NXP ADVANCED, SMART, SECURED IOT PLATFORM WITH SENSOR FUSION, LOCAL AND CLOUD ANALYTICS

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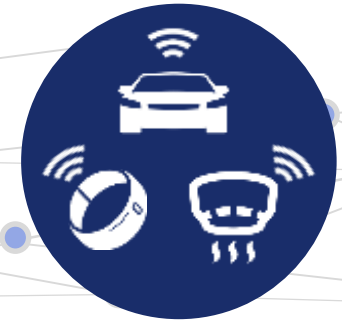
SECURE CONNECTIONS FOR A SMARTER WORLD

SECURE CONNECTIONS FOR A SMARTER WORLD

Everything **Connected**



1B+ additional consumers online, **30B+** connected devices

Connectivity

Everything **Smart**

40B+ devices with intelligence shipped in **2020**

Processing

Everything **Secure**

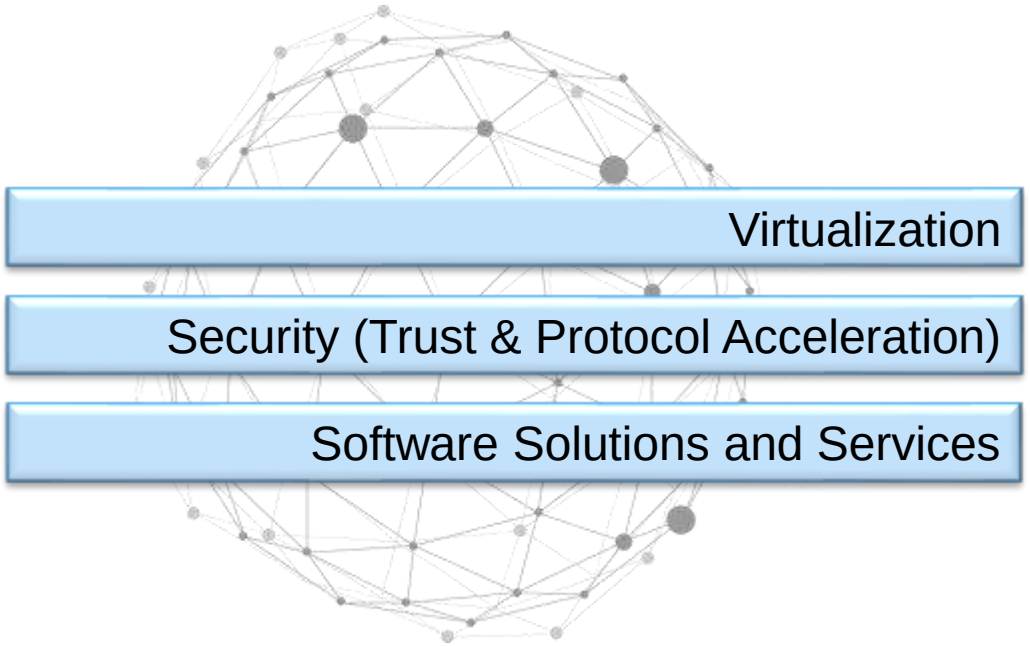
Potential savings to economy up to **half trillion dollars**

Security

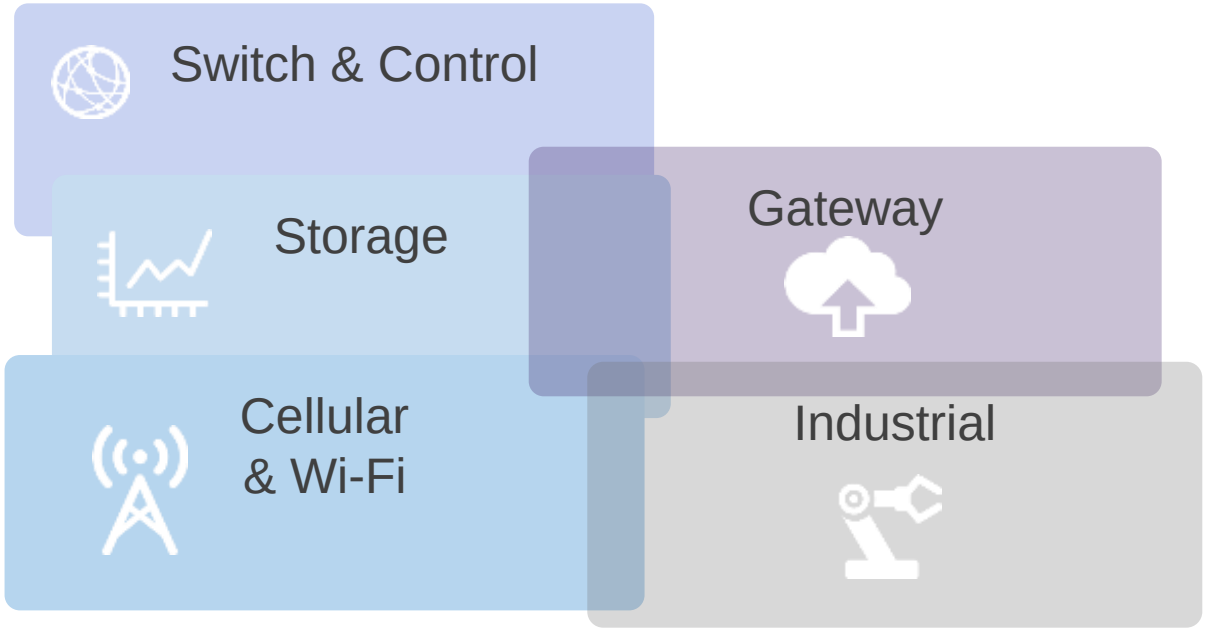
Source: Euromonitor; Gartner; ARM Holdings; UBS; Center for Strategic and International Studies; McAfee, NXP analysis, International Telecommunications Union

Who is Digital Networking…

Enabling Secure Infrastructure
with Cost- & Power-Efficient Solutions
and unique expertise



DN Targeted Solution Segments



Silicon and Software Provide the Solutions our Customer Require

Multicore Processors

35W	LS2088
	LS2080
	LS1088
	LS1046
	LS1043
	LS1021
1W	LS1012

Smart Home

IOT Gateway

High-End GW

Retail Router

Services Routers

Carrier WAP

Enterprise WAP

Wi-Fi Extender

vE-CPE

vCPE

SD-WAN Access Node

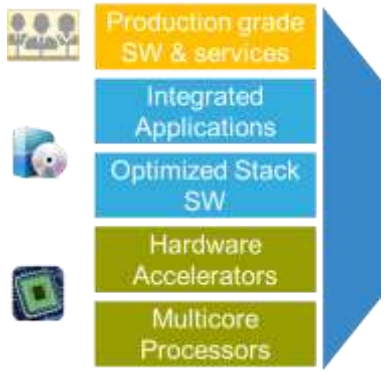
100Gbps Services Switch

25Gbps Services Switch

NFV infrastructure

Roadside Infrastructure

Solutions deployed by ODM and OEM partners



Software Platforms

IOT & Home | GW | WLAN | vCPE | Switch | NFV | ITS

Enablement Software

Secure Embedded & Enterprise Linux Distributions

AGENDA

- IoT Time to Market Challenges (Secured, Elastic IoT services, Automation)
- NXP Virtualized IoT Platform – LS102x/104x (Advanced, Smart, Secured)
  - Advanced (Virtualized Platform using Docker Container VMs)
    - Multi-Cloud, Multi Gateways for Multi tenant services
  - Smart (Sensor Fusion, Distributed Analytics in Gateway and Cloud)
  - Secured (Firewall, VPN/IPSEc tunnel etc.)
- ODM IoT Gateway example: Accton LS1043 integrated WLAN, IoT, vCPE Product
- Summary

01.

IoT Time to Market Challenges

Secured, Elastic IoT services, Automation

IOT System integration Solutions

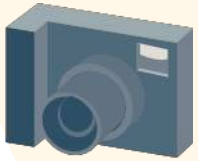
Transportation

Finance

Security &
Surveillance

Healthcare
Remote monitoring

IOT



Consumers

Smart Buildings
Cool, Heat …

Meters & sensors

Industries
Electric, Gas, Cars…

Wearable

IoT Time to Market Challenges (Convergence of IoT with vCPE)

NFV Virtualized network Convergence with Virtualized IOT Gateway

Transportation

Finance

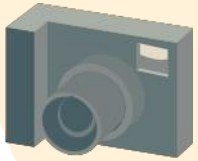
Security & Surveillance

Healthcare

Remote monitoring

Fast Time To market for new service introduction (inc. Secured IoT)

Elasticity Of Services (Scalable)



Consumers

Automation of on-demand services (& Dynamic Service Chaining)

