




Open RAN Introductie

ir. Eildert van Dijken
11 mei 2020




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Open RAN – Introductie



1. History Open Source Mobile Communication
2. RAN Vendors
3. Open RAN, OpenRAN & O-RAN
4. 5G RAN Configuration
5. Market Developments & Outlook



Open RAN

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OpenBTS & OSMoCom

- Open Source Mobile Communication

Hardware: USRP (with RFX900/1800 modules)

Software: GNU Radio, OpenBTS, Asterisk

Internet: Connected to a laptop and a phone.

OSMoCom logo

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Cheap and Cheerful

OpenRAN from concept to commercialisation - CrowdCell

MWC '17: Concept

MWC '18: Pre-commercial CrowdCell

- General Purpose Processing
- Software Defined Radio
- Power Amplifier
- Wireless Backhaul

NEW TELECOM INFRA PROJECT

HW SW Disaggregation Cost

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Core Network Vendors



Core Networks



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Core Network > IT Tech



Core Networks



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Open or Closed Eco Systems

Distribution and apps	Distribution and apps	Distribution and apps
Software	Software	Software
Hardware	Hardware	Hardware
Chipsets	Chipsets	Chipsets
IBM	DEC	Univac

Distribution Channels Retail, online, direct, supermarkets
Applications Adobe, Autodesk, Microsoft
Operating Systems Microsoft, Redhat, Ubuntu
Hardware Providers Compaq, Dell, HP
Processor Companies AMD, Intel, RISC

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Linux Foundation Open Edge

Standards & Orgs for Edge

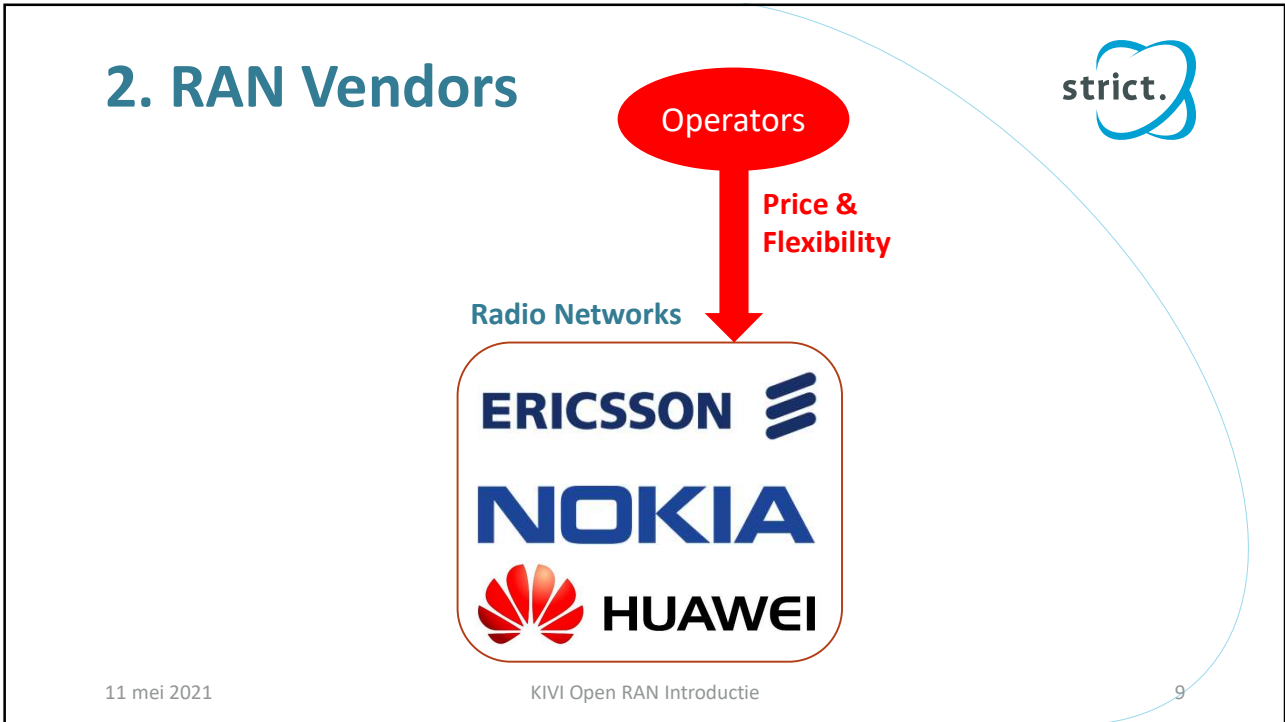
- ETSI / ISG MEC
World Class Standards
- openEDGE computing
- A/ECC
Automotive Edge Computing Consortium
- IoT Alliances & Consortiums**
- OpenFog / Industrial Internet Consortium

