ISO/IEC JTC 1/SC 41
Internet of Things and related technologies
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Initial Study Report on SRG10 "Secure networking framework"

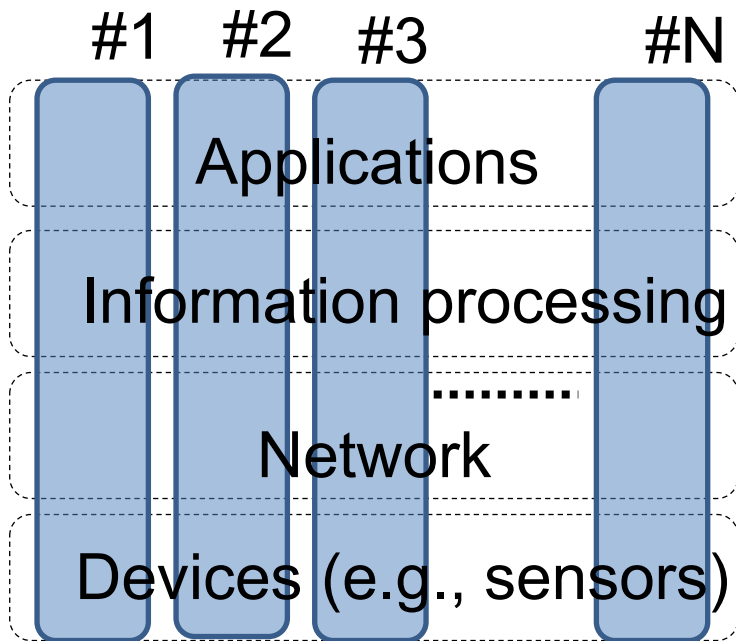Tetsuya Yokotani

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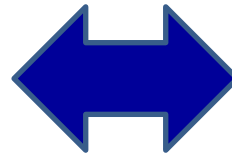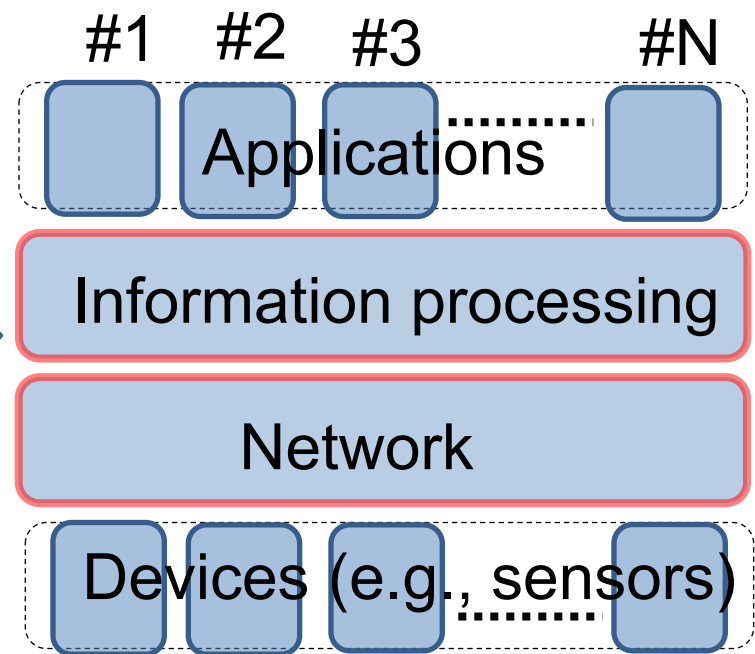9. Scope of standardization

