

# Enabling architectural diversity

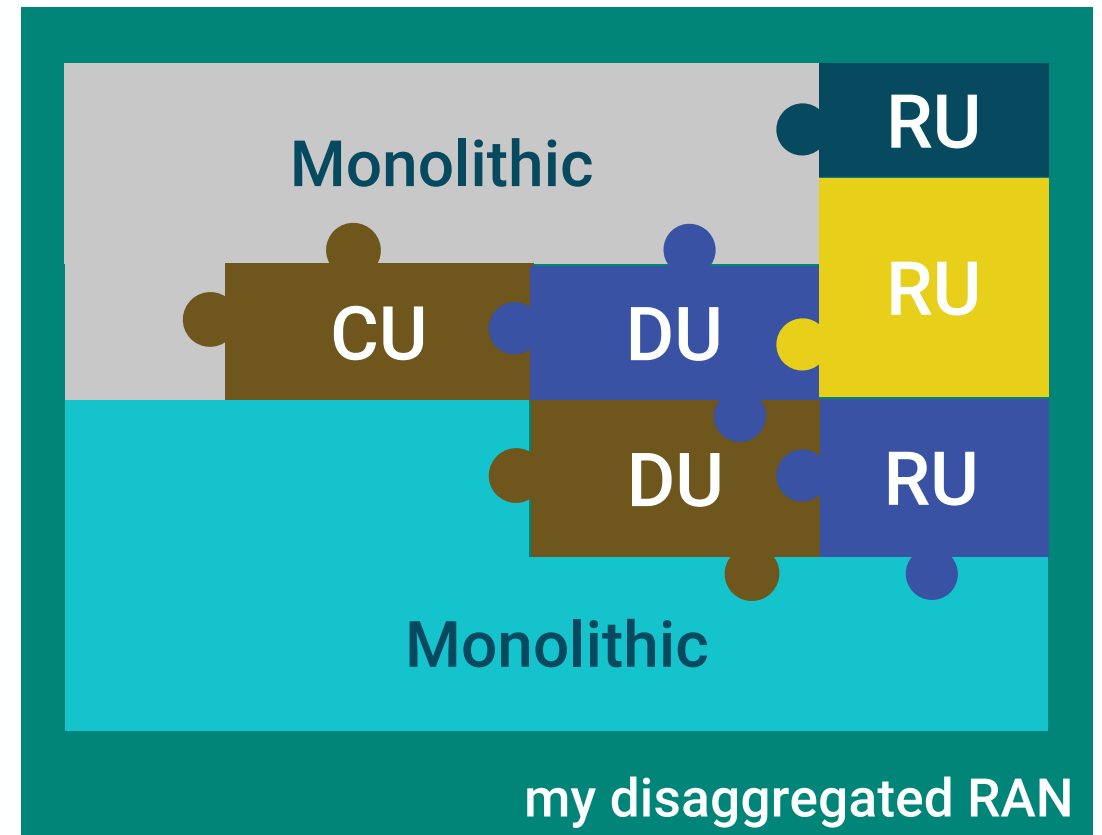
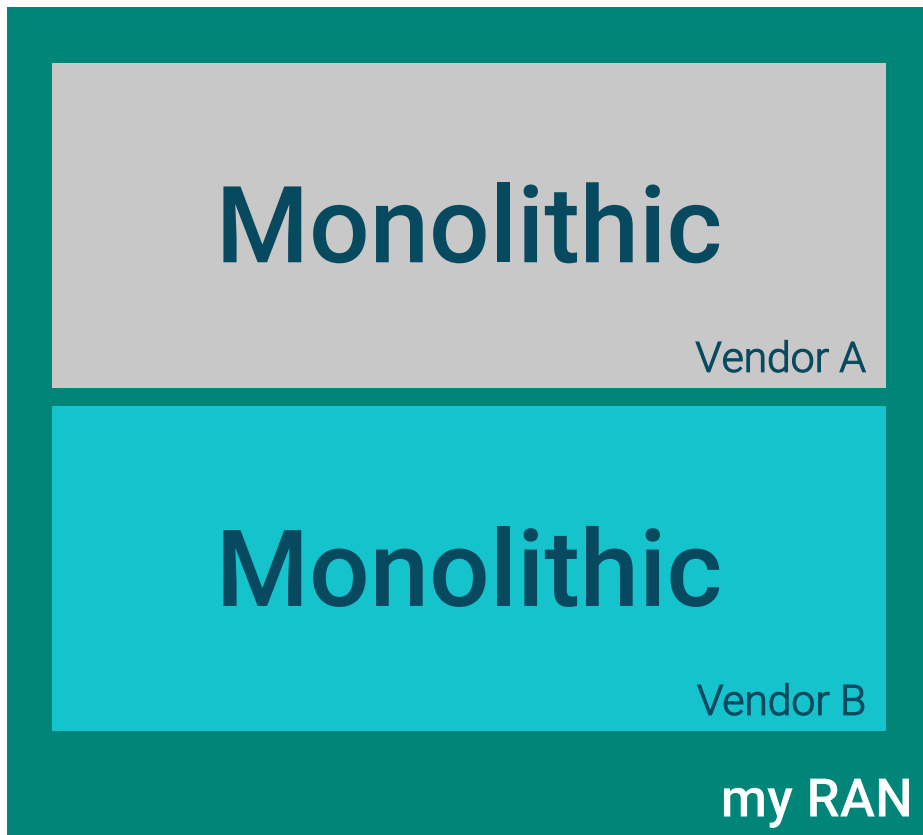
Dealing with the aftermath of the RAN “Big Bang”