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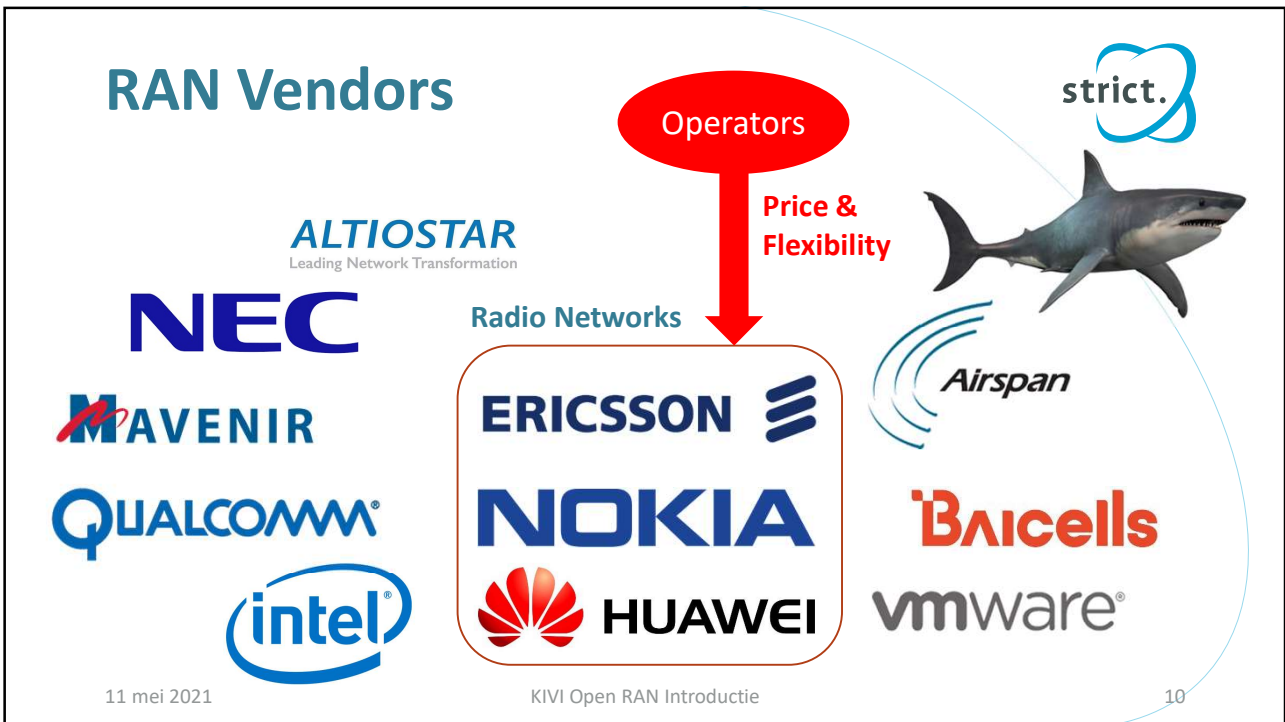
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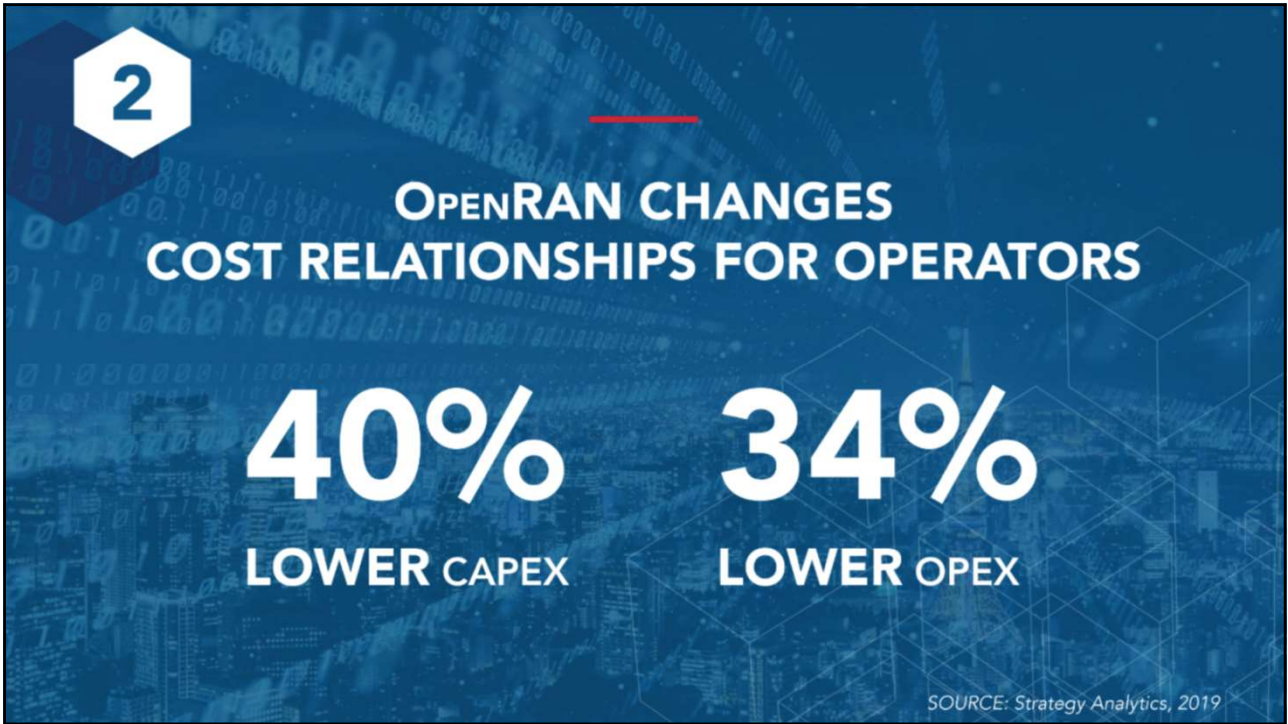
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Native Open RAN Operators

dish

Rakuten UN-LIMIT V
4G+5G

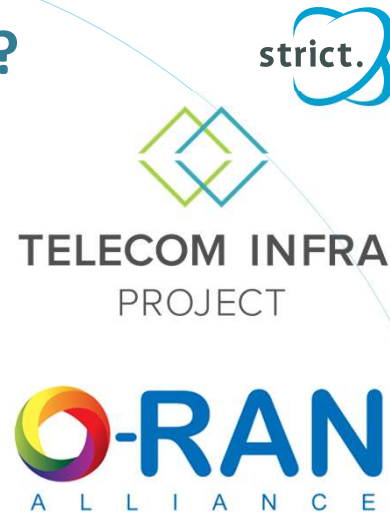
Rakuten Mobile

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3. Open RAN or OpenRAN?

- Open RAN = The movement for open radio access networks
- OpenRAN = Project group 2G/3G/4G or Project group 5G NR of TIP - Telecom Infra Project
- O-RAN – O-RAN Alliance group, defining specifications and supporting integration and testing



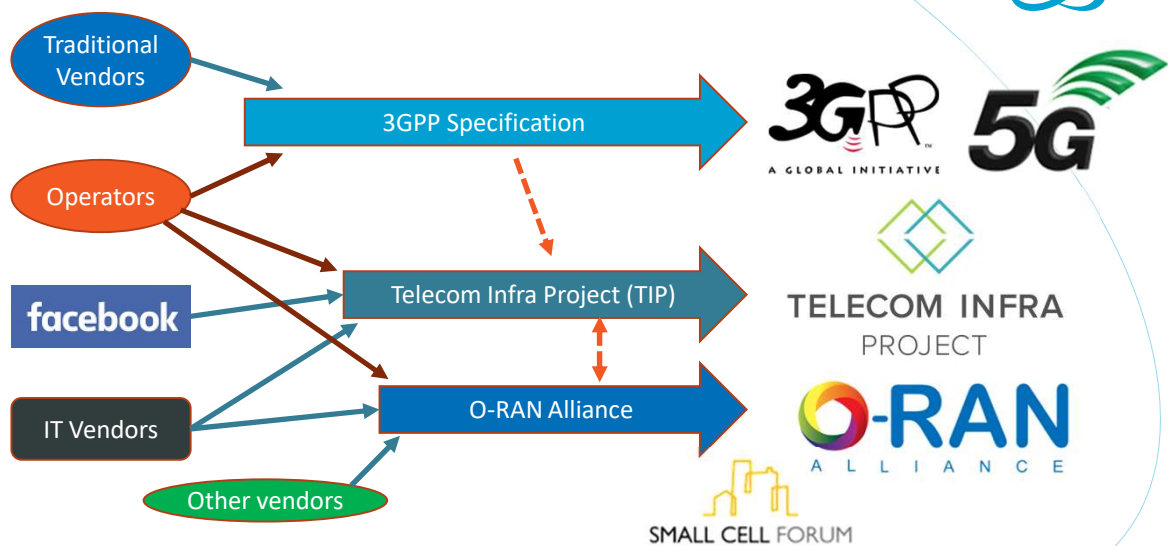
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Open RAN Developments



