

# Realizing the Internet of Things using Information-Centric Networking

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# A vision for the IoT

- Many research efforts consider IoT as an enhanced WSN.

## **We think we need to move one step further**

- How connected things can be exploited in a meaningful way?
- What about things with no computational power whatsoever?
- Application independent

# ICN + IoT = Love

- J. Francois et al. “CCN Traffic Optimization for IoT,” in NoF 2013 : The 4th International Conference on Network of the Future, IFIP/IEEE. IEEE, Oct 2013.
- G. Piro, I. Cianci, L. Grieco, G. Boggia, and P. Camarda, “Information centric services in smart cities,” Journal of Systems and Software, vol. 88, pp. 169 – 188, 2014.
- [...]

# ICN + IoT = Love

- ACM ICN-2014 – Sigcomm

**15:40-16:40 Session 4: Internet of Things**

Session Chair: Jeff Burke (*UCLA, USA*)

## **Multi-Source Data Retrieval in IoT via Named Data Networking**

Marica Amadeo (*University Mediterranea of Reggio Calabria, Italy*); Claudia Campolo (*University Mediterranea of Reggio Calabria, Italy*); Antonella Molinaro (*University Mediterranea of Reggio Calabria, Italy*)

## **Internet of Things Interest in ICN: Insights from a Life-Size CCN Deployment**

Emmanuel Baccelli (*INRIA, France*); Christian Mehlis (*Freie Universitaet Berlin, Germany*); Oliver Hahn (*INRIA, Germany*); Thomas C. Schmidt (*Hamburg University of Applied Sciences, Germany*); Matthias Wählisch (*Freie Universitaet Berlin, Germany*)

# ICN + IoT = Love

- ICNRG
  - Information-centric Networking: Baseline Scenarios
    - **“2.8. Internet of Things”**
  - ICN based Architecture for IoT - Requirements and Challenges
  - ICN based Architecture for IoT

# Challenge: Naming

- A name should identify:
  - Thing Owner/Context
  - Thing Identity
    - RFID, QRCode, Barcode
  - Properties
- Information authentication and provenance verifications
- Manageability, Revocability
- Many to one

# Challenge: Contextual information lookup

- Information lookup based on name, metadata, user context
- API that hides the complexity of the underlay architecture
  - Consider things capabilities

# Challenge: Trust models

- Limited (or even not at all!) computational power
- Things can be tampered
- Things can not be easily updated
- Transitive trust and trust delegation
- Eliminate the need for CA



# Challenge: Access control and privacy

- Information will be replicated
- Information and its meta-data is expected to be sensitive
- Contextual access control

# Challenge: Information forwarding

- Delay tolerance
- Mobility
- Traffic engineering
  - Introduction of special nodes along the path that perform information morphing
- Permanent and ephemeral subscriptions

# Moving forward

- Clean slate or overlay?
  - Probably overlay is a better option: faster deployment, easier large scale experimentation, trigger new IoT applications

Thank you