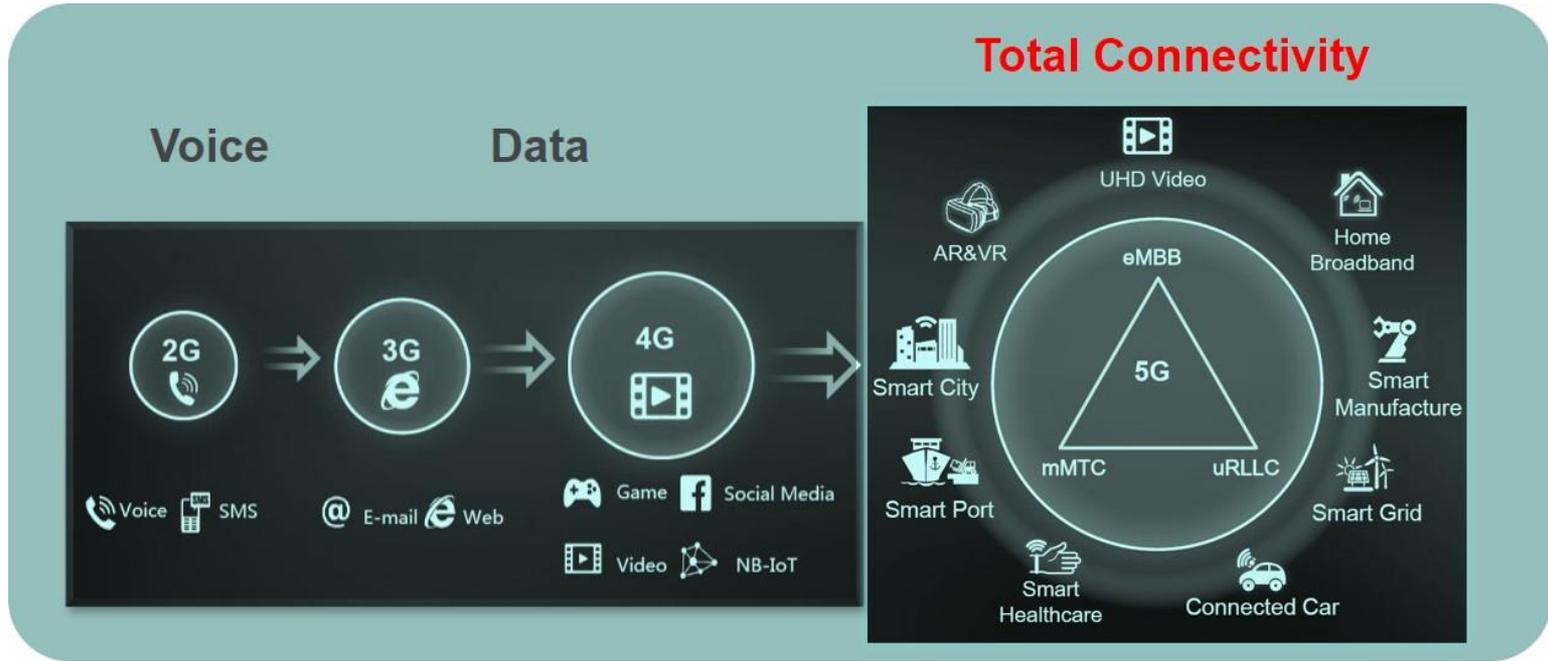# Workshop 5G
5G na prática – Casos de Uso
Brasília, 5 de Novembro, 2019

