

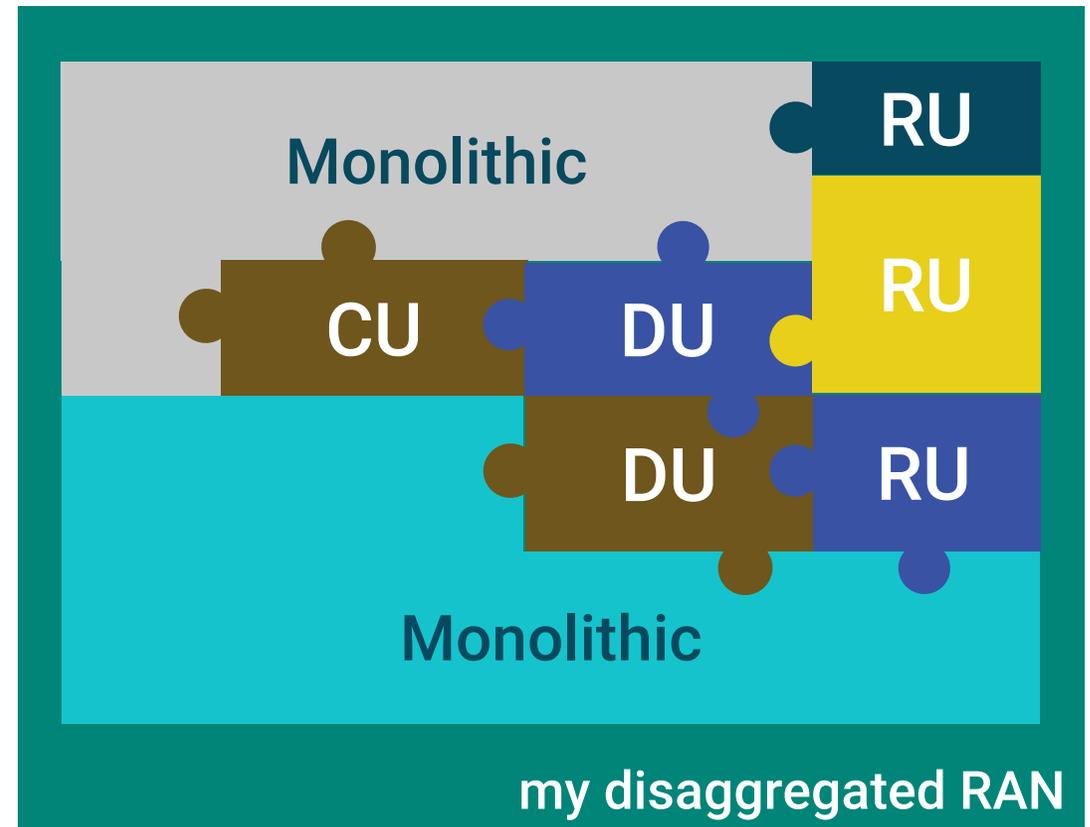
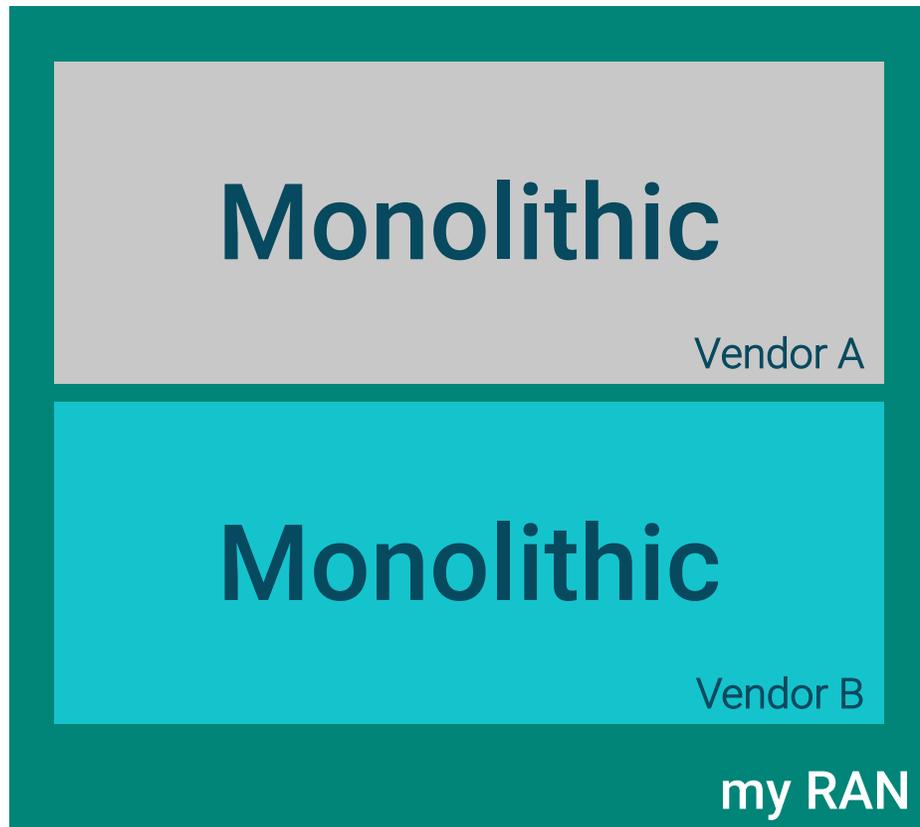
Enabling architectural diversity