1. IoT architecture
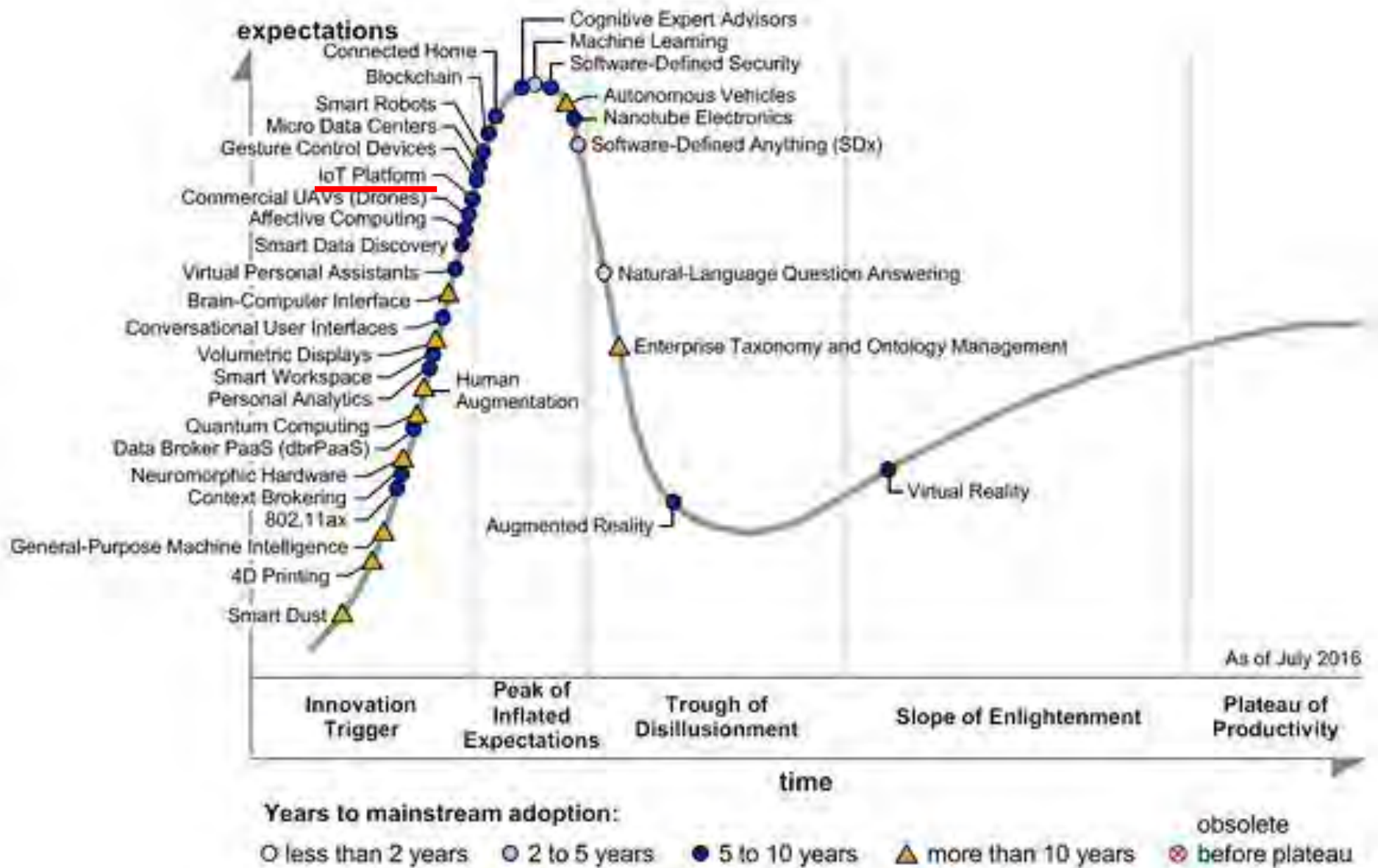
Vertical vs. Horizon

Vertical architecture

#1   #2   #3   #N

Applications

Information processing

Network

Devices (e.g., sensors)

Horizon architecture

#1   #2   #3   #N

Applications

Information processing

Network

Devices (e.g., sensors)

1. IoT architecture

Comparison on "Network" point of view

	Vertical architecture	**Horizon architecture**
Advantages	Optimization for each application	Commonality for every application
Disadvantages	Individual network infrastructure for each application	Turning of specifications for every application
Remarks	LAN or proprietary networks	WAN or standardized networks

2. IT technology map for IoT

Reference: Gartonr IT Technology map 2016

3. Network configuration for IoT

Applications

Information Platform

Wide Area Network (WAN) based on IP

Also for IoT

Optical network

Optical network

Mobile network

Optical network

Mobile network

Gateway

Area Network /
Proximity Network

For IoT

Devices

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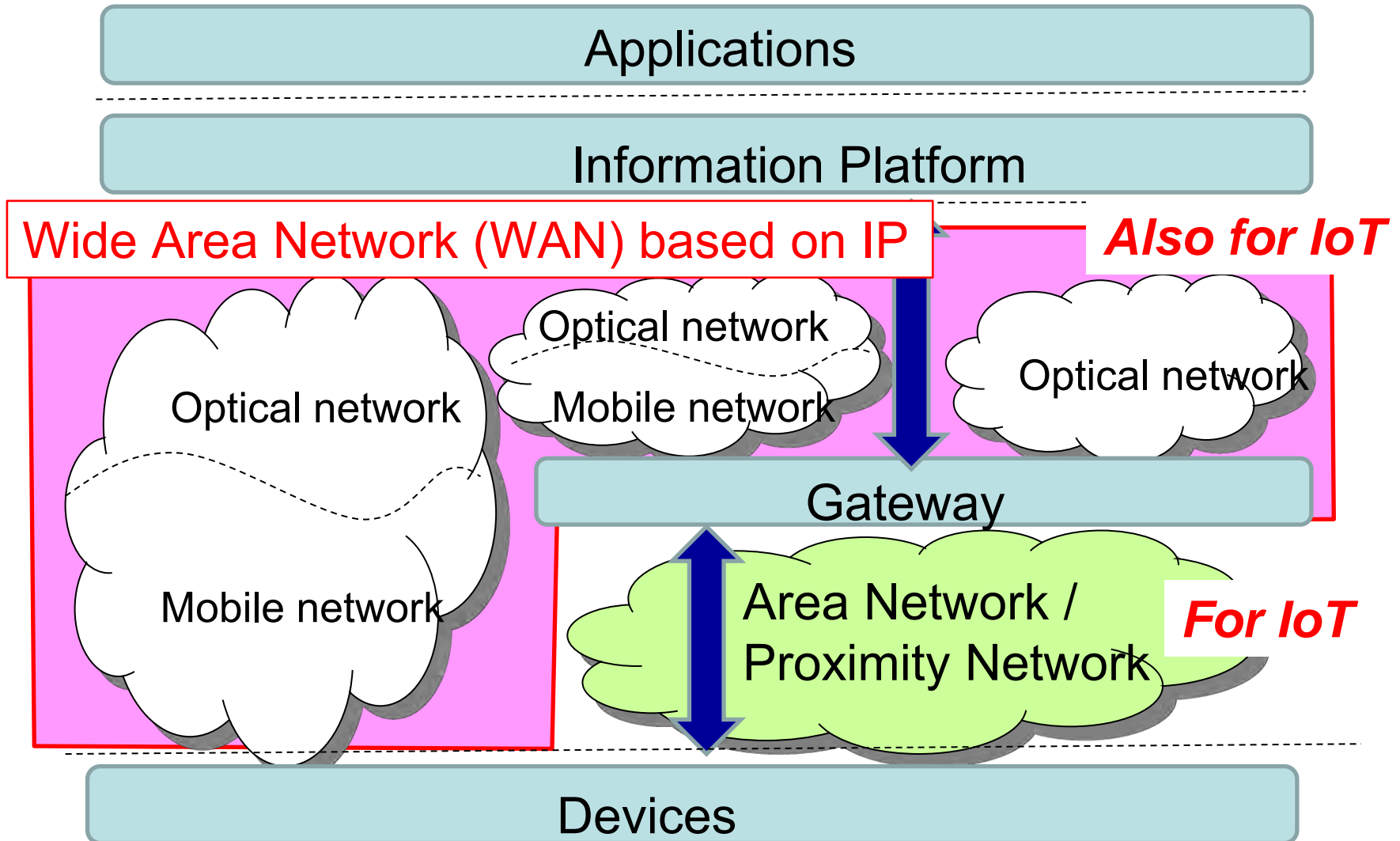
3. Network configuration for IoT
Necessity of communication platform

Cost, Difficulty(Installation, Operation, Production, R&D)

