



以 5G，AR/VR 及 AI 建構 未來工作與學習新世界

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Agenda

- Future Hybrid Work and Hybrid Learning
- Metaverse – the need for better Connection
- Open and Disrupting 5G technology
- 5G RAN
- 5G Core
- AI/ML in Education

A man wearing a red beanie, glasses, and a white face mask is looking down at a red smartphone. He is wearing a tan jacket and has a brown leather backpack. The background is a blurred, busy indoor space with warm lighting and other people, suggesting a public area like a train station or airport.

The future is uncertain

the world has changed forever

A person is sitting on a light-colored rug, using a silver laptop. The laptop screen displays a video conference with a large window showing a woman in a white shirt pointing at the screen, and several smaller windows showing other participants. The person's hands are on the laptop keyboard. In the background, there are some blue folders and papers on the rug.

*1.2 billion children moved to hybrid learning
in a matter of weeks*



Businesses are adopting
a digital-first model



In the future, 58% will work 8 or more days each month from home

98% of all meetings will include participants joining from home



Connection is evolving
and so are we.



The metaverse is the next evolution of social connection. Our company's vision is to help bring the metaverse to life, so we are changing our name to reflect our commitment to this future.

Journey to a better communication

Natural communication is spatial and multi-dimensional, not flat.

We rely on body language and gestures.

As compelling as 2D experiences can be, they are never quite the same as being there in person.

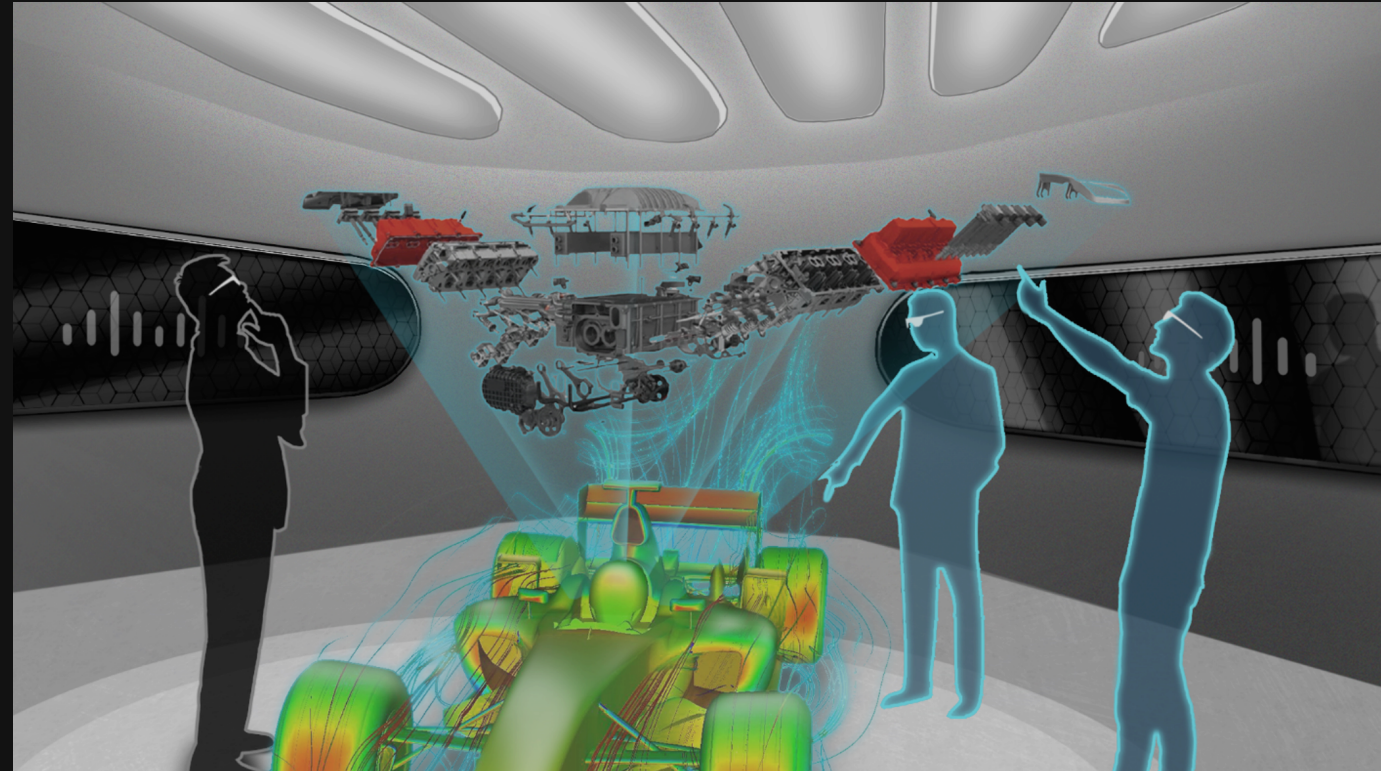


Vision

New way to travel

Replicate the feeling of being in a room together, when thousands of miles apart.

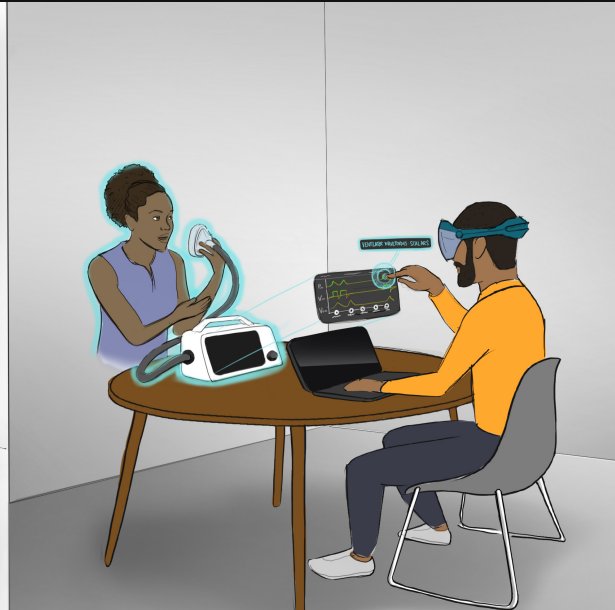
Global pandemic made the need for this even more essential for a [successful Hybrid work model](#).



Evolution From 1:1



To 1:Many holographic immersive experience in Webex



Military Kicks Off Deployment of 5G Testbeds for Augmented and Virtual Reality