Smart Buildings

Cool, Heat …

Meters & sensors

Industries

Electric, Gas, Cars…

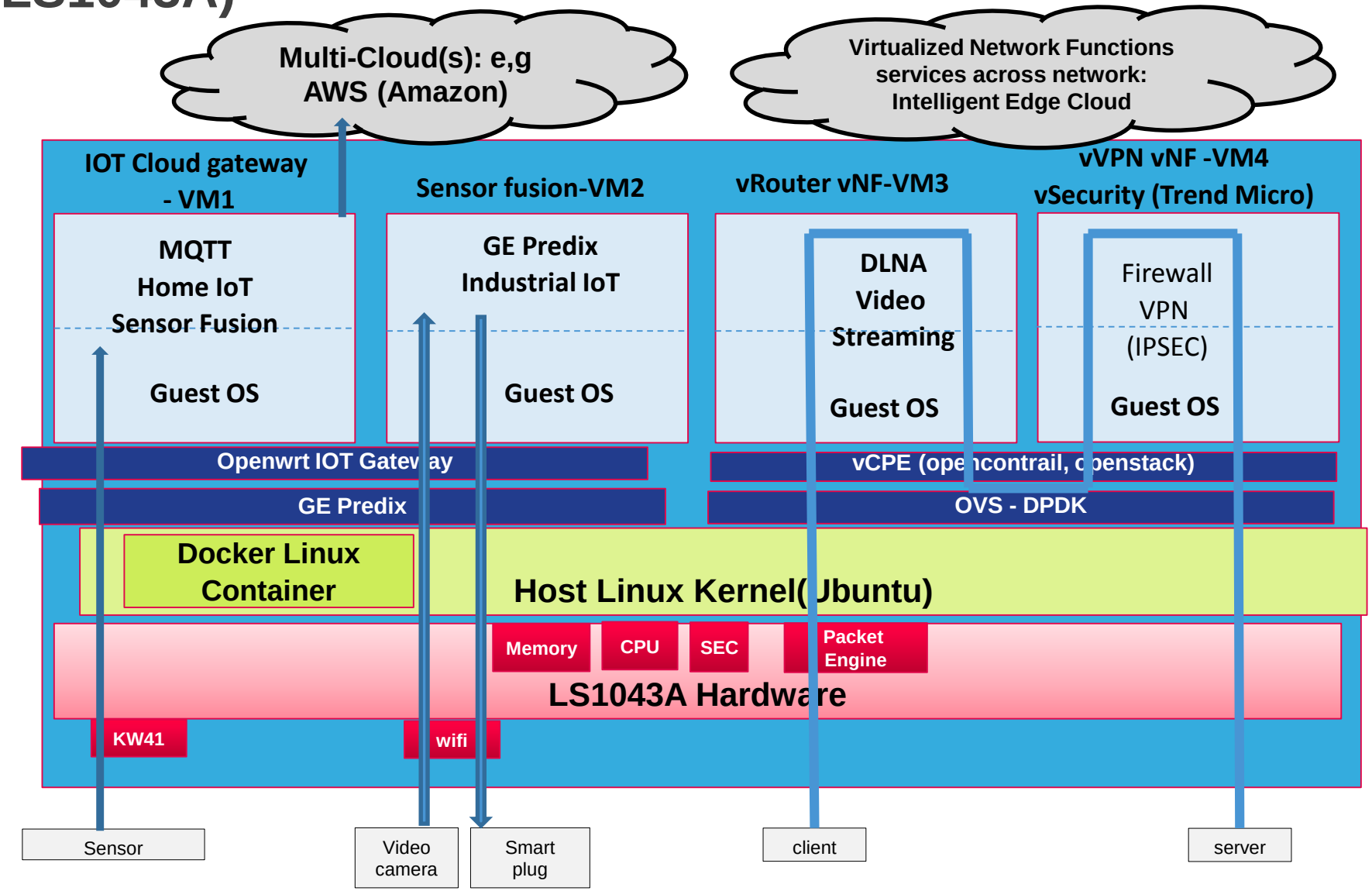
Wearable

02.

Advanced, Virtualized Platform (using Docker Container VM)

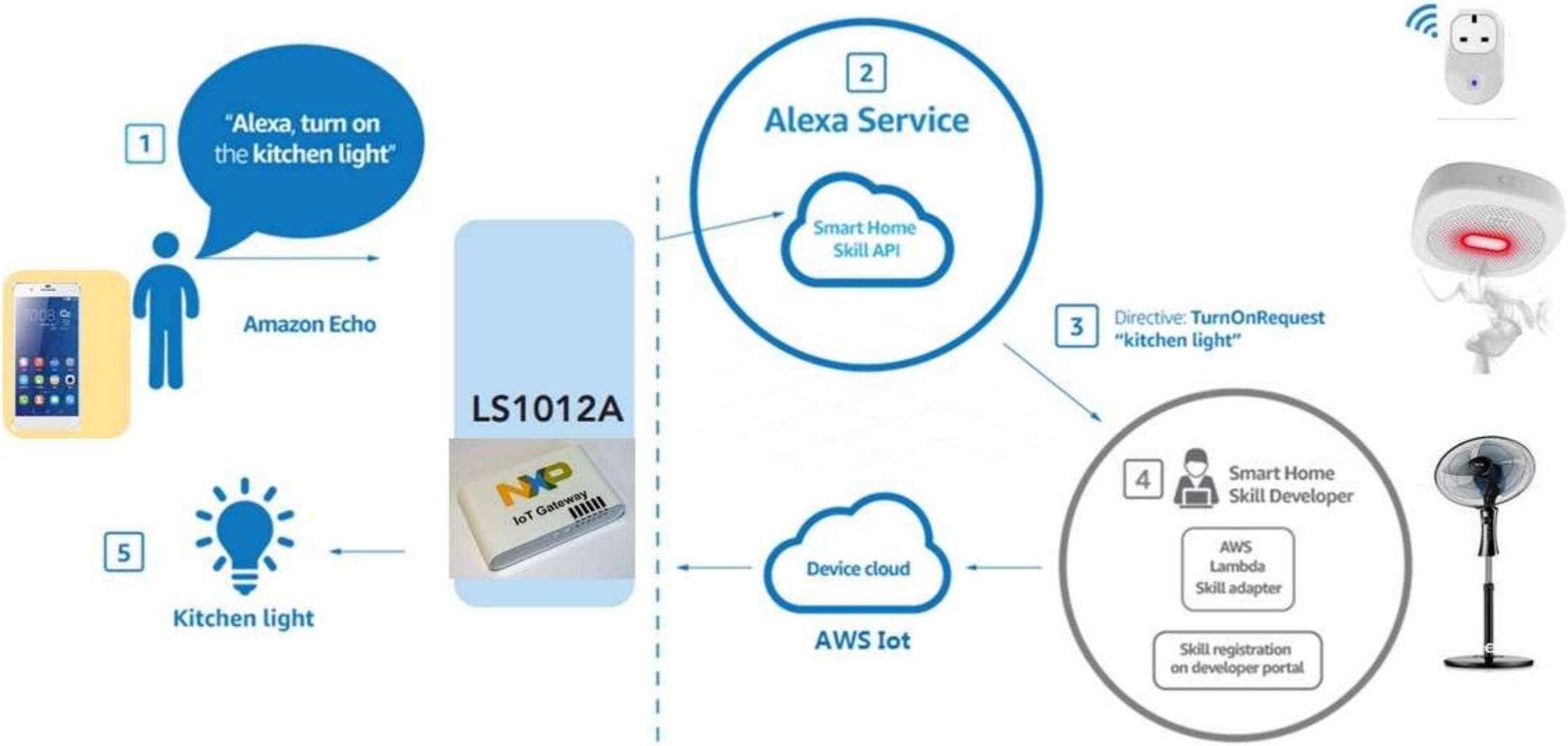
Multi-Cloud, Multi Gateways for Multi tenant services

Advanced, Virtualized IoT Solution Platform (LS1043RDB, Accton LS1043A)



Advanced, Multi-Cloud Virtualized IoT Platform (LS1043RDB)

- Elastic service deployment: multiple Containers, multi-tenants



Advanced, Multi-Cloud Virtualized IoT Platform (LS1043RDB)

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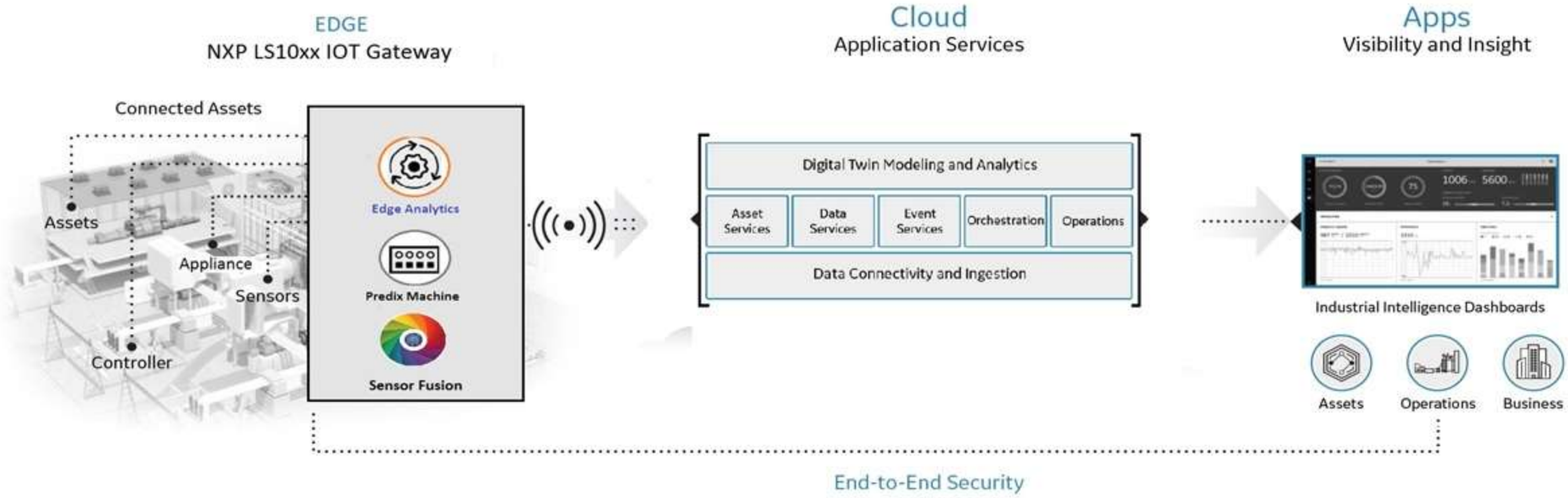
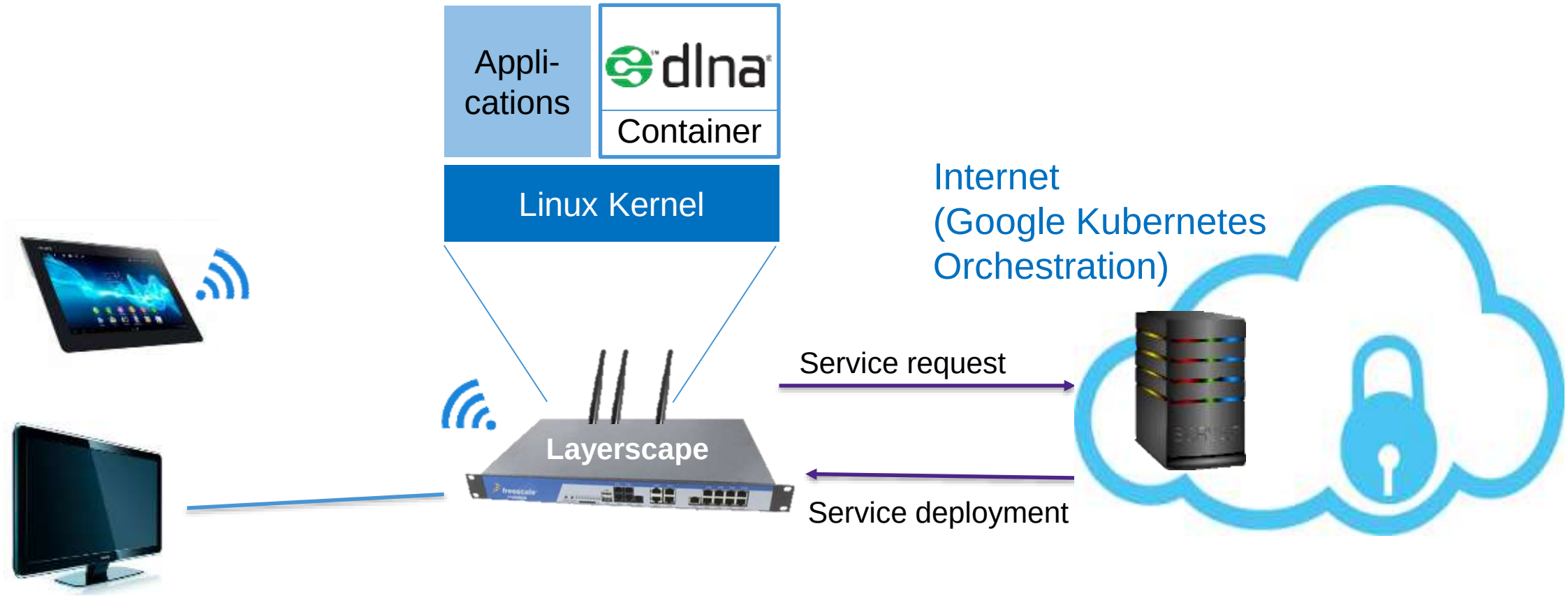


