Hyper-connected
IoE Network Technology
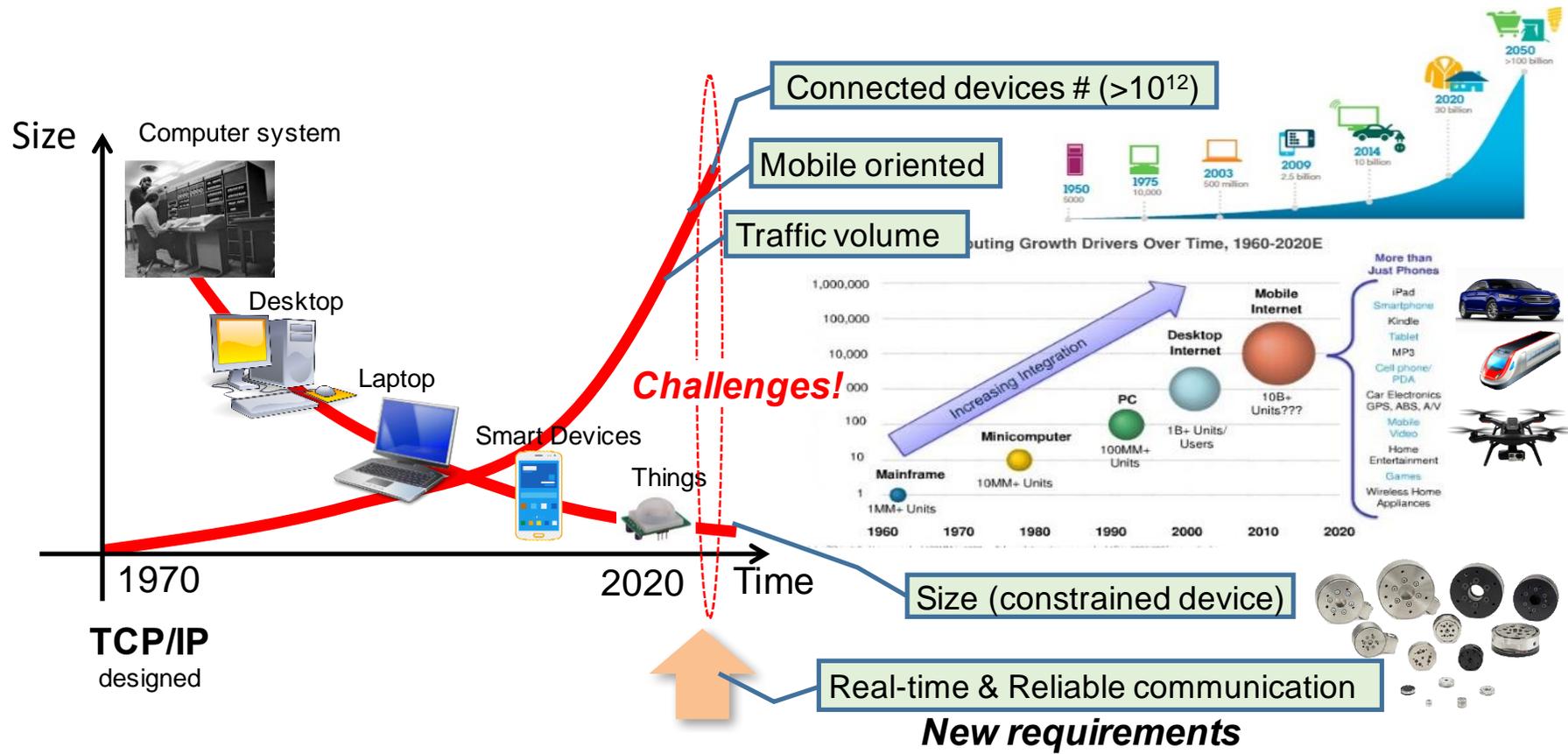
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ICNRG

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- Challenges for IoE

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- Overview of Architecture
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  - Overall architecture