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

1800MHz
900MHz

IN THE BEGINNING
1G
900MHz
MACROCELL
VOICE

MACROCELL

MICROCELL
MACROCELL

FEMTOCELL
PICOCELL

MACROCELL

MICROCELL

3G

2G

VOICE

VOICE
VoIP

4G

2G

VIDEO

3G

3G

5G 

4G

2G



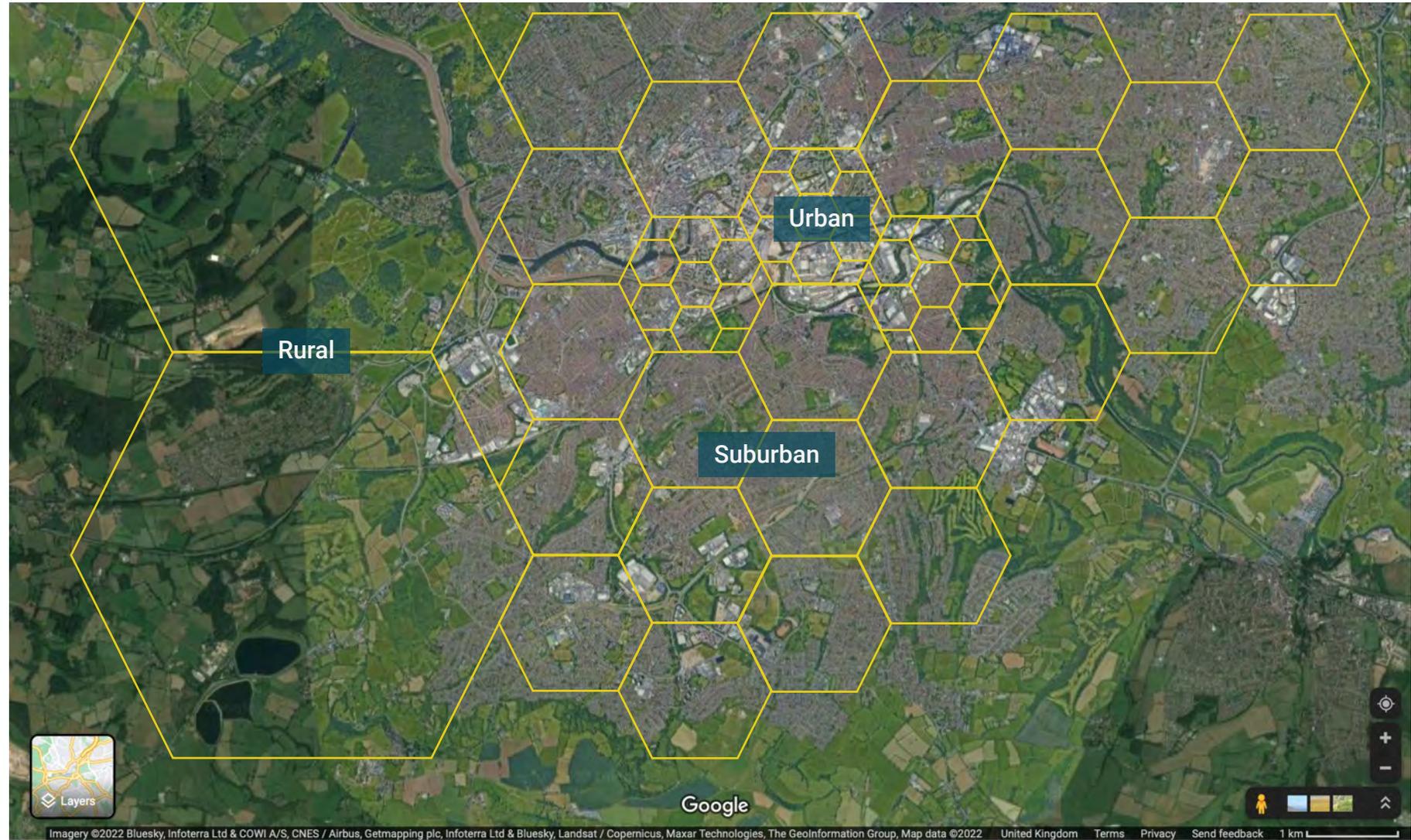
First steps to accommodate the real world



