

Evolving NFV towards the Next Decade  
Celebrating the 10<sup>th</sup> Anniversary of ETSI NFV

# **NTT DOCOMO'S NFV Journey: past, present and future vision**

Dr. Joan Triay

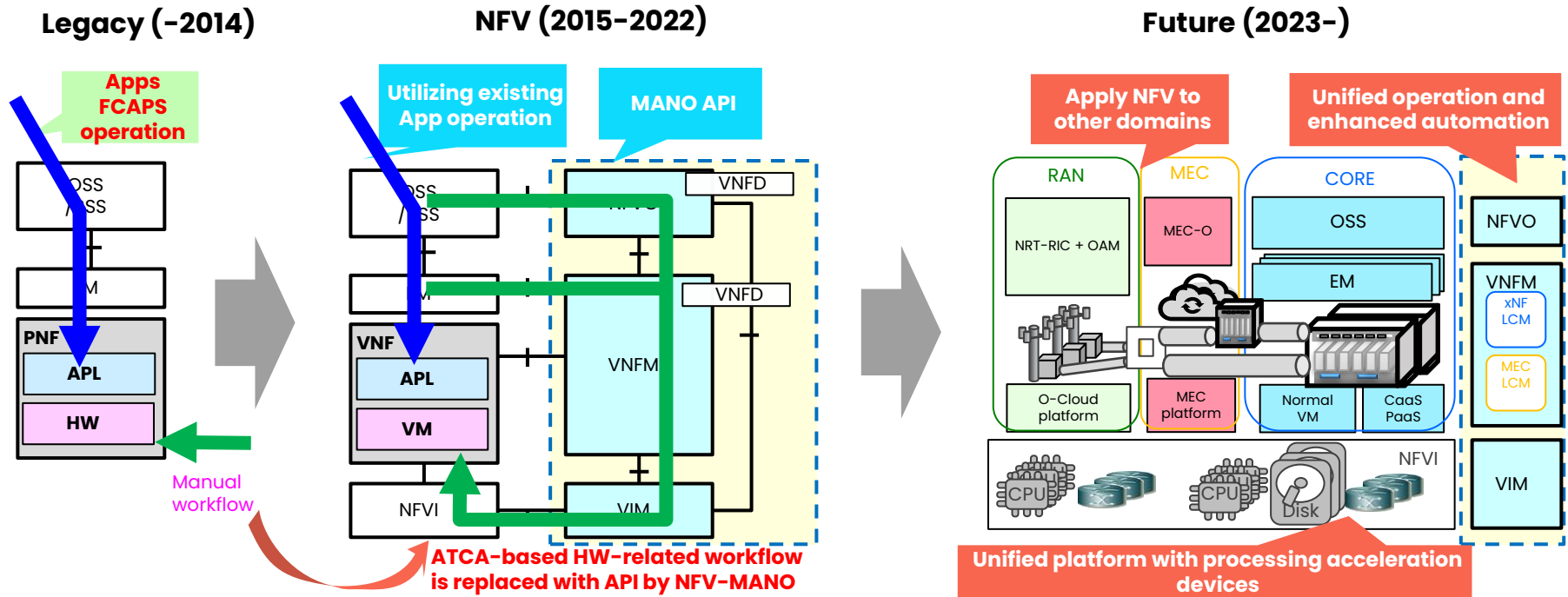


