Using ICN in disaster scenarios
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M. Arumaithurai, **J. Seedorf** , A. Tagami, K. Ramakrishnan, N. Blefari Melazzi

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Scenario

Disaster Scenario

- **The aftermath of a disaster, e.g. hurricane, earthquake, tsunami, or a human-generated network breakdown**

- E.g. the enormous earthquake which hit Northeastern Japan on March 11, 2011 (causing extensive damages including blackouts, fires, tsunamis and a nuclear crisis)
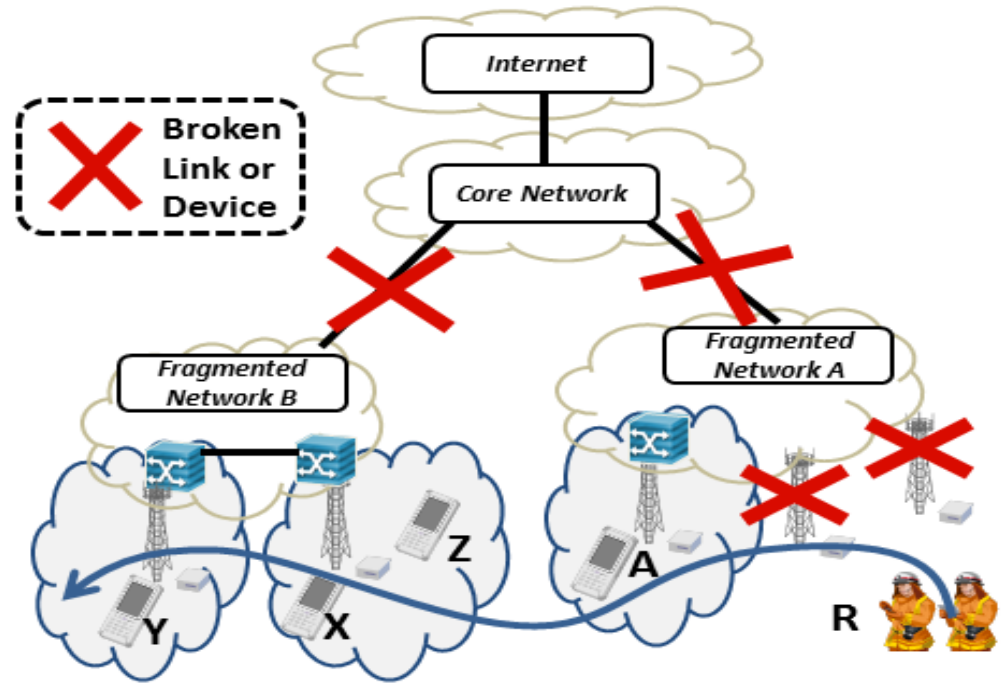
Specific constraints and requirements in such situations

- **Energy and communication resources are at a premium**
  - E.g. due to failure of certain devices and communication links
- **It is critical to efficiently distribute disaster notification and critical rescue information**
  - Authorities would like to inform the citizens of possible shelters, food, or even of impending danger
  - Relatives would like to communicate with each other and be informed about their wellbeing
  - Affected citizens would like to make enquiries of food distribution centres, shelters or report trapped, missing people to the authorities

Key Use Cases

Delivering Messages to Relatives/Friends

- Citizens want to confirm to each other that they are safe

Spreading Crucial Information to Citizens

- State authorities want to be able to convey important information (e.g. warnings, or information on where to go or how to behave) to citizens

Verifying Information provided by Citizens

- Citizens want to spread observations and warnings, these potentially need to be verified by authorities before making available to all users

→ **Corresponding technical requirements are discussed in the document**

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Solution Outline (1) *NEW* in -02 version of the draft

ICN-based approaches for addressing the use cases

- ICN 'data mules':
  - mobile entities can act as ICN 'data mules' which are equipped with storage space and move around the disaster-stricken area gathering information to be disseminated

- Priority dependent name-based replication:
  - By allowing spatial and temporal scoping of named messages, priority based replication depending on the scope of a given message is possible
  - E.g. "NREP": ICN messages have attributes such as user- defined priority, space, and temporal-validity[1]

1 - Psaras, I., Saino, L., Arumaithurai, M., Ramakrishnan, K., and G. Pavlou, "Name-Based Replication Priorities in Disaster Cases", 2nd Workshop on Name Oriented Mobility (NOM), 2014

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Solution Outline (2)   *NEW* in -02 version of the draft

ICN-based approaches for addressing the use cases

- Data-centric confidentiality and access control:
  - Security relies on information exclusively contained in the message itself, or, if extra information provided by trusted entities is needed, this should be gathered through offline, asynchronous, and non interactive communication
  - E.g. Attribute-based Encryption, Identity-based Encryption

- Decentralised authentication of messages:
  - Enabling users to assess the trustworthiness of received information without relying on a centralised authority
  - E.g. using an "offline" web-of-trust to bind self-certifying names to real-world identities[2]

2 - Seedorf, J., Kutscher, D., and F. Schneider, "Decentralised Binding of Self-Certifying Names to Real- World Identities for Assessment of Third-Party Messages in Fragmented Mobile Networks", 2nd Workshop on Name Oriented Mobility (NOM), 2014

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Acknowledgements

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Background: GreenICN Project

GreenICN: Architecture and Applications of Green Information Centric Networking

Duration: 3 years (1 Apr 2013 – 31 Mar 2016)

Website: http://www.greenicn.org

EU Coordinator:	JP Coordinator:
Prof. Xiaoming Fu	Mr. Shigehiro Ano
University of Göttingen	KDDI R&D Labs
Germany	Japan

GreenICN Project Overview

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Project Consortium

European Partners

GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

EU Coordinator
Georg-August-Universität Göttingen (UGO, Germany)
Contact: Xiaoming Fu <fu@cs.uni-goettingen.de>

NEC
NEC Europe Ltd. (NEE, UK)

CEDEO.net
CEDEO (CED, Italy)

orange
Telekomunikacja Polska (Orange Labs, Poland)

UCL
University College London (UCL, UK)

cnit

Japanese Partners

KDDI R&D LABS

JP Coordinator
KDDI R&D Laboratories Inc. (KDD, Saitama)
Contact: Shigehiro Ano <ano@kddilabs.jp>

NEC
NEC Corporation (NEJ, Tokyo)

Panasonic
Panasonic Advanced Technology Development Co., Ltd

東京大学 THE UNIVERSITY OF TOKYO
University of Tokyo (UTO, Tokyo)

早稲田大学 WASEDA University
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8

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