Advanced, Virtualized IoT Platform: with Docker container (VM) services (DLNA Media Streaming..) using Google Kubernetes Cloud Orchestration



Docker Container (VMs) supports:

Secured, Elastic IoT services, Automation with dynamic service chaining

Advanced, Virtualized IoT Platform video demo (LS1043RDB)

Docker Container VM #1

- Sensor Fusion Aggregation (Rule-based, local vs cloud analytic, actions)
- Elastic: - easy to dynamic loading of another IoT Gateway (GE-Predix Industrial Gateway); https://www.predix.io/

- **Docker Container VM #2**
- DLNA media Streaming

- **Docker Container VM #3**
- Security packages – Firewall, VPN/IPSEC tunnel, Trend Micro Deep packet inspection etc

Demonstrate VM isolation: (Destroy DLNA VM #2, IoT VM #1 continues running)
Then relaunch DLNA VM #2

03.

Smart

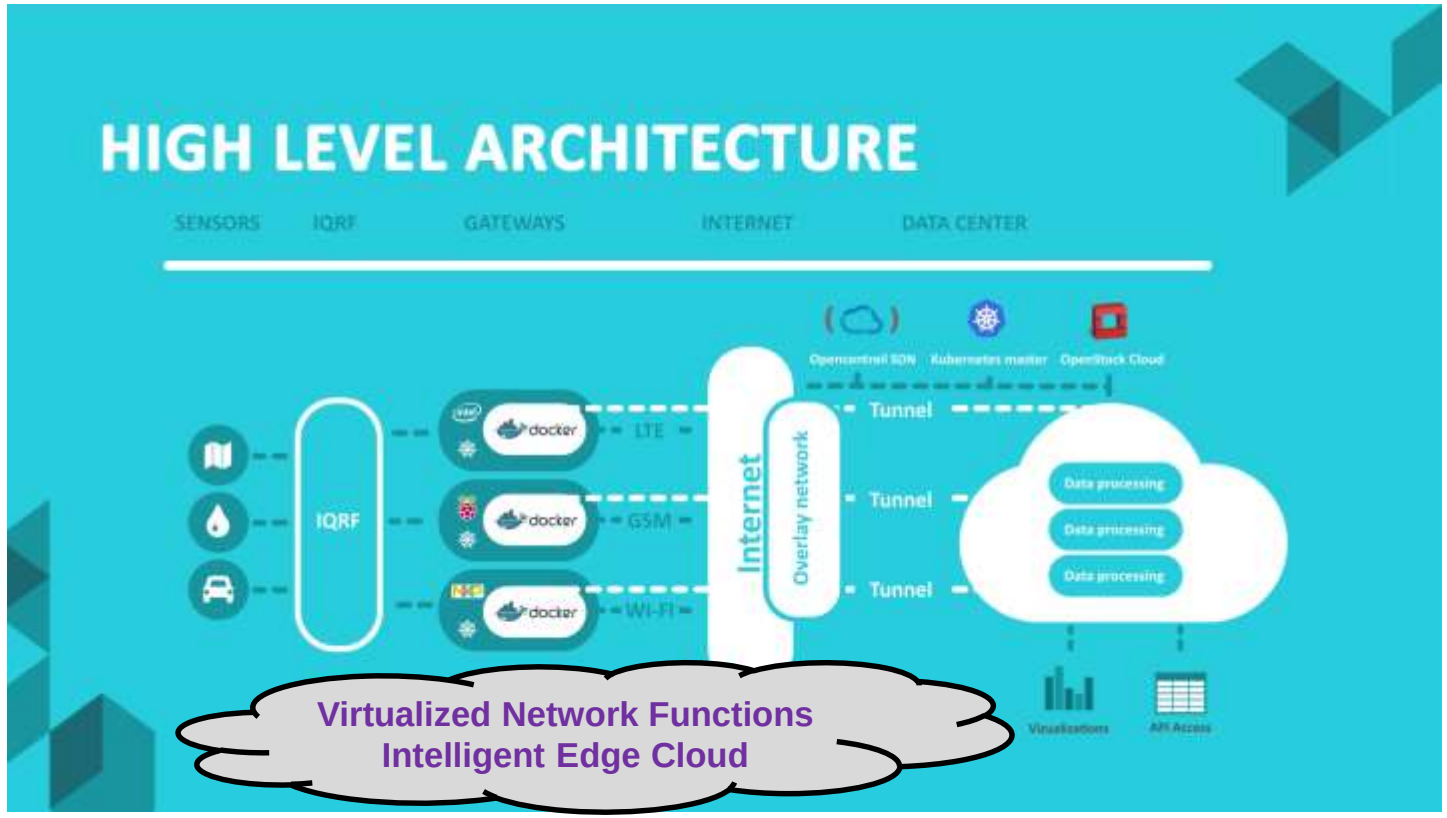
Sensor Fusion, Distributed Analytics (Gateway and Cloud)

Smart, Intelligent Edge: SDN/Openstack & Google/Kubernates Converged IoT Platform supports Virtualized, Docker Containerized (VM) IoT Services

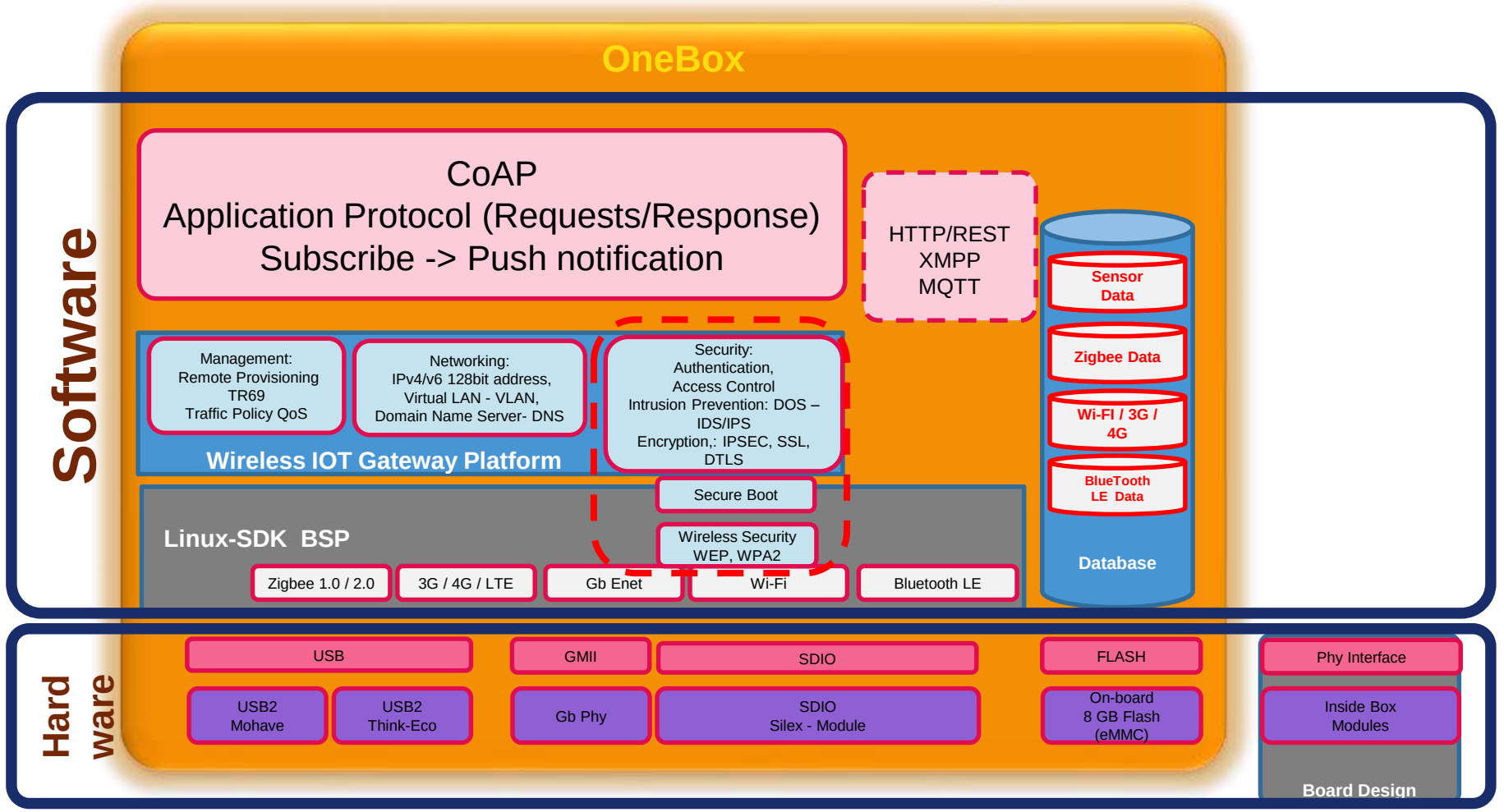
- **Open source software platform**
  Leverage open source SDN platform: OpenStack, Kubernetes, Docker, OpenContrail, OpenFlow etc.

- **HW and vendor independence**
  No vendor lock-in on both software and hardware side. IoT Gateway CPU must have either x86/64 or ARM architecture.