Proximity network

WAN
(Communication platform)
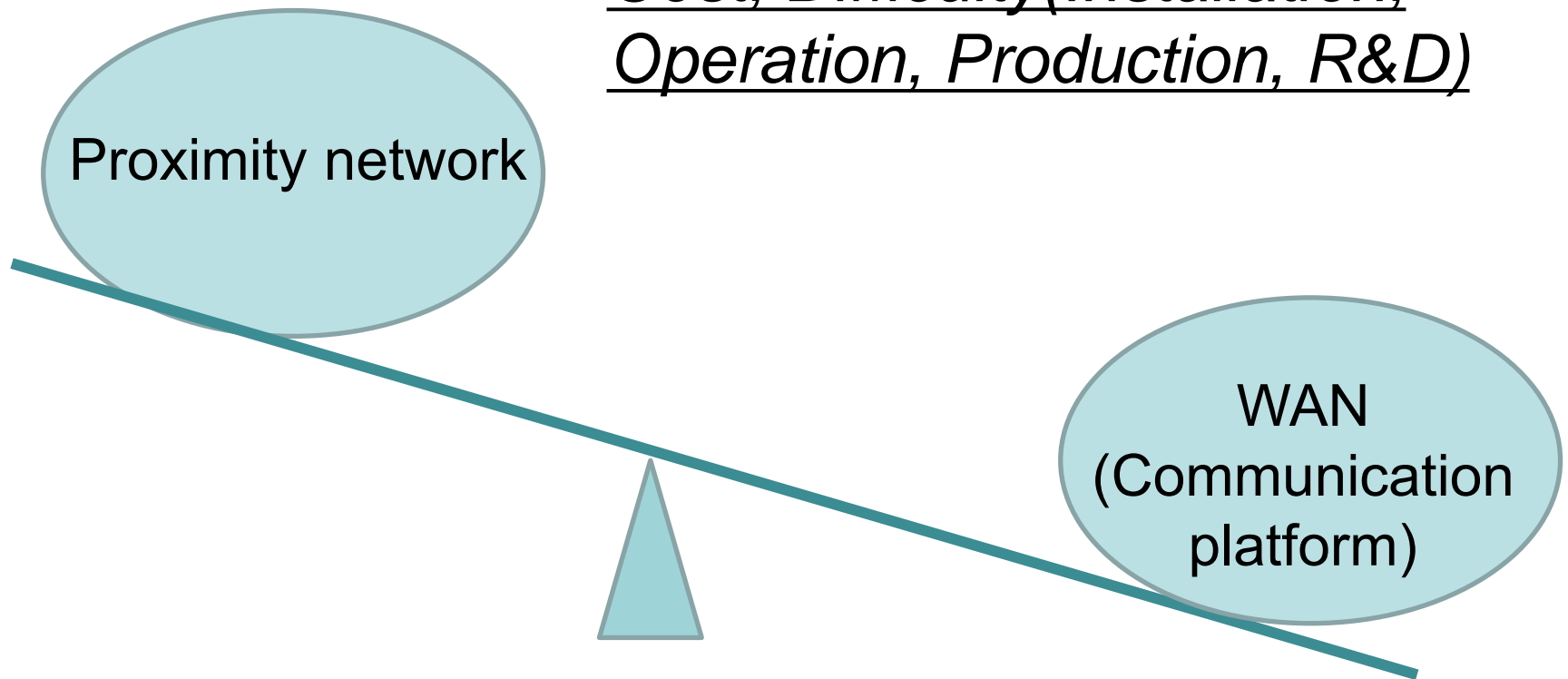
3. Network configuration for IoT