# Message from DOCOMO's CTO

# **DOCOMO's NFV: our journey in the past 10 years**

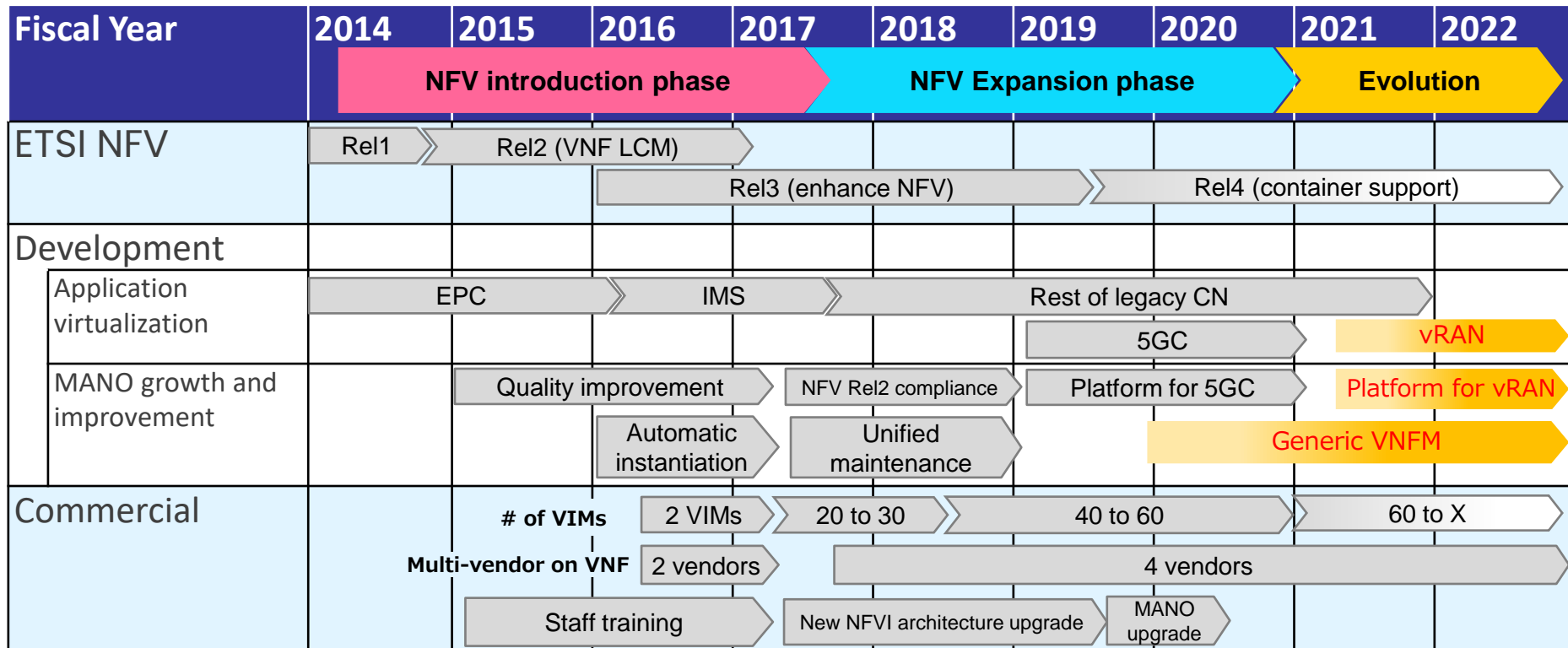
# DOCOMO's network evolution by NFV

DOCOMO succeeded in transitioning to NFV.  
DOCOMO is going to apply NFV to other NW domains.