- 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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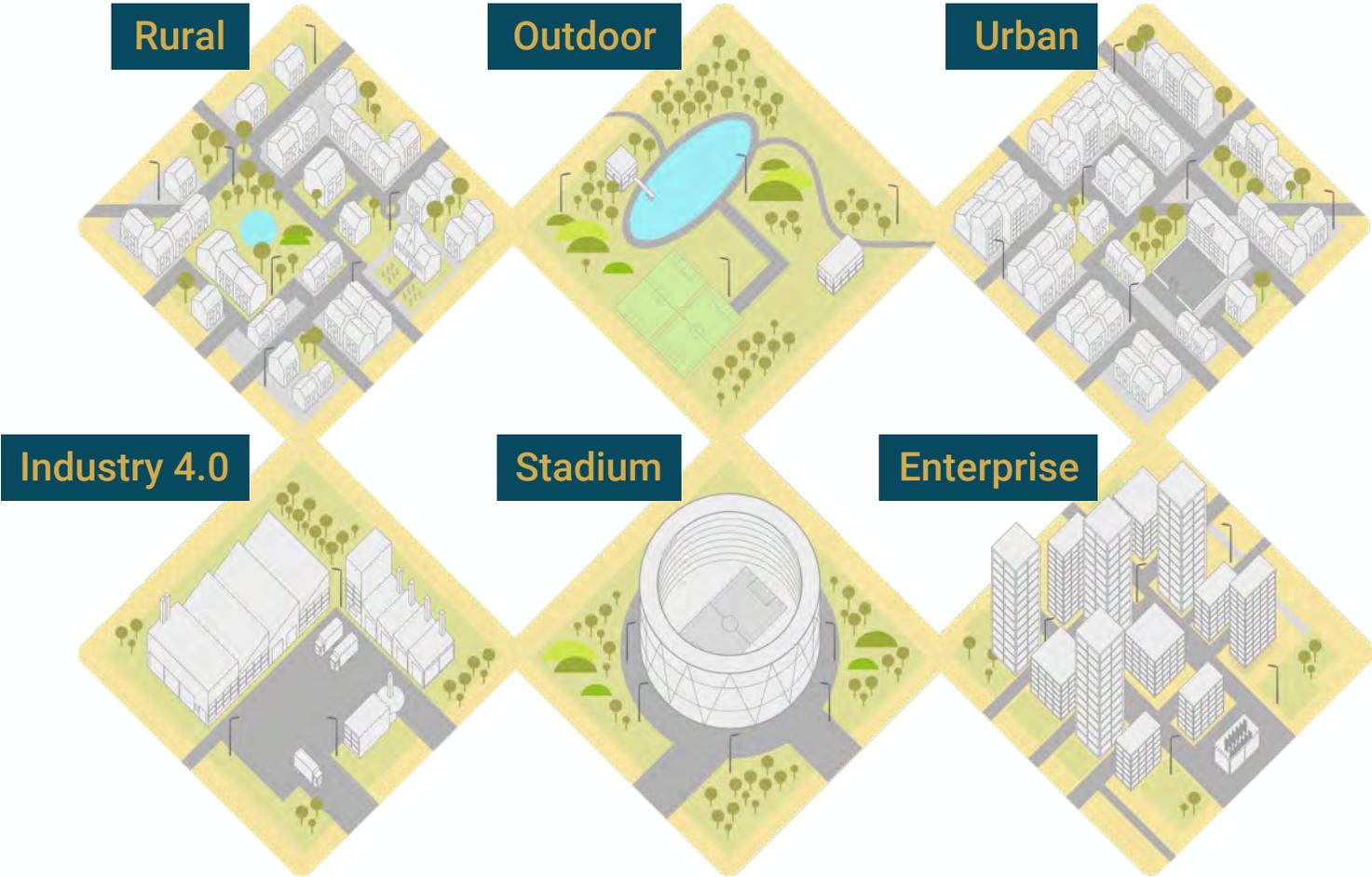


But...