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Addressing 5G OpenRAN Challenges

-  Bits/sec/hertz/\$ - New TCO Business Models, Cost and Resiliency
-  Virtualization - All Elements Virtualized except the Radio
-  Open Source – Processes and platforms
-  Open Interfaces – Resistance to Vendor Lock in
-  Low cost RRUs – Merchant Chipsets replacing proprietary design
-  New Suppliers - Open, Multi-Vendor, enlarged supply chain

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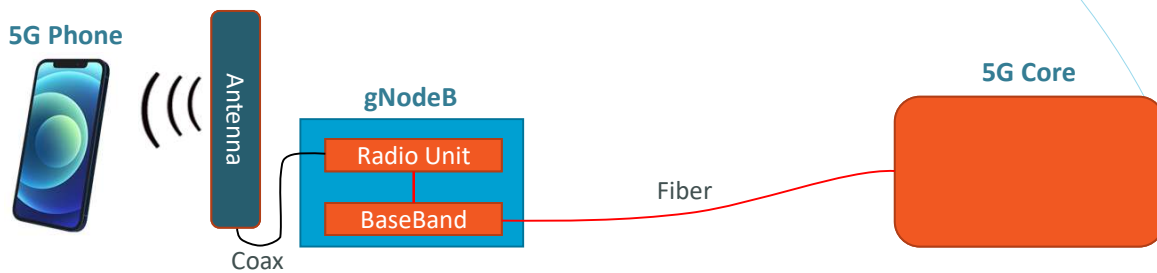
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Bron: Mavenir