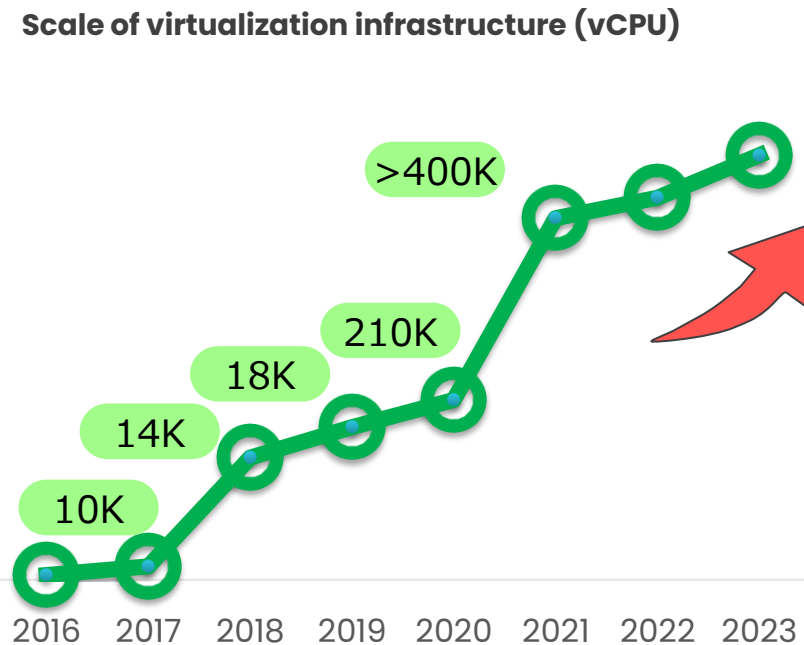
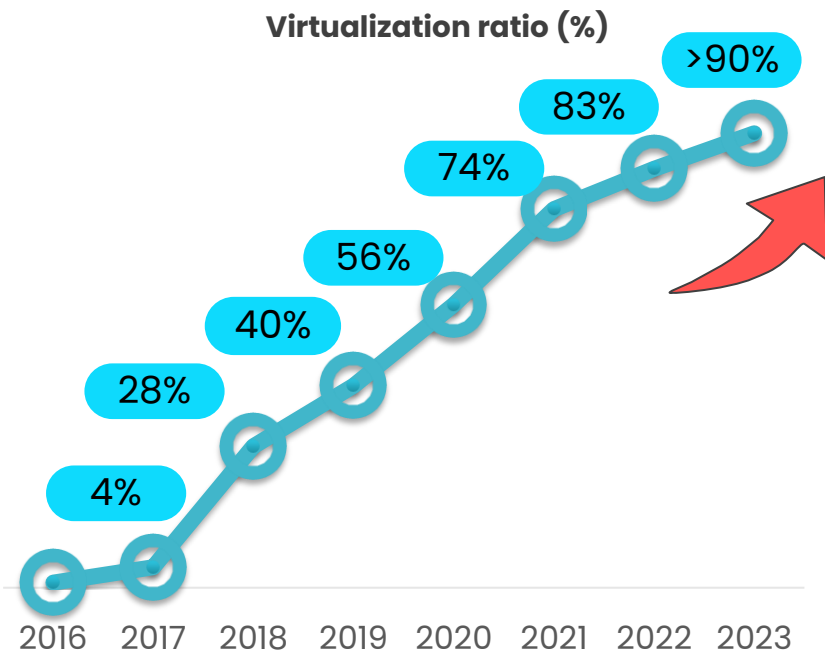
# DOCOMO's NFV development journey

DOCOMO has contributed to NFV standardization while promoting commercial development and providing feedback to standardization.



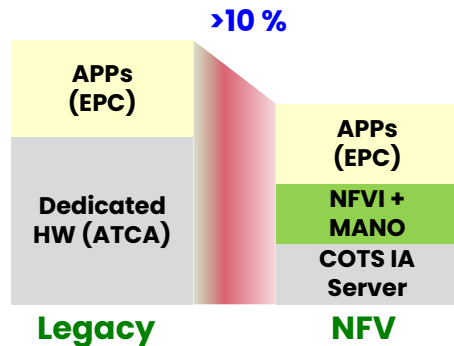
# DOCOMO's NFV: real numbers

DOCOMO has virtualized over 80% of its core network.  
DOCOMO core network will be fully virtualized in 2025.