Dr Doug Pulley  
Chief Solutions Architect, Picocom





# Diversity: RAN Supply Chain



RU: Radio Unit DU: Distributed Unit  
CU: Centralised Unit

In the beginning...



# One

Frequency band  
Channel bandwidth  
Standard (1G)  
Type of cell (macrocell)  
Traffic Type (voice)





**1G  
900MHz  
MACROCELL  
VOICE**

2100MHz  
3600MHz

1800MHz  
900MHz

2100MHz

900MHz

1800MHz

900MHz

900MHz

IN THE BEGINNING

1G

900MHz

MACROCELL

VOICE

MACROCELL

MICROCELL

MACROCELL

MICROCELL

FEMTOCELL

FEMTOCELL

PICOCELL

MACROCELL

MICROCELL

3G

5G



3G

4G

2G

4G

2G

3G

2G

2G

VOICE

VOICE

VoIP

VoIP

VIDEO

VOICE







# First steps to accommodate the real world



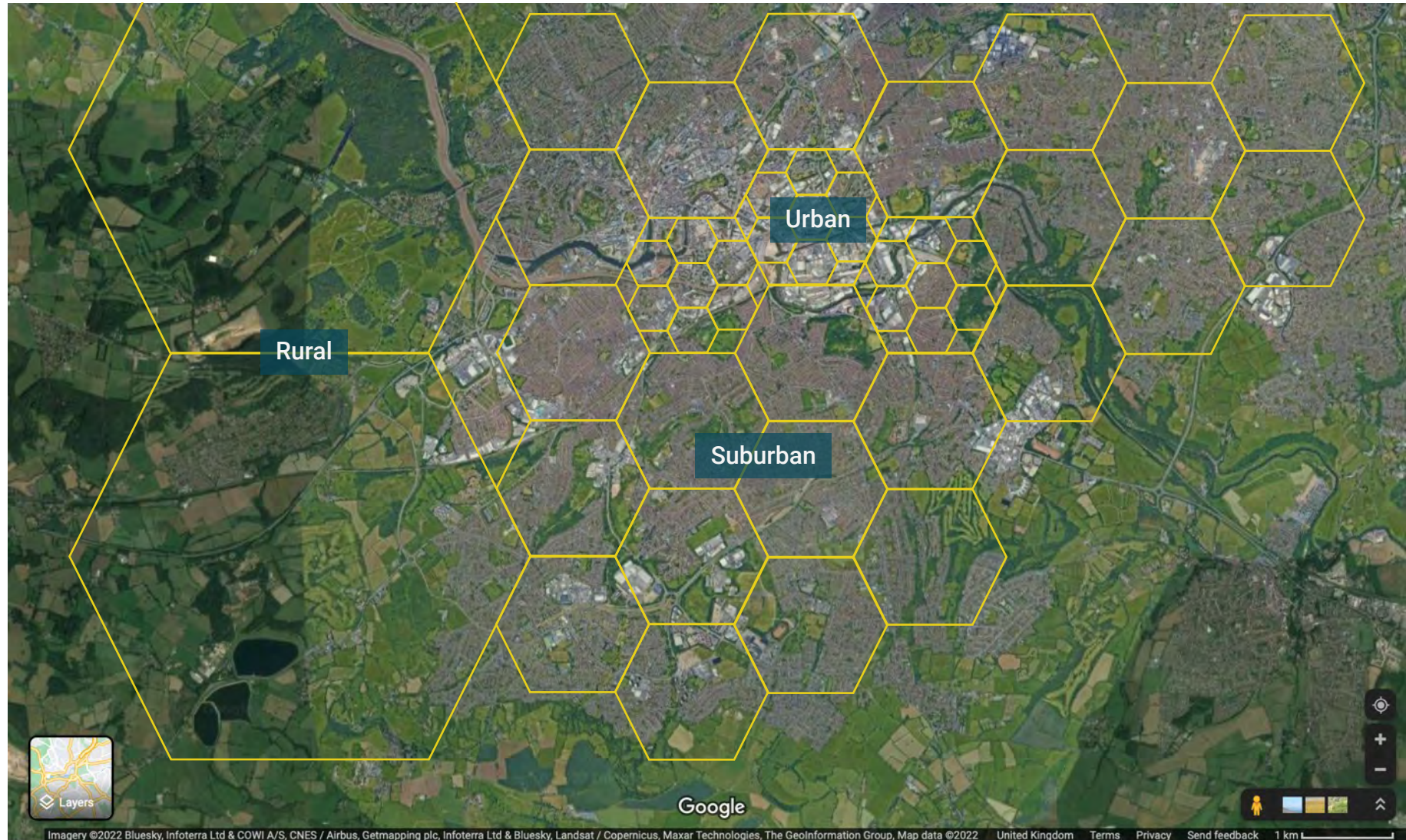
2 types of diversity

- user density
- radio environment

2 degrees of freedom

- cell radius
- channels/spectrum

**Cooper's Law**



Source: Google Maps with Picocom labels, cell overlay



# Then the traffic came...



Cells were made smaller  
- cell splitting  
- microcells

**More Cooper's Law**



**More attention to environment mapping**



# The phones got internet and fitted in your pocket

People went indoors...

It was warm and dry



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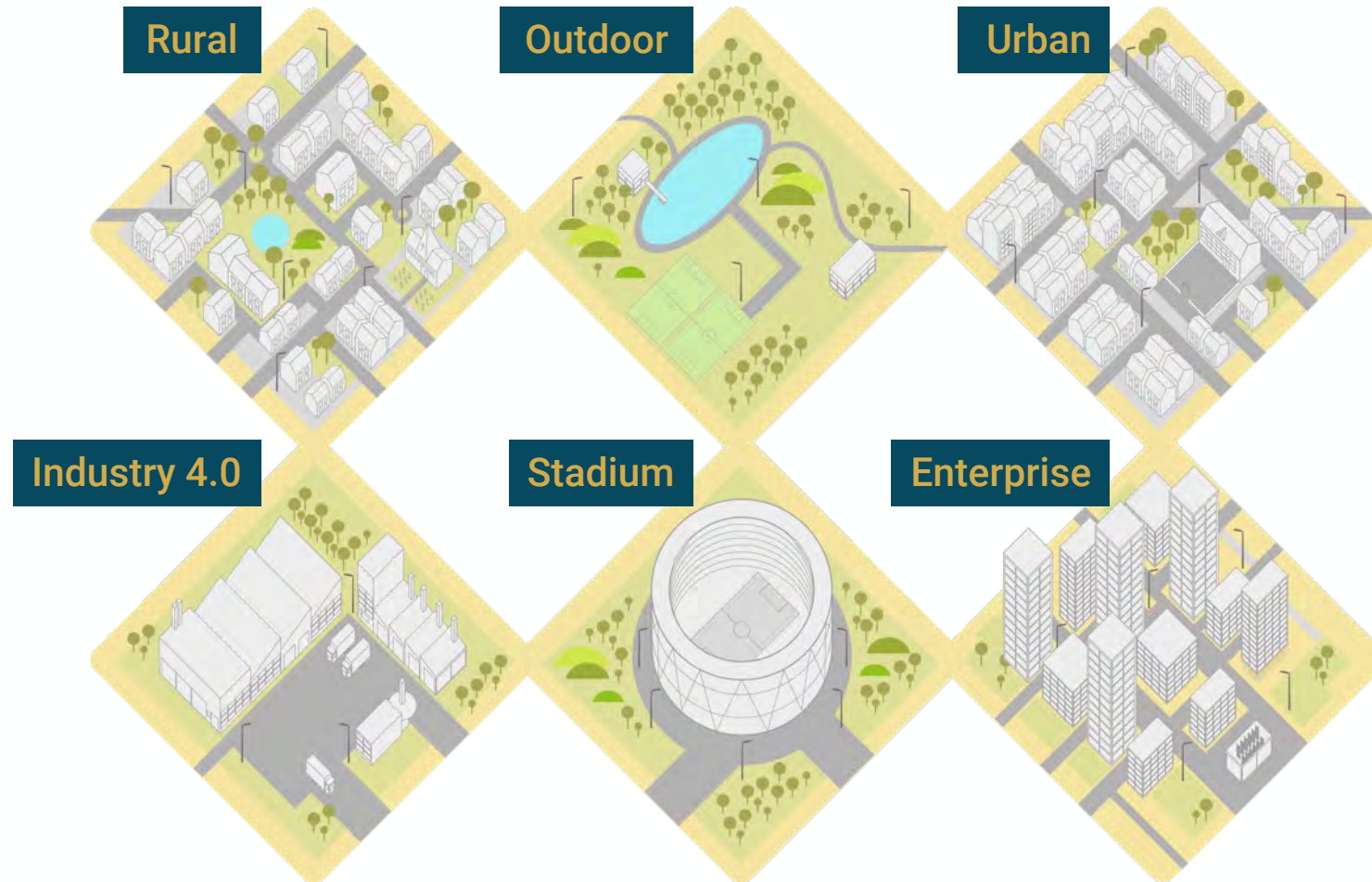


