NOKIA

Network Disaggregation

鹿志村　康生

yasuo.kashimura@nokia.com

自己紹介

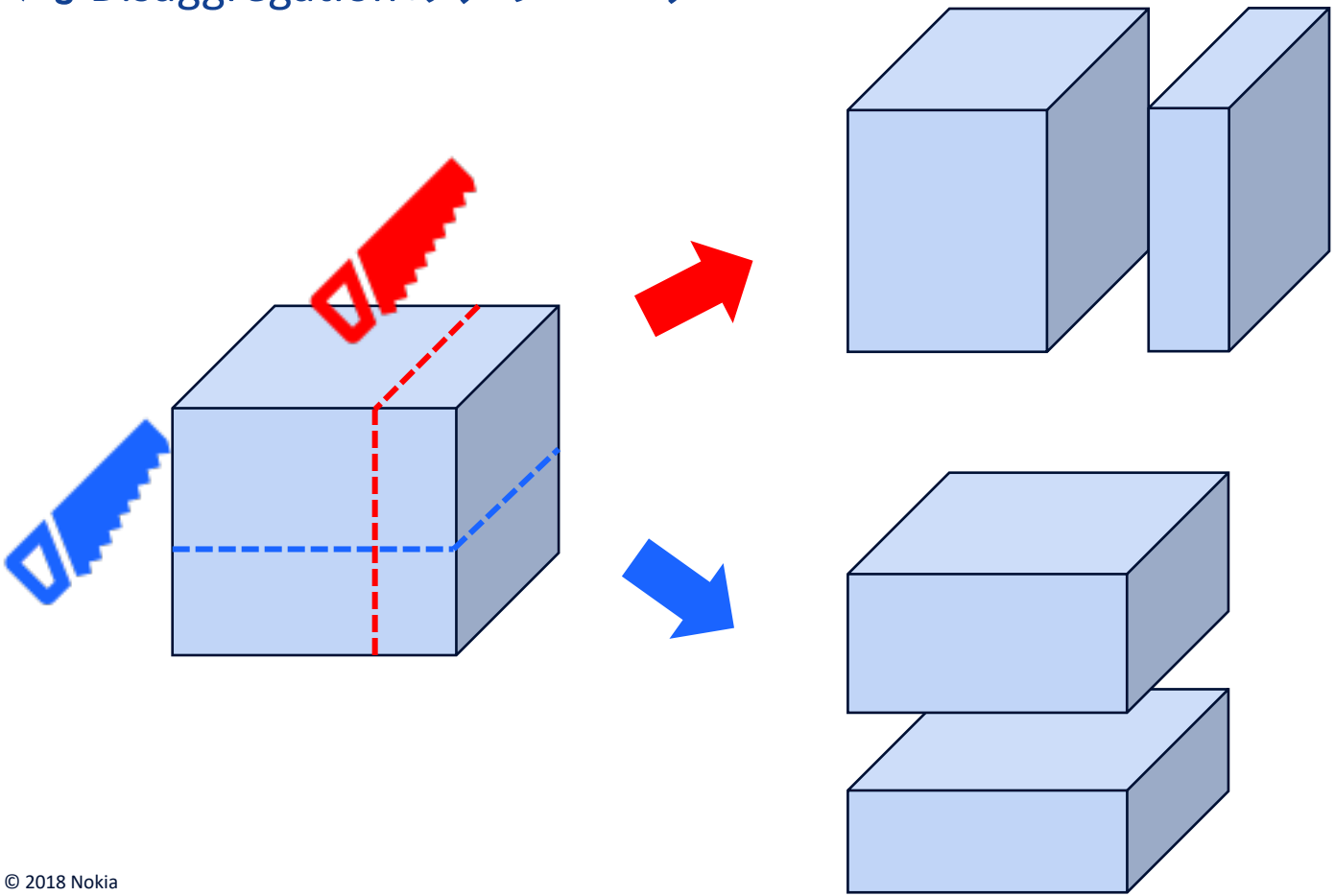
1997〜2001　NTT/NTTコムウェア

2001〜2008　シスコシステムズ

2008〜2016　アルカテル・ルーセント
サービスプロバイダ向けルーター・スイッチ、EPC、SDN等の製品事業部

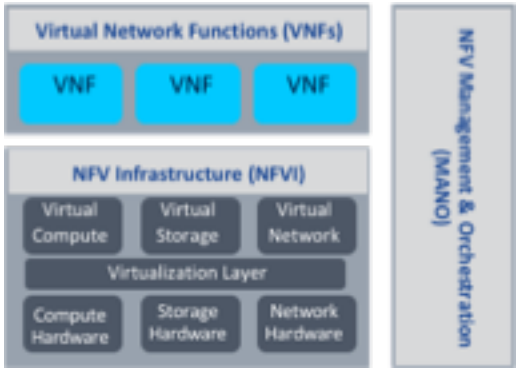
2016〜　Nokiaにより買収され一夜で会社の看板が変わる。
NokiaのIP&Optical Networks製品事業部責任者