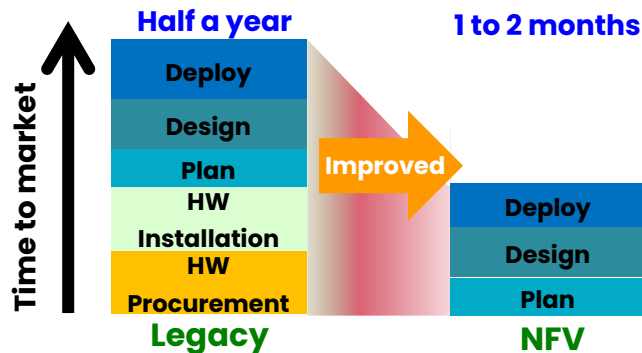


# Core network transformation by NFV

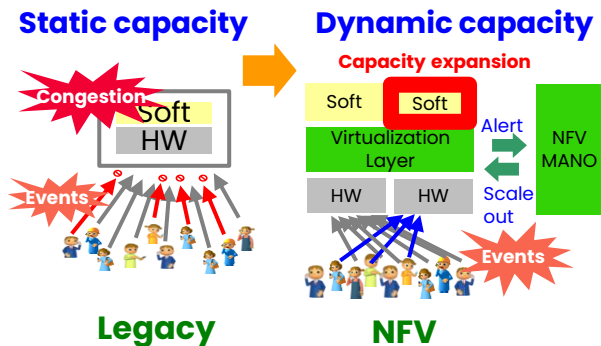
## CAPEX reduction



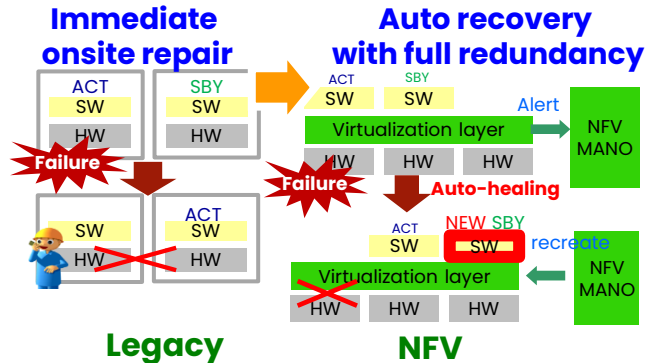
## Improve agility



## Improved connectivity



## Improved reliability



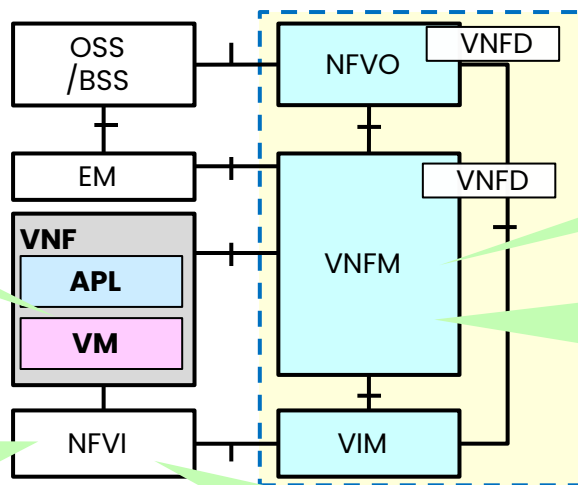
# Lessons learned from NFV development and operations

Reference architecture and IF specifications are required for long-term operation and sustainable maintenance.

#1 Decoupling of application software and hardware should be further investigated

#2 Telecom-specific software/hardware extensions become a huge risk for future upgrades

#3 Upgrade procedure of both NFVI and VIM gets longer and more complex



#4 IF customization is a risk for keeping backward compatibility and future interoperability