But...

Information doesn't pass quickly through walls  
[See Claude Shannon]



# And more specific scenarios





Rural 🙌

Mass Transport

Park

Enterprise



Shopping Mall

Park

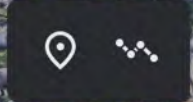
Enterprise

Urban

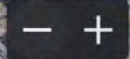
Suburban

Stadium

Park

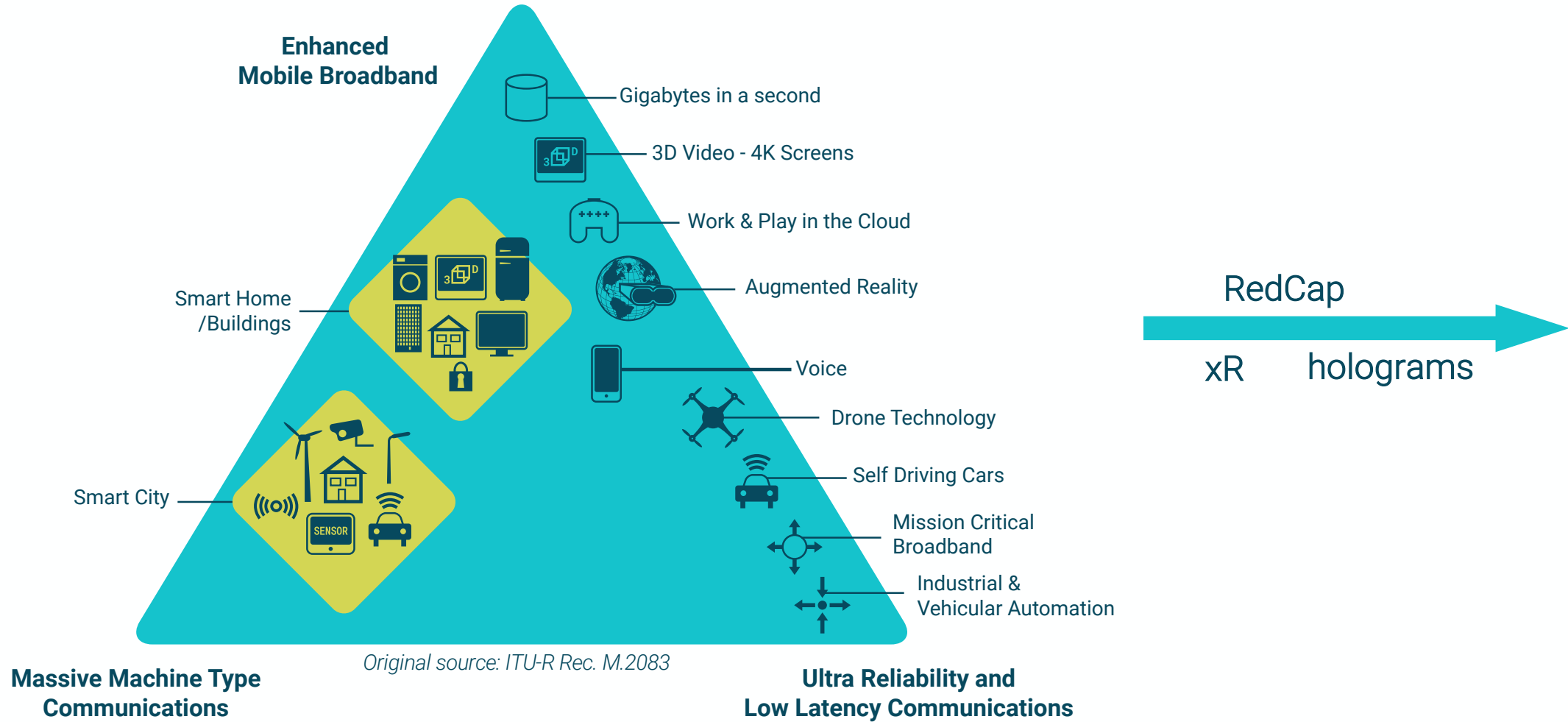


Zoom Out





# The onward march of traffic diversification





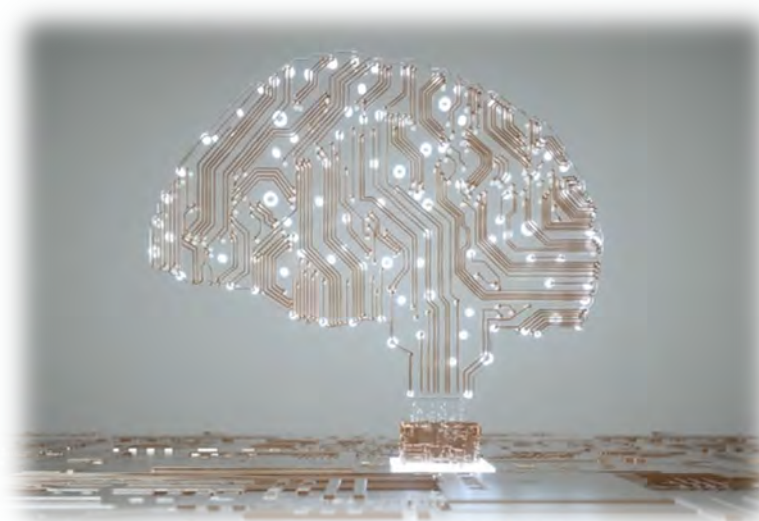
# And yet more resources...