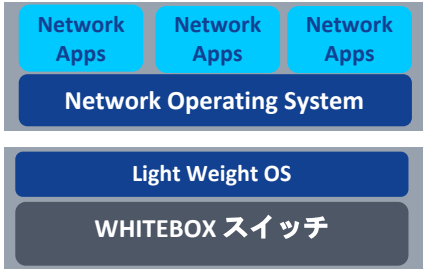
様々なDisaggregationのアプローチ



様々なDisaggregationの例

1. Generic Hardware + Software



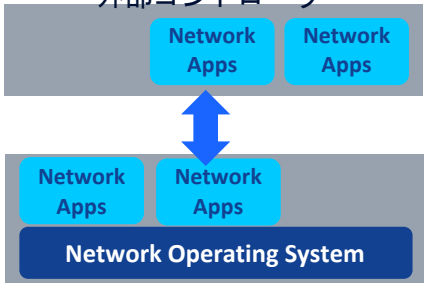


3. NFのC-plane/U-Plane分離

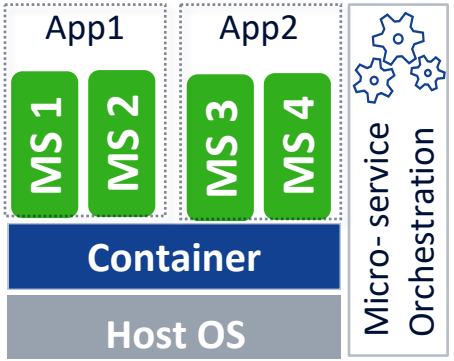
Disaggregation

2. Network OSから外部への機能分離

外部コントローラー



4. NFのMicro Service化



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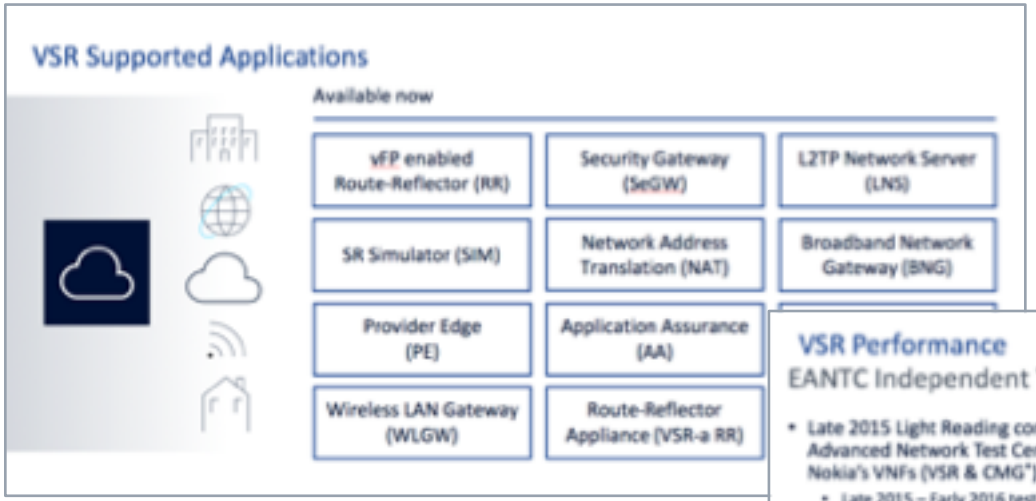
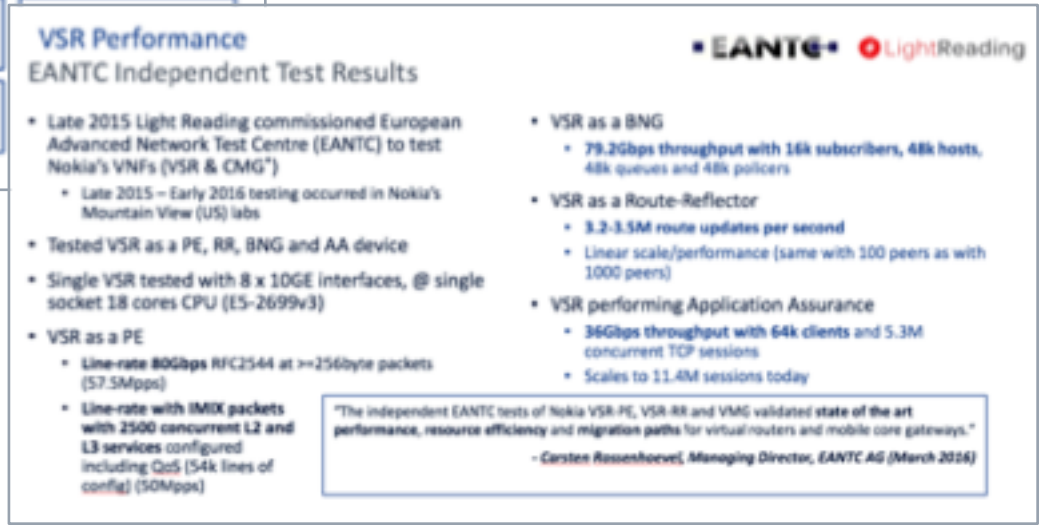
1. Generic Hardware + Software (Router系)





