Research and Development of Hyper-connected IoE Network Technology, funded by NST, Korea

Intelligent IoE Information Platform

Progress

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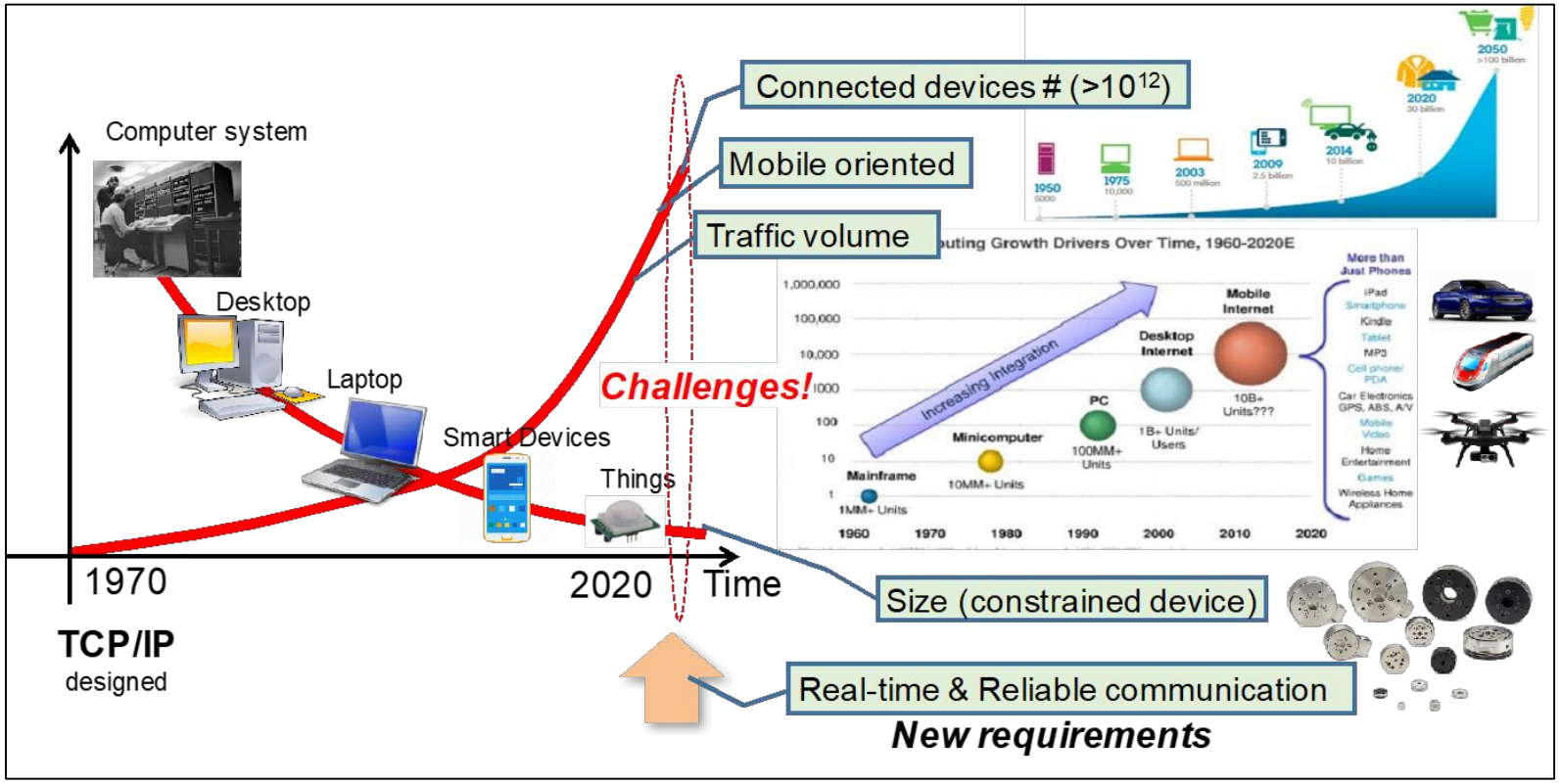
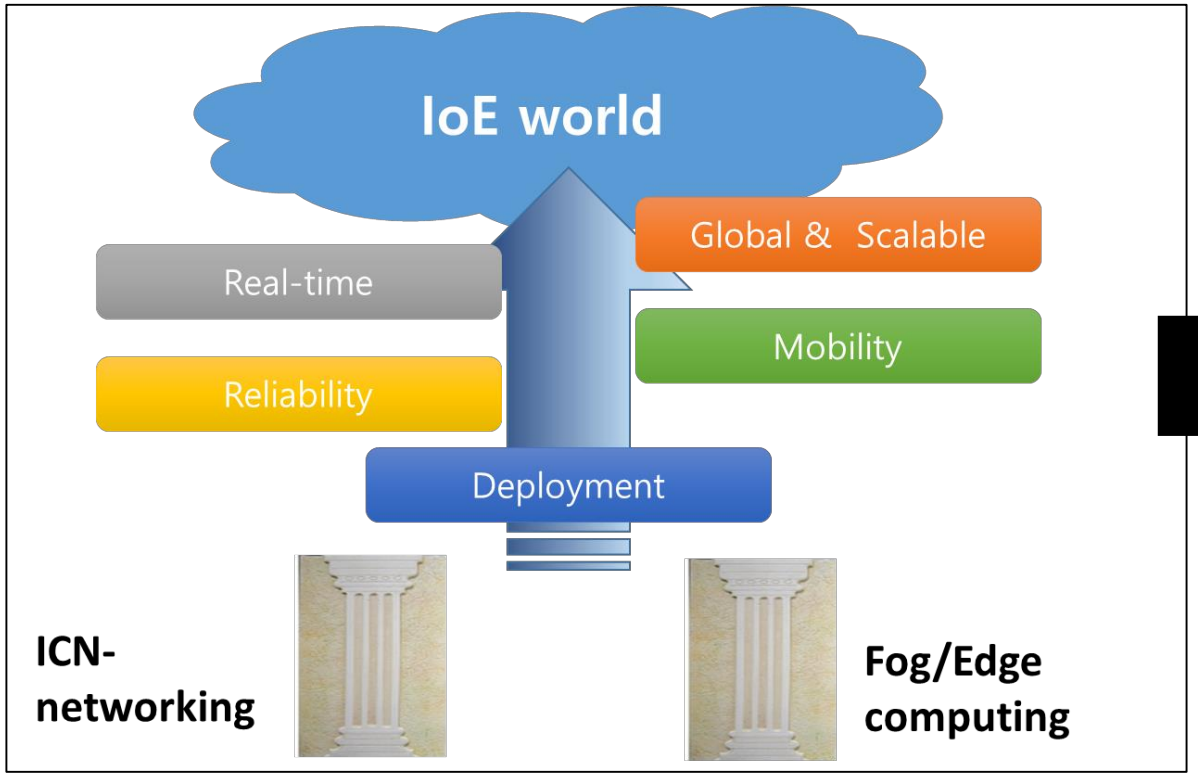
Introduction