- Summary

Challenges

Emerging Technologies

- SDN
  - Control Plane (CPl) and Data Plane (DPl) separation
  - A centralized logical control and view of the network
  - underlying network infrastructure is abstracted from the applications

- NFV
  - Decoupling SW from HW
  - Using COTS computing HW to provide Virtualized Network Functions (VNFs) through SW virtualization techniques
  - Flexible network function deployment

- Fog Computing
  - Moving cloud computing infrastructures closer to end users to address these challenges.
  - The edge computing complements the cloud computing not replace it.
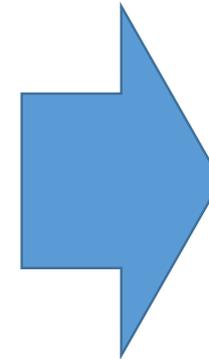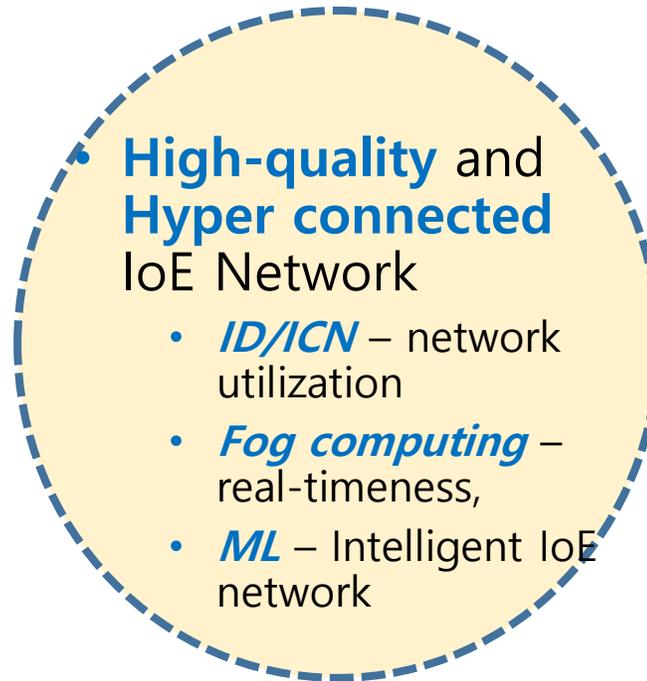
Research Experiences