Fábio Moraes
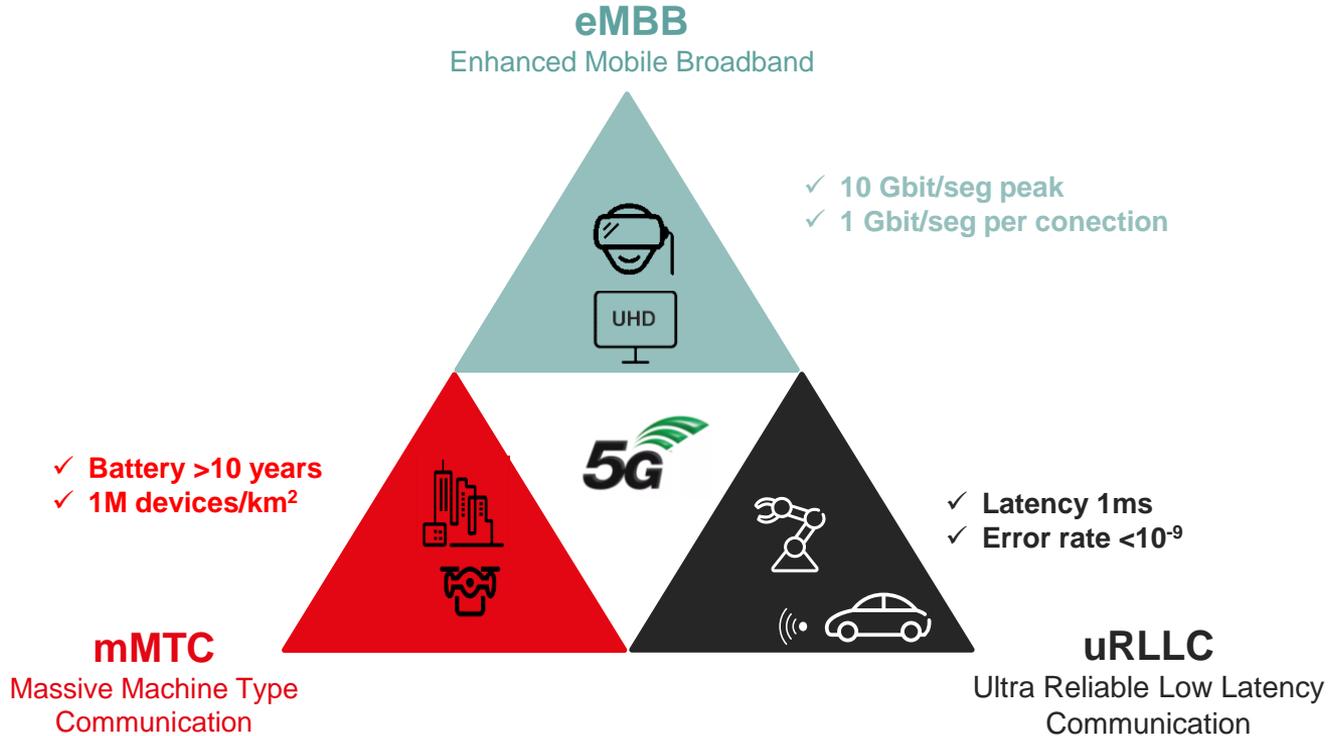Diretor de Estratégia
GSMA

O que é 5G (1/2) – Mais do que maior velocidade

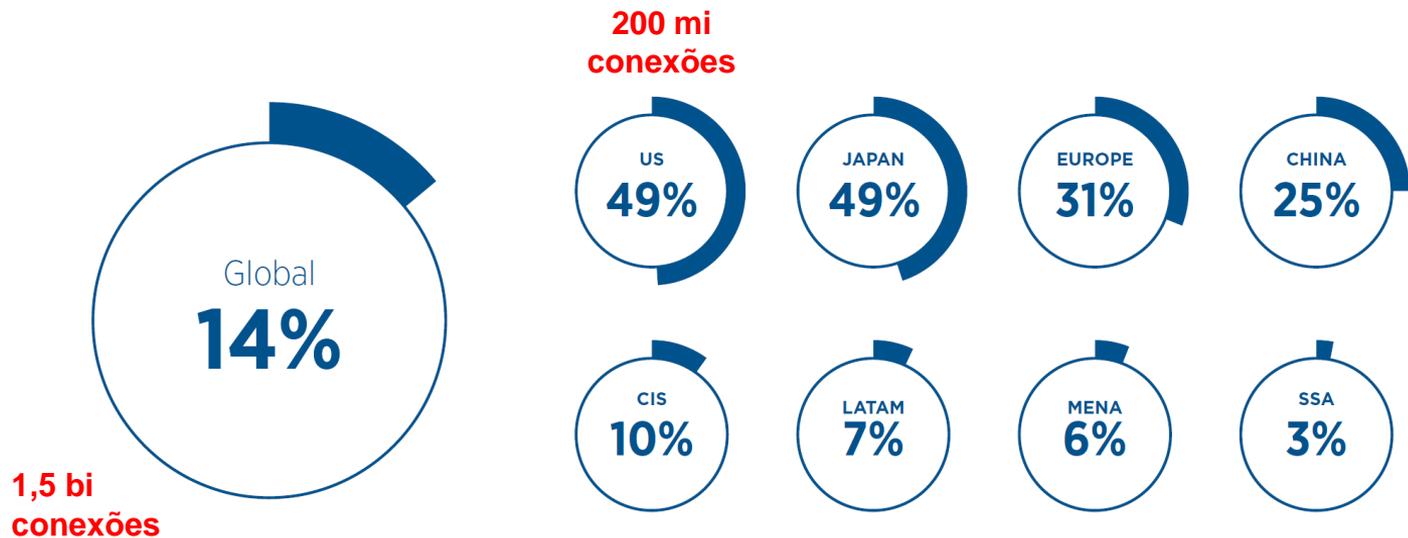**5G habilita uma nova geração de aplicações**