*THz*

*FR2*

*FR1*





# Architectural diversity is a technology enabler



## Barriers to ubiquitous high-quality experience

- low signal
- slow fading
- fast fading

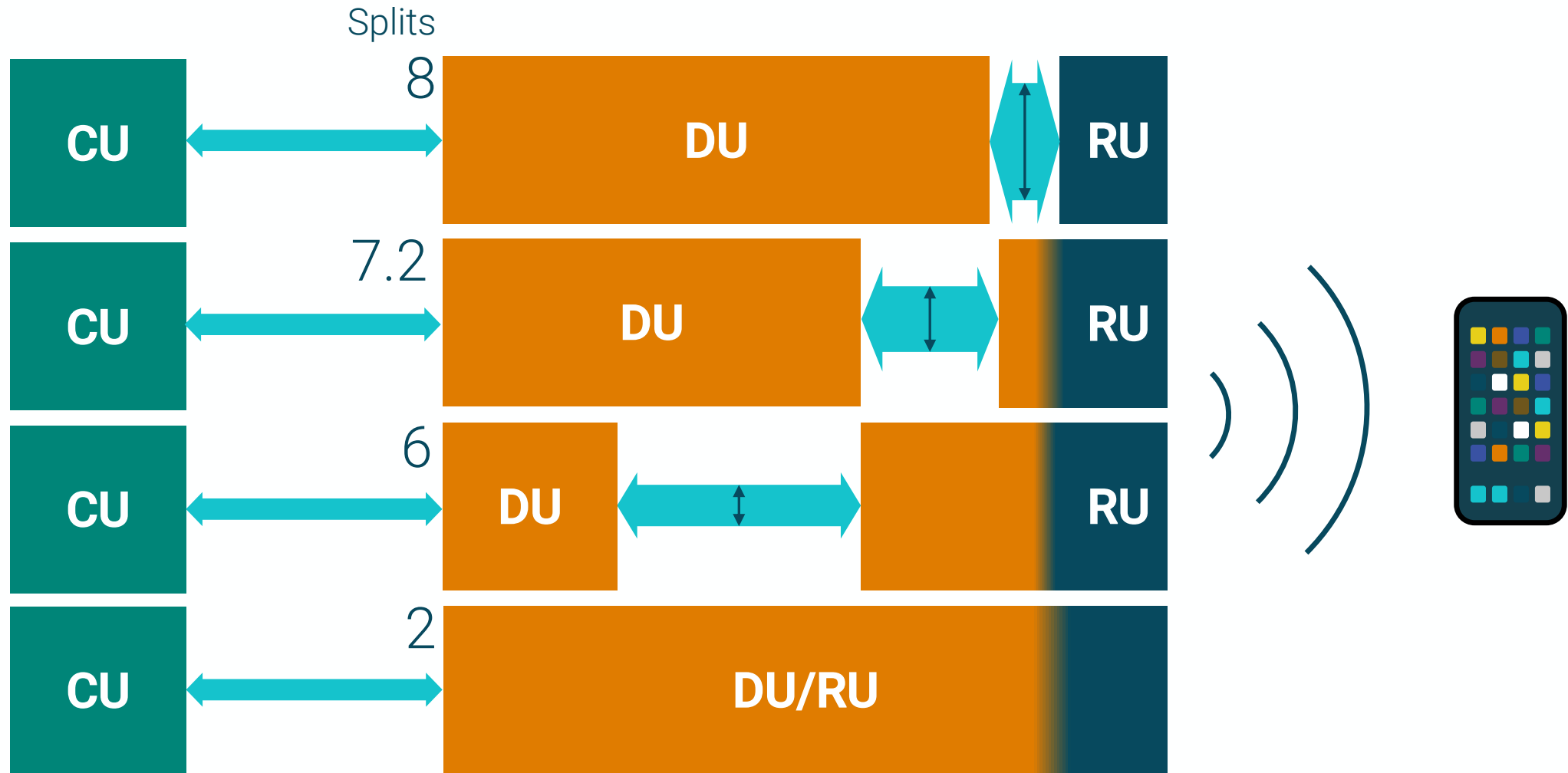
## Mitigation

- surround users with nearby antennas
- scattered around the service area
- processed jointly