Information doesn't pass quickly through walls

[See Claude Shannon]

And more specific scenarios



Rural 🙌

Mass Transport

Park

Enterprise



Shopping Mall

Park

Enterprise

Suburban

Stadium

Urban

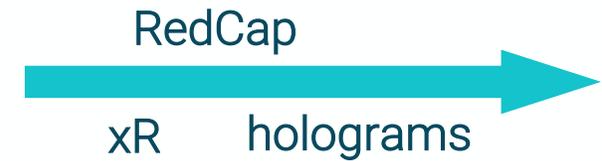
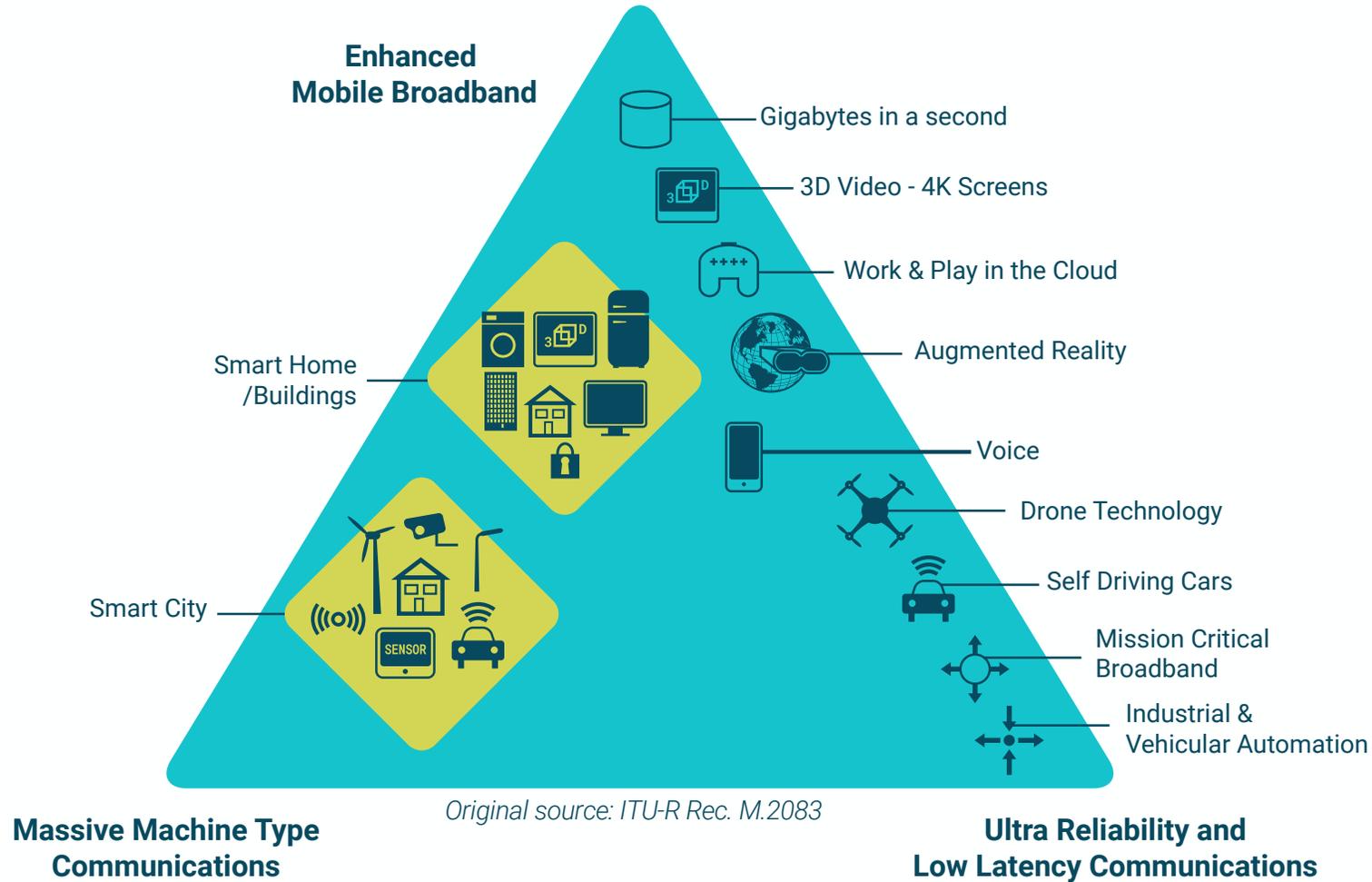
Park