2000s~　　　　**2010**　　　　　　**2013**　　　　　　**2016**

Future Internet
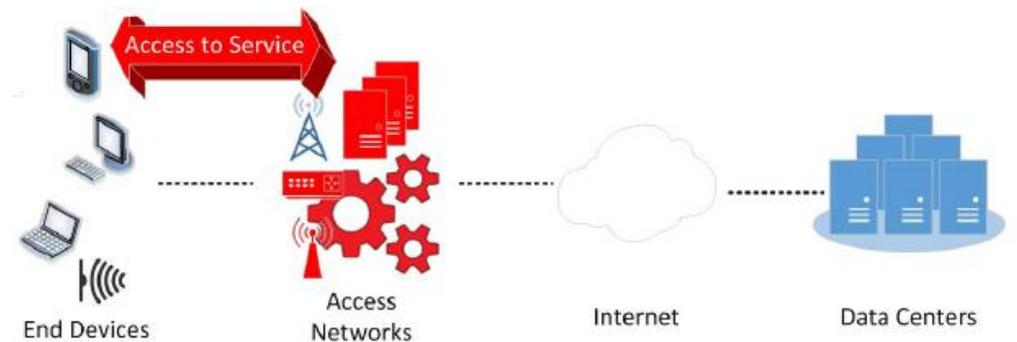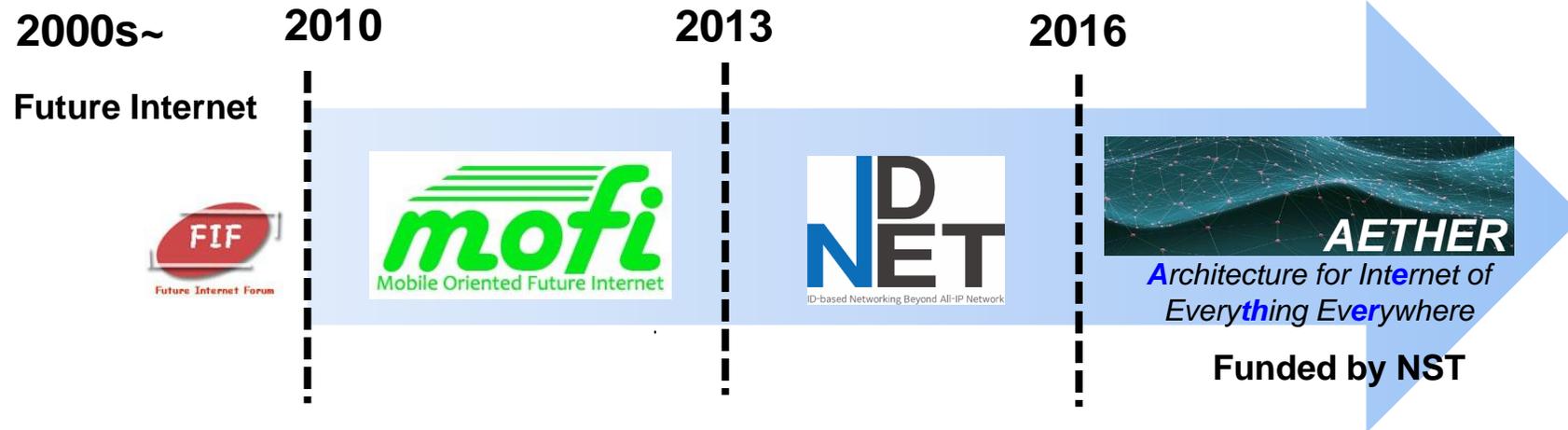
- **Mobile Intrinsic Arch.**
- **ID/Loc separation**
- **SDN based Mobile domain**
- **ID space compatible with IPv6**

- **ID-based Networking**
- **ID/Loc separation**
- **Hierarchical and Domain structure**
- **Clean-slate architecture**

- **Global connectivity**
- **Scalable networking for massive Things**
- **Real-timeness**
- **Mobility**
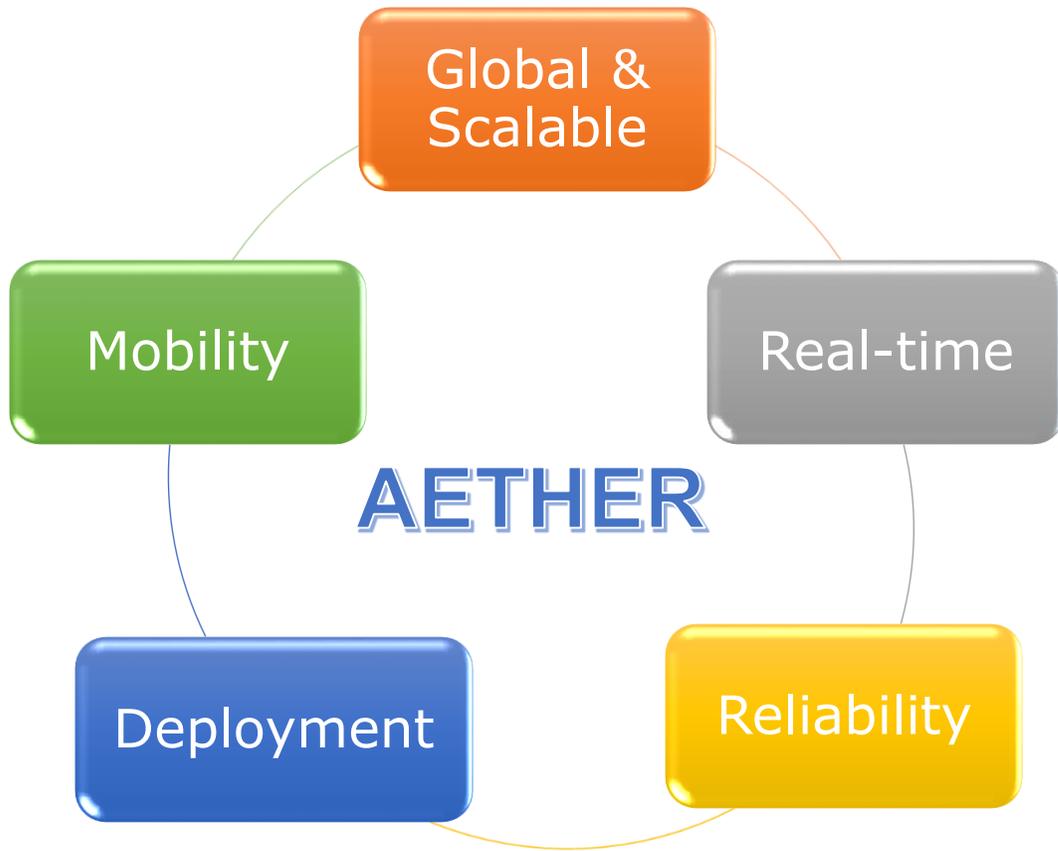- **Reliability**
- **Deployability**