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4. Simple 5G Configuration

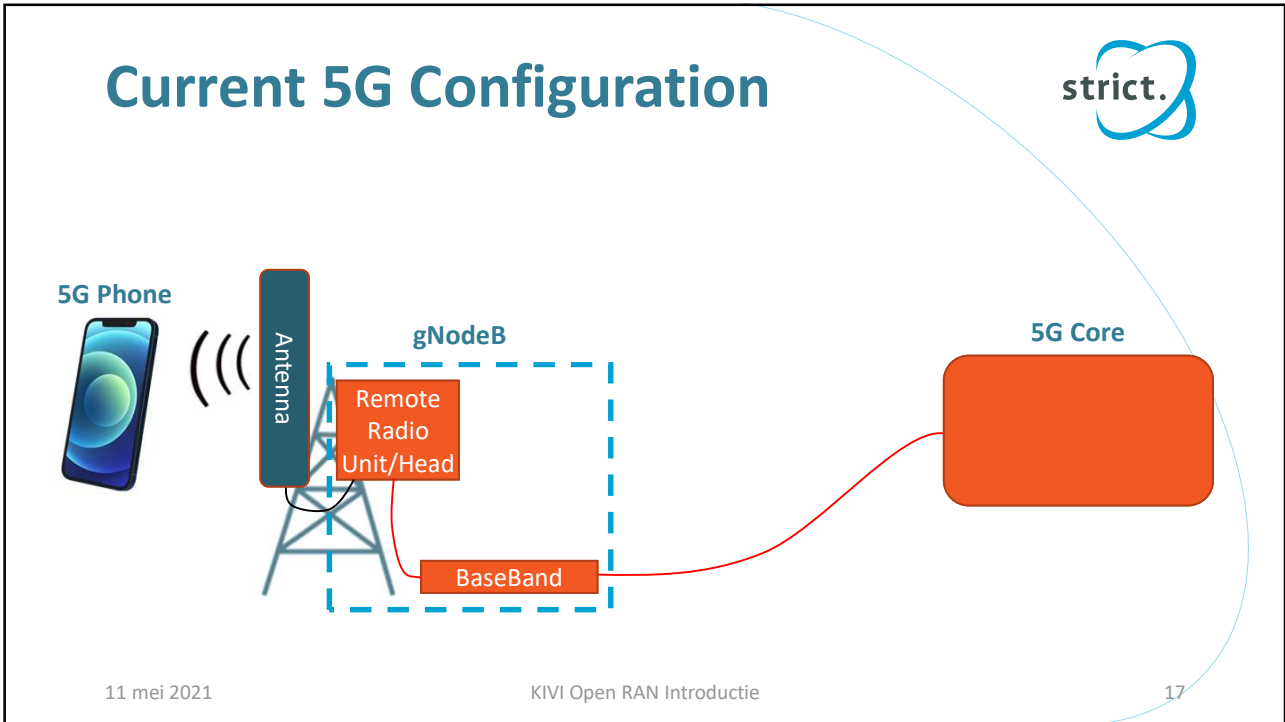


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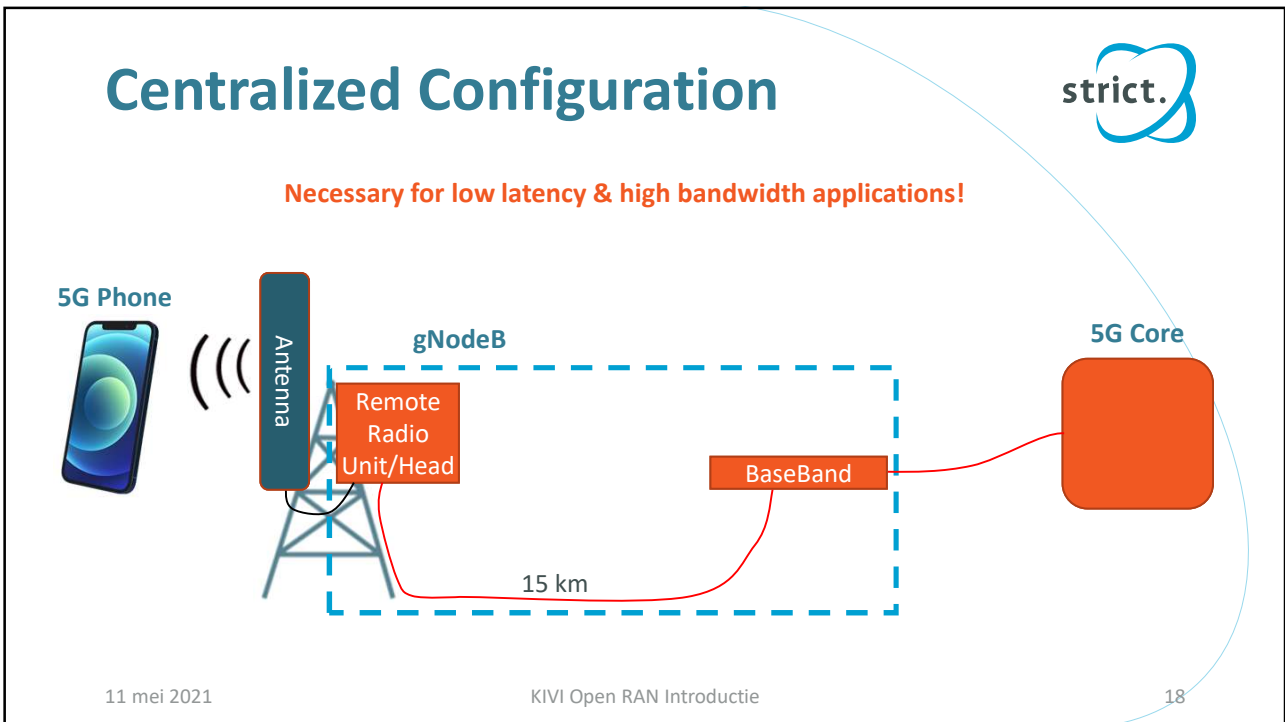
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