O que é 5G (2/2) – Connectividade total baseada em três pilares

eMBB
Enhanced Mobile Broadband

✓ **10 Gbit/seg peak**
✓ **1 Gbit/seg per conection**

✓ **Battery >10 years**
✓ **1M devices/km^2**

✓ **Latency 1ms**
✓ **Error rate <10^{-9}**

mMTC
Massive Machine Type
Communication

uRLLC
Ultra Reliable Low Latency
Communication

Planos de lançamentos de 5G por país

EUA e Coréia do Sul lideram

2018/19   2020   2021 and beyond

Adoção regional de 5G em 2025, excluindo IoT e FWA

200 mi conexões

Global 14%

1,5 bi conexões

US 49%	JAPAN 49%	EUROPE 31%	CHINA 25%
CIS 10%	LATAM 7%	MENA 6%	SSA 3%

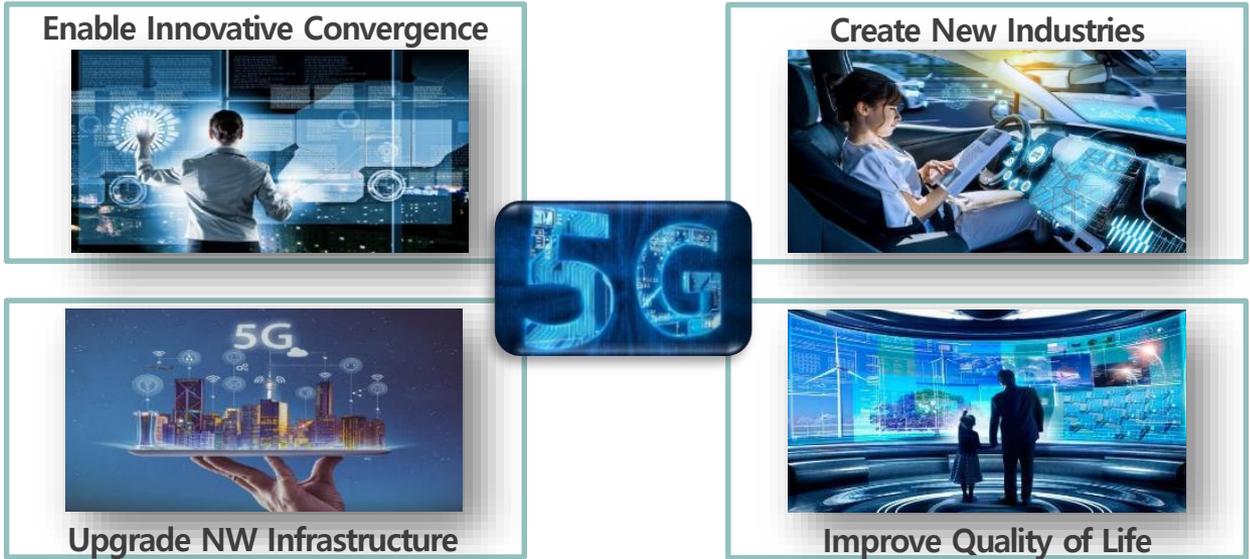(2025, percentage of connections excluding cellular IoT)