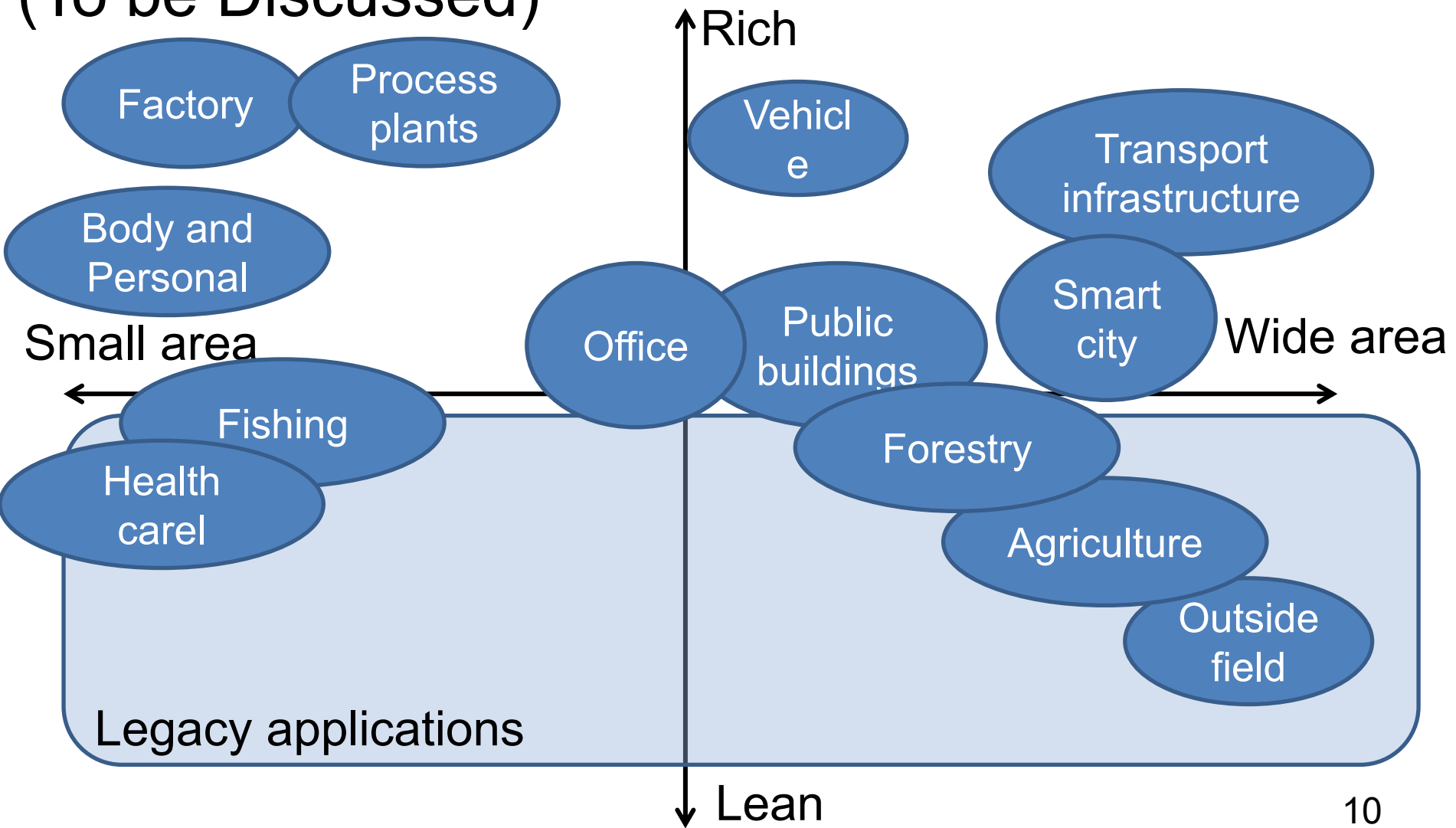## Network vs. Computing for IoT
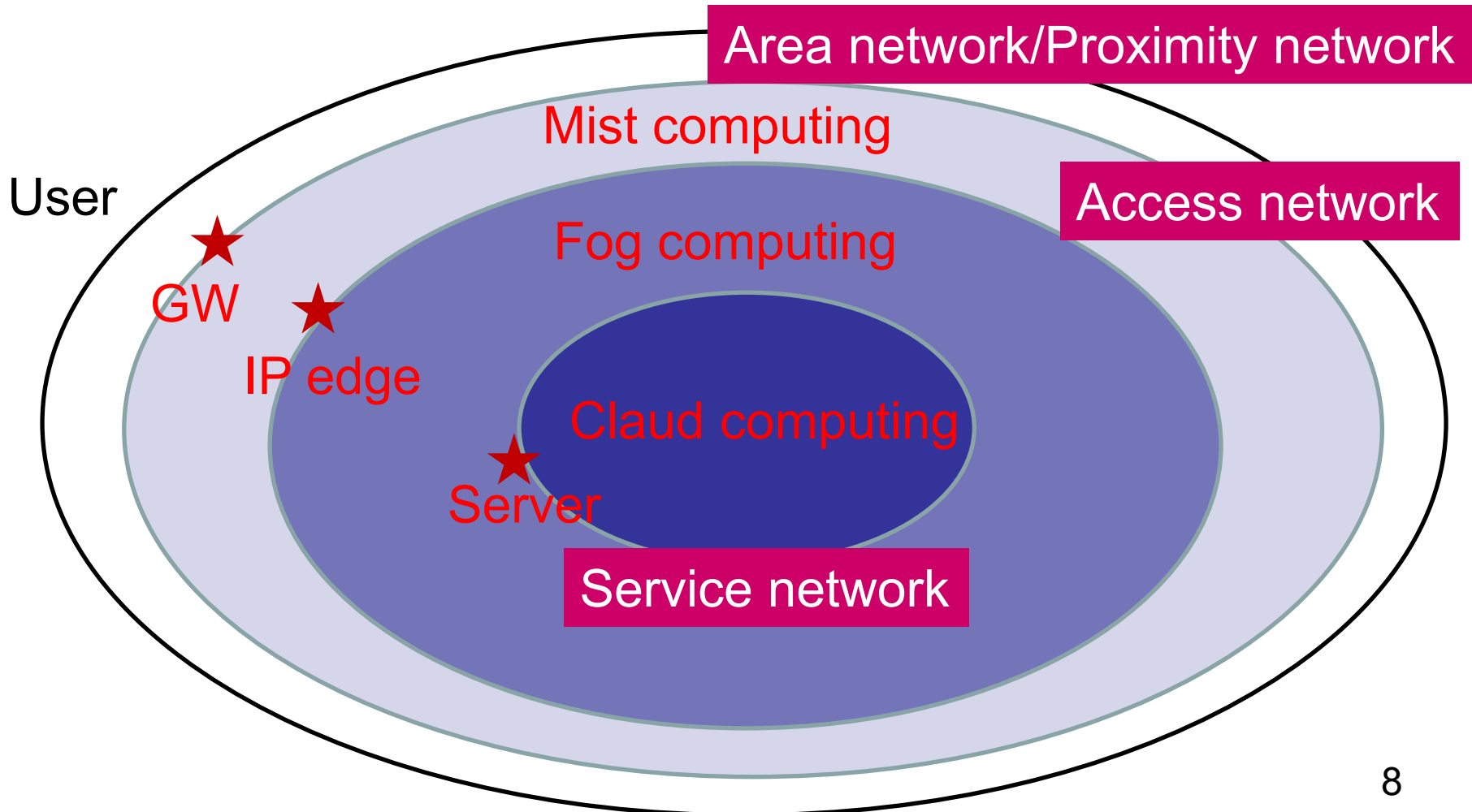
4. Typical applications