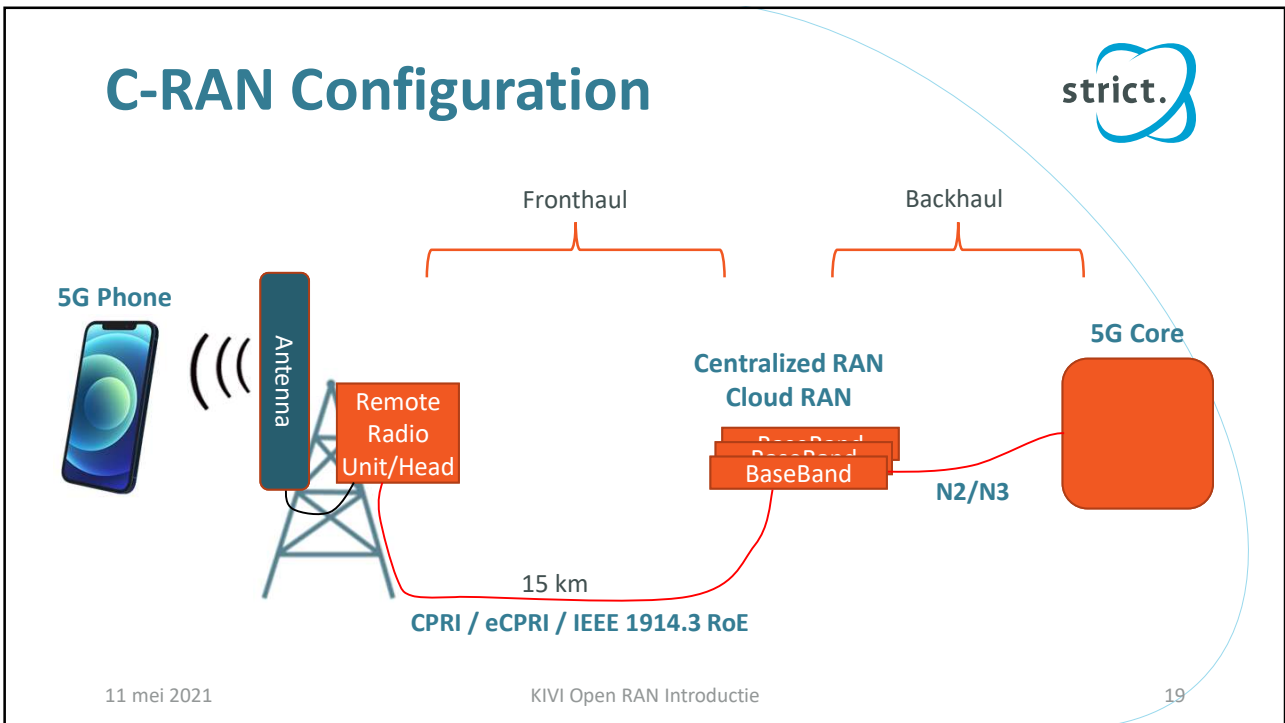
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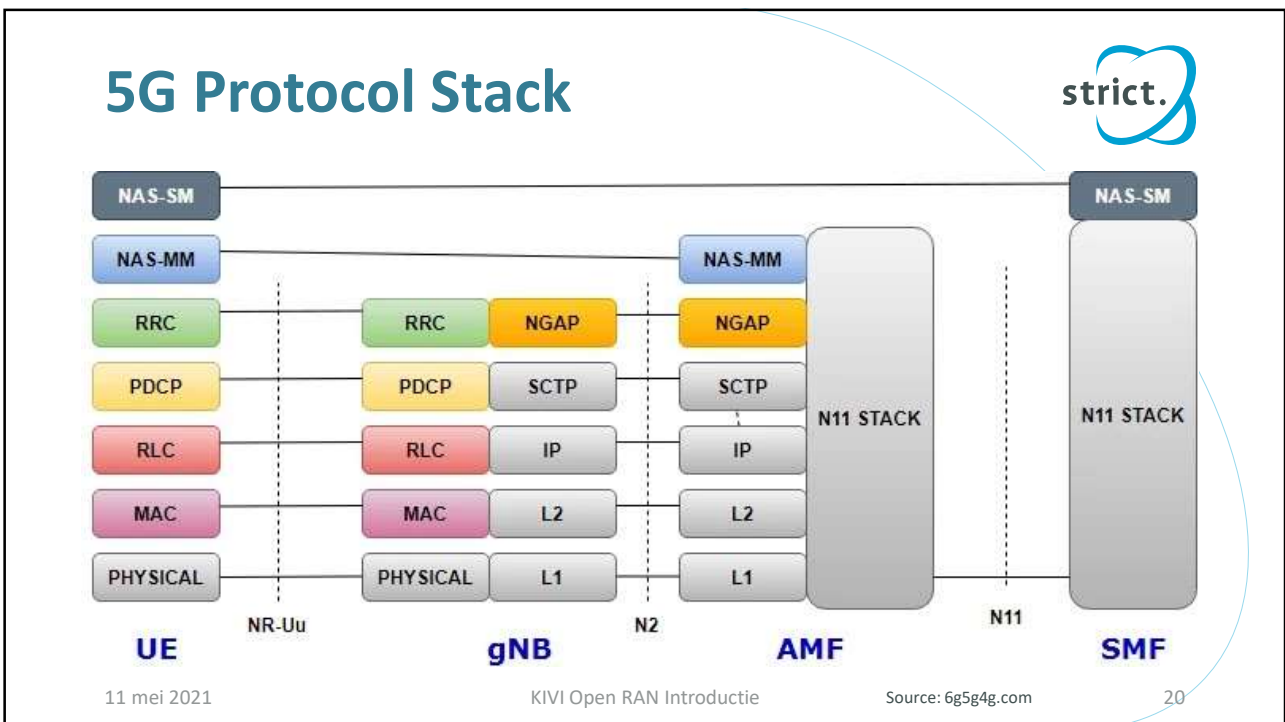
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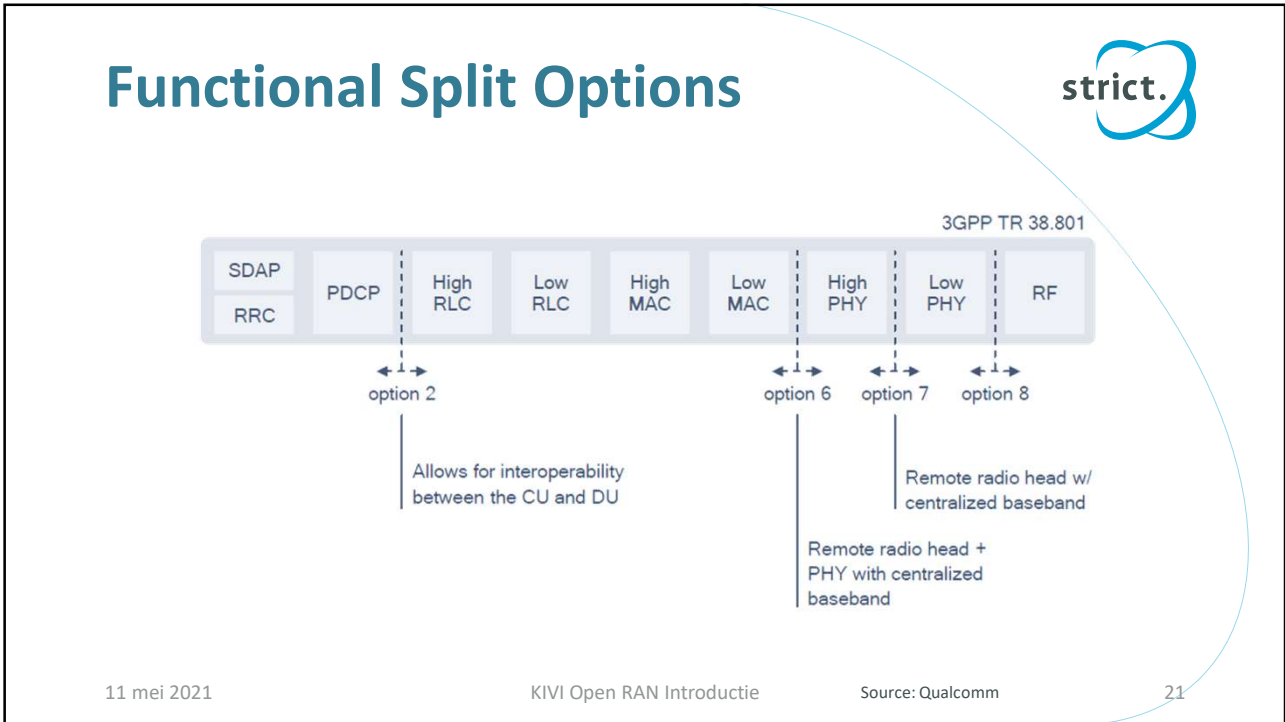