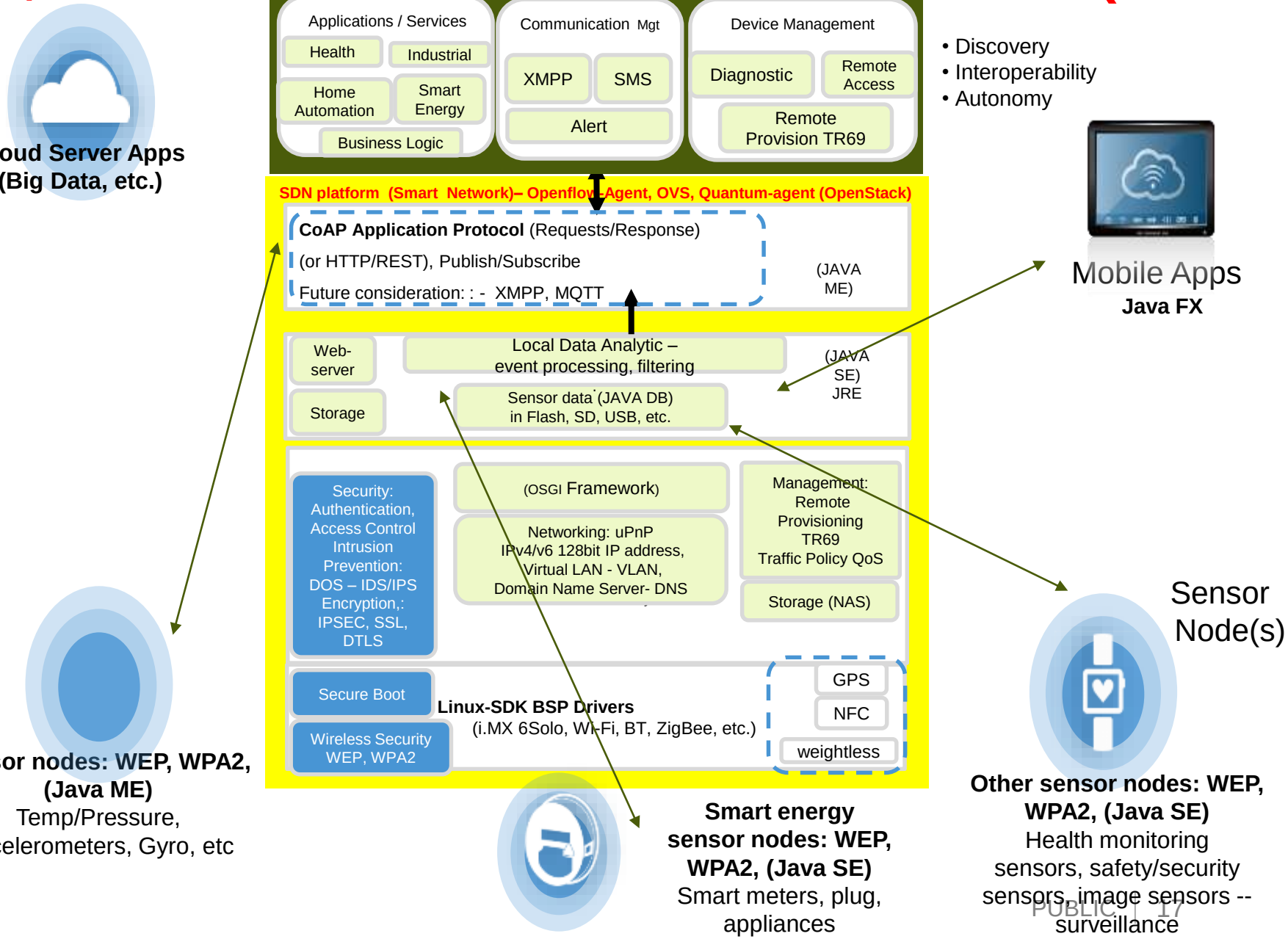
- **Interoperable SD-IOT Platform supports Virtualized IoT Services (Software Defined IoT Platform)**
  Open, standard-based IoT platform collaborating multiple IoT use cases. For instance IoT gateways can be used in the street lamps for counting objects the same way as in the smart factory or industry 4.0 application.



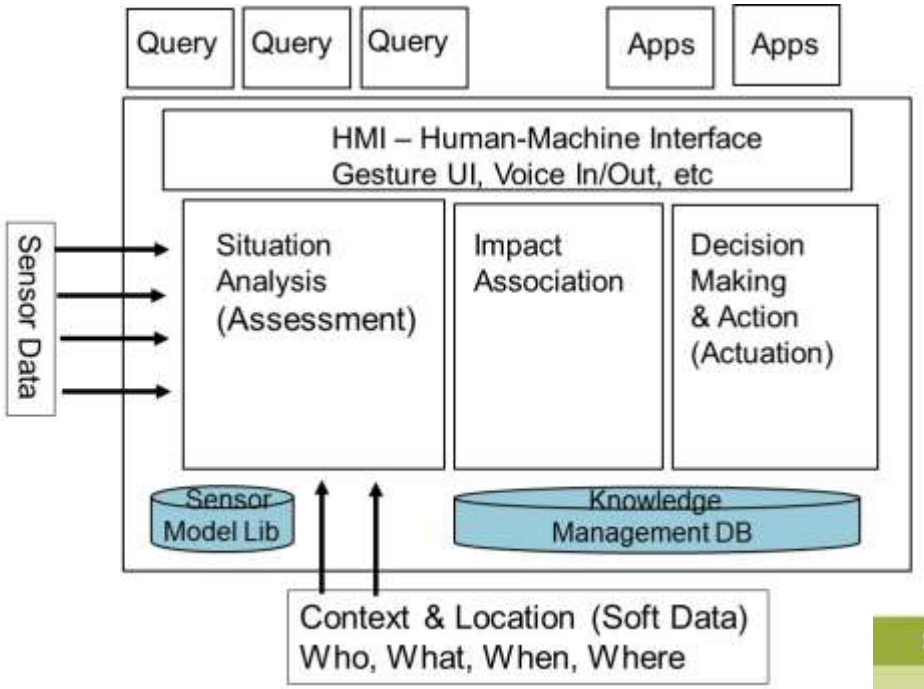
NXP Advanced, Smart, Secured IoT Software Platform



NXP Smart, Secured IoT Service-Delivery Platform (With Cloud API)

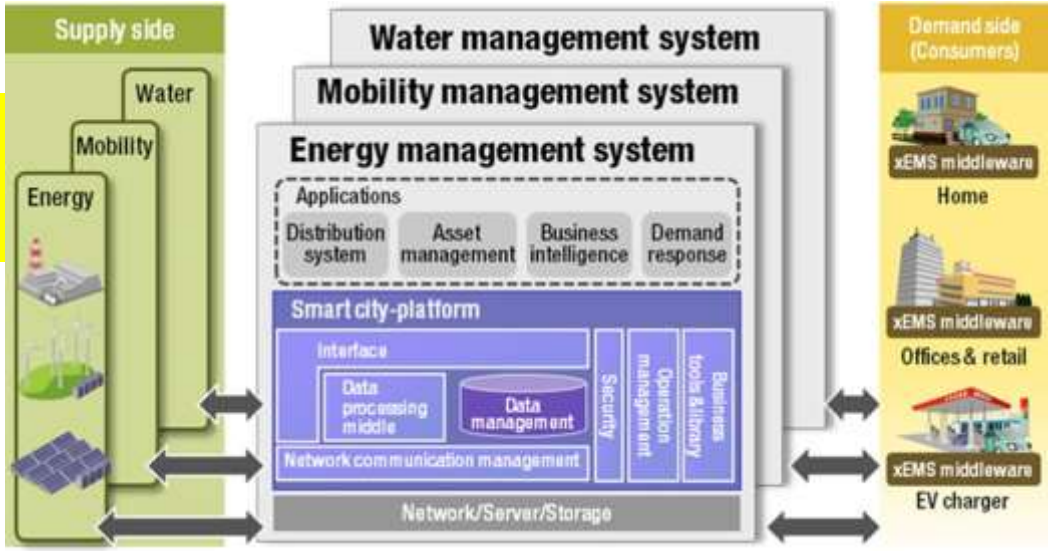


Smart, Distributed Sensor Fusion
(Distributed Analytics and Actions @ Gateway and Cloud)



- Rule-based, table-driven,
- Easy to update knowledge-base

Distributed Sensor Fusion Framework



04.

Secured
(Trusted IoT Platform)
(Firewall, VPN/IPSEc tunnel etc.)

NXP's Advanced, Smart, Secured Wireless Gateway

LS104x Multi-mode wireless: Secured, Virtualized IoT service Gateway

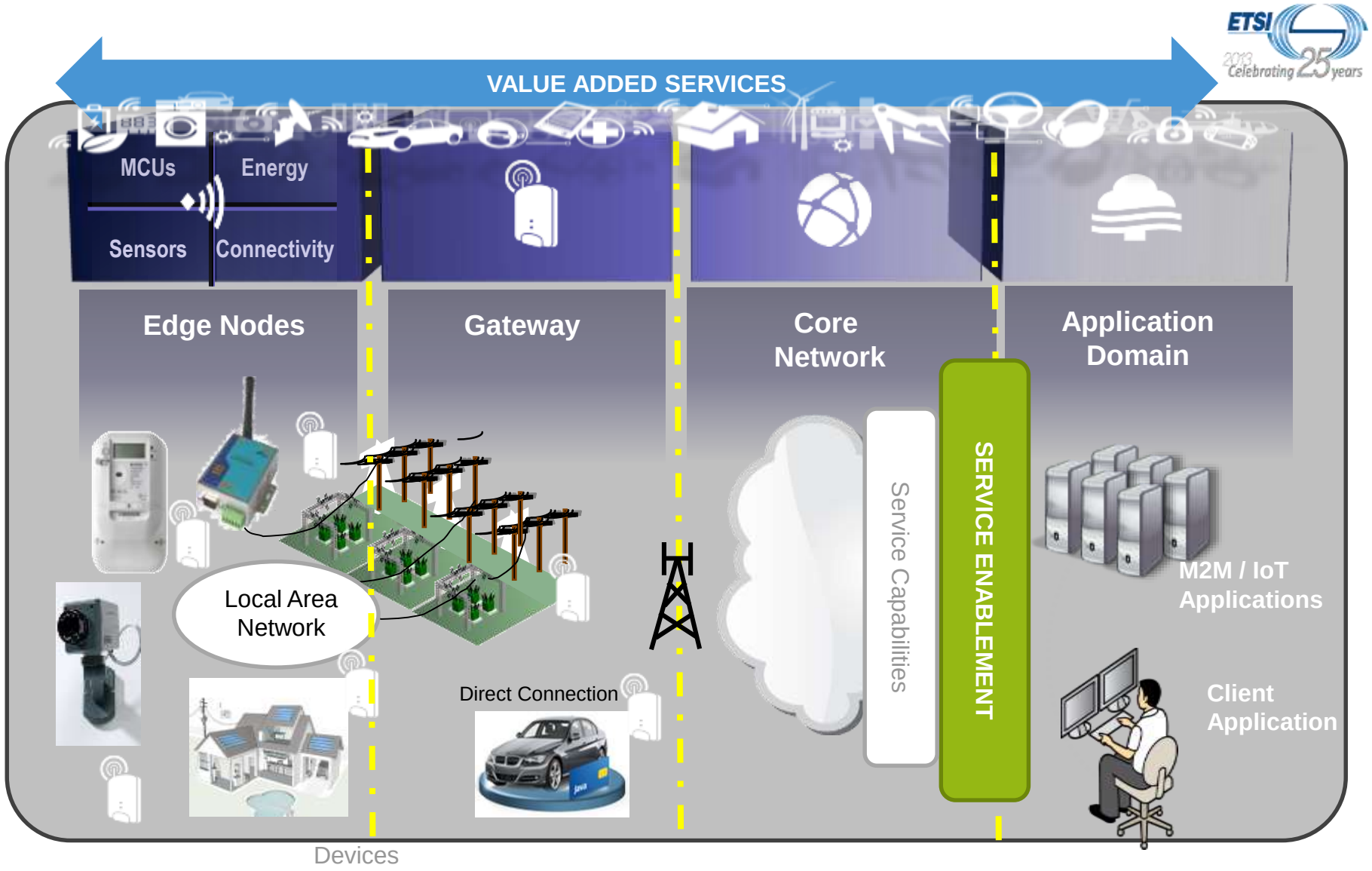
Gen 1 – non-VM, not HA
(Vulnerable to attack)