Coréia do Sul: 66% - 41 mi conexões*

* 1,6 mi no final de Junho
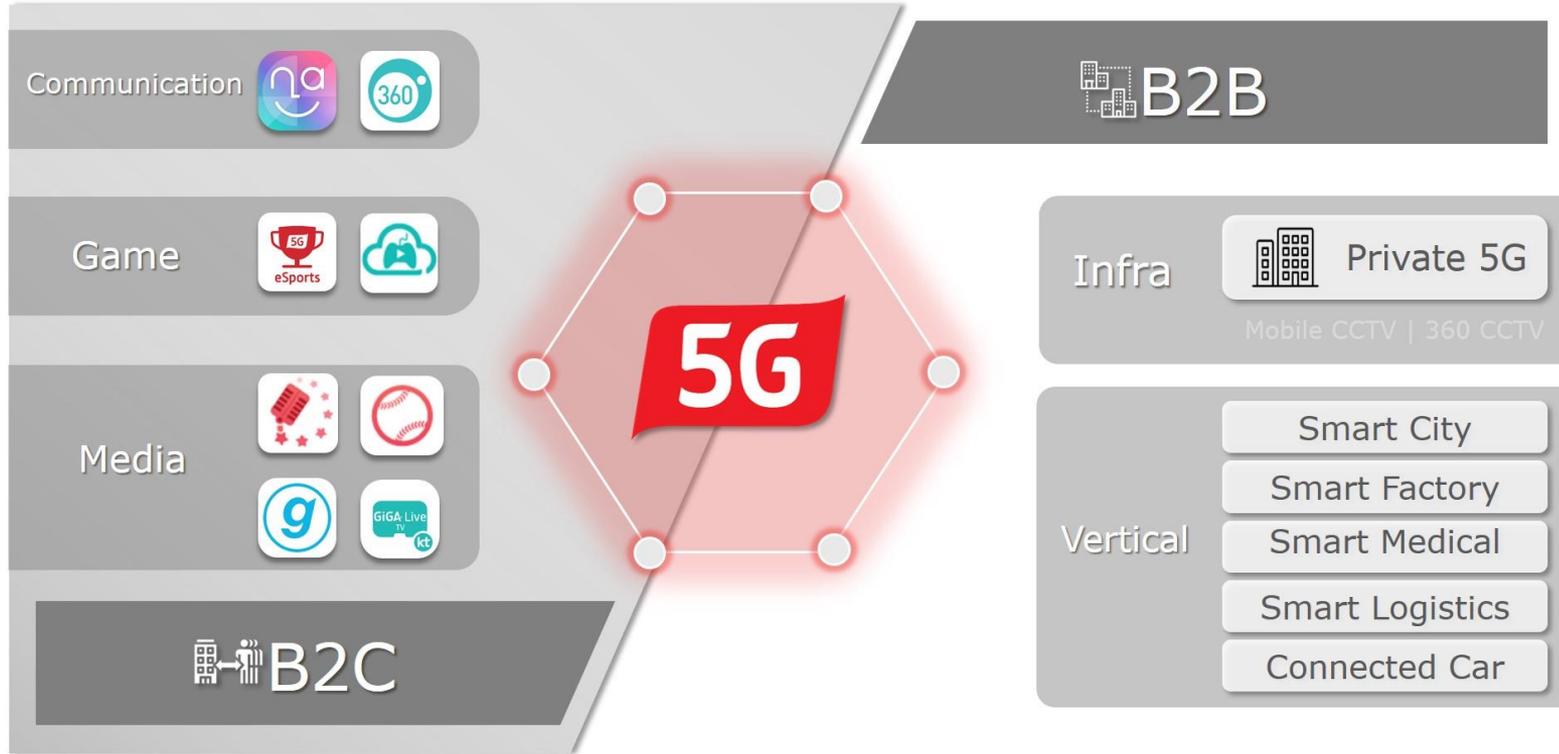
5G+: Política do governo da Coréia do Sul

5G como alavancador chave de crescimento econômico e desenvolvimento nacional

Enable Innovative Convergence

Create New Industries

Upgrade NW Infrastructure

Improve Quality of Life

Source: Korea Telecom

Volume de Mercado Estimado em 2026 → $1,161 Bilhão

Casos de Uso – Uma visão da KT

Source: GSMA intelligence

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Casos de Uso – Consumer – "5G Superpower Services" (KT)