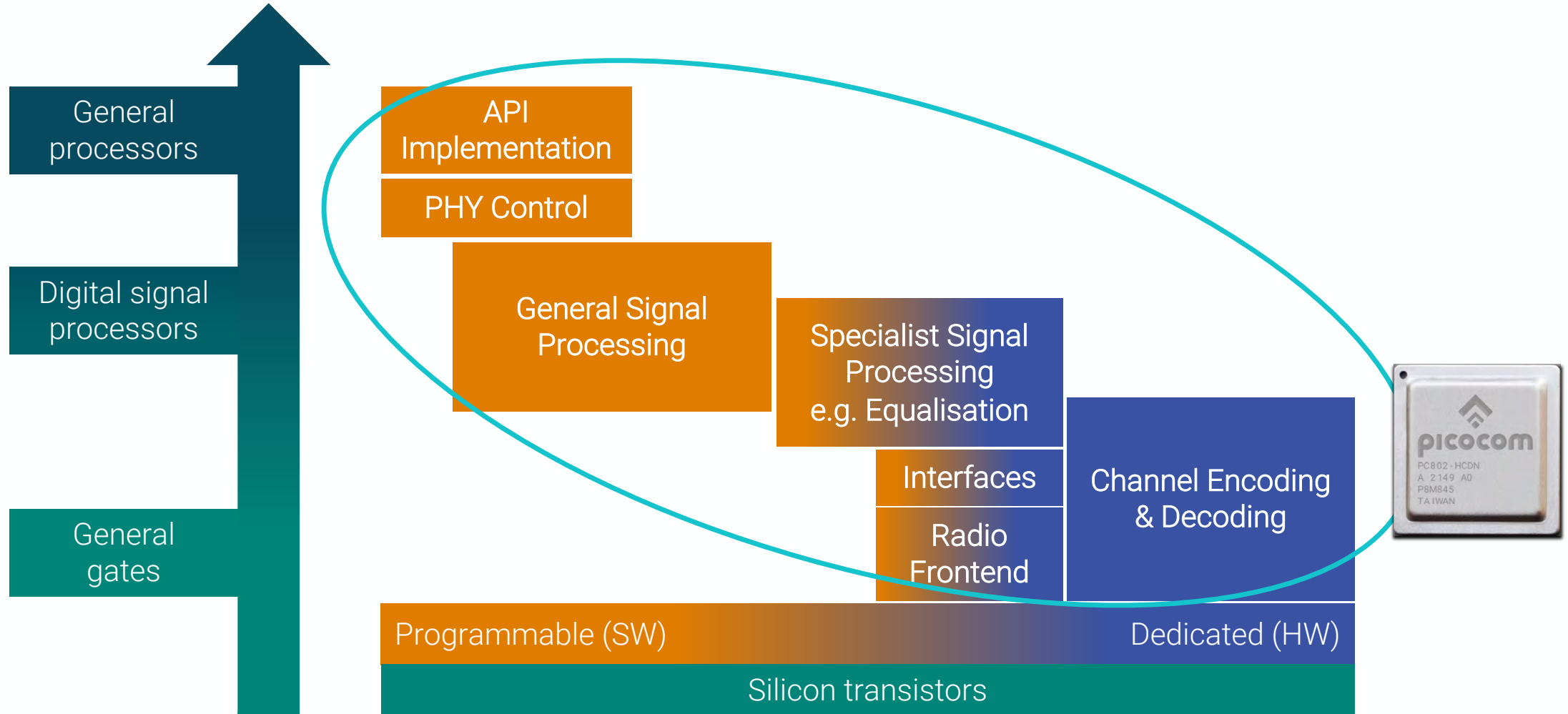
# Slice and Dice



*"Getting radio units where they need to be"*

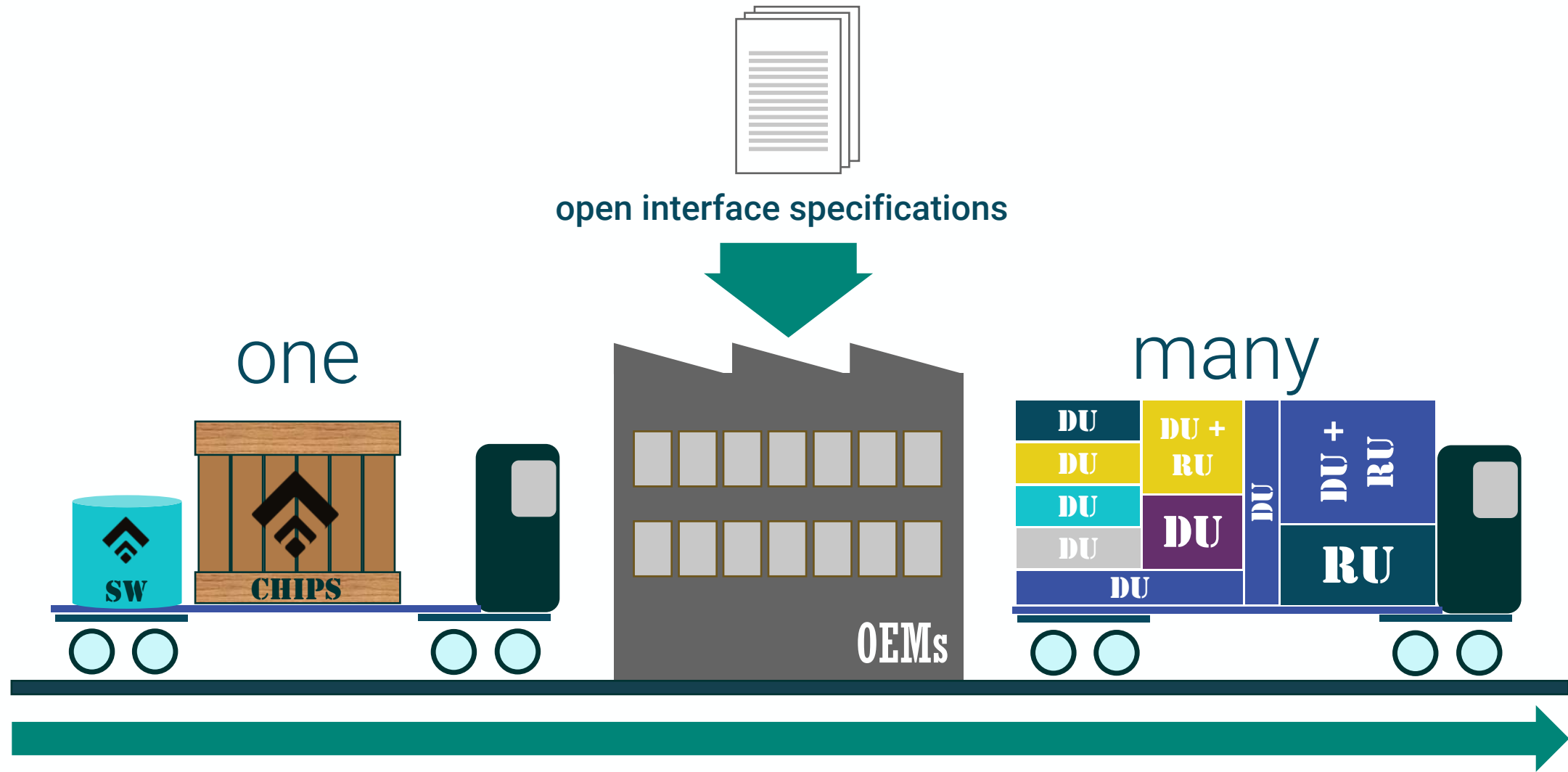