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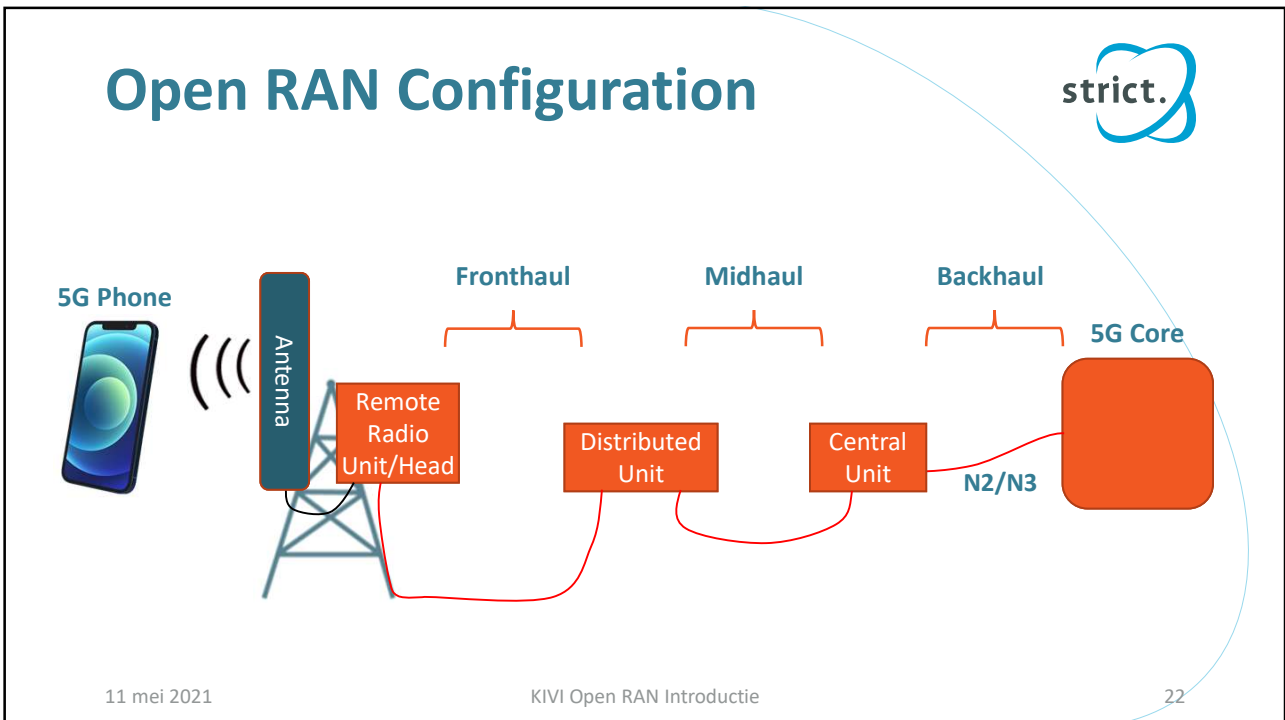
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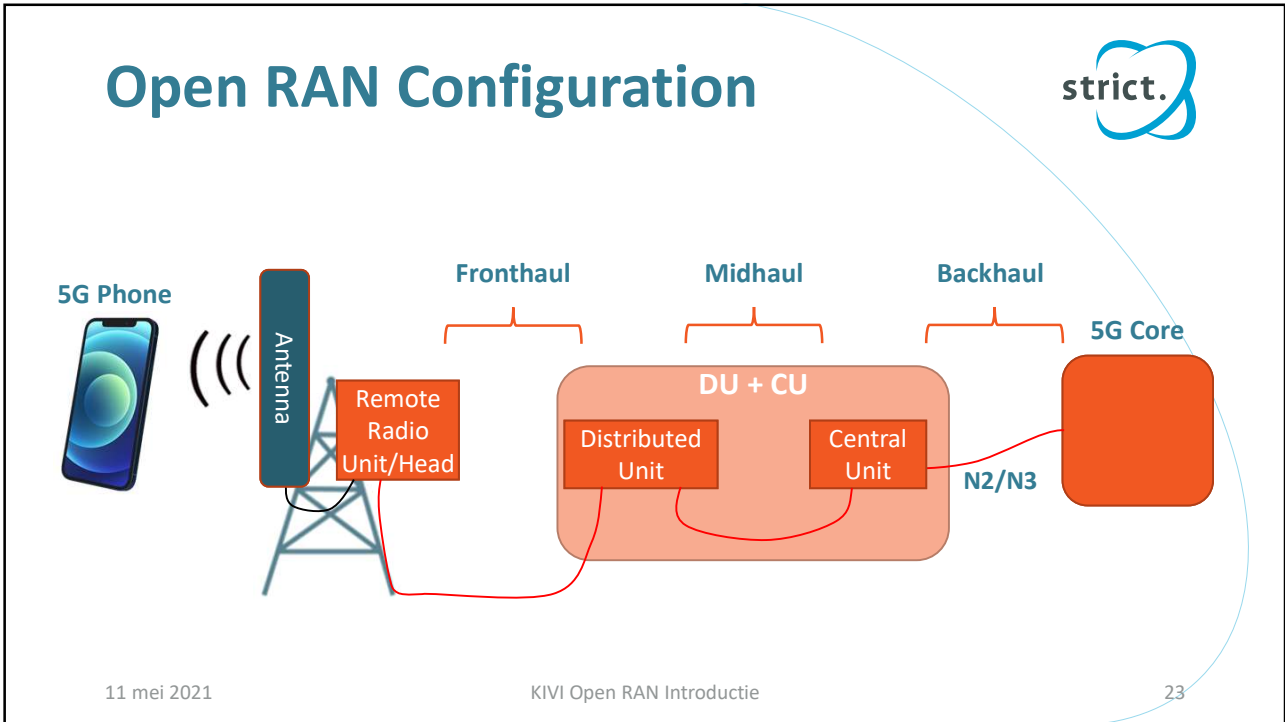
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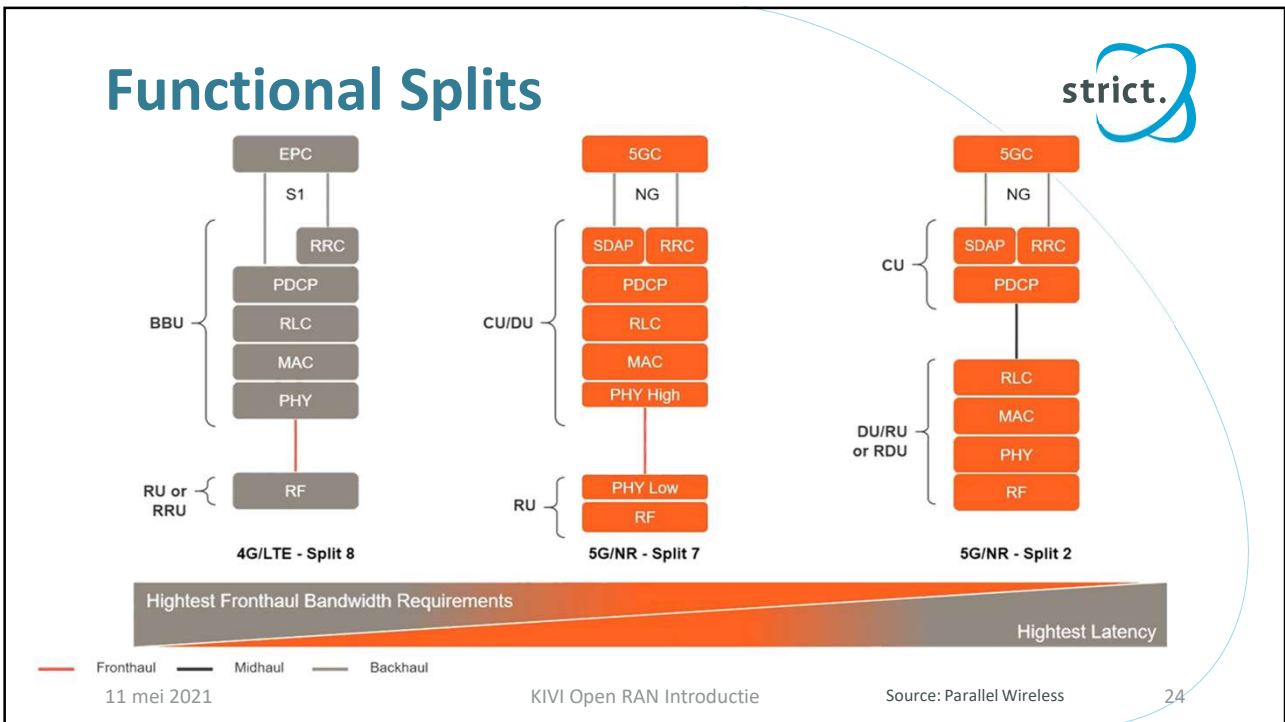