- Development of IoE Network Architecture in Hyper-connected IoE environment

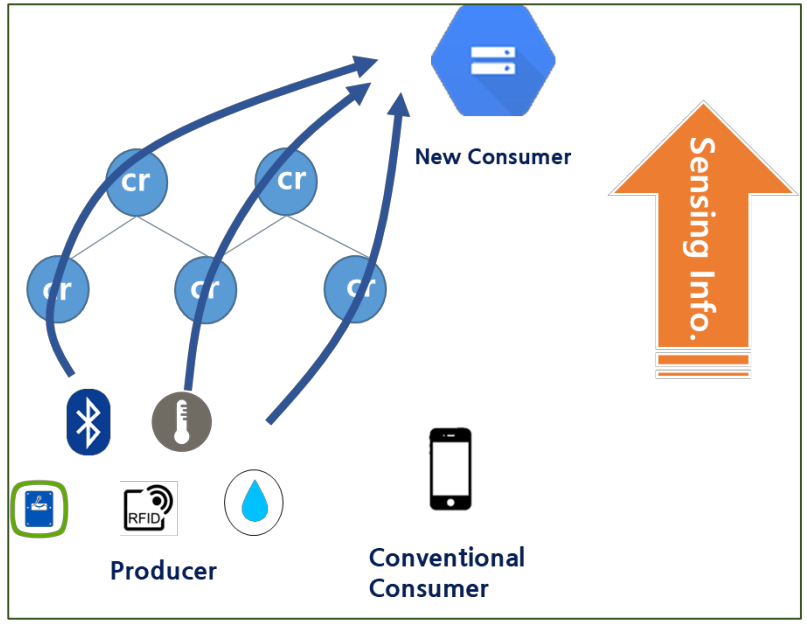


Requirements & Principles



- ICN based communication for Inter-networking
- Applied Fog concept to Edge network as domain network
- Information centric reliability support (Information security and privacy)
- Domain specific networking structure
- Name and Information centric Mobility Support
- IP core network consideration
- Global Testbed