Gen 2 – TRUSTED,
support VMs
(Virtual Machines) within
the Gateway

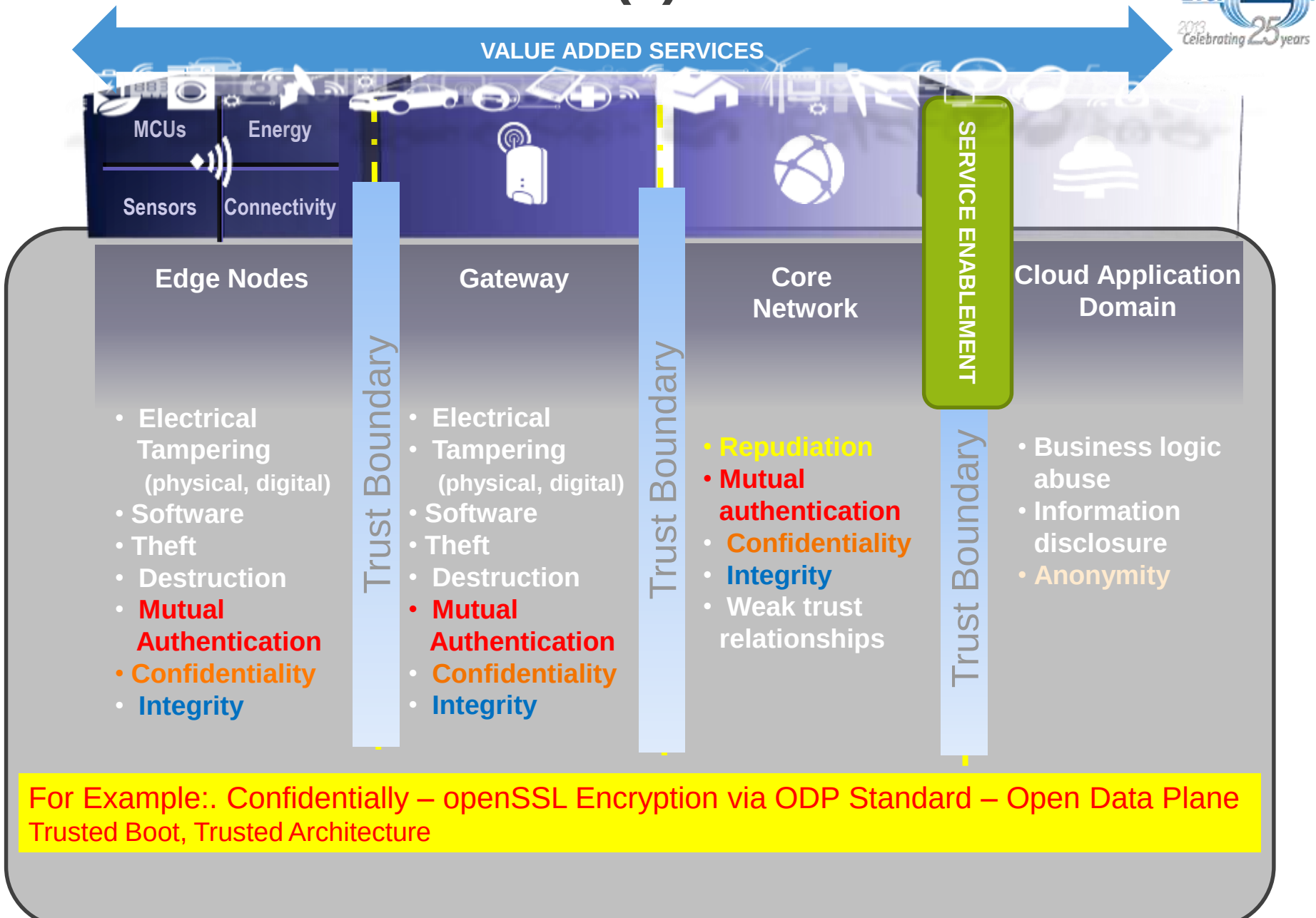
Gen 3 – TRUSTED, HA
support VNF (Virtualized Gateway)
(Virtual Network Function)
Secured VnFs – Firewall, tunnels
on-demand Service chaining
across the network,
VNF can be run outside
the Gateway onto
other network equipment

HA – High Availability –
Load balance,
Auto-Fail-over etc

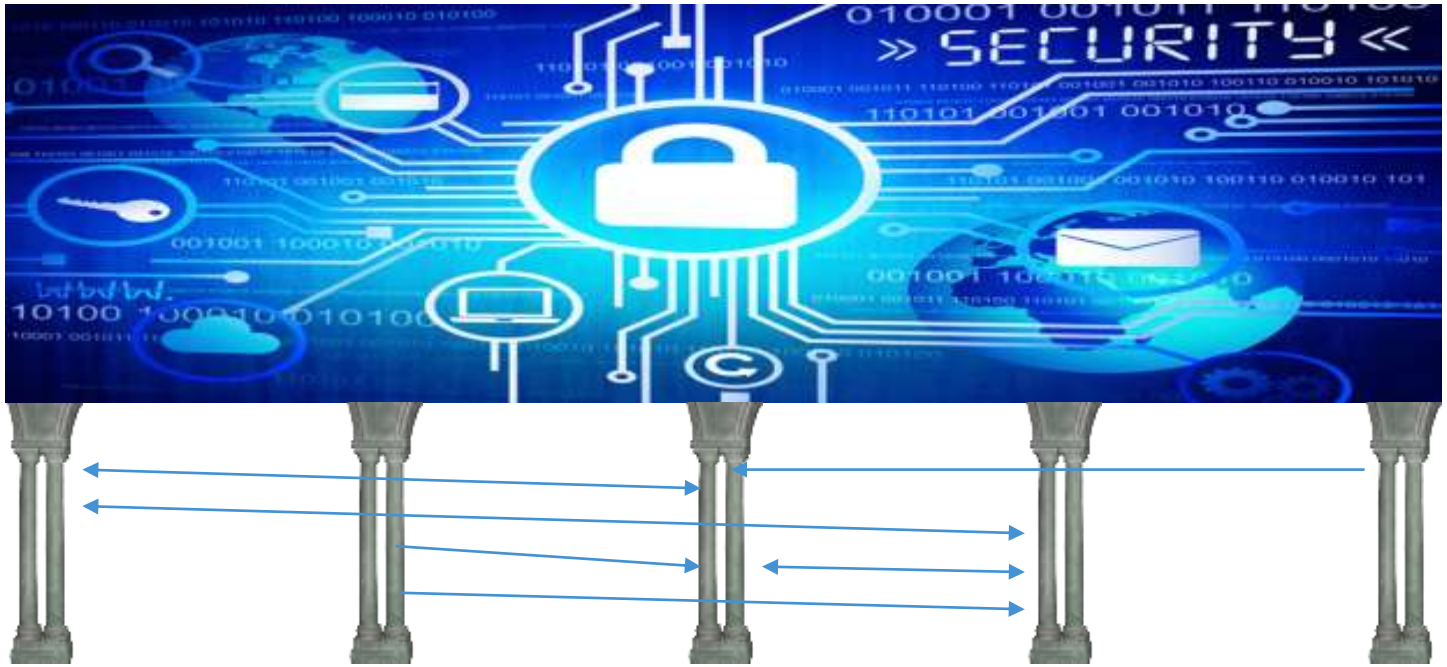
Internet of Things & Secured Service Delivery Platform



Secured IoT Platform Standard(s)



NXP Secured IoT - Pillars of Cybersecurity (NIST.gov) – TRUSTED Integration with Commercial security packages – e.g. Trend Micro