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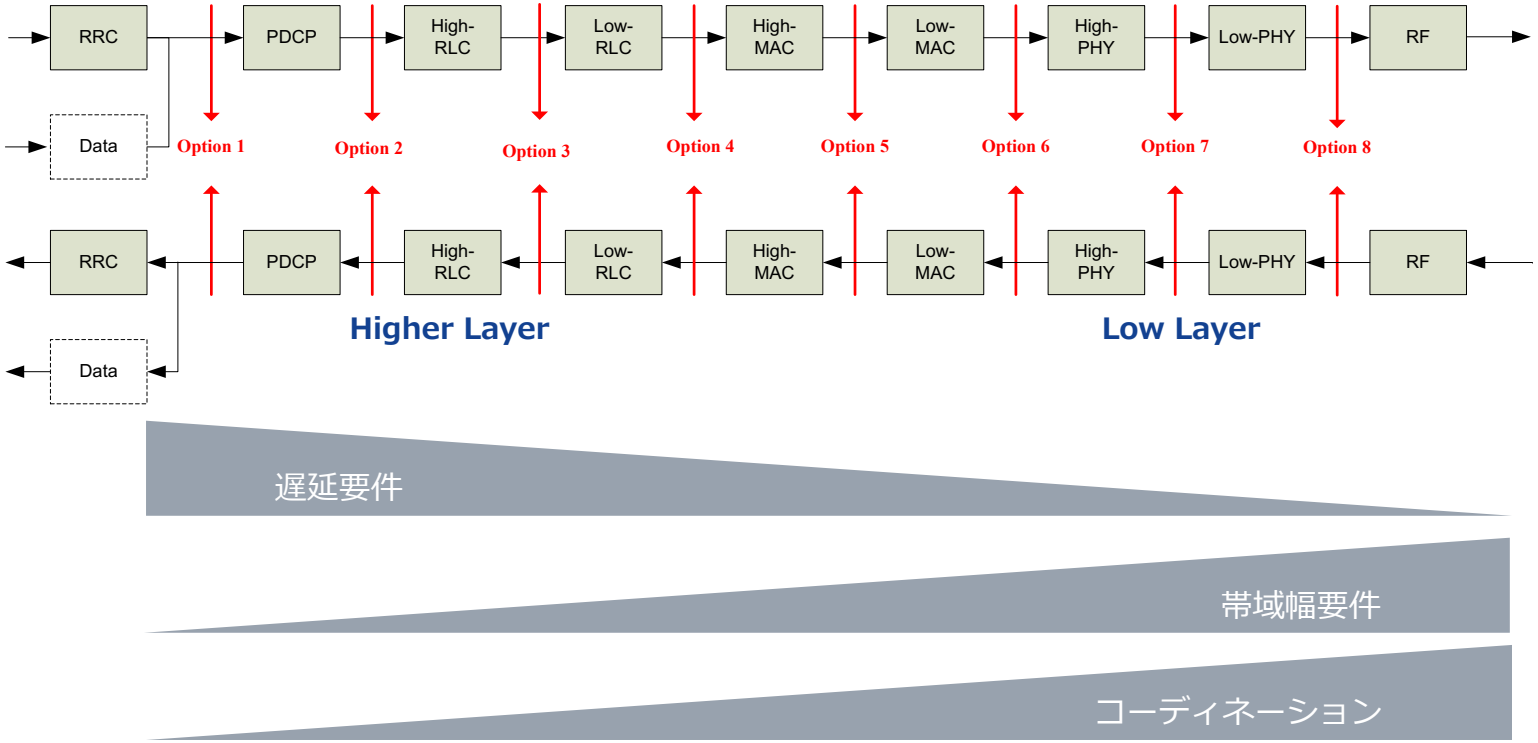
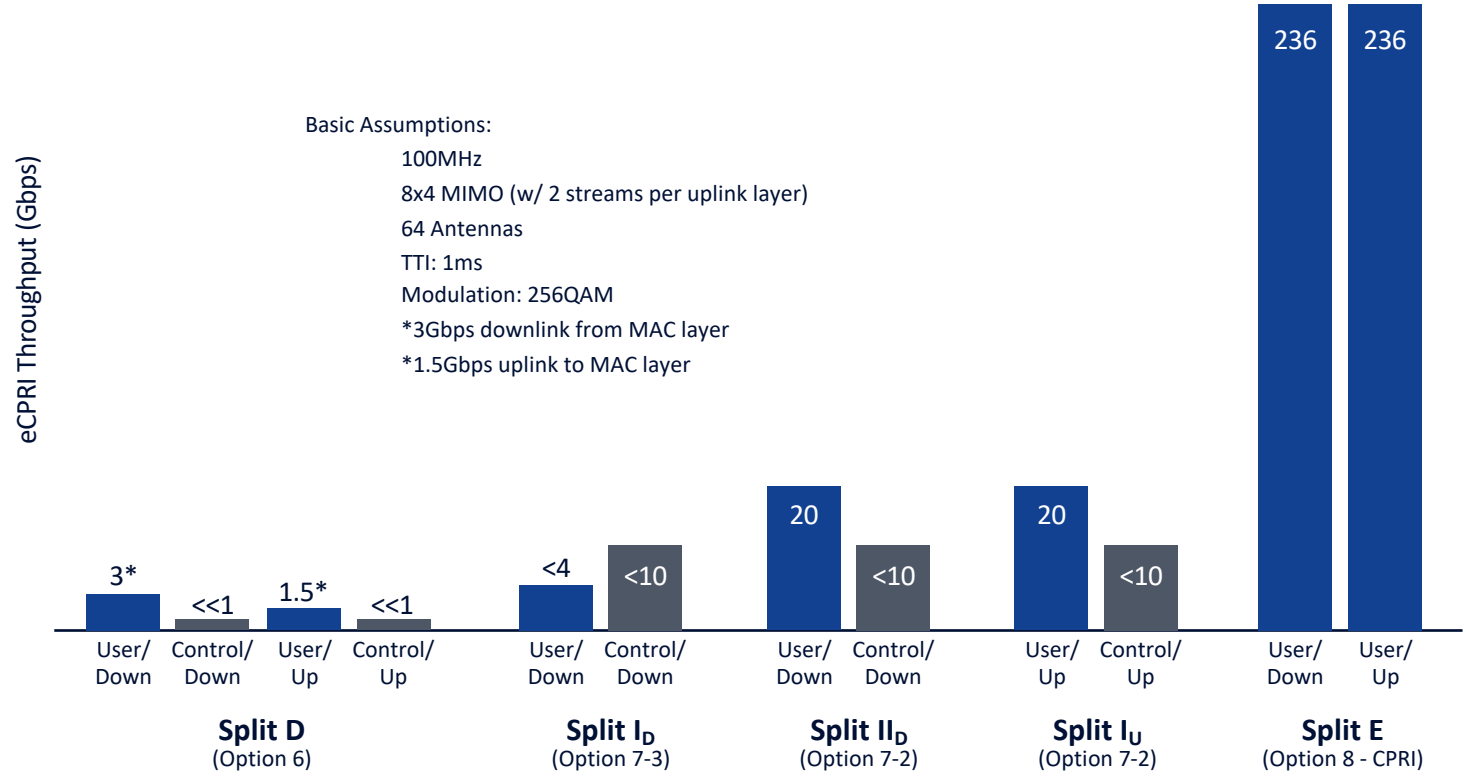
1. Generic Hardware + Software (Radio系)