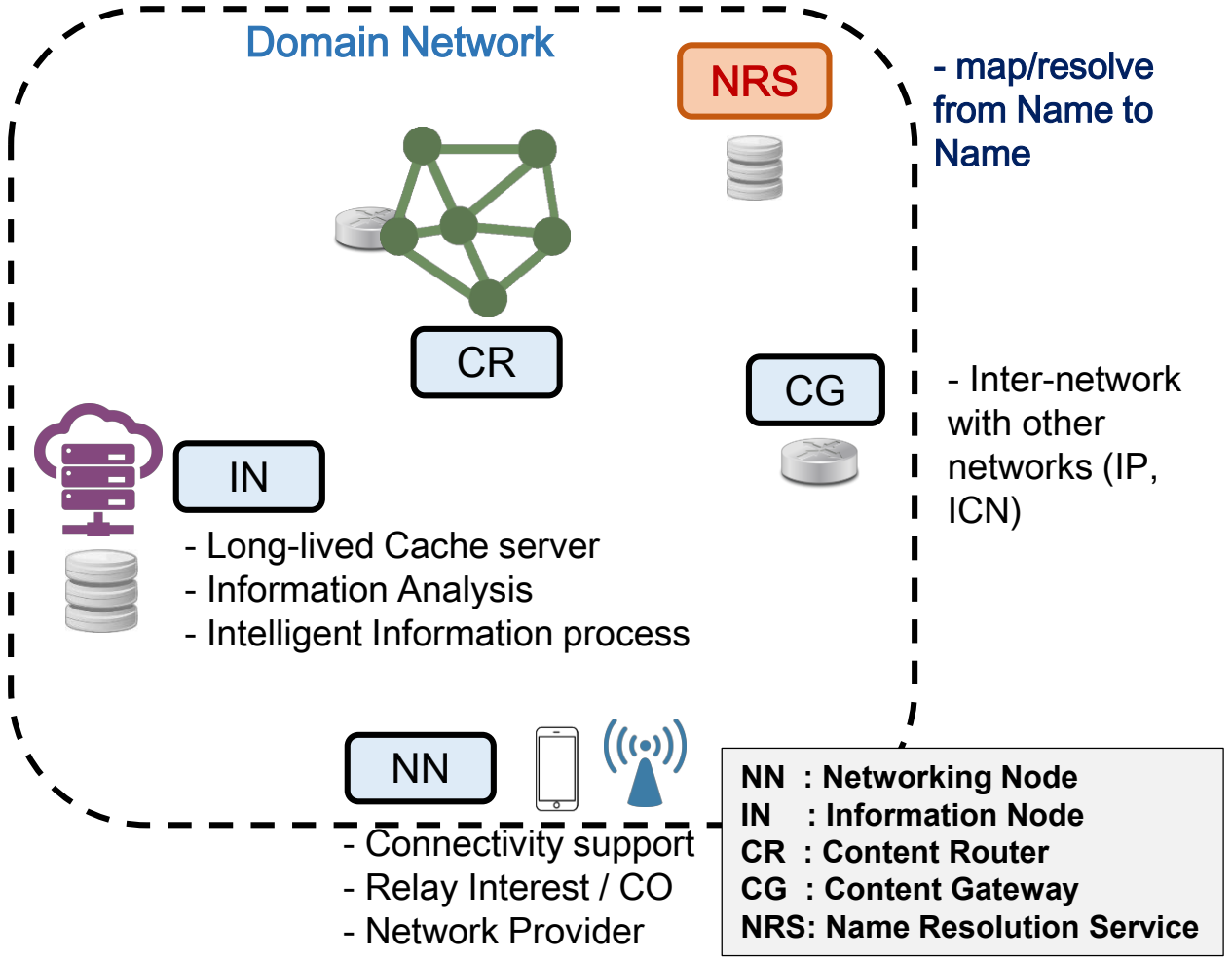
Considerations for IoE



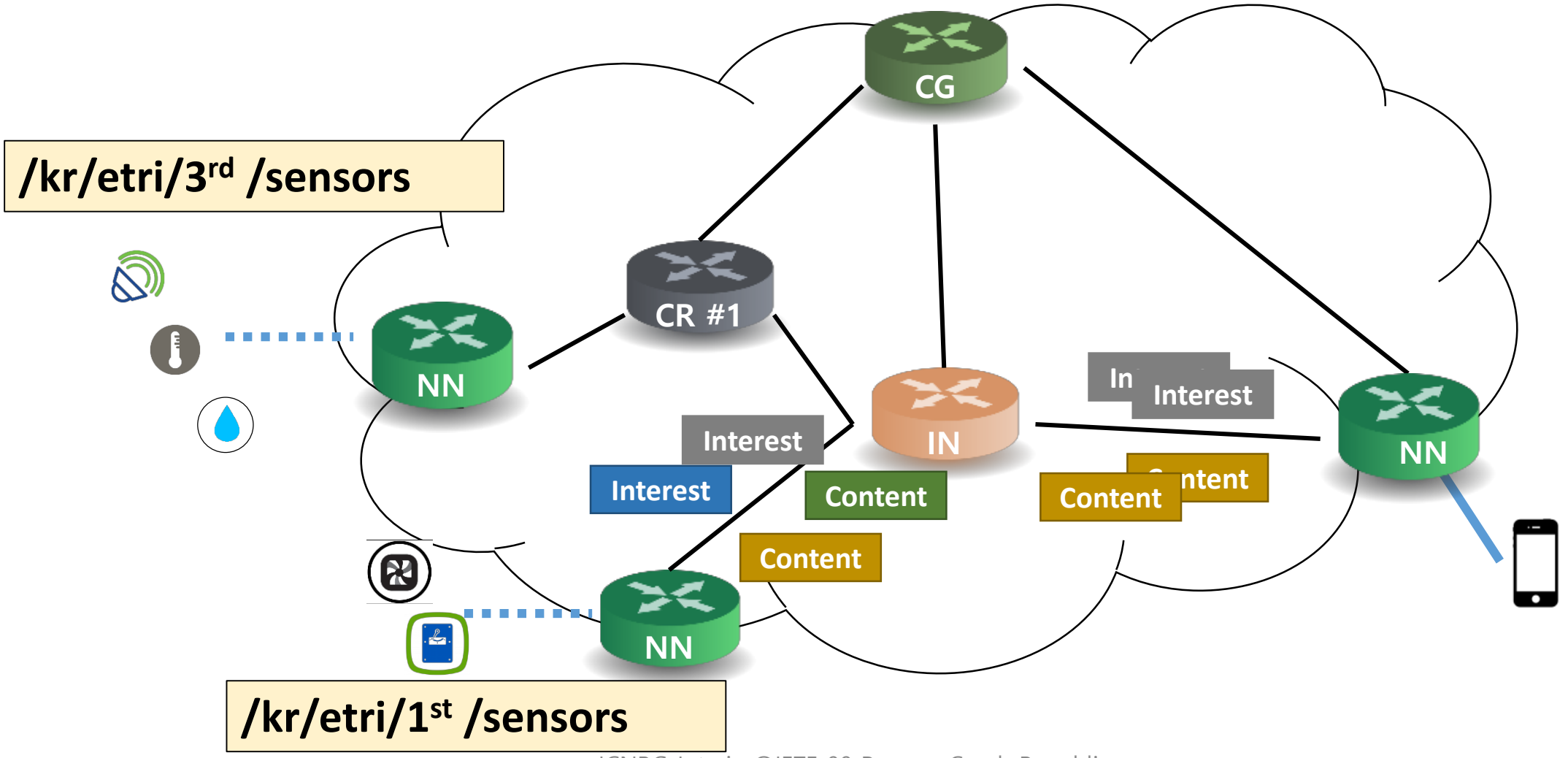
- Multiple producers model
  - Differ from common ICN model
  - Differ from common consumer
    - Cloud, data server, etc.
- Producers can move out commonly
  - Moving producers enabled with People, Car, etc.
- Various IoE service domains
  - Smart building, home, city, etc.
    - Pre-process Information
  - Information flow according to service domains
    - Non-cache, analyzed information, information push, etc.