- Global (Outside fields)
- Transport Infrastructure
- Home
- Public buildings
- Offices
- Factories
- Process plants
- Agriculture
- Forestry
- Fishing
- Body and Personal
- Healthcare
- Vehicles
- Smart cities

Reference: "Technical Report on IoT Use cases, use cases submitted from 2015-2016", CD text v2

4. Typical applications
Relationship between applications and networks (To be Discussed)

Rich

Factory

Process plants

Vehicle

Transport infrastructure

Body and Personal

Small area

Office

Public buildings

Smart city

Wide area

Fishing

Forestry

Health carel

Agriculture

Outside field

Legacy applications

Lean

5. Requirements for IoT network

Traffic characteristics of IoT and Legacy

	IoT		Legacy services

Criteria	Not Required Required
Bandwidth of source	
Delay	
Delay variation	
Loss	
Network resilience	
No. of access	Total BW: Large

5. Requirements for IoT network

Traffic characteristics of IoT and Legacy

**Contents in the ubiquitous society
From tiny to huge ⇒ Scale free**

NICT AKARI Project
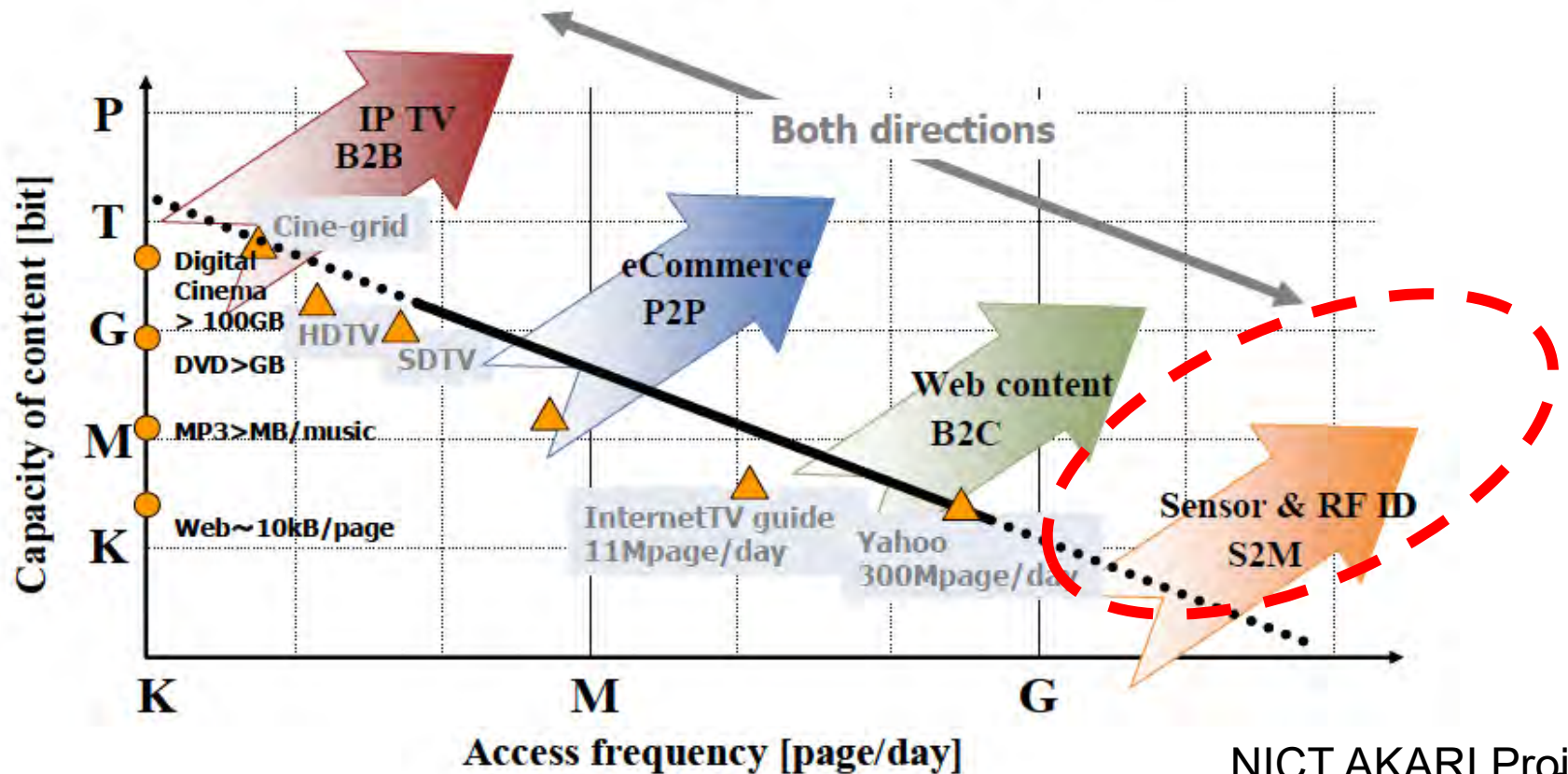
5. Requirements for IoT network

General
- Scale free (User traffic, Management, Operation)
- IP base (Compliance with Internet infrastructure)

IoT Specific
- Light weight processing
- Timeliness for some applications

6. Key issues for IoT network

Network edge (IoT device)
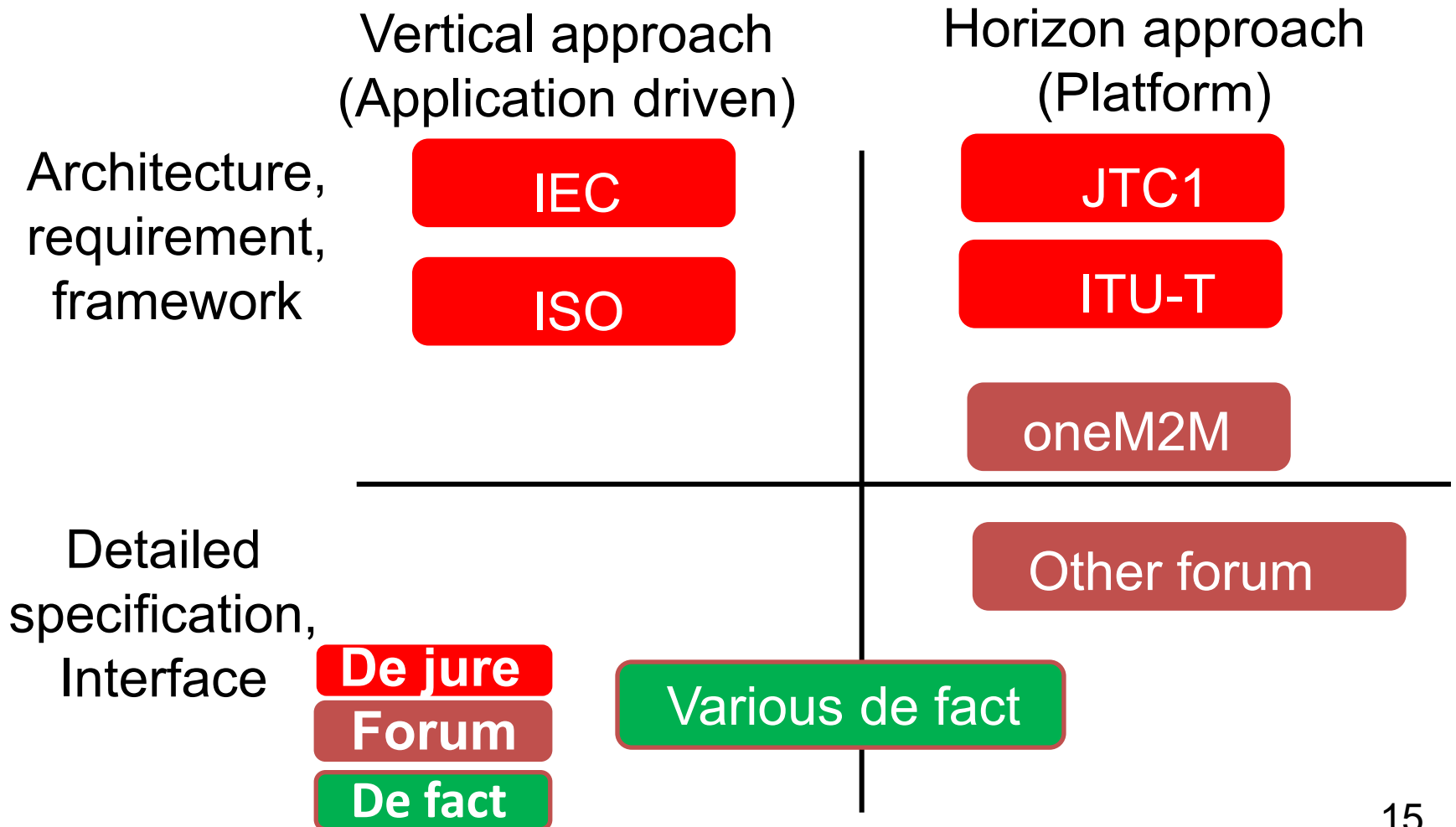- Effective packet processing to mitigate processing power