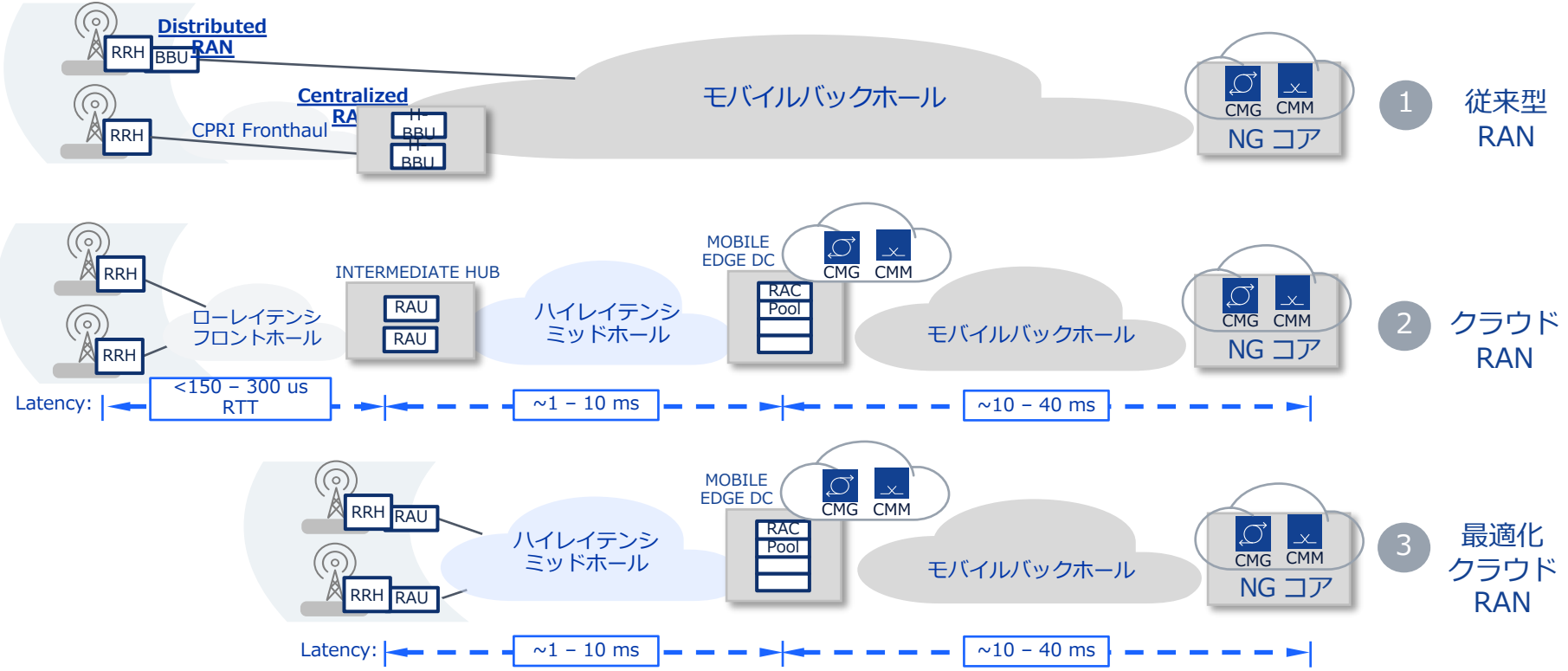
無線基地局の内部機能分離



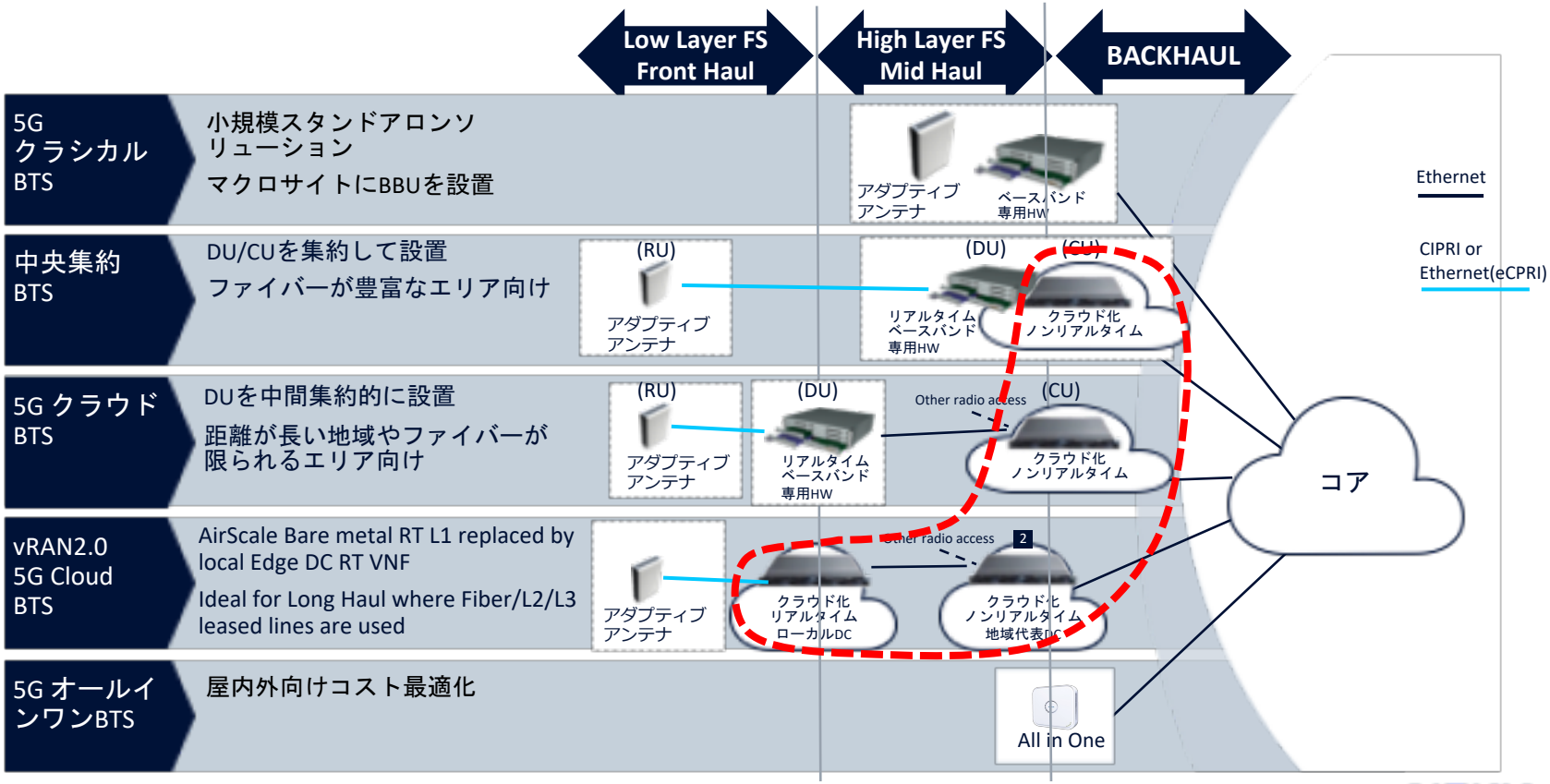
機能分離レイヤによるネットワークへの帯域要件の違い



機能分離レイヤによるネットワークへの遅延要件の違い



1. Generic Hardware + Software (Radio系)



RANのオープン化への動き (1)

ORAN(Open Radio Access Network) Alliance

xRAN

AT&T	ASOCS	Netsia
Deutsche Telekom	Blue Danube,	**Nokia**
NTT/DOCOMO	Ciena	Radisys
SK Telecom	Cisco	Samsung
Telstra	Commscope	Stanford University
Verizon	Fujitsu	Texas Instruments
AltioStar	Intel	University of Sydney
Amdocs	Mavenir	
Aricent	NEC	

C-RAN Alliance

China Mobile Research Institute
Huawei Technologies
ZTE Corporation
Nokia Solutions and Networks System Technology (Beijing)
Datang Mobile
Intel Corporation .
Broadcom Limited Xilinx
Wind River Systems
RedHat Software (Beijing)
Spirent Communications Technology (Beijing)

ORAN Alliance

Will continue to be an operator led initiative

Board made up of the 5 founding operators: AT&T, DT, China Mobile, Orange and NTT DOCOMO

1Q/2018
- Completion of the first open front haul specification

2Q/2018
- Working group set-up
- Governance settled
- The legal formation of the new entity completed
- Updated By-law and IPR policy

3Q/2018
- New use cases
- New working groups operational
- Merger completed
- New interface spec. released

4Q2018

1Q2019
- PoC at MWC 2019

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RANのオープン化への動き (2)

TIP(Telecom Infra Project)

- **Announced in MWC 2016**
- **Sponsor members: FB, Intel, Nokia, SKT, DTAG**
- **Originally focus on connecting the unconnected.**
- **Telecom Infra Project, Inc. (Delaware)**

Mission

The Telecom Infra Project (TIP) is an innovation-focused initiative driven by operators, infrastructure providers, system integrators, and other technology companies that aim to reimagine the traditional approach to building and deploying telecom network infrastructure.