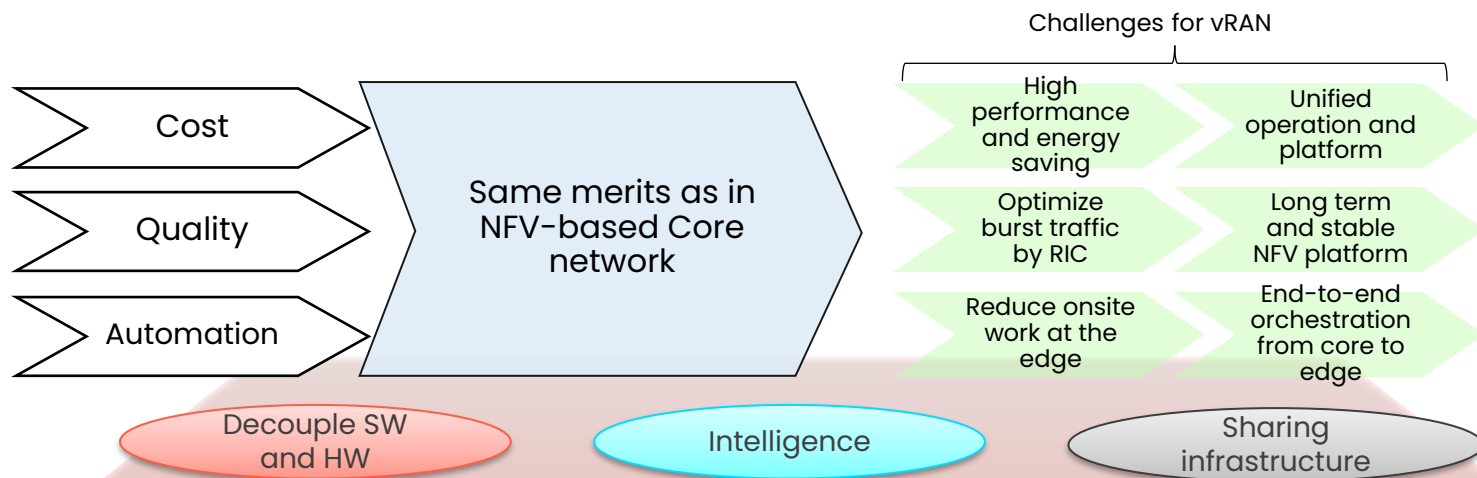
#5 Specific management for each VNF does not scale, neither economically nor in operational terms

# **DOCOMO's vision for the next decade**

# Next NFV challenge is RAN domain

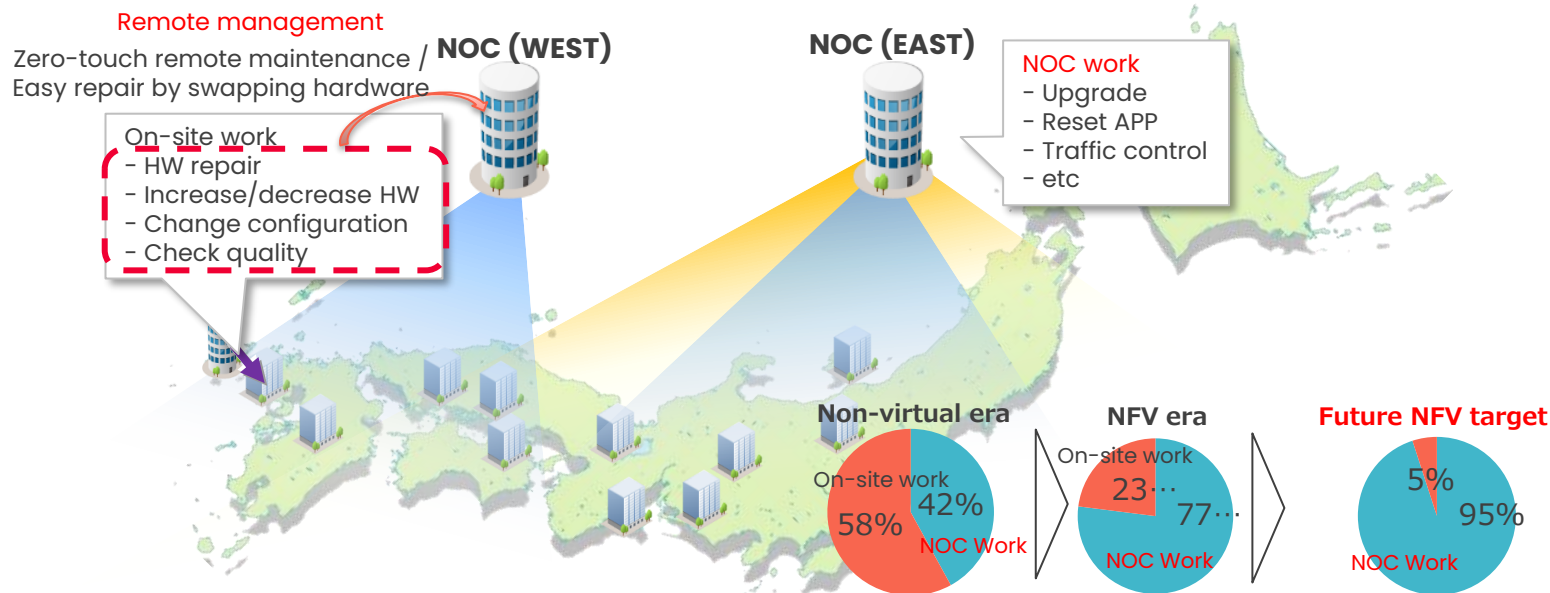
✓ Aiming to revolutionize network construction and operation by introducing NFV and evolving further the benefits realized in the core network