Approaches

- Pure ID communication
  - Develops everything for ID based communications
    - ID, routing/forwarding, service API, etc.
  - Intrinsic security support
  - Intrinsic mobility, multi-homing support
  - Extensible to ICN concept
    - (Where is ID assigned ?)

- IP evolution
  - IP address space reuse as Locator
  - Mobility, Multi-homing support
  - Deployment in real world
  - Deployment in global testbed
    - Global collaboration works

+

- **High-quality** and **Hyper connected** IoE Network
  - *ID/ICN* – network utilization
  - *Fog computing* – real-timeness,
  - *ML* – Intelligent IoE network

- **Hybrid approach brings *the best***
  - Define *new ID space*
  - *Deployment* in real world
  - Intrinsic *security* support
  - Intrinsic *mobility* support
  - *Real-timeness* by adopting Fog computing
  - *Intelligent* network by adopting ML

Carnegie Mellon University

SmartFIRE
www.eukorea-fire.eu

Requirements and Principles

Global & Scalable · **Real-time** · **Mobility** · **Deployment** · **Reliability** · **AETHER**

- Thing to Thing (E2E) communication style as the norm
- Applied Fog-Computing as Edge network
- The unified Identifier for all of things (physical and virtual)
- Self-configuration of Non-structured / flat typed TID
- Information-Centric communication for Interworking
- Scalable and Flexible Mapping system
- IP compatible Service support
- Global Testbed

AETHER

- Name and ID
  - Application uses Name as URI
  - Self-certifying ID assigned to Things, Information

- Edge (Fog computing) and Interworking
  - Exploiting ICN
    - Pub/Sub networking, Cache

- IP core (as Internet)
  - Exploit ID/Locator separation scheme
    - Mapping System development (Name or ID to IP address)

- Advantages
  - Intrinsic security, mobility -> ICN, ID/LOC separation
  - Real-timeness -> Fog computing (In network cache)
  - Scalable and Global Interworking -> ICN (Pull model in network)
  - *Intelligent Autonomic network -> ML*