Project Groups

Access Projects
- Edge Computing
- Power and Connectivity
- System Integration and Site Optimization
- OpenCellular – Wireless Access Platform Design
- Solutions Integration
- OpenRAN
- CrowdCell
- vRAN Fronthaul

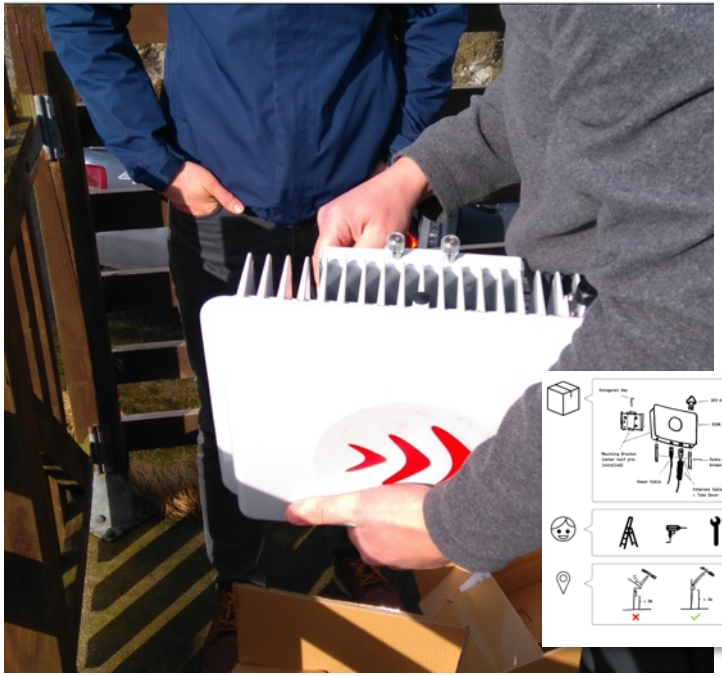
Backhaul Projects
- Millimeter Wave (mmWave) Networks
- Open Optical & Packet Transport

Core & Management Projects
- Artificial Intelligence and Applied Machine Learning
- End-to-End Network Slicing (E2E-NS)
- People and Process