Communication

Real 360

narle

Game

eSports Live

Streaming Game

Media

Baseball Live

Musician Live

Real Genie Pack

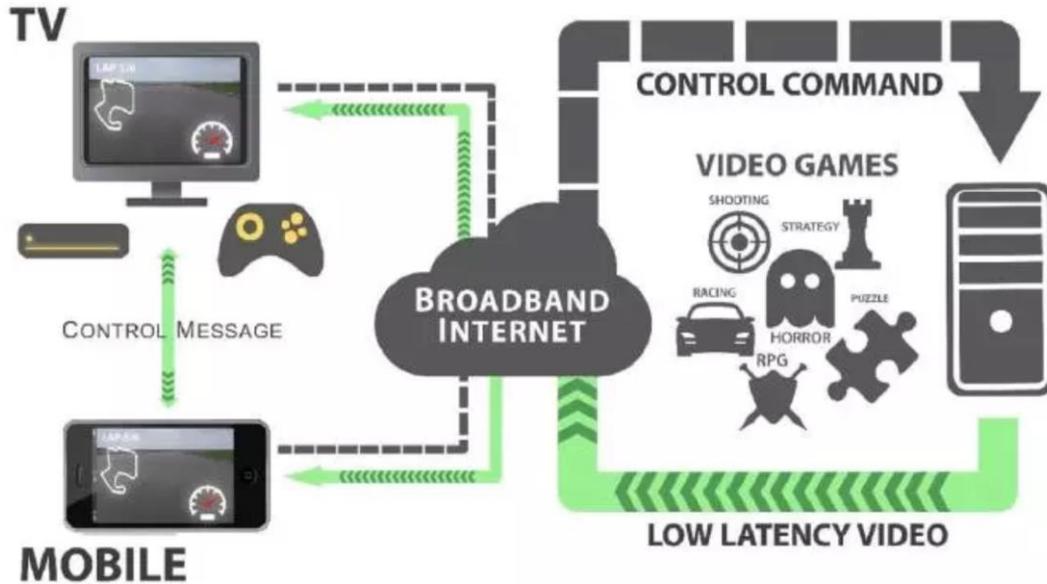
GiGA Live TV

Casos de Uso – Consumer – 5G Cloud Gaming

A baixa latência do 5G permite o processamento e armazenamento de games na nuvem, permitindo "independizar" a performance do dispositivo.
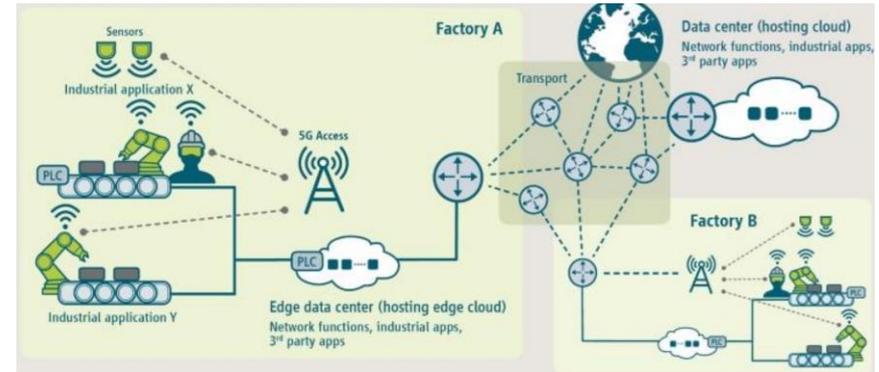
A indústria de Games terá receita global de USD 152 bi em 2019

Fonte: reporte Newzoo, Jun, 2019

Segmento B2B Visão preponderante: 5G como alavancador da Indústria 4.0

5G desempenhará papel central ao longo de todas as indústrias, servindo como Tecnologia de Uso Geral (GPT – General Purpose Technology) - KT

Source: 5G-ACIA, "5G for Connected Industries and Automation", Whitepaper, Apr'18

"*The impacts of the ICT revolution* are now palpable in all countries, and are projected to be economically and socially revolutionary in the coming years as technology penetrates and *fosters fundamental change in all sectors and dimensions of lif*e."

Professor Dale Jorgenson (Harvard)
'The ICT revolution, world economic growth, and policy issues' (2016)

B2B – Use Cases KT

Immersive Media

Smart Factory

AI Hotel Robot

Connected Car

Public Safety

Use Cases – Industry

AI Cooperative Robot

Remote Cockpit

5G Neckband

AR Supporter

360 CCTV

B2B – NTT Docomo – Caso 1 – Construção remota

To realize a remote operating system for construction/mining machines leveraging the high-speed and low-latency characteristics of the 5G radio technology
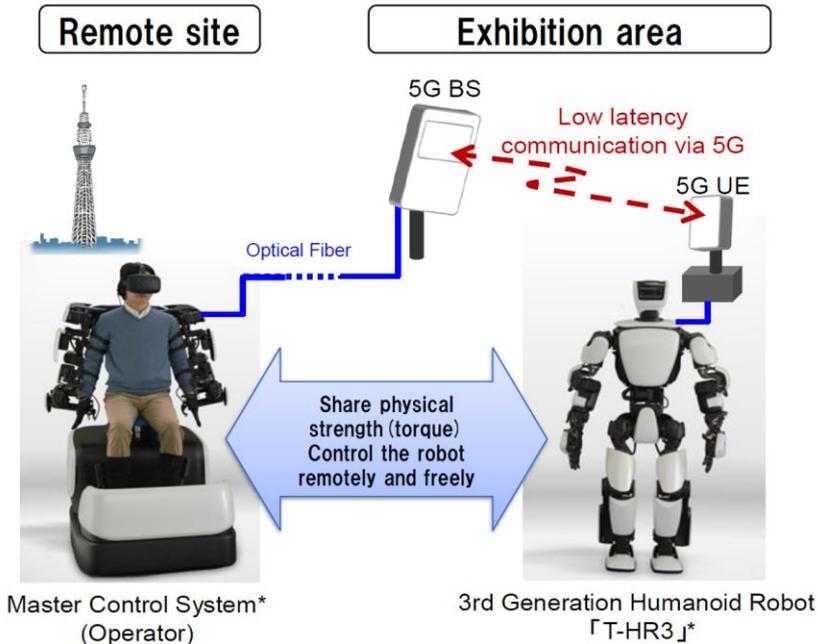

KOMATSU test field @ Mihama-ku, Chiba

Remote cockpit @ Tokyo (DOCOMO HQ)