Basic scenario
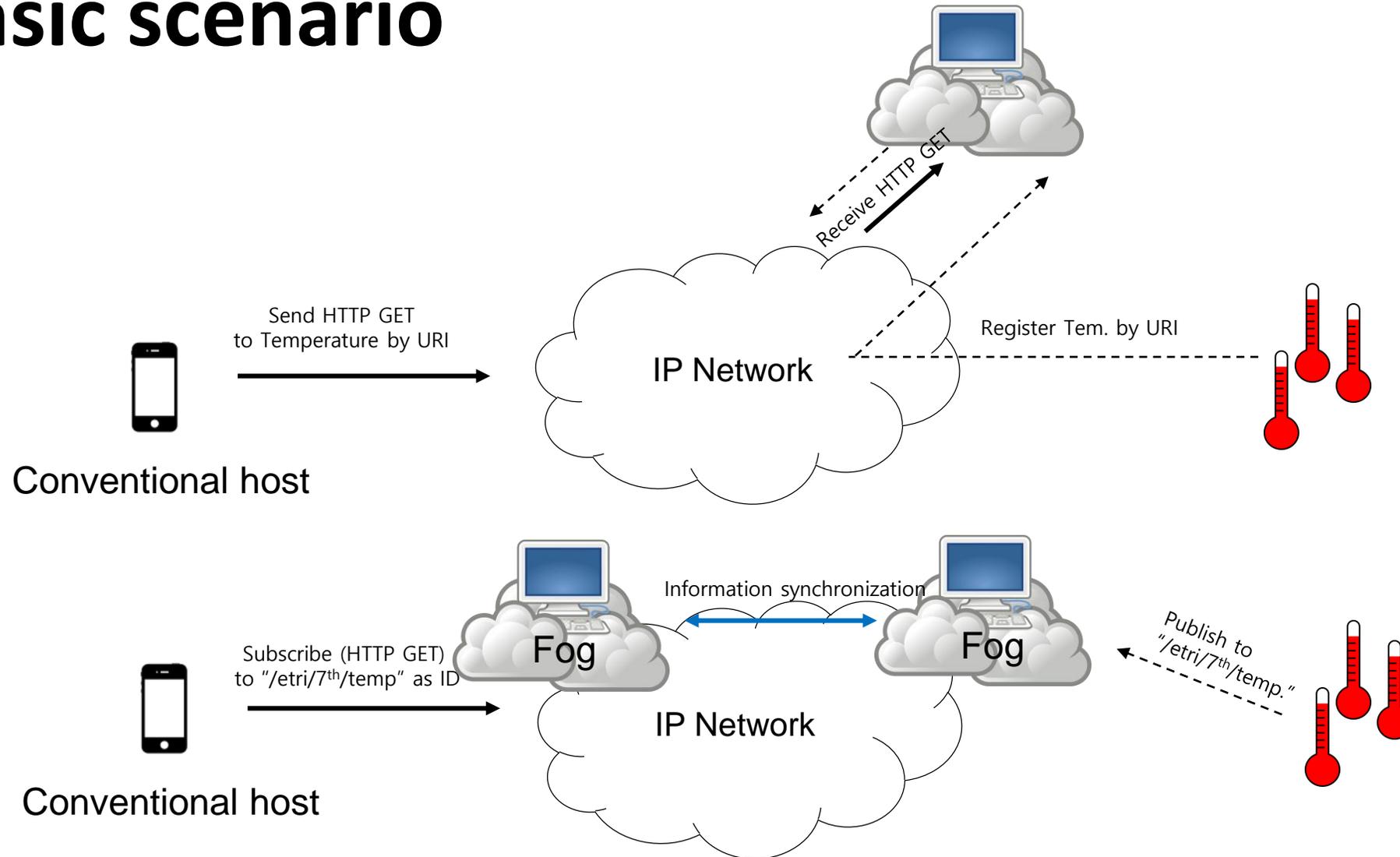
Summary

- AETHER for future IoE networking
  - Start from December, 2015 ~

- Design of AETHER
  - Both Self-certifying ID and Name
  - Enabling technologies
    - ICN
    - Fog-computing
    - ID/Locator separation

- ICN related works in ICNRG
  - Discuss about NRS design, such BF-based
  - Discuss about NRS requirements.
  - Future, we'll participated in ICN-IoT work