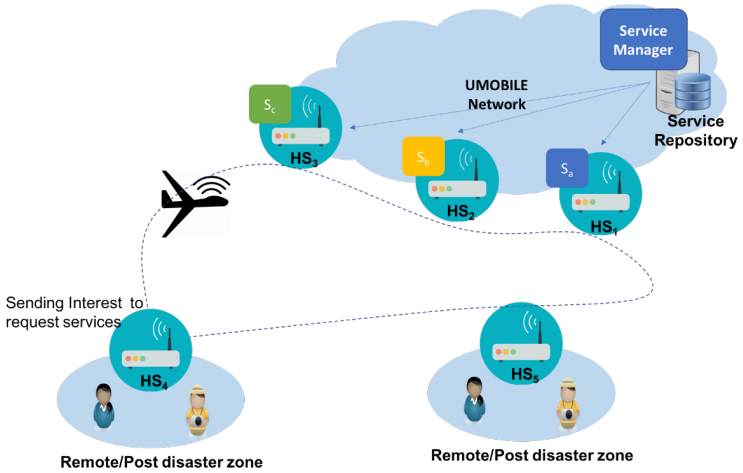
(a) AP-assisted scenario (b) WiFi Direct scenario



Quality of Service

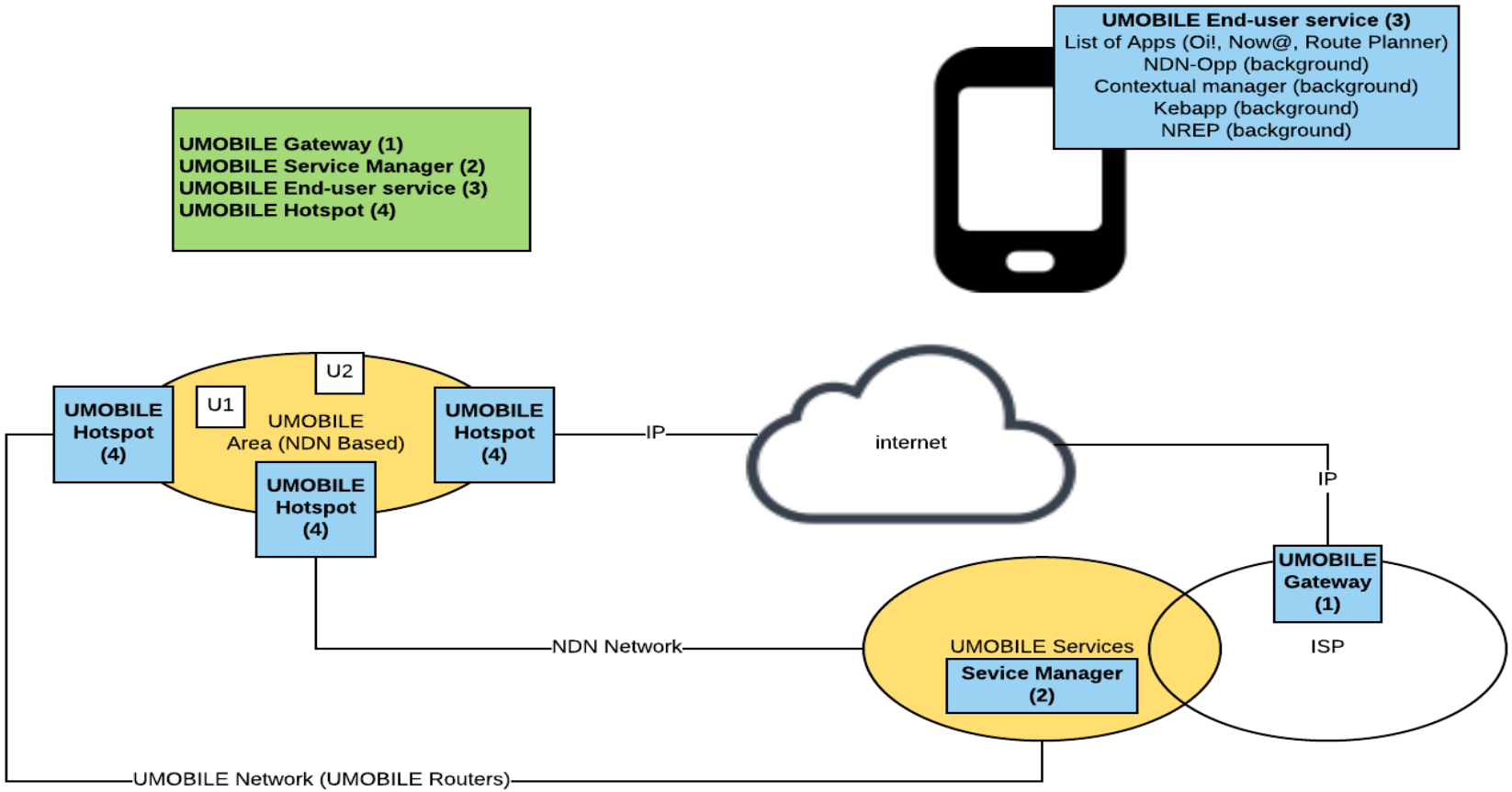
- Edge service deployment
  - Application-level mechanism to overcome latency and availability constraints
  - UMOBILE hotspots
  - Core network, isolated nodes





