Hyper-connected IoE Network Technology

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ICNRG
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Challenges

- Computer system
- Desktop
- Laptop
- Smart Devices
- Things

Connected devices # (>10^12)
Mobile oriented
Traffic volume

1970: TCP/IP designed

Challenges!

- Size (constrained device)
- Real-time & Reliable communication

New requirements

2020: Traffic volume

AETHER@ICNRG - Interim
Emerging Technologies

• SDN
  • Control Plane (CPI) and Data Plane (DPI) 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~

Future Internet

Funded by NST

2010

mofi
Mobile Oriented Future Internet

• Mobile Intrinsic Arch.
• ID/Loc separation
• SDN based Mobile domain
• ID space compatible with IPv6

2013

NET

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

2016

AETHER

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

Architecture for Internet of Everything Everywhere
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

• 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

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

- Global & Scalable
- Real-time
- Mobility
- Reliability

- 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

Conventional host

Send HTTP GET to Temperature by URI

Register Tem. by URI

Subscribe (HTTP GET) to "/etri/7th/temp" as ID

Information synchronization

Publish to "/etri/7th/temp"
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