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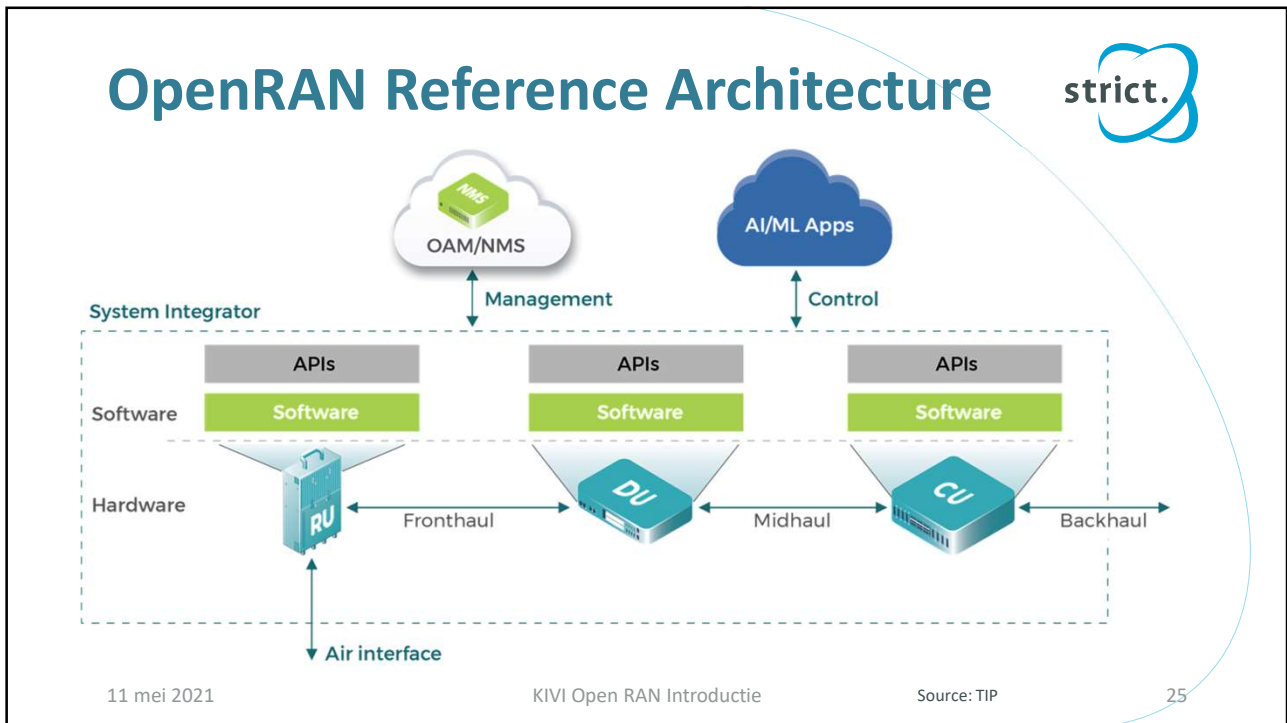
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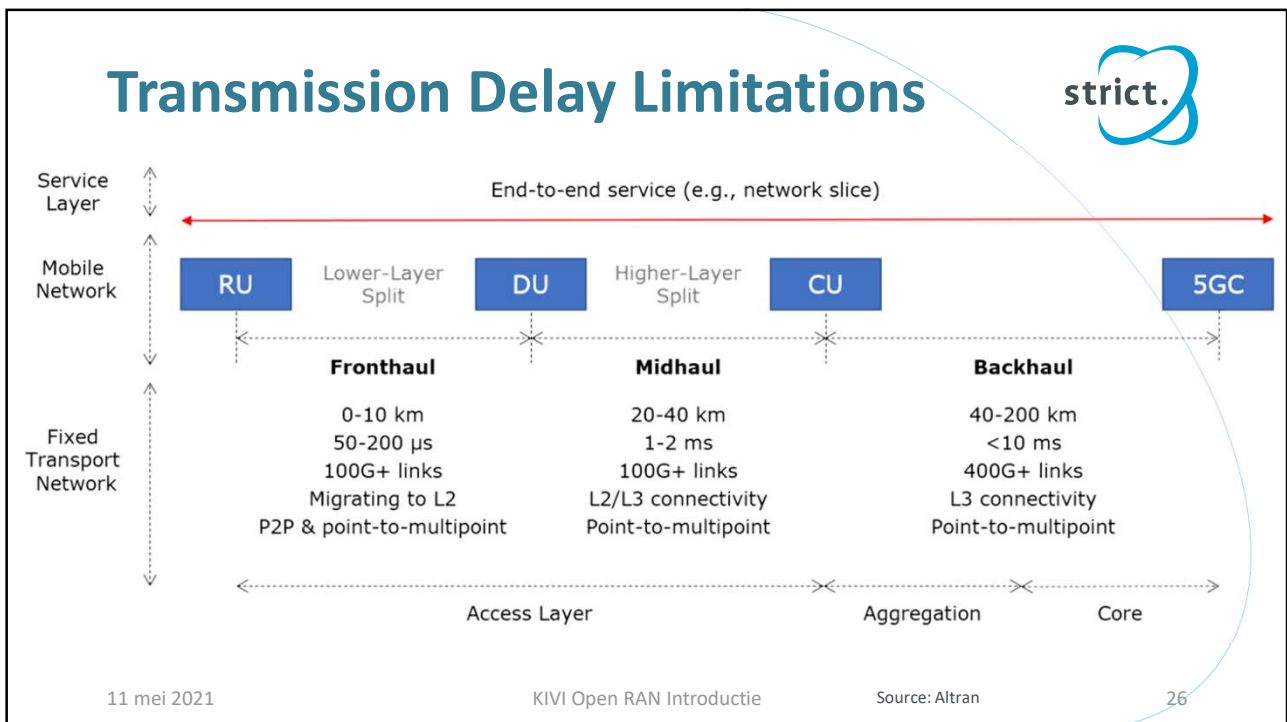
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5. Market Development