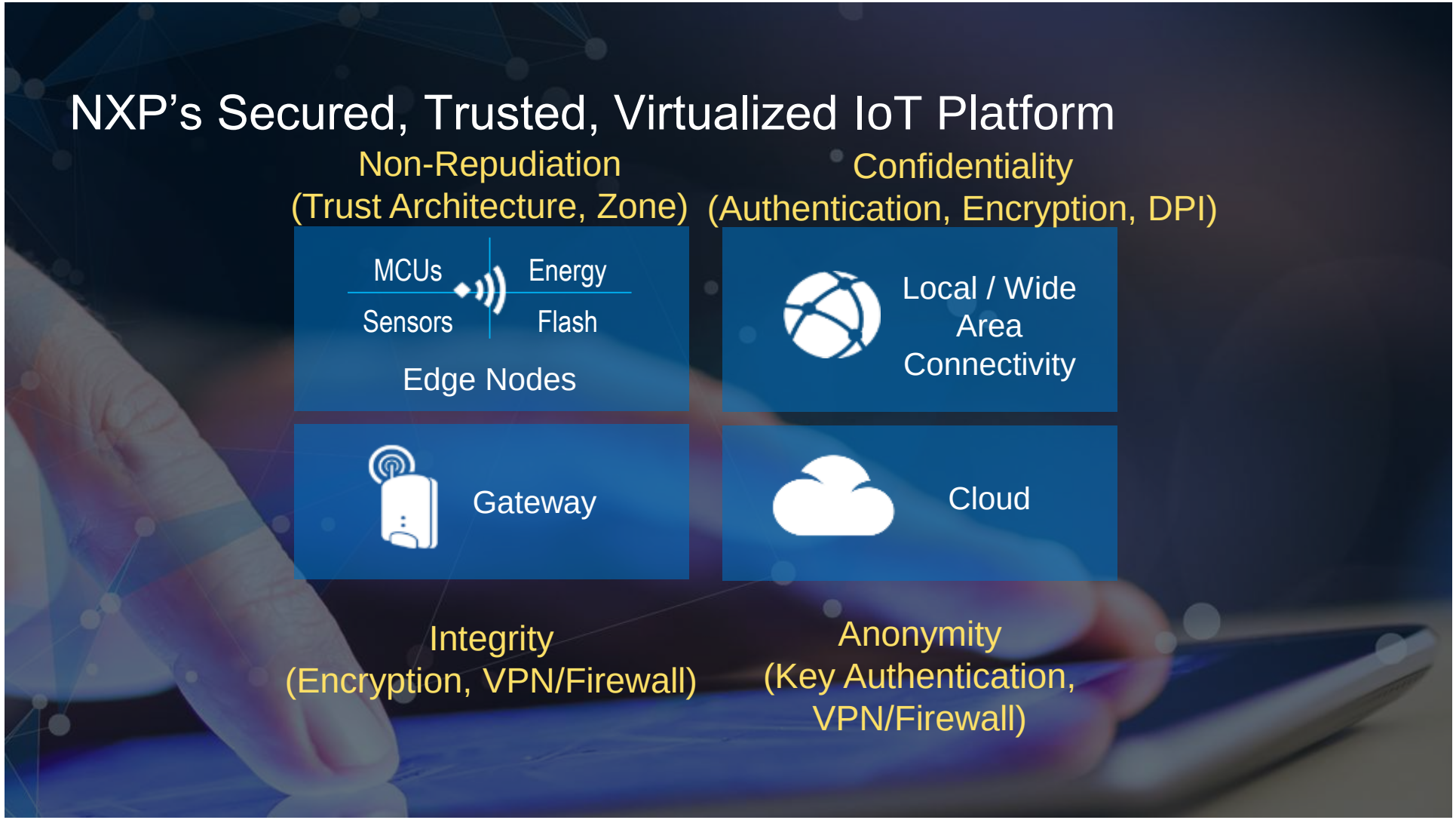


Availability	Non-repudiation	Integrity	Confidentiality	Authentication
The property of being accessible and usable upon demand. Applies to assets such as information or information systems	Provides the capability to determine whether a given individual took a particular action such as creating information, sending a message, approving information, and receiving a message	A state in which information has remained unaltered from the point it was produced by a source, during transmission, storage, and eventual receipt by the destination.	Preserving authorized restrictions on information access and disclosure, including means for protecting personal privacy proprietary information. and	The process of verifying the identity or other attributes of an entity (user, process, or device). Also the process of verifying the source and integrity of data

NXP's Secured, Trusted, Virtualized IoT Platform

Non-Repudiation
(Trust Architecture, Zone)

Confidentiality
(Authentication, Encryption, DPI)



Integrity
(Encryption, VPN/Firewall)

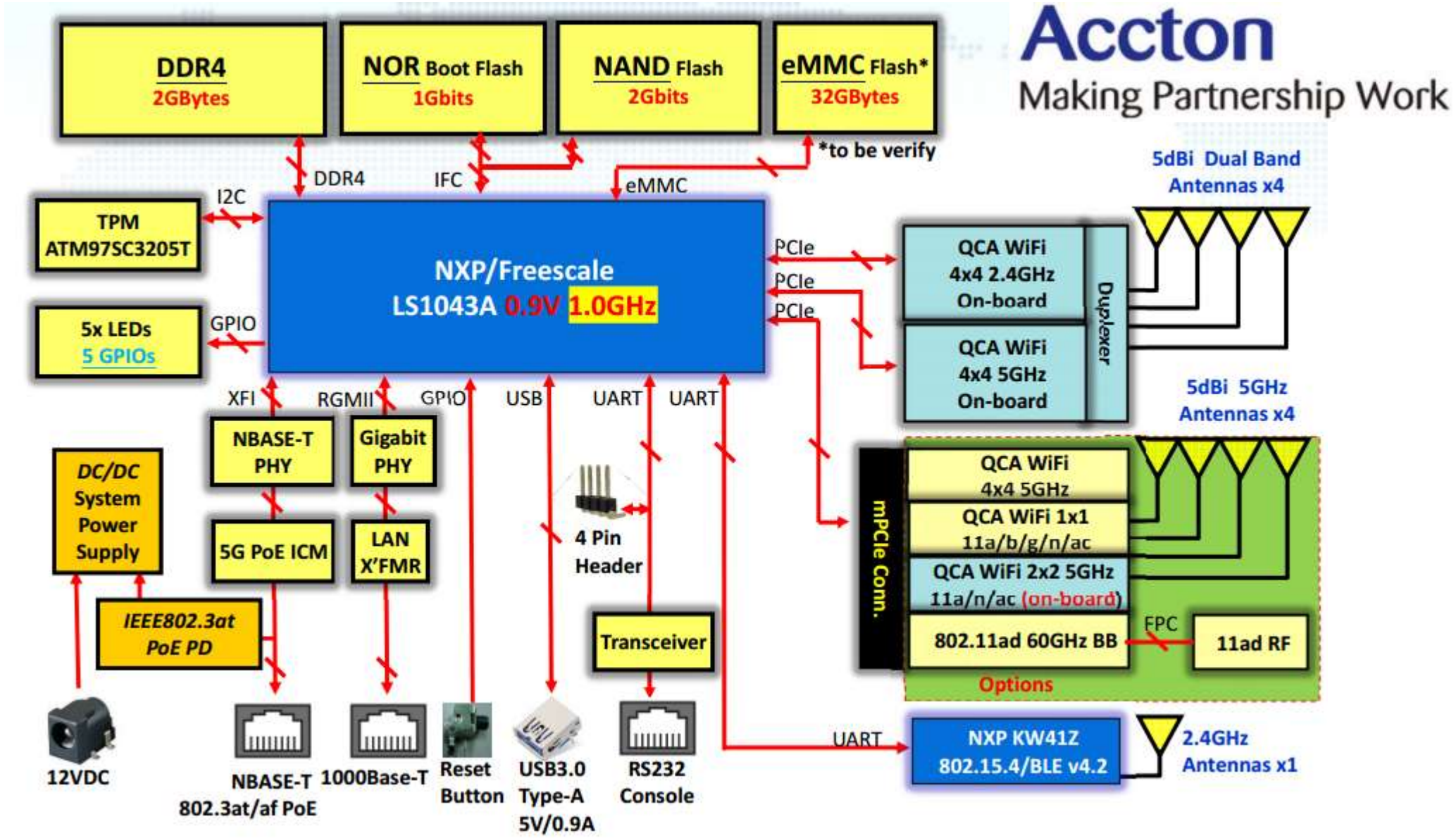
Anonymity
(Key Authentication, VPN/Firewall)

05.

Accton 8407FA WLAN / vCPE / IoT Gateway

Using NXP LS1043A Platform

Accton 8407FA WLAN/vCPE/IoT Gateway – NXP LS1043A White Box Platform



Accton 8407FA WLAN/vCPE/IoT Gateway – NXP LS1043A Platform

	Specification Description
Network Processor	Freescale LS1043 A-53 quad core @ 1.0GHz
Memory	• Parallel NOR flash: Up to 128MByte • NAND flash: Up to 2GByte (default: 256MBytes) • Optional 32GBytes eMMC flash (extendable up to 64GBytes) • DDR4: up to 8GBytes
Radio	• Radio #1: QCA 2.4GHz 11ac WAVE-2 4x4 **on-board** radio • Radio #2: QCA 5GHz 11ac WAVE-2 4x4 **on-board** radio • Radio #3: QCA 5GHz 11ac WAVE-2 2x2 **on-board** radio (default) • mPCIe slot option for other 3rd radio configurations
RF TX Power Target	• 2.4GHz Wi-Fi radio: 18dBm per chain at low data rate • 5GHz Wi-Fi radio: 15~18dBm per chain at low data rate
BLE	NXP KW41Z (ZigBee/Thread capable)
Ethernet Interface	• One port 1/2.5/5G NBASE-T multi-rate Ethernet • One port 1000BASE-T Ethernet
USB	One USB 3.0 host port with 5V/900mA bus power (A-type connector)
Console	One RJ45 modular serial console port
TPM	Atmel AT97SC3205T
Push Button	One reset to factory default push button
System Power Source	• Single 802.3af/at PoE PD over NBASE-T Ethernet port • 12Vdc/2.5A power input jack

Product Applications

- **Enterprise/Campus Wi-Fi AP**
- **Wireless ISP**
- **Wireless Mesh Backhaul**
- **Wireless Bridge**
- **Spectrum Intelligence**
- **Public Hotspot Wi-Fi**
- **Hospitality Wi-Fi**

06.

Summary

Summary

- NXP’s Virtualized IoT Platform – Enterprise, Class, Industrial Ready

- NXP Virtualized IoT Platform – LS102x/104x (Advanced, Smart, Secured)
  - Advanced IoT (using Docker Container VMs)
    - Multi-Cloud, Multi Gateways for Multi tenant services
  - Smart (Sensor Fusion, Distributed Analytics in Gateway and Cloud)
  - Secured (Firewall, VPN/IPSEc tunnel etc)

- ODM IoT Gateway example: Accton LS1043 integrated WLAN, IoT, vCPE Product

- Summary

SECURE CONNECTIONS
FOR A SMARTER WORLD

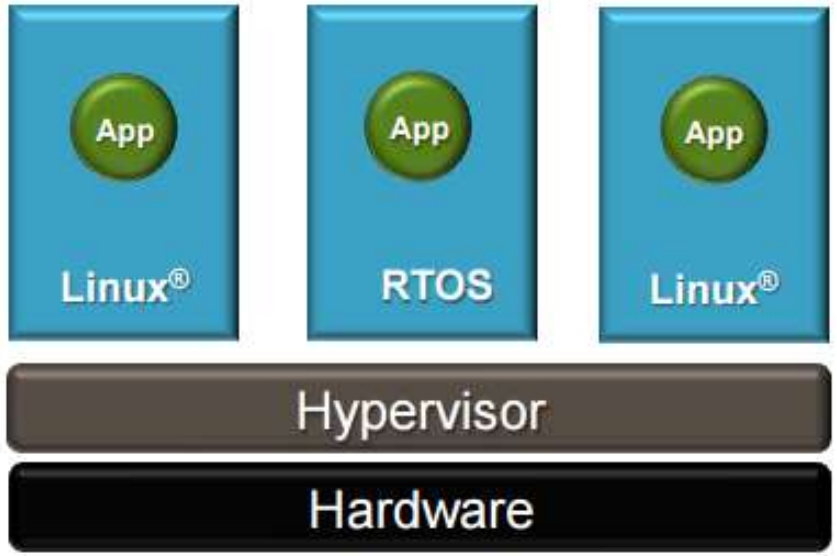
07.
Backup

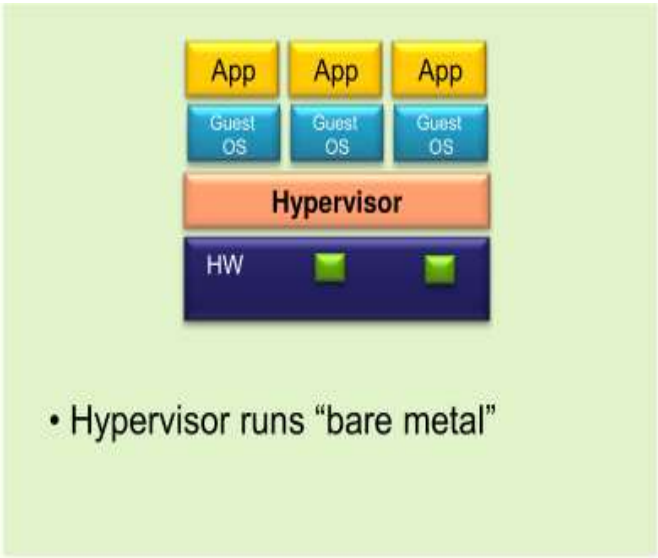
What is Virtualization?