Zoom Out - +



The onward march of traffic diversification



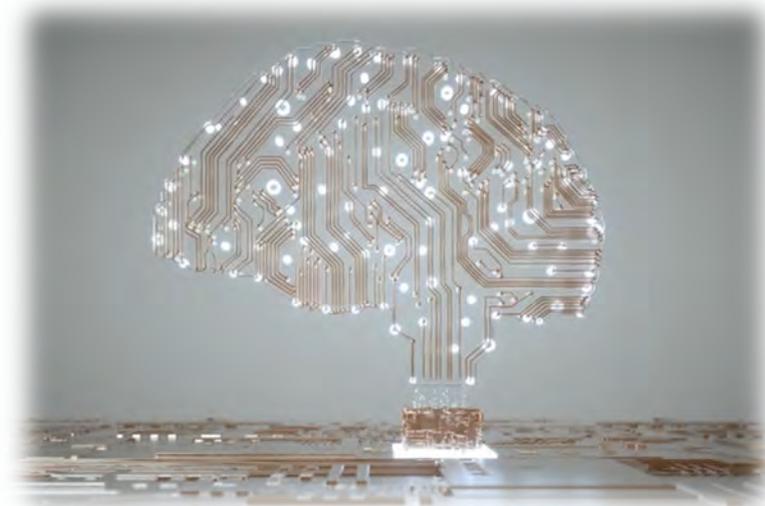
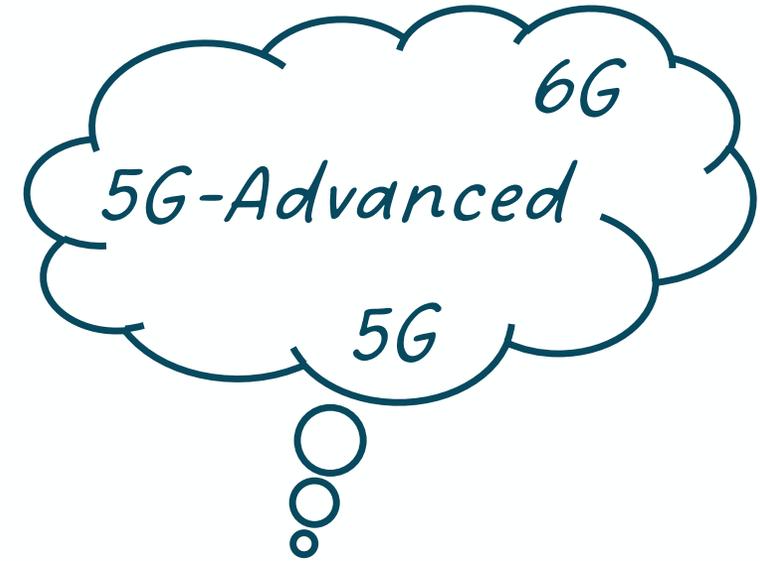
And yet more resources...