- Reducing hardware cost, energy-power, on site work and maintenance
- Intelligent, automatic and highly efficient resource usage
- Maximize merit across multi-domains from RAN to Core



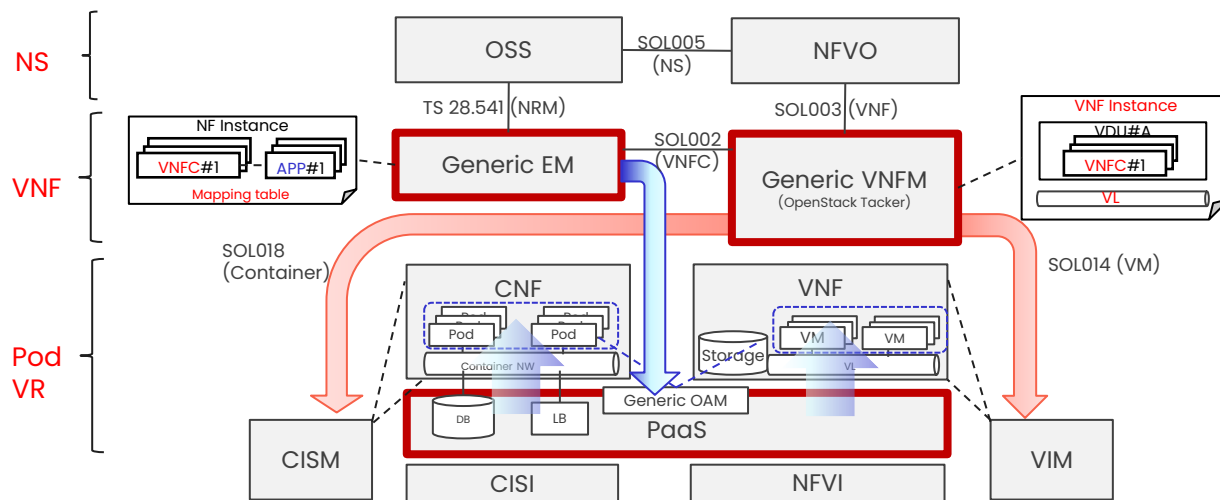
# Expectation in vRAN operation

- ✓ Expand the scope of automation and the capabilities of remote OAM by means of virtualization and orchestration technologies
  - Reduction of on-site work by disaggregated RAN/CN and remote control
  - Intelligent orchestration and zero touch operation through virtualization and softwarization



# Unified platform for multi-domain

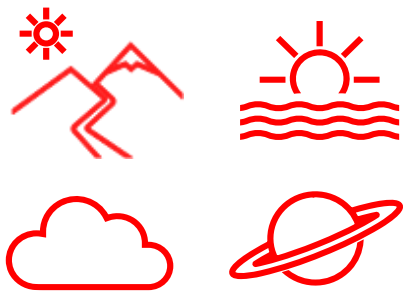
- ✓ DOCOMO tries to realize a unified platform using the ETSI NFV architecture to maximize NFV merit on a multi-vendor environment
  - Respecting standard specifications (ETSI NFV, O-RAN, 3GPP SA5)
  - Both container-based and VM-based applications to be managed
  - Generic management functions for application & virtual resources
  - One orchestration and telco PaaS for both RAN and CN



# Next vision to support new use cases

## ✓ Beyond 5G and 6G should support new use cases

- Communication coverage and massive sensors
- Variety of use cases like XR, automation, digital twin