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T-HR3 × 》5G

Remote site

Exhibition area

5G BS

Low latency communication via 5G

5G UE

Optical Fiber

Share physical strength (torque) Control the robot remotely and freely

Master Control System* (Operator)

3rd Generation Humanoid Robot 「T-HR3」*

- Remote control of humanoid robot utilizing low latency capability of 5G
- Physical strength (torque) and haptic perception can be shared between the operator and the robot (T-HR3)
- Operator can control the robot remotely and freely with the sense of avatar
- Use cases
  - Support household cares, care for old people and child, etc, remotely
  - Support constriction works and medical diagnostic by the robot
  - Extreme work at, e.g. disaster area, space

B2B – NTT Docomo – Caso 3 - Telemedicina

Remote doctor's interview and diagnosis trials based on 4K high resolution video transmission over 5G to realize telemedicine services between the advanced medical hospital and the local medical clinic
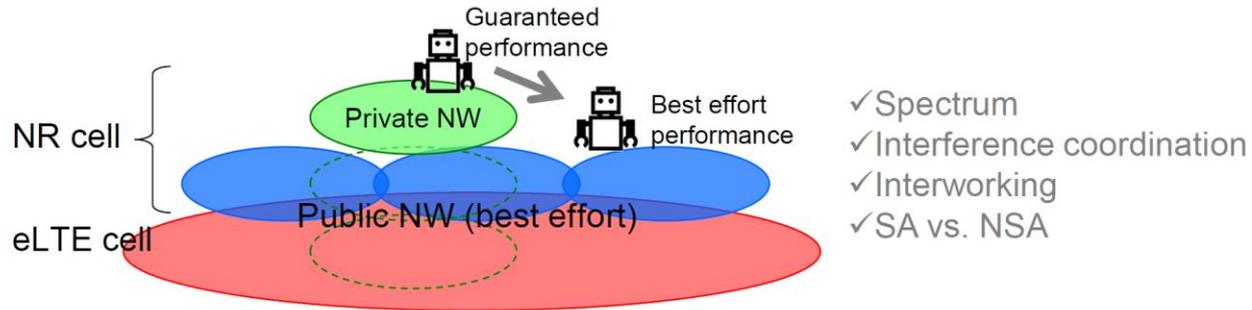
Advanced medical hospital

Local medical clinic

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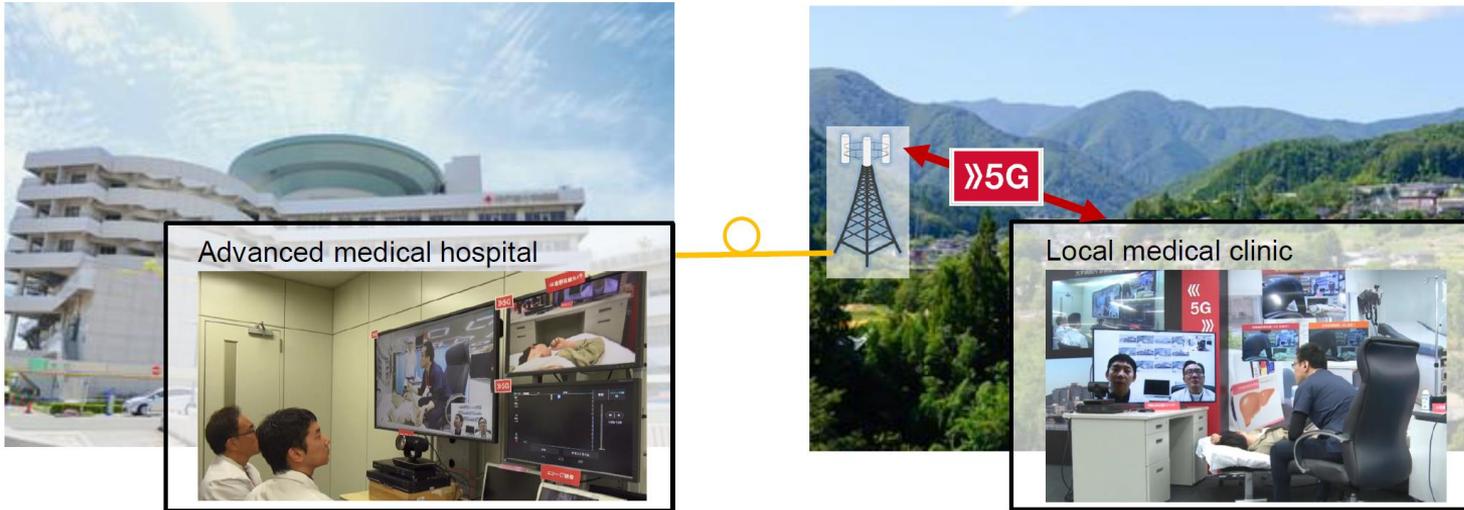
B2B – NTT Docomo – Caso 4 – Rede 5G Privada

■ High demand of industry network to provide specific and high performances, e.g.;

- Relatively high minimum data rate (sometimes for many devices, sometimes uplink heavy)
- High reliability to keep service quality
- Low end-to-end latency
- Easy temporary network deployment for events, construction sites, etc.