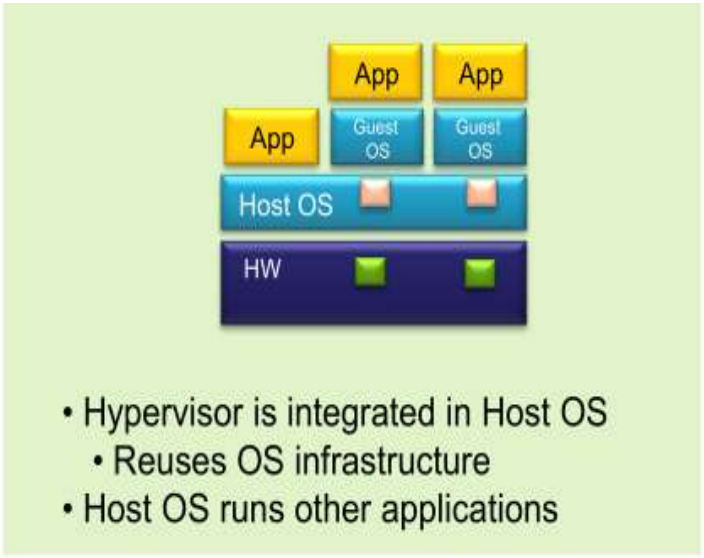
- **Virtualization** – Hardware and Software technologies that provides an abstraction layer that enables running multiple operating systems on a single system

- A **hypervisor** is a software component that creates and manages virtual machines which can run operating systems.

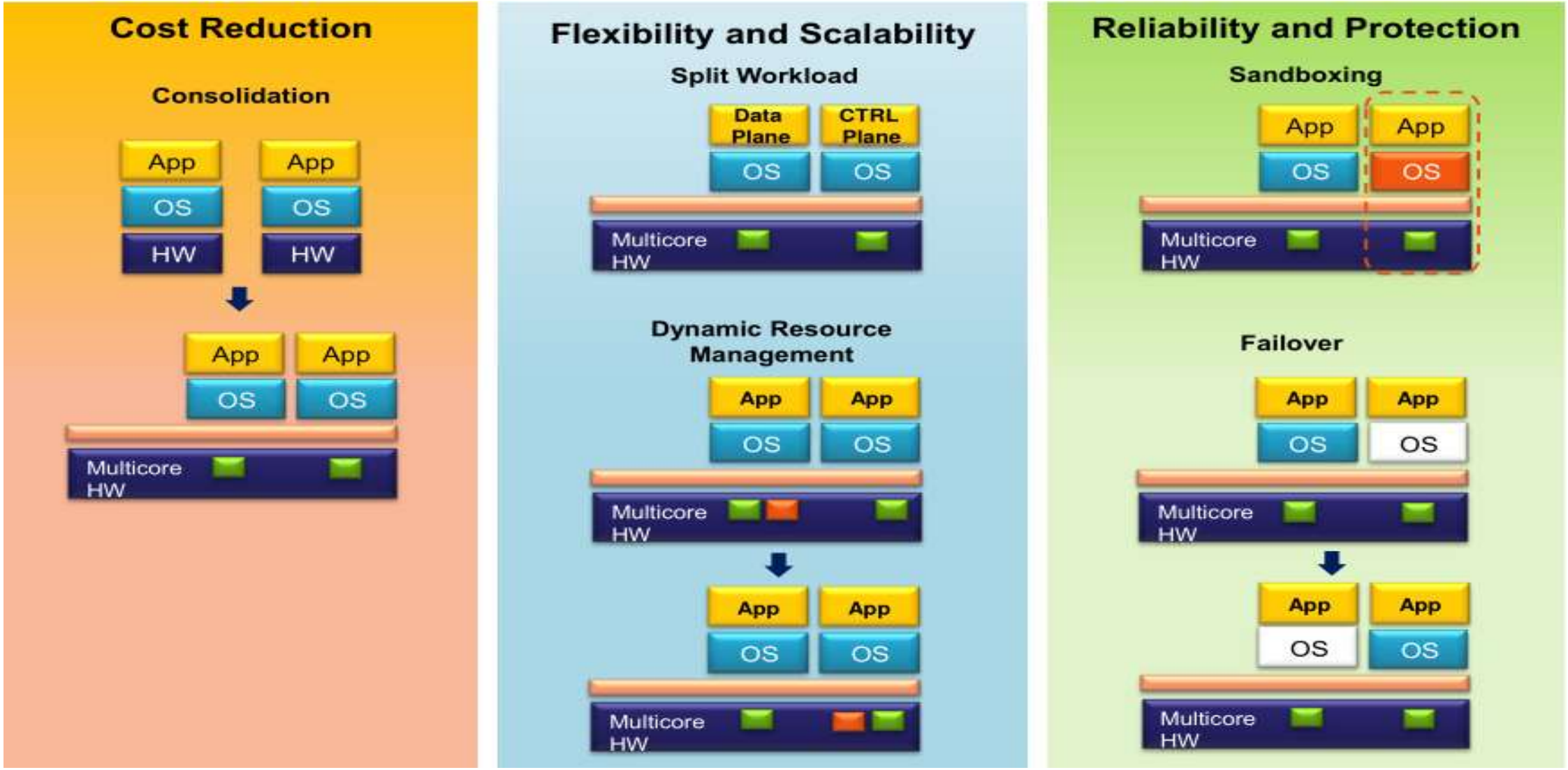
- **Virtualization Use Cases**
  - **Cost Reduction (Improved HW utilization)**
  - **Reliability & Protection**
  - **Flexibility & Scalability**



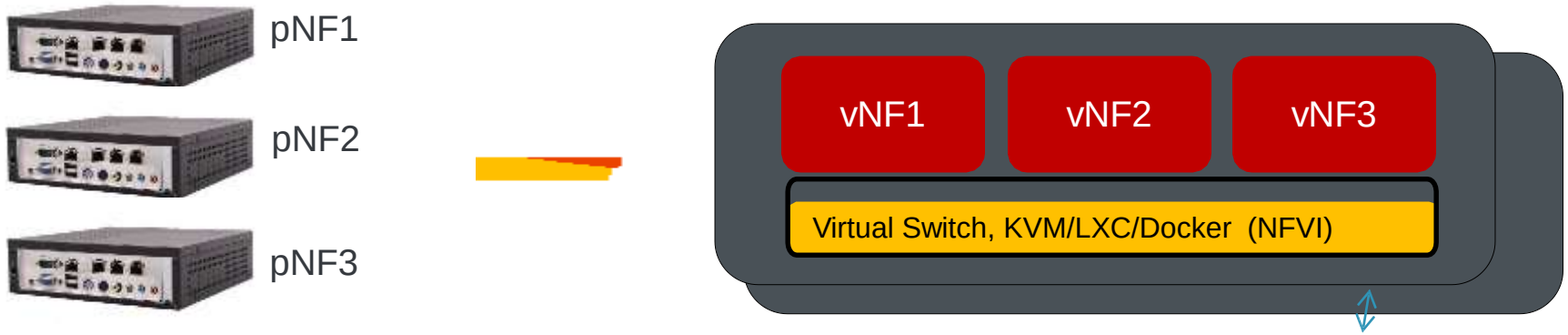




Virtualization Use Cases



NFV – Network Function Virtualization



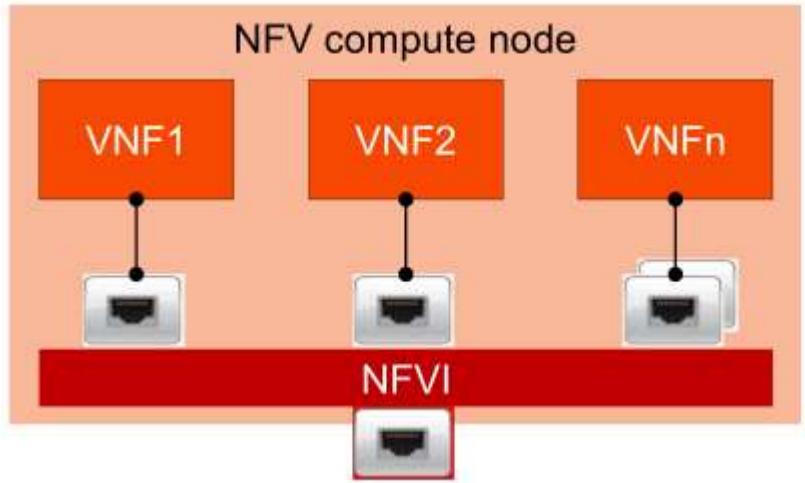
- NFV offers a **new way to design, deploy and manage networking services/functions**
- **What you can do with NFV?**
  - Run network functions on general-purpose common hardware
  - Take network functions in and out of service, and **scale them up and down** easily
  - Multiple network functions can share a NFV node (Compute Node)
  - Automate service delivery with orchestration
- **Proven Cloud technologies for IT applications in data centers (same can be used for NFV)**
  - Orchestration tools such as OpenStack, Opencontrail etc.
  - Hypervisors such as KVM,LXC,Dockers etc..
  - Virtual switch using OVS,DPDK-OVS etc.
  - Opencontrail using vrouter agent for Dynamic service chaining

NFVI (NFV Infrastructure) Concept and Challenges

- **NFVI enables virtualization of hardware and exposes each virtual hardware to VMs**

- **NFVI consists of multiple SW modules**
  - Orchestration agent
  - Libvirt
  - Hypervisor such as KVM, LXC, Docker etc..
  - QEMU for emulating hardware

- **Networking**
  - VxLAN – Overlay based virtualization
  - OVS – Virtual Switching
  - Firewall – Filtering traffic going to/from VMs.
  - Traffic Control
  - DDoS prevention
  - IPSec for security-on-wire