End-End System
- Low overhead by IP and related protocols
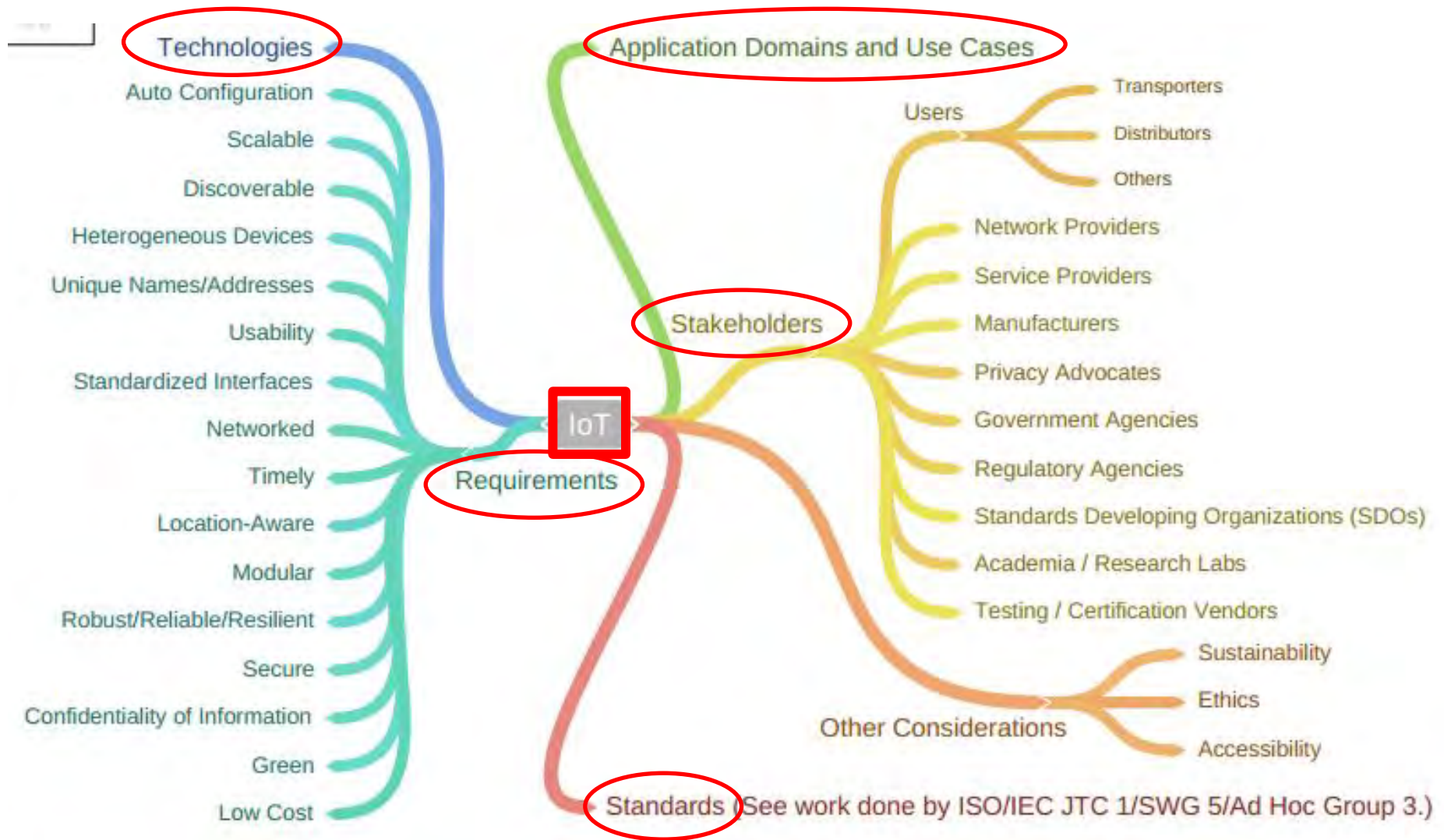- Simplified transfer

Security, Safety and Privacy
- Secure communication for non intelligence IoT devices, e.g., sensors

7. Survey of standardization trends for IoT

IoT Mind Map specified by JTC1

JTC1 activities for IoT standardization
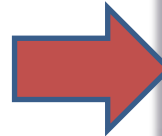
Technical Report

⬇

Reference architecture
Terminology
Use cases

WG10

➡

IoT RA functional view
IoT RA system view
IoT RA communications view
IoT RA information view
IoT RA usage view