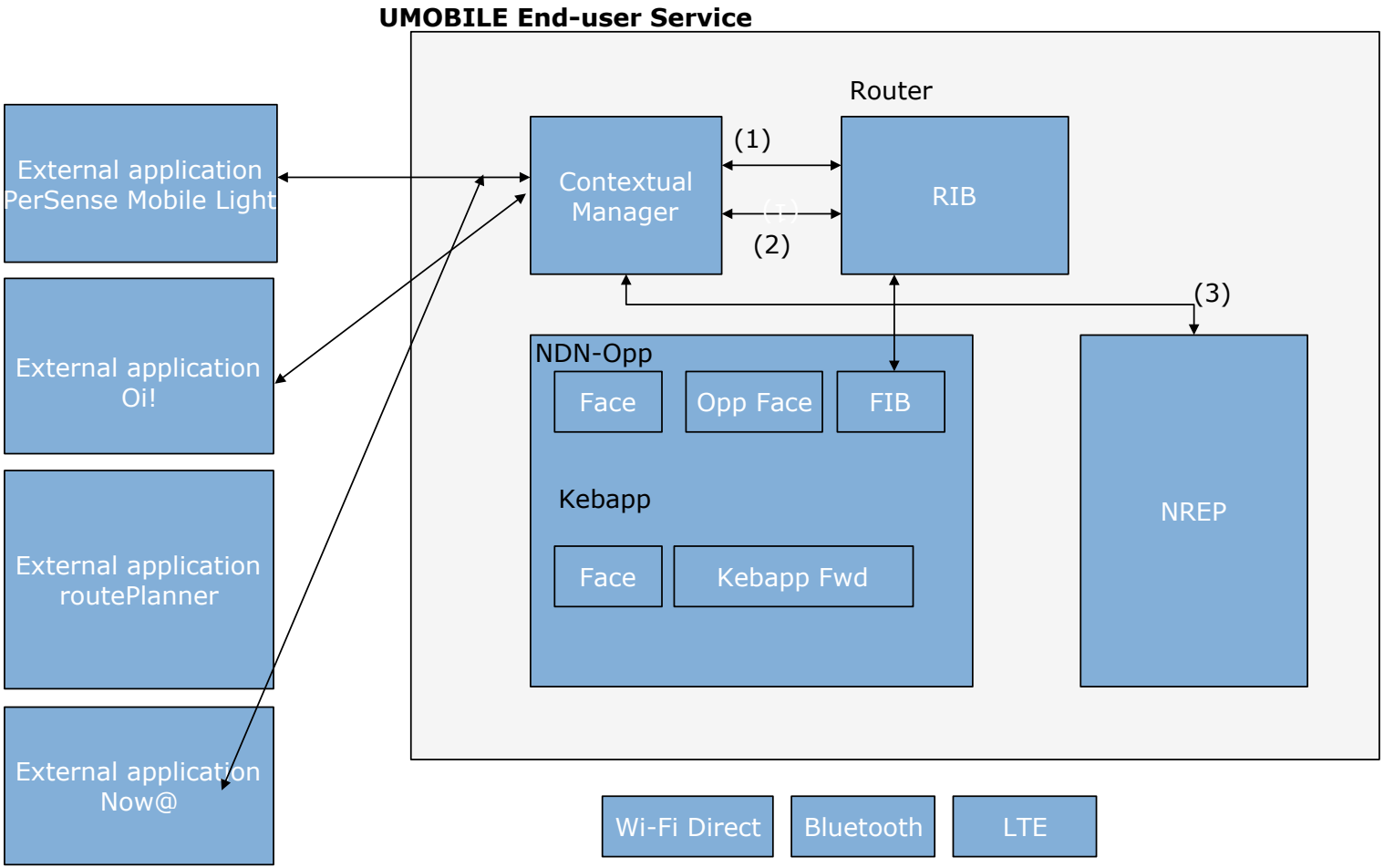
UMOBILE as a Whole

Main Elements, End-to-End Perspective



UMOBILE as a Whole

End-user Service



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