TIP Community Labs

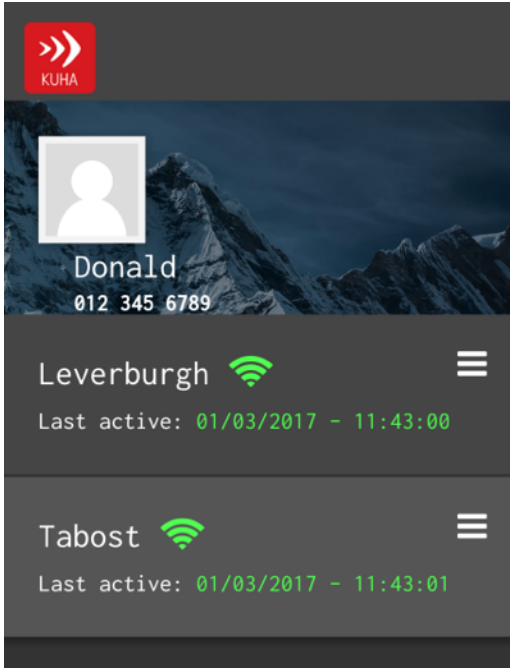
TEAC

RANのオープン化への動き (2)
TIPのRadioトライアル@スコットランド



Local residents set up the Kuha base station using Ikea-like instructions

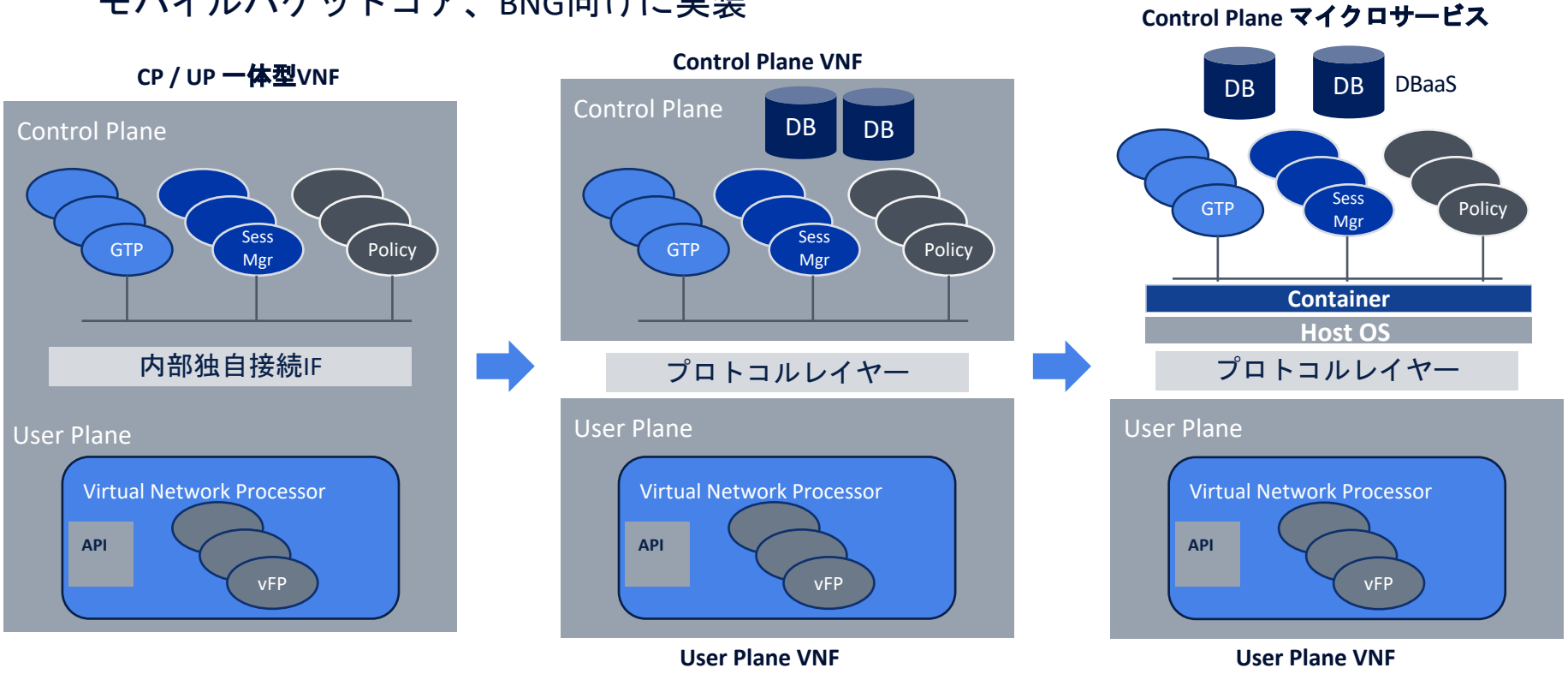
Completed installation



Kuha Cloud OSS UI shows the base station status and assists the local users.

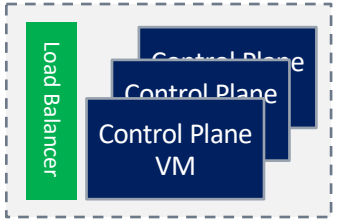
3. NFのC-plane/U-Plane分離
4. NFのMicro Service化

モバイルパケットコア、BNG向けに実装



3. NFのC-plane/U-Plane分離
U-Planeの選択肢

Control Plane:
(SMF, PGW-C, SGW-C, combo SMF/PGW-C for 4G-5G IWK)

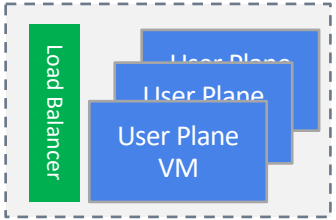


CMG (Control Plane)
- State efficient control plane
- Single IP address architecture
- Dynamic scale-in/out

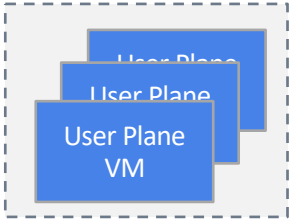
Sx (4G), N4 (5G)

User Plane:
(UPF, PGW-U, SGW-U, combo UPF/PGW-U for 4G-5G IWK)