⬇

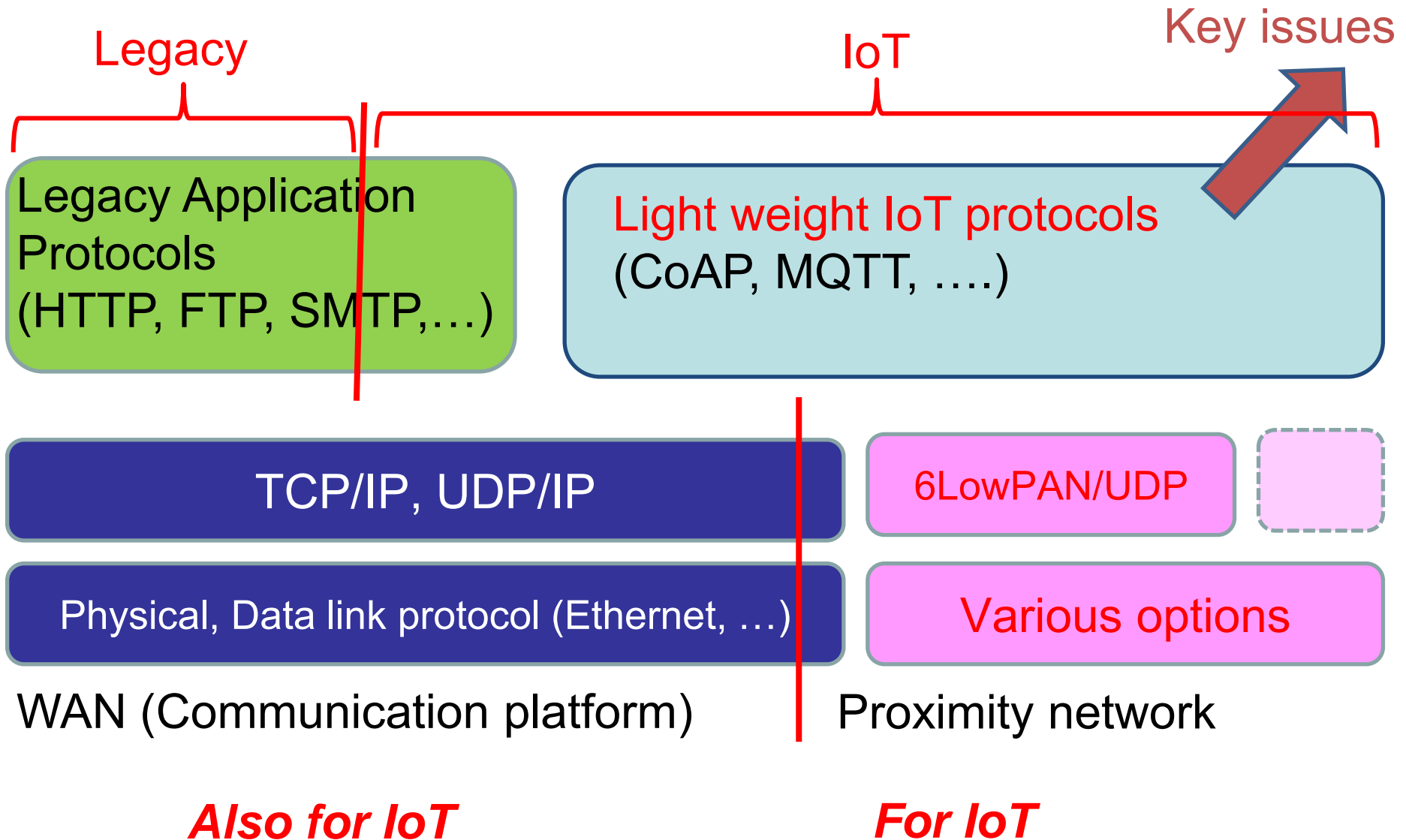**Secure Networking framework**

⋮ SC41 ⋮

ITU-T activities for IoT standardization

SG13 Future networks (& cloud)
SG15 Transport, Access and Home
SG20 IoT and applications, smart cities

Standardization of Communication protocols

Legacy

IoT

Key issues

Legacy Application Protocols
(HTTP, FTP, SMTP,…)

Light weight IoT protocols
(CoAP, MQTT, ….)

TCP/IP, UDP/IP

6LowPAN/UDP

Physical, Data link protocol (Ethernet, …)

Various options

WAN (Communication platform)

Proximity network

Also for IoT

For IoT

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8. Communication technologies for IoT

Possibility of current IP base communication

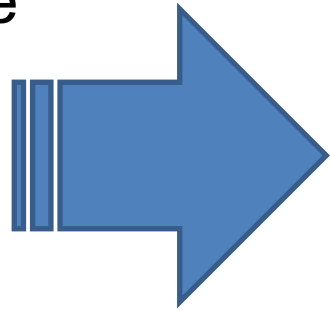Heavy Processing in IoT

IP

Data link layer

Physical layer
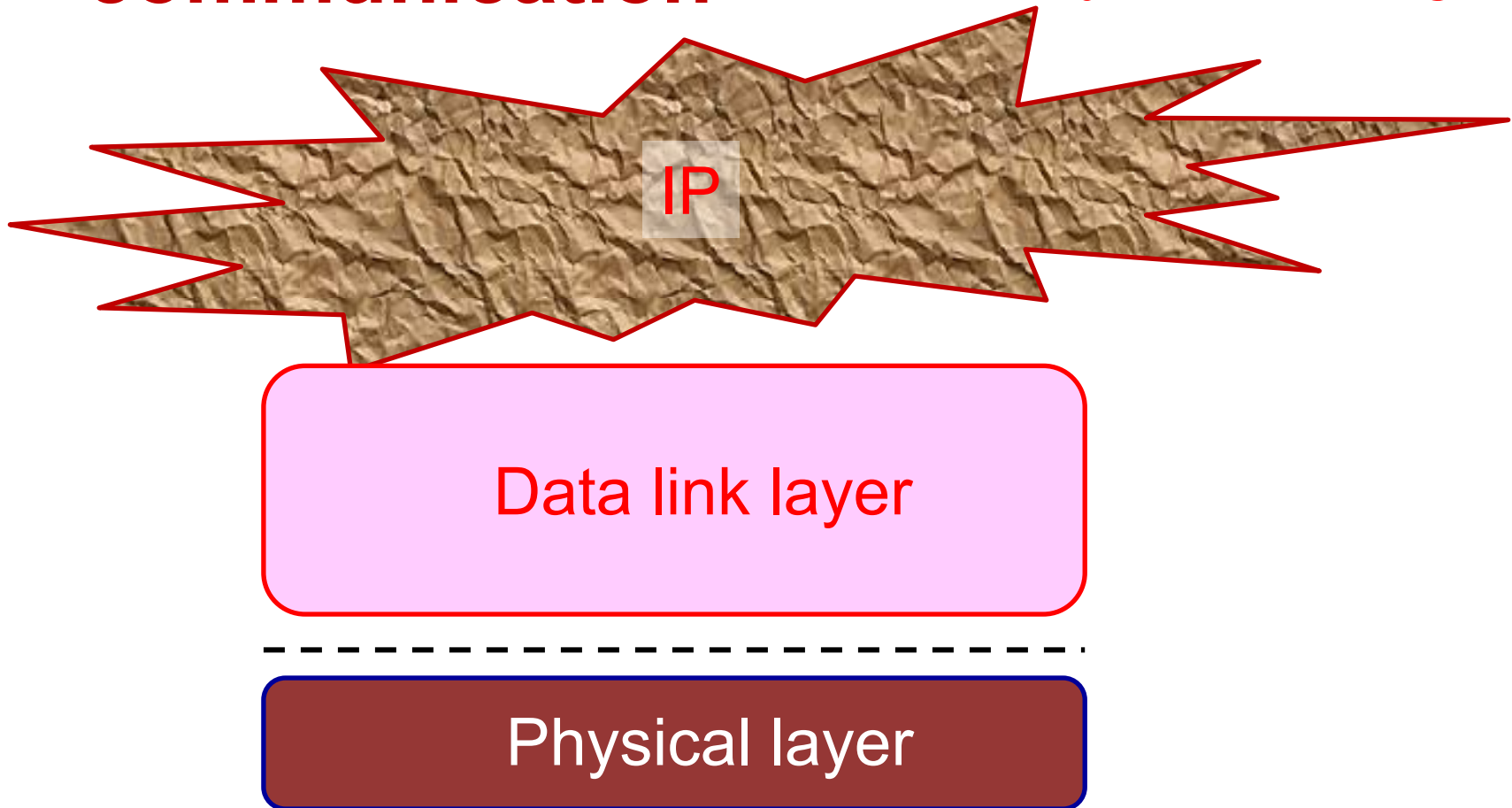
Optimization of IP for IoT