O-RAN

- Further Dis-aggregation
- RAN Cloudification
- Open APIs
- Multi-Vendors Interoperability

1st Level Dis-aggregation

- Proprietary System
- Some Dis-aggregation
- Partially Virtualized
- No Interoperability

Traditional RAN

- Closed Proprietary System
- No Open Interfaces
- No Interoperability

O-RAN components: O-RU, O-DU, O-CU, RIC. Interfaces: OFH, F1. Core: EPC / NGC. Features: Open interfaces and APIs with interoperable RAN components, NFV modules and reference designs, Intelligence and automation for Plug and Play.

1st Level Dis-aggregation components: RU, DU (Layer 1, Layer 2), CU (Layer 3). Interfaces: FH, F1. Core: EPC / Next Generation Core (NGC). Features: Proprietary hardware, NO multi-vendors interoperability (DU); Virtualized proprietary design, NO multi-vendors interoperability (CU).

Traditional RAN components: RRH, BBU (Layer 1, Layer 2, Layer 3). Interface: FH. Core: Evolved Packet Core (EPC). Features: Proprietary hardware and design, Does not support multi-vendors interoperability.

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Open RAN Key Companies

SYSTEMS INTEGRATORS	
vRAN SOFTWARE SUPPLIERS	
RU HARDWARE AND SOFTWARE SUPPLIERS	
CU AND DU HARDWARE SUPPLIERS	
SECURE VIRTUALIZATION PLATFORM SUPPLIERS	
CHIPSET SUPPLIERS	

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Source: ABI Research

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Vodafone opinion (April 2021)



- End to end: Mavenir, Parallel Wireless and Altiostar
- 2G software: Fairwaves and Parallel Wireless
- 3G software: Mavenir and Parallel Wireless
- 4G software: Altiostar, Parallel Wireless and Radisys
- Radio hardware: Baicells, NEC and Parallel Wireless



Many Integration Issues



Support Issues – who you gonna call?



Will it really be cheaper?



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Vodafone Open RAN



- Vodafone U.K. CTO Scott Petty called the move an “important milestone” said Open RAN can “make us less dependent on current larger technology suppliers, and find ways to reduce the cost of rolling out mobile coverage. Open RAN can also help close the digital divide between urban and rural Britain.” - Oct 2020



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vodafone

VodafoneZiggo innoveert in mobiele netwerk met Open RAN

19 oktober 2020

NEC – Altiostar & Others

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Dedicated versus COTS

- OpenRAN 5G is nog lang niet geschikt voor mobiele operators

5G BaseBand

Dedicated 5G BaseBand

Commercial Off The Shelf
(Zelfde Performance)

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UK Telecoms Diversification Taskforce



- The Government should set out a clear ambition for the deployment of equipment from alternative suppliers, or from **Open RAN solutions, to a meaningful proportion of the network** - and clarify its intent to ensure these alternative suppliers should form an integral part of the UK's urban networks in the longer term. We recommend the Government sets a challenging ambition to work toward a significant portion of equipment within mobile operators' networks being supplied by new suppliers and/or through open architectures. The Taskforce believes **25%** by the mid 2020s should be the initial aspiration for mobile operators. – **Report & Findings, 20 April 2021**

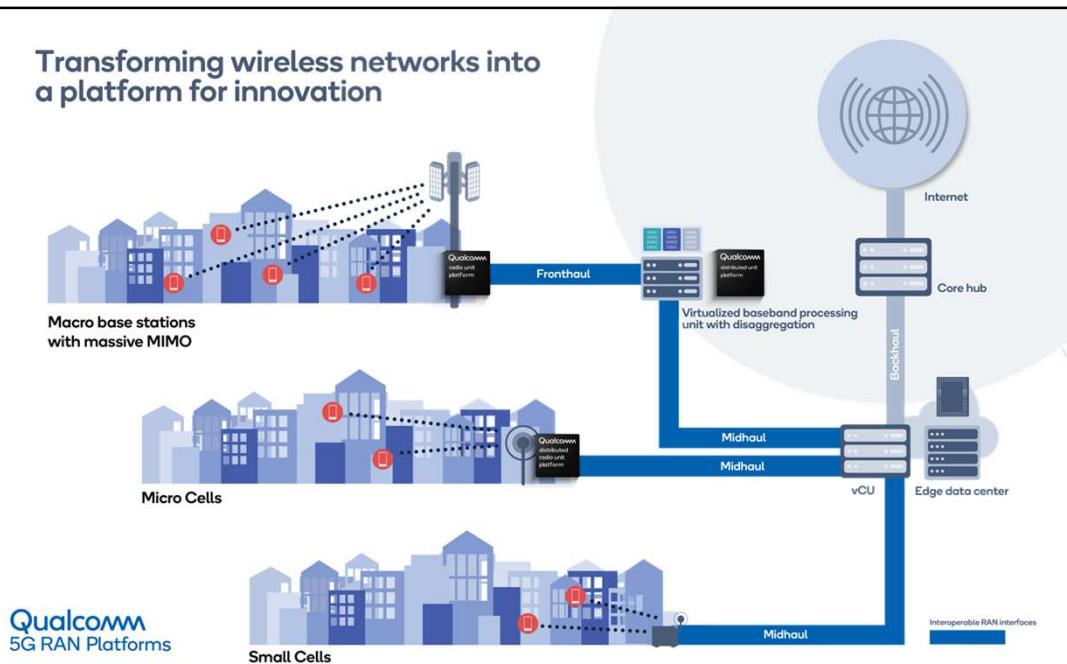
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Transforming wireless networks into a platform for innovation



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Operator Developments



Multi-Operator Open RAN MoU agreement

- Collaborate on implementation & testing
- Develop common requirements for vendors
- Commitment to deploy

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Open RAN 5G Ecosystem

- Multi-party (12 companies)
- DOCOMO open fronthaul expertise (1st 5G O-RAN)
- 5G vRAN from 2022

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5G vRAN deployment

- Live commercial traffic
- Sub 6 GHz spectrum
- DSS for LTE/NR coexistence
- Cloud native software
- Disaggregated DU and CU

Source: LightReading

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Open RAN Worldwide Initiatives



Source: TelecomInfraProject

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Wat kunnen we verwachten?



- Operators zullen Open RAN gebruiken om goedkopere RAN infrastructuur te realiseren
- Het is niet eenvoudig om aan de vele netwerk specificaties te voldoen (>2.000 testen)
- De komende jaren zal Open RAN maar beperkt worden toegepast in Nederland
- Veel nieuwe RAN vendors zorgen voor een groter ecosystem
- Dit geeft veel mogelijkheden voor Private Netwerken

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Bedankt voor uw aandacht! Nog vragen?

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