➜ Private 5G network is a promising solution to address such requirements

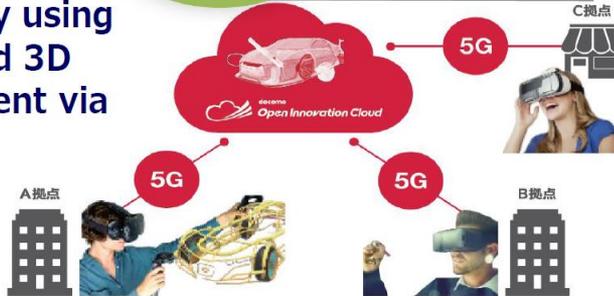■ A technical issue – public/industry overlay deployment

NR cell

eLTE cell

Guaranteed performance

Private NW

Best effort performance

Public NW (best effort)

✓ Spectrum
✓ Interference coordination
✓ Interworking
✓ SA vs. NSA

Colaboração é a chave – Iniciativa NTT Docomo

Co-creation with partners from a wide range of industries

- Medical, education, others **7**%
- Communications **3**%
- Financial, Insurance **4**%
- Logistics, Transportation **5**%
- Local Government **7**%
- Construction **7**%
- Media **7**%

3,000 Partners over

- **24**% Service
- **19**% Wholesale, Retail, Restaurant
- **17**% Manufacturing

Co-work remotely using VR goggles and 3D Drawing Equipment via 5G

docomo Open Innovation Cloud

A拠点 5G 5G B拠点 C拠点 5G

5G verification environment

DOCOMO's 5G Open Lab ™
Yotsuya, Osaka, Okinawa, Guam

- DOCOMO AI technology
- Natural conversations
- Image recognition
- Trend Micro
- Partner technology
- SONY
- Wacom
- VMware
- NEC
- NTT-TX