Single VM CMG
- Scale: 4M PDU
- Throughput: up to 120Gbps



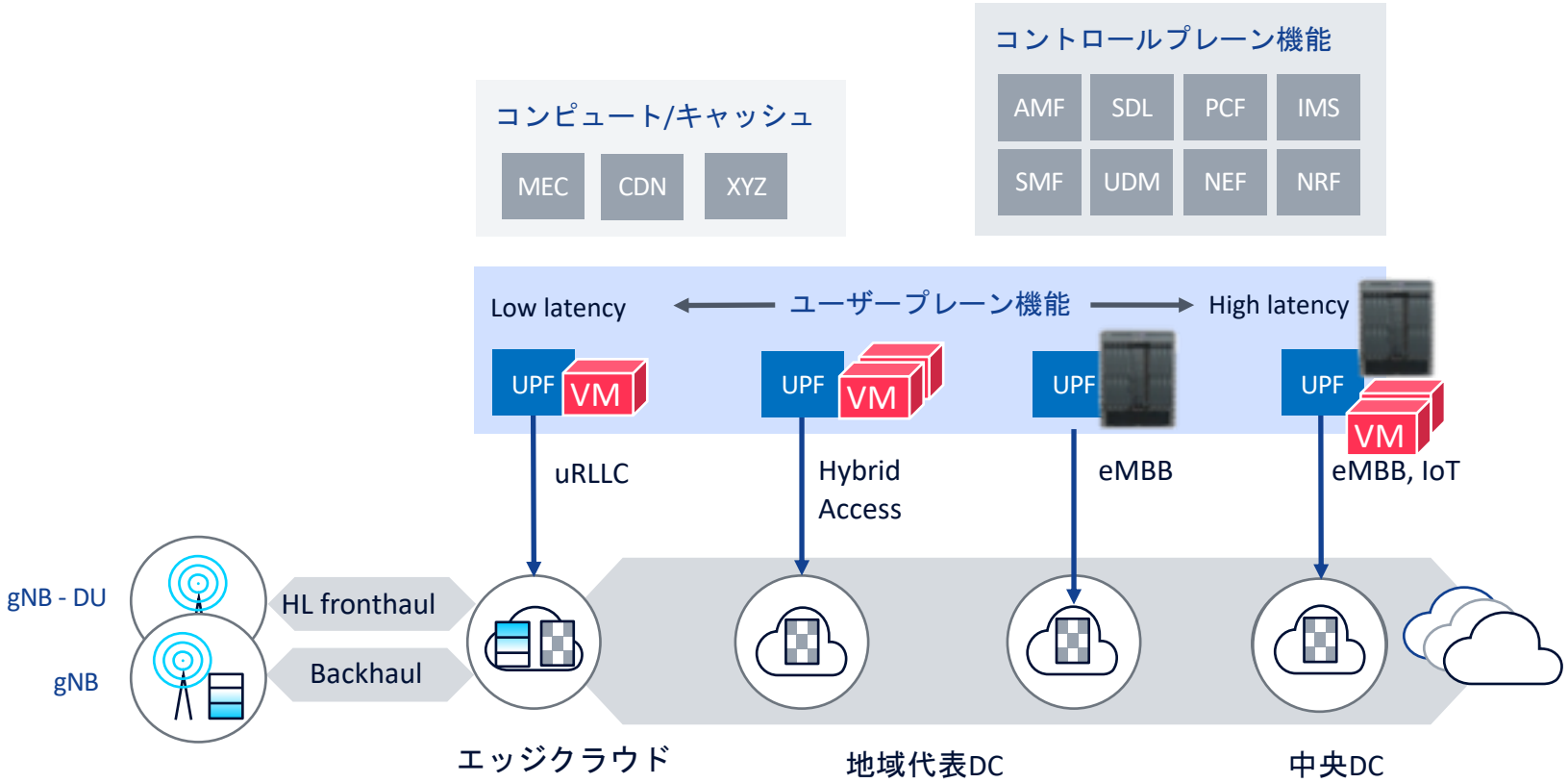
Multi-VM CMG with LB
- Scale: 32M+ PDU
- Throughput: up to 960Gbps



Multi-VM CMG without LB
- Scale: 32M+ PDU
- Throughput: up to 960Gbps

7750
- Scale: 16M+ PDU
- Throughput: Multi terabit

3. NFのC-plane/U-Plane分離
用途に応じたUPF設置場所とプラットフォームの選択



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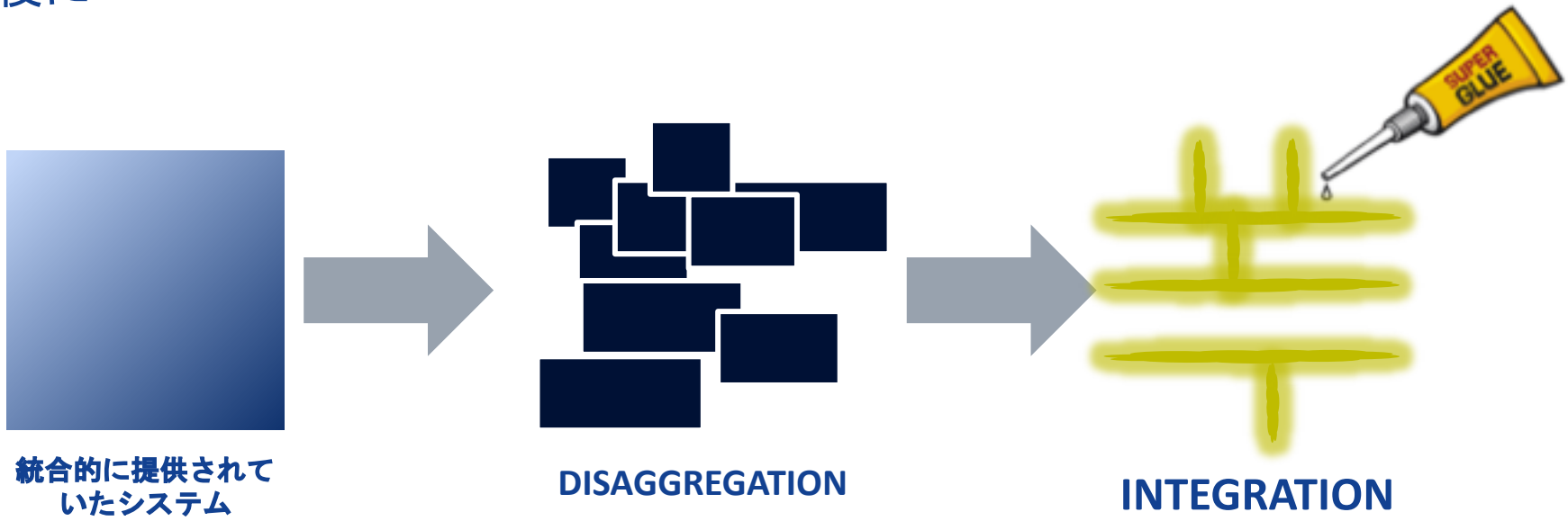
最後に



DisaggregateしたものはIntegrateする必要がある。
Integrationには労力とコストがかかる。また責任の所在をどこにおくか。
何を目的としてDisaggregationを適用するか深い考慮が必要。

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