THz

FR2

FR1



Architectural diversity is a technology enabler



Barriers to ubiquitous high-quality experience

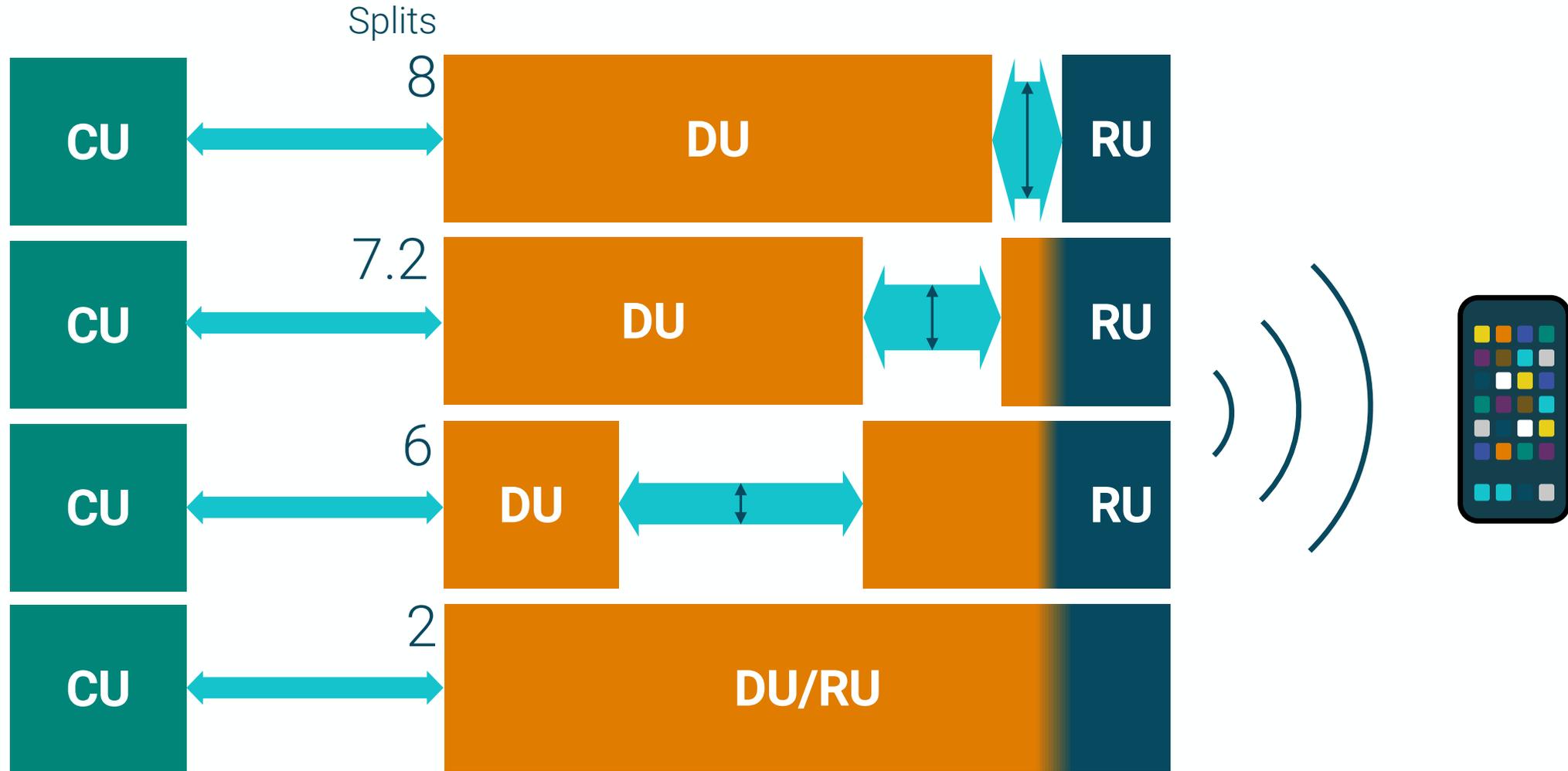
- low signal
- slow fading
- fast fading