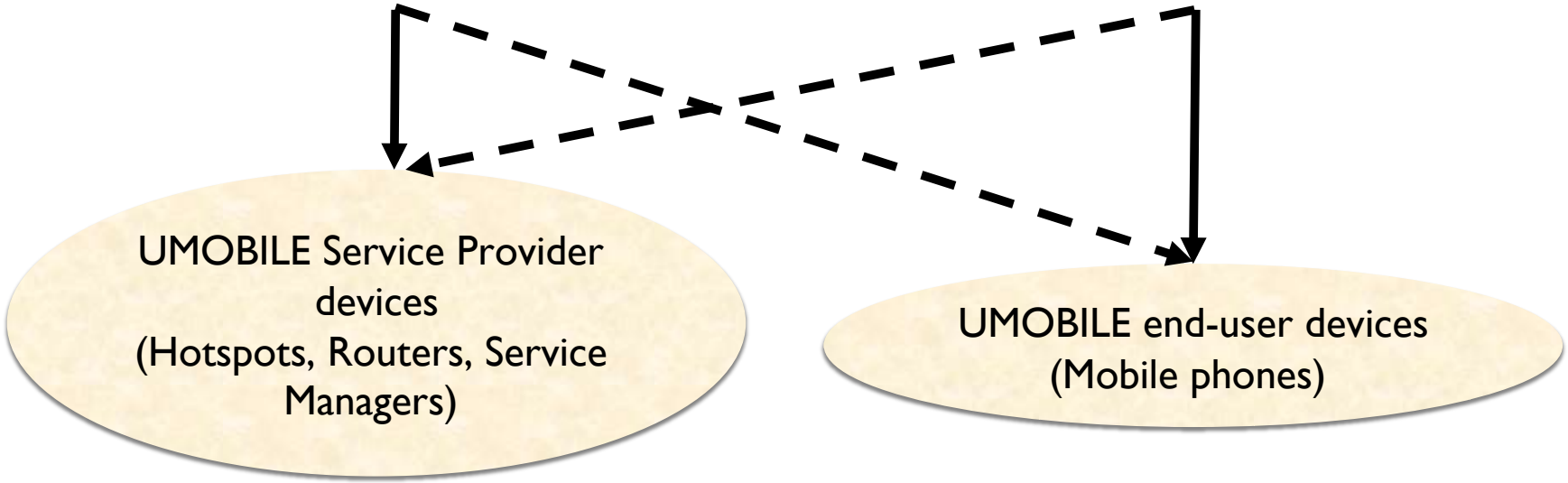
UMOBILE as a Whole

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



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