DOCOMO Cloud Foundation

DOCOMO Open Inovation Cloud ™

Colaboração é a chave - 5G como Plataforma – Visão KT

Source: GSMA intelligence
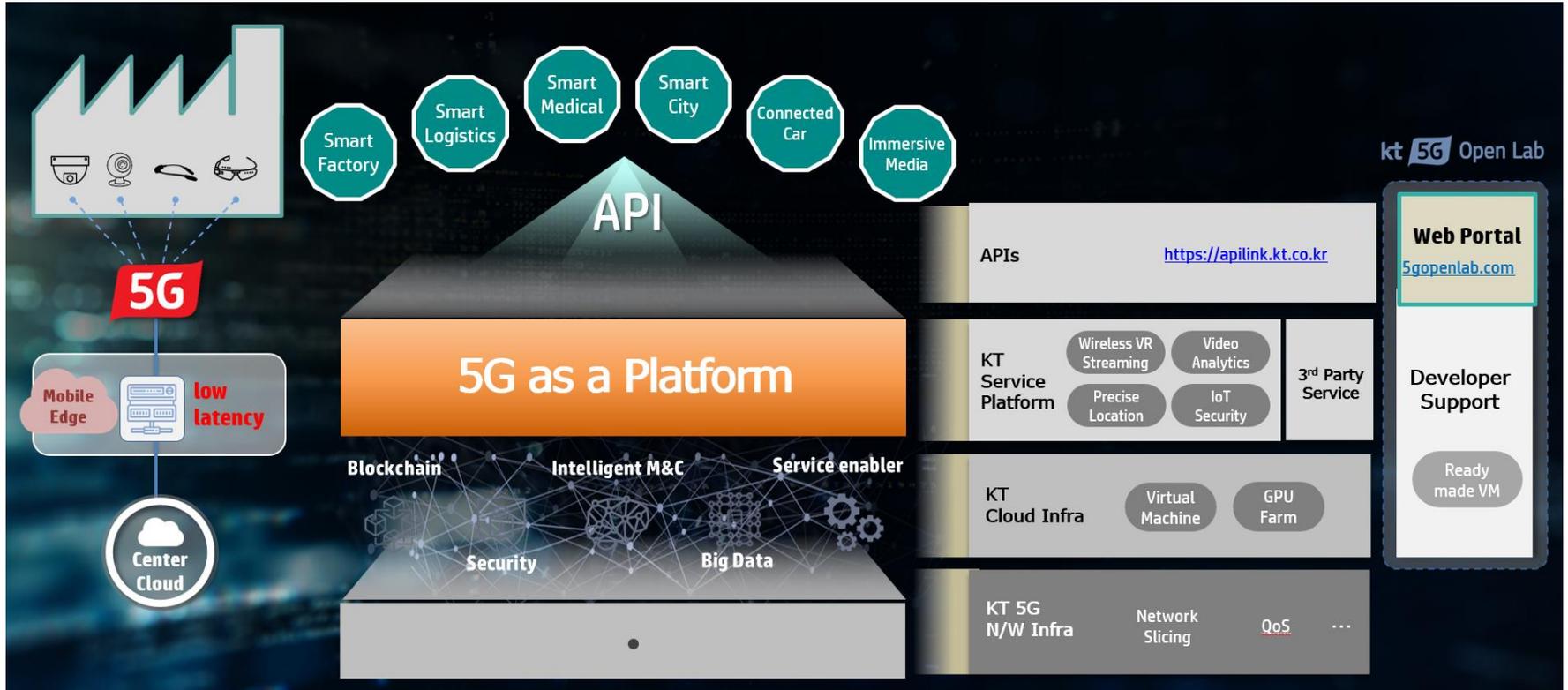
Obrigado!
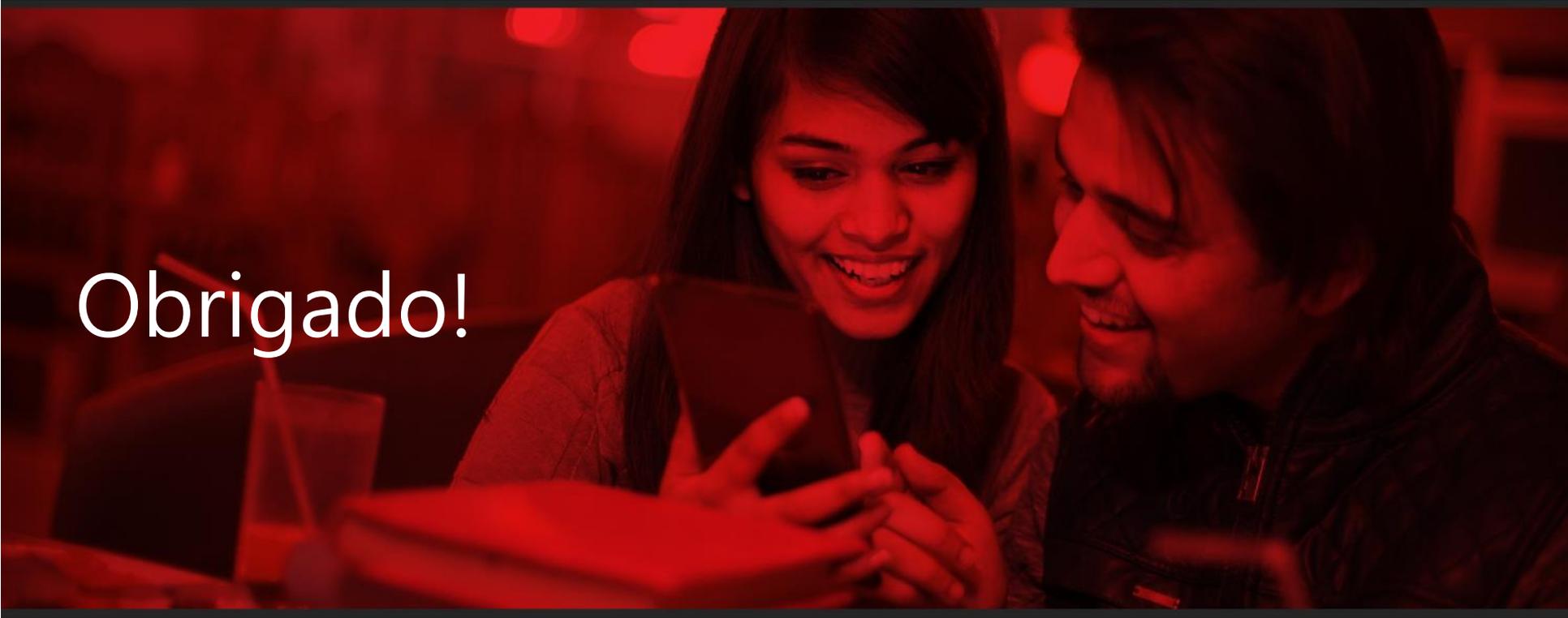
KT 5G B2B Use Case – Skyship

5G enabled high-quality, real-time communication & surveillance platform

Earthquake

Fire

Maritime Safety

Typhoon

Flood

Distress