Communication coverage expansion (all environments)



Extended reality (XR)



Multi-sensory



Societal automation



Massive connectivity and sensing

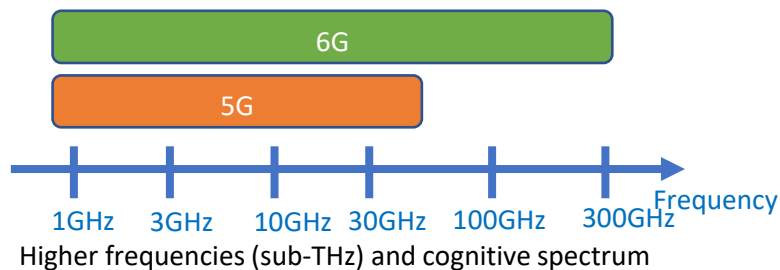


Digital twin and cyber-physical fusion

# Potential key technologies for the next decade

## ✓ NFV will provide and inter-work with new technologies to support Beyond 5G and 6G

- New types of resources and virtualization
- Integrating new technologies like AI, segment routing



Integrated connectivity and sensing

Artificial Intelligence



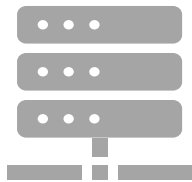
Machine Learning



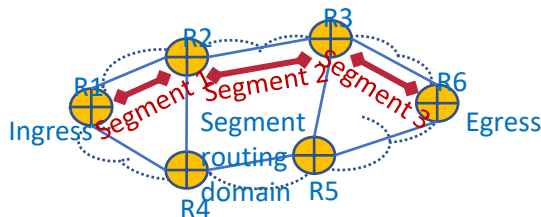
Deep Learning



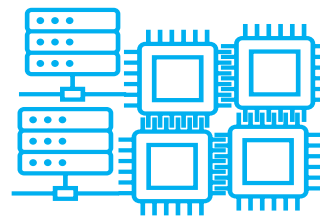
Integrated and collective AI/ML



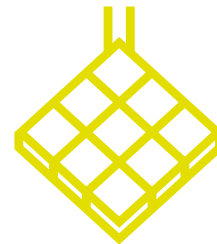
Serverless, unikernels



Segment routing, new IP stacks



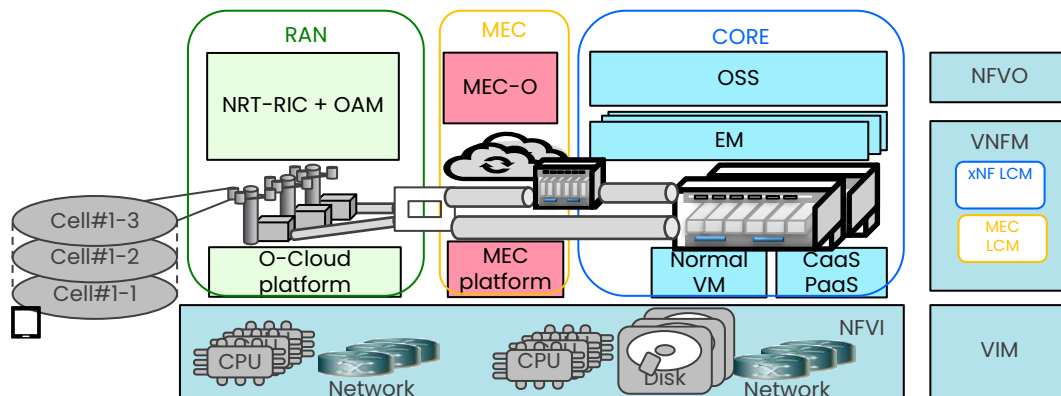
Whiteboxes and new compute fabrics



Smart meta-surfaces

# Conclusion

- ✓ DOCOMO succeeded to deploy NFV
  - Over 80% virtualized in core network with essential merits for operation and deployment
  - Next stage is RAN
- ✓ DOCOMO believes technology agnostic ETSI NFV specifications realize unified operation and management for future telecom infrastructure



Thank you!