# Building LTE/NR PHY processing in an SoC





one : many

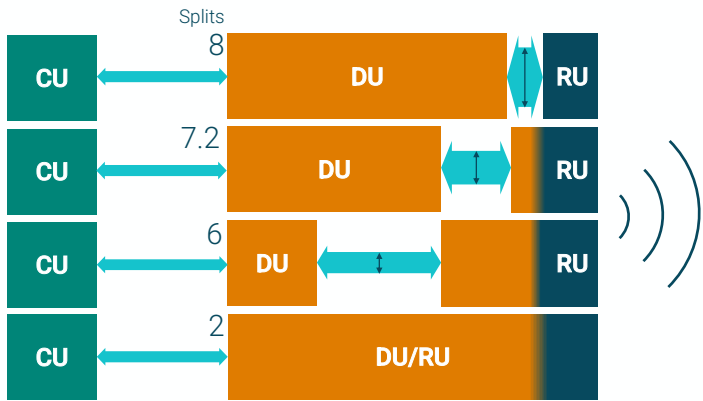
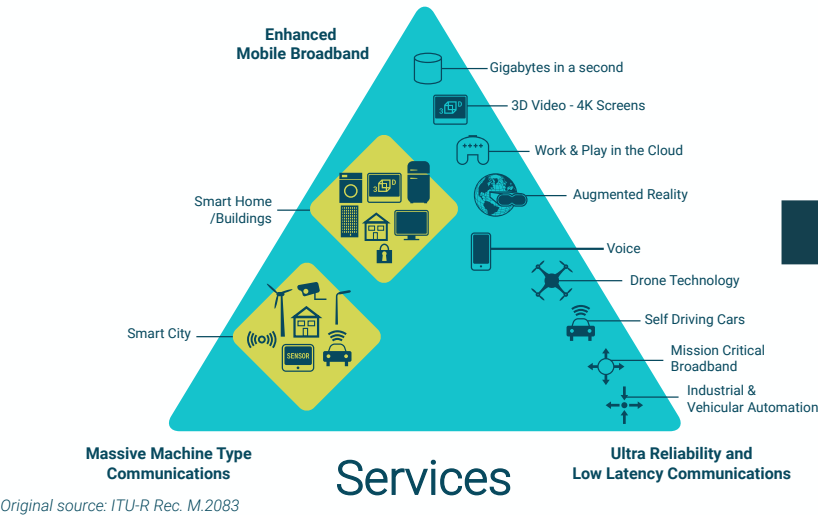




So...



Environment



Architectures



Resources



Tools



Powerful.  
Flexible.  
Optimised.

PC802.