Intelligent IoE Information Platform

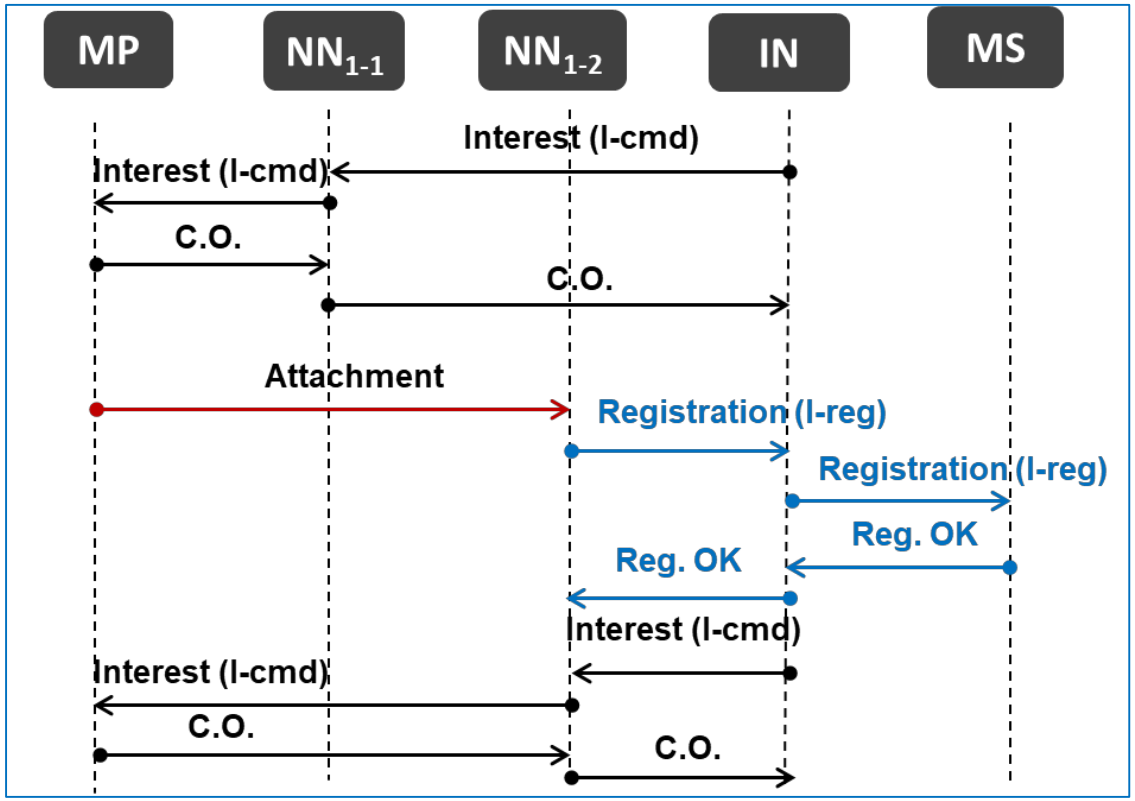
- A novel Domain networking architecture
  - ICN based communication
    - CICN based Implementation
    - **NRS interworking with CICN**
  - Fog/Edge computing concept
    - Define of specific purpose nodes
      - Networking, Information analysis, gateway node
  - Intelligence
    - Intelligent Information analysis
      - Applying ML