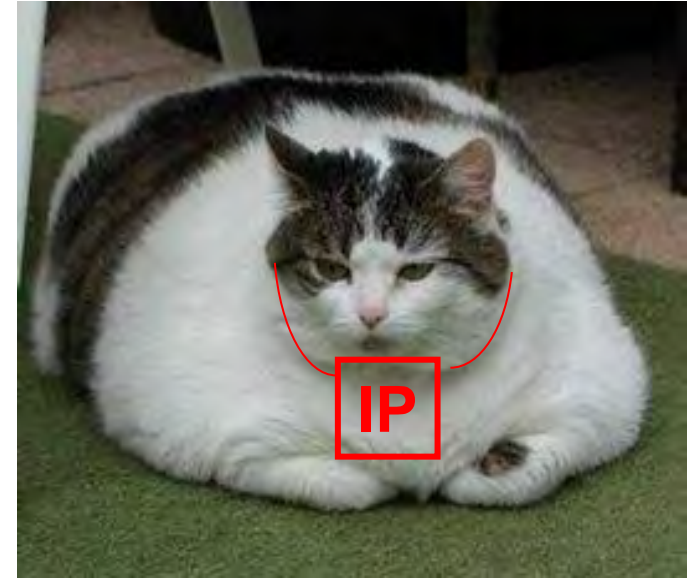IP may be heavy in some applications of IoT!

Architecture
• Connectionless
• Packet driven
• U/C mixture

Tuning for IoT

Function
• Transfer
• Routing
• QoS control
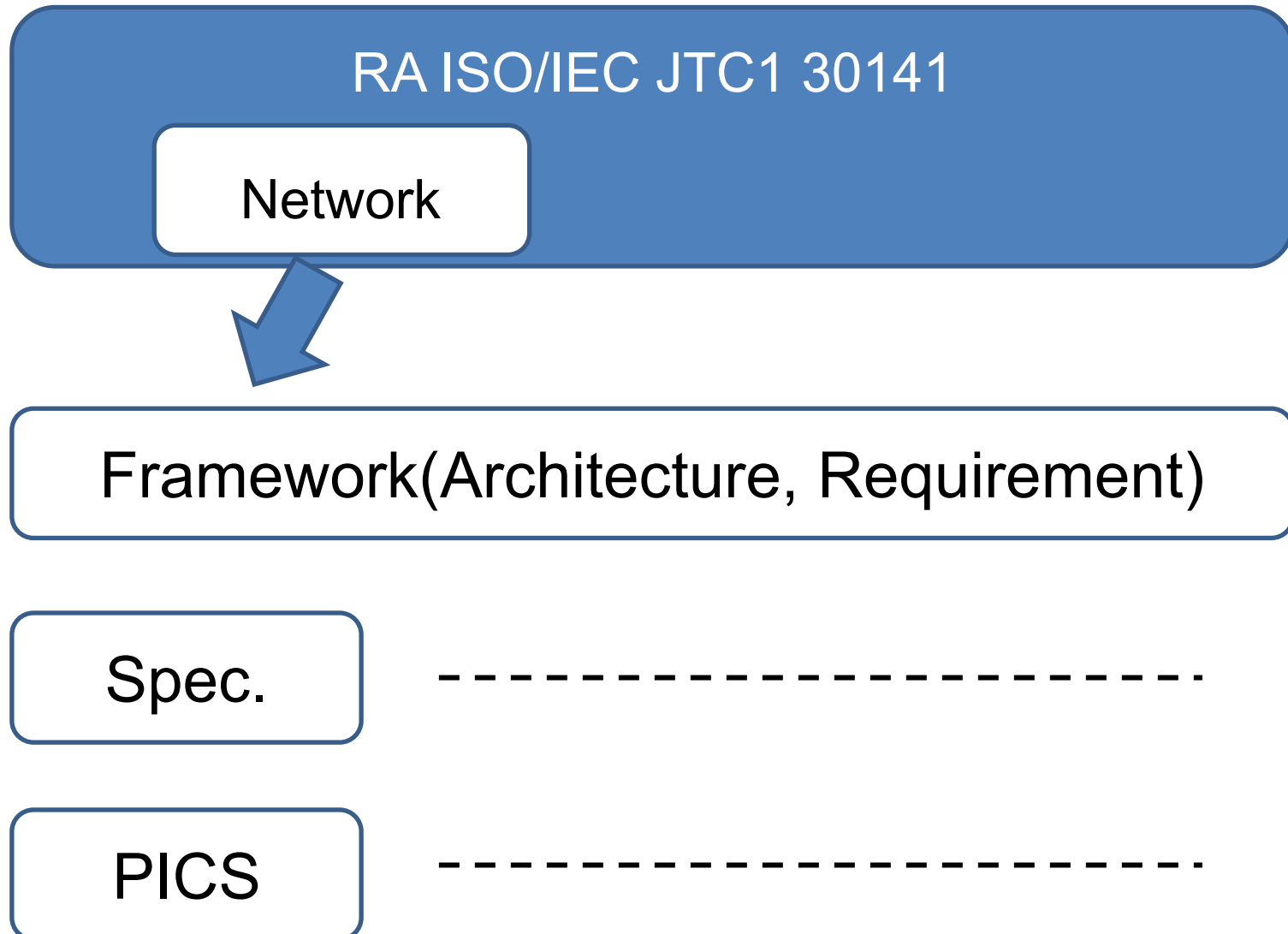• Management
• Security
• ……..

• Reduction of # of packets
• Reduction of processing
• Optimization of application protocols

Technical issues and their solutions

- Traffic control

- Network virtualization and edge computing

- Lightweight protocol (e.g., named base protocol)

9. Scope of standardization

RA ISO/IEC JTC1 30141

Network

Framework(Architecture, Requirement)

Spec. -

PICS -

PICS: Protocol Implement Conformance Statements)

Proposed document stricture

Part 1: Architecture and Requirements on Communication Network for IoT Platform

Part 2: Communication Protocol for IoT Platform

Part 3: PICS Proforma of IoT communication Protocol

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