- **Challenges**
  - More intelligence is being added to VMM, Intelligence is pushed to the edge
  - Amount of traffic processed by vNFs is much higher than typical IT applications, therefore networking performance is important

Network market shifting to virtualization (SDN/NFV)

NFV Promises Three Benefits to Operators

Service Velocity

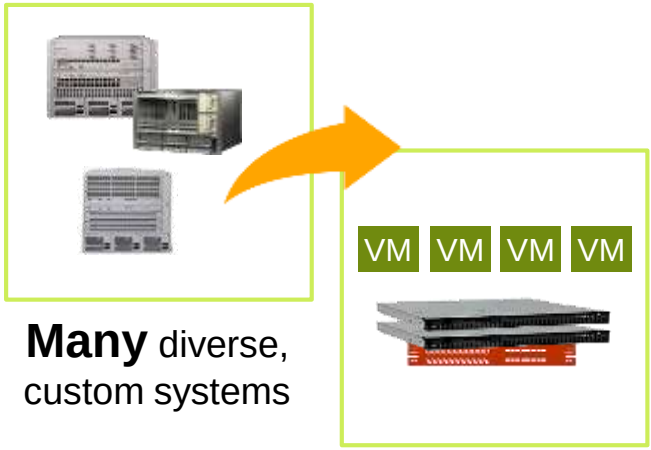
1

Designing custom **hardware & software**

Writing **code** you can run and test in a VM

Capex and Opex Reduction

2

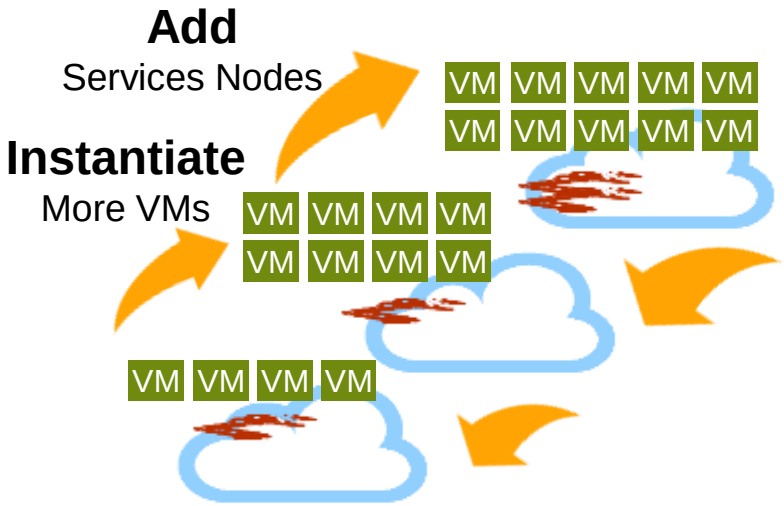


Many diverse, custom systems

Fewer, homogenous COTS systems

Scalability & Elasticity

3



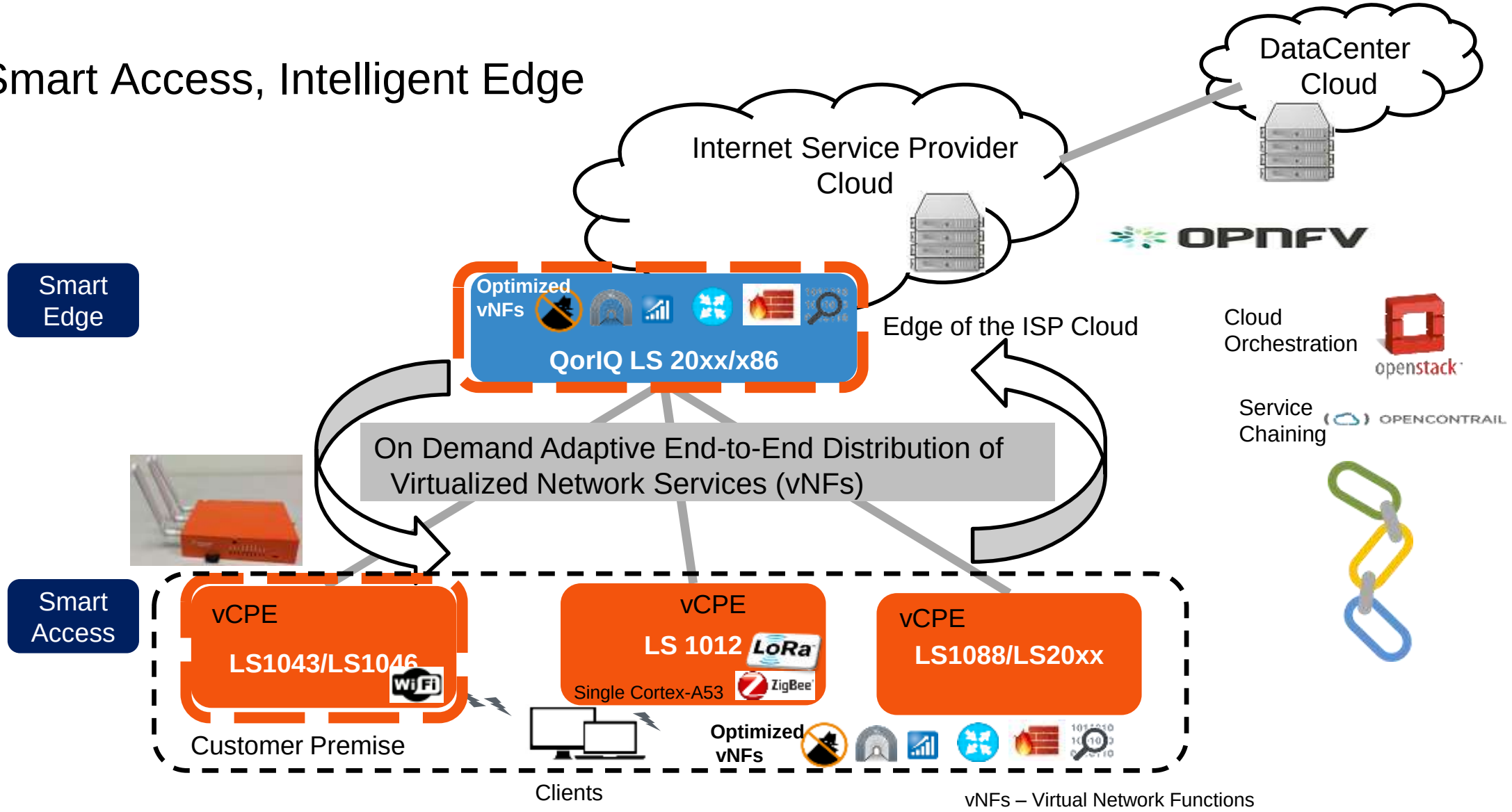
Add Services Nodes

Instantiate More VMs

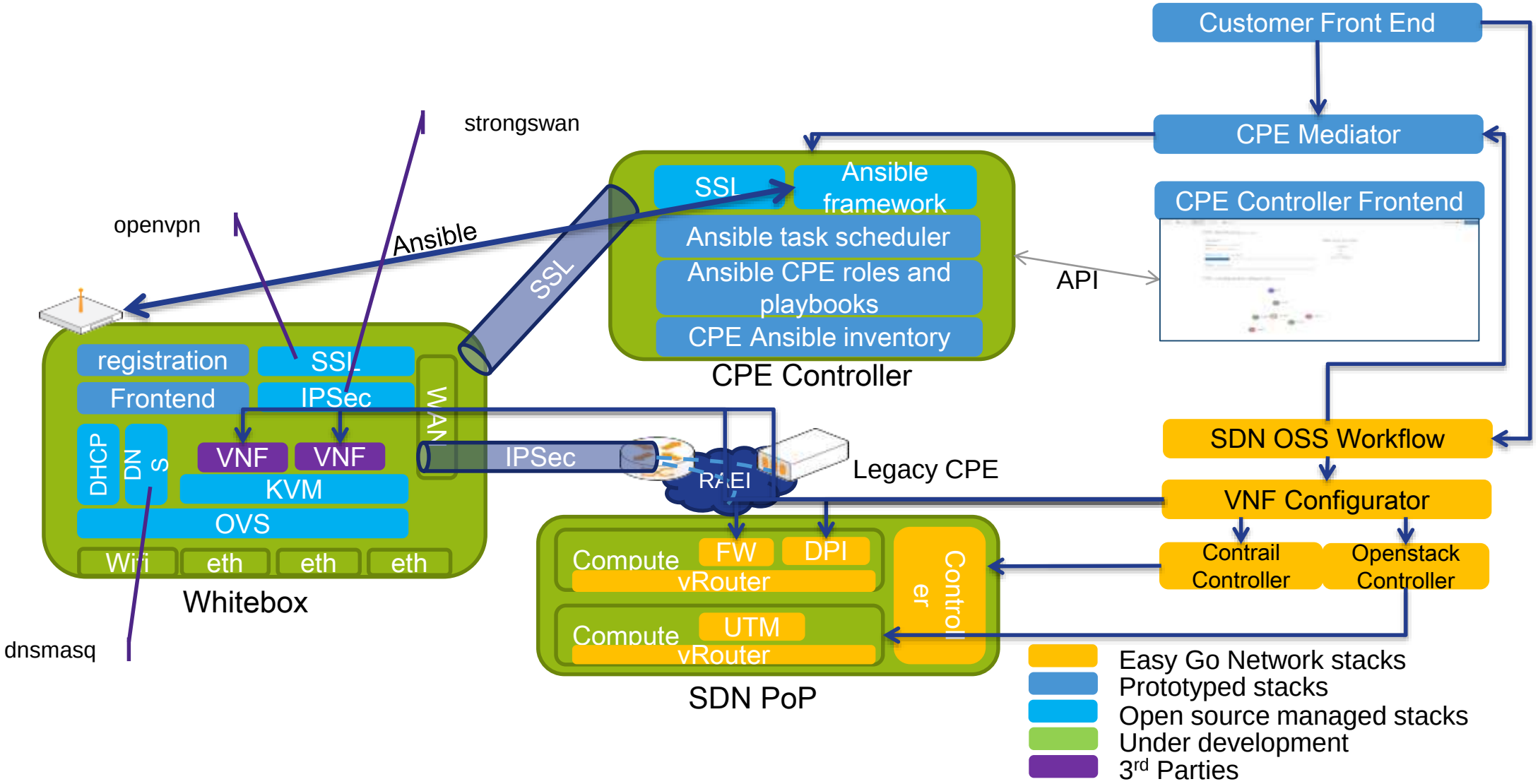
Scale Back with Demand

NXP Virtualization Platform

- Smart Access, Intelligent Edge



vCPE Last Mile – Intelligent Edge, Smart Access



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