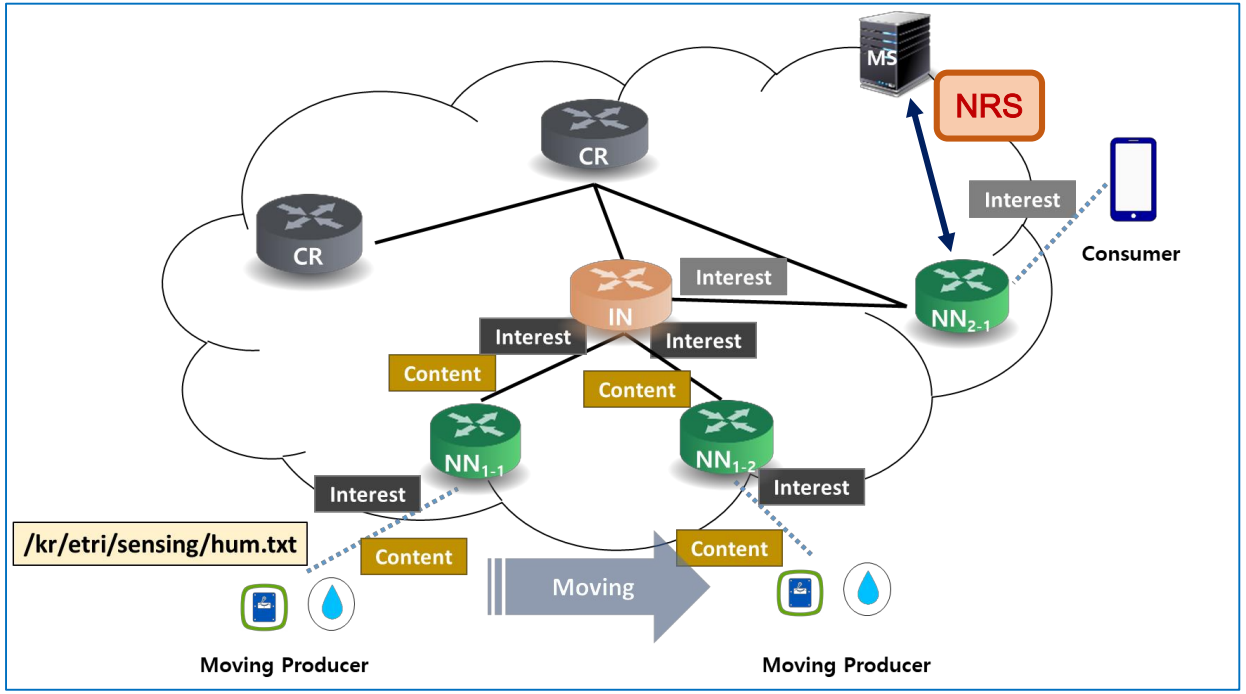


Communication Scenario



Producer Mobility support with NRS



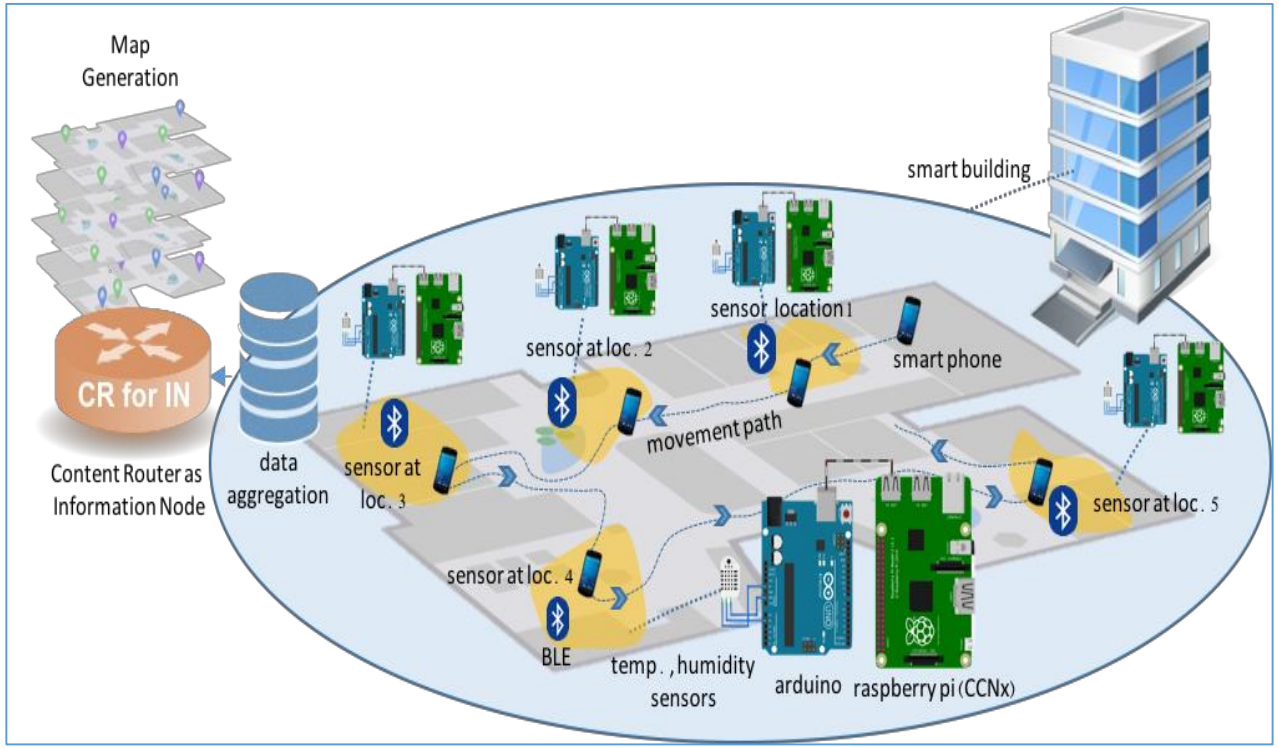


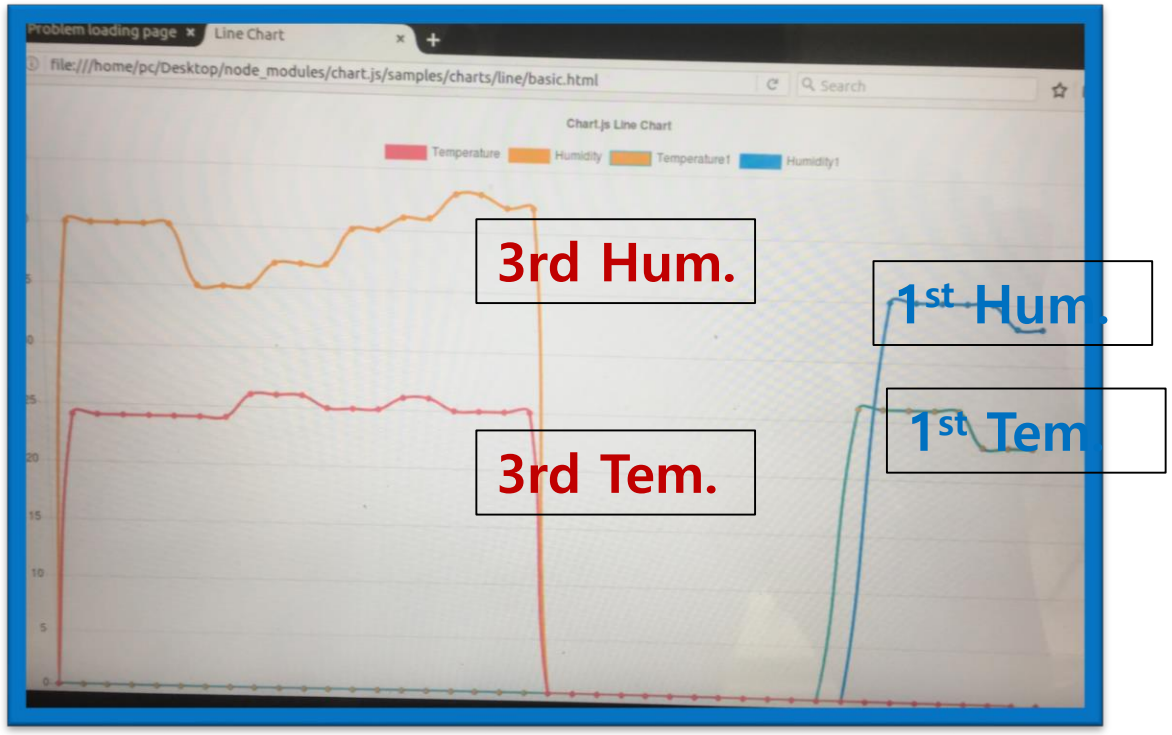
Intelligent Information process

- IoE data preprocessing
  - Classification of IoE information types (application types)
    - Classification of Content Object by Deep learning (CNN and RNN)
  - Applying cache strategies
    - E.g., mission critical information must be push to Cloud or consumer directly without cache
- Interest analysis
  - Developing name filter for caching policy
  - Applying cache strategies
    - Prefetching Information
    - Decision of Cache rules