Mitigation

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

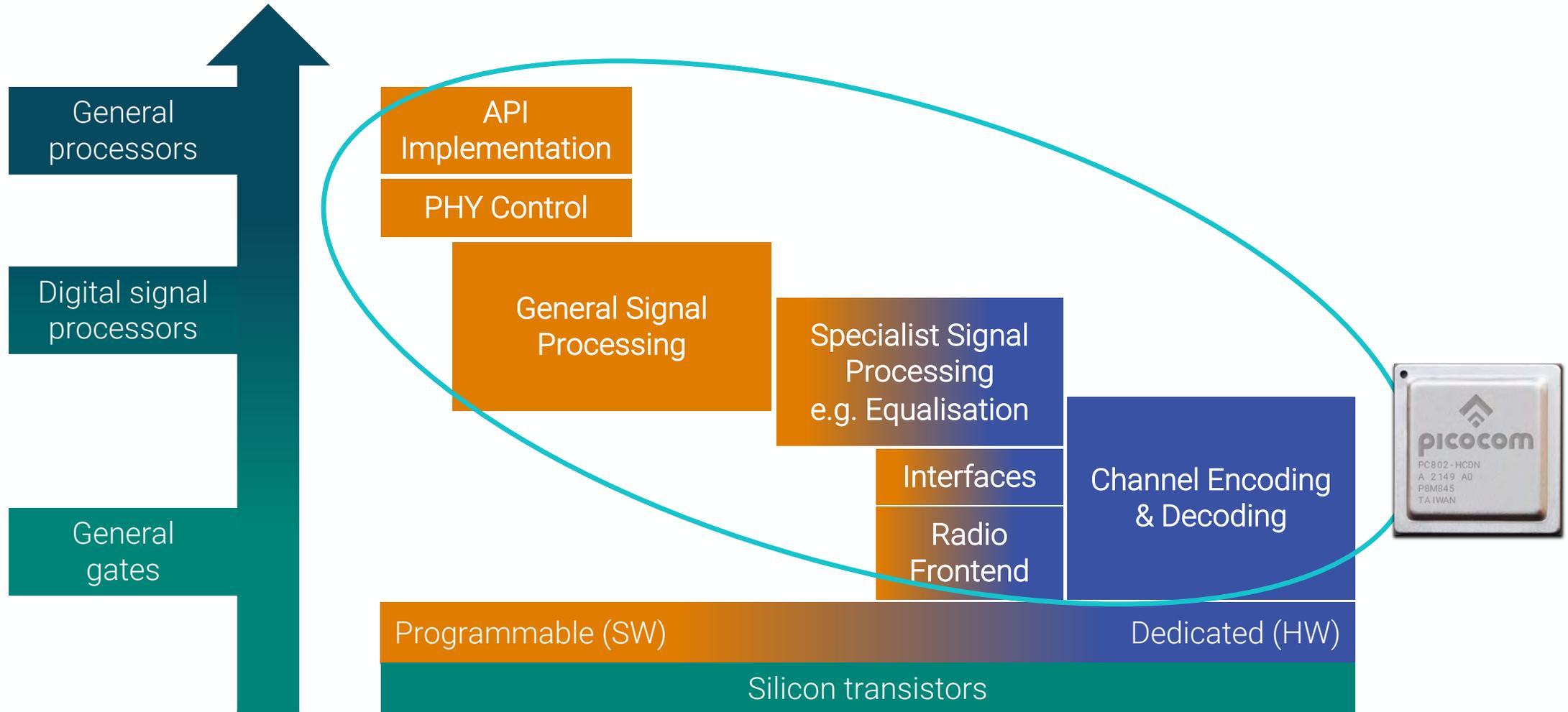


Slice and Dice

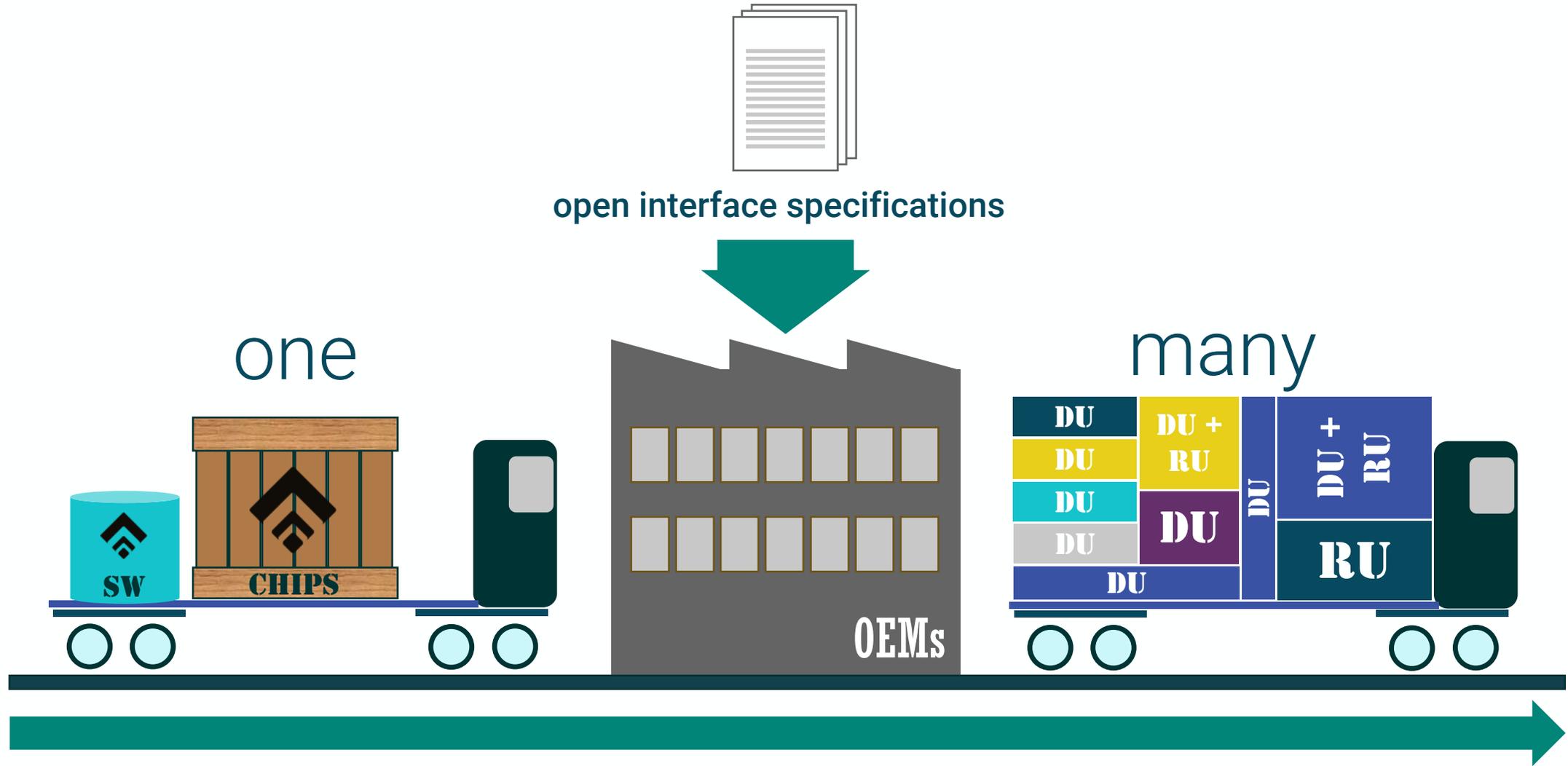


"Getting radio units where they need to be"

Building LTE/NR PHY processing in an SoC



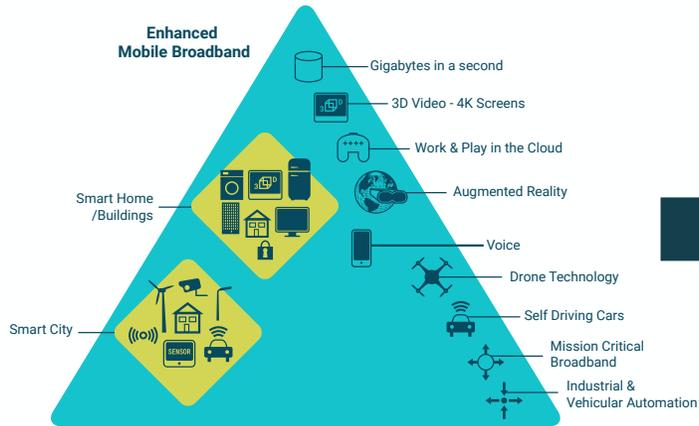
one : many



So...



Environment

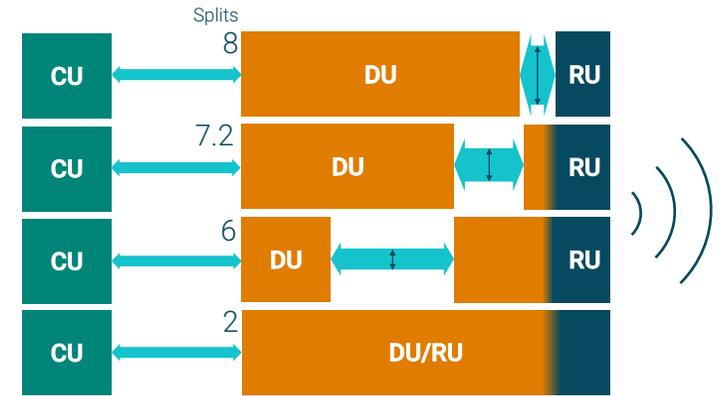


Services

Massive Machine Type Communications

Ultra Reliability and Low Latency Communications

Original source: ITU-R Rec. M.2083



Architectures



Resources



Tools

Powerful.
Flexible.
Optimised.

PC802.



picocom

Empowering Wireless