Development as Proof of concept

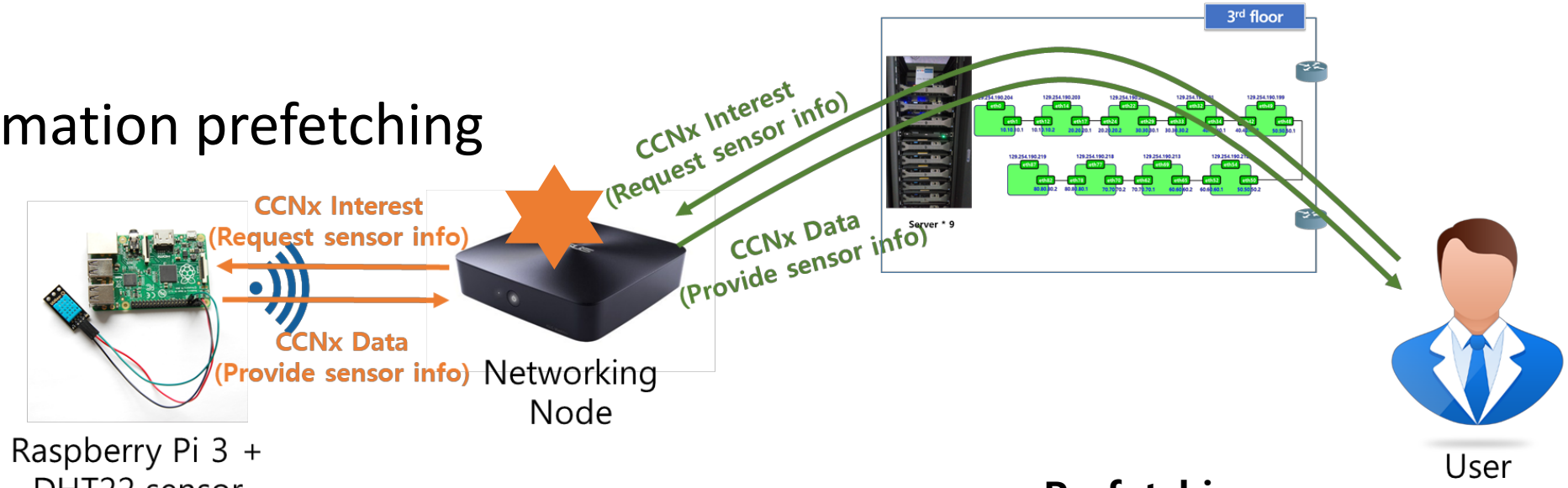
- Mobile Crowd Sensing





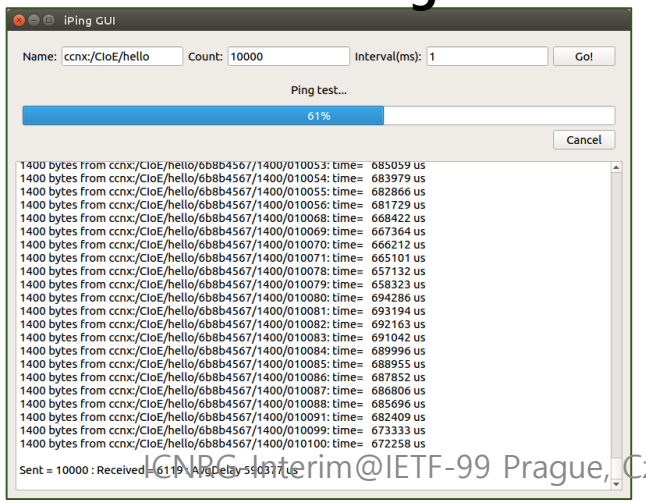
Development as Proof of concept

- Information prefetching

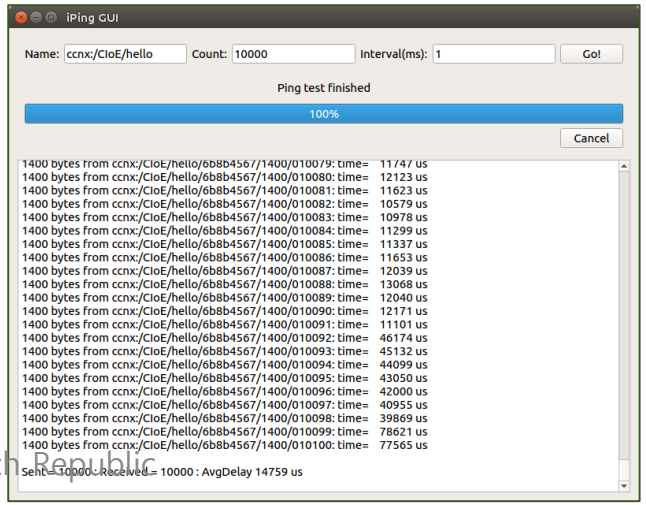


- Result

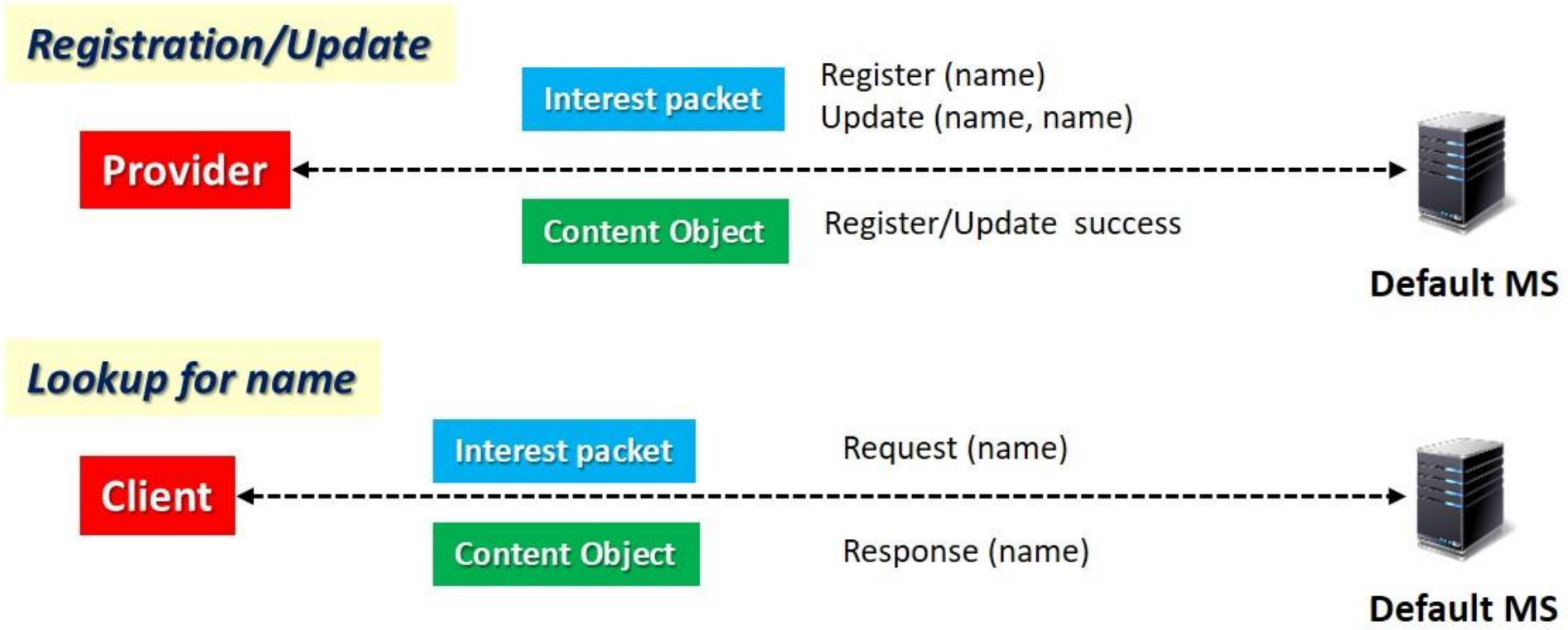
Prefetching off



Prefetching on



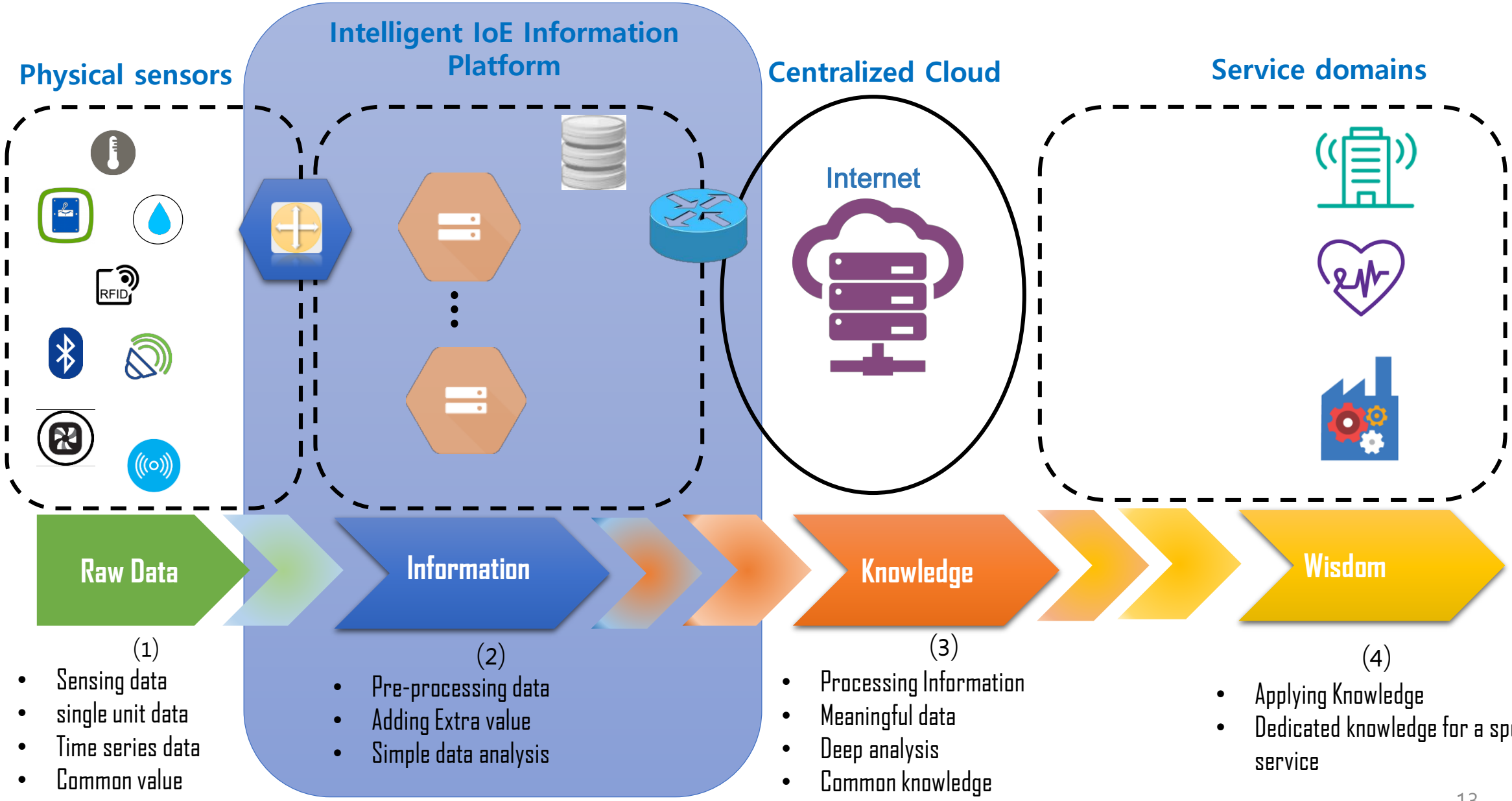
NRS Development



Ongoing works

- Extending CICN implementations
  - **Develop NRS for supporting producer mobility, replica server, etc.**
  - Applying ML on
    - Cache rules
    - Prefetching Interest strategy
- Applying Fog architecture
  - Develop information-centric intelligent computing nodes
- Develop a IoE service

Summary – Information Flow concept



(1)
- Sensing data
- single unit data
- Time series data
- Common value

(2)
- Pre-processing data
- Adding Extra value
- Simple data analysis

(3)
- Processing Information
- Meaningful data
- Deep analysis
- Common knowledge

(4)
- Applying Knowledge
- Dedicated knowledge for a specific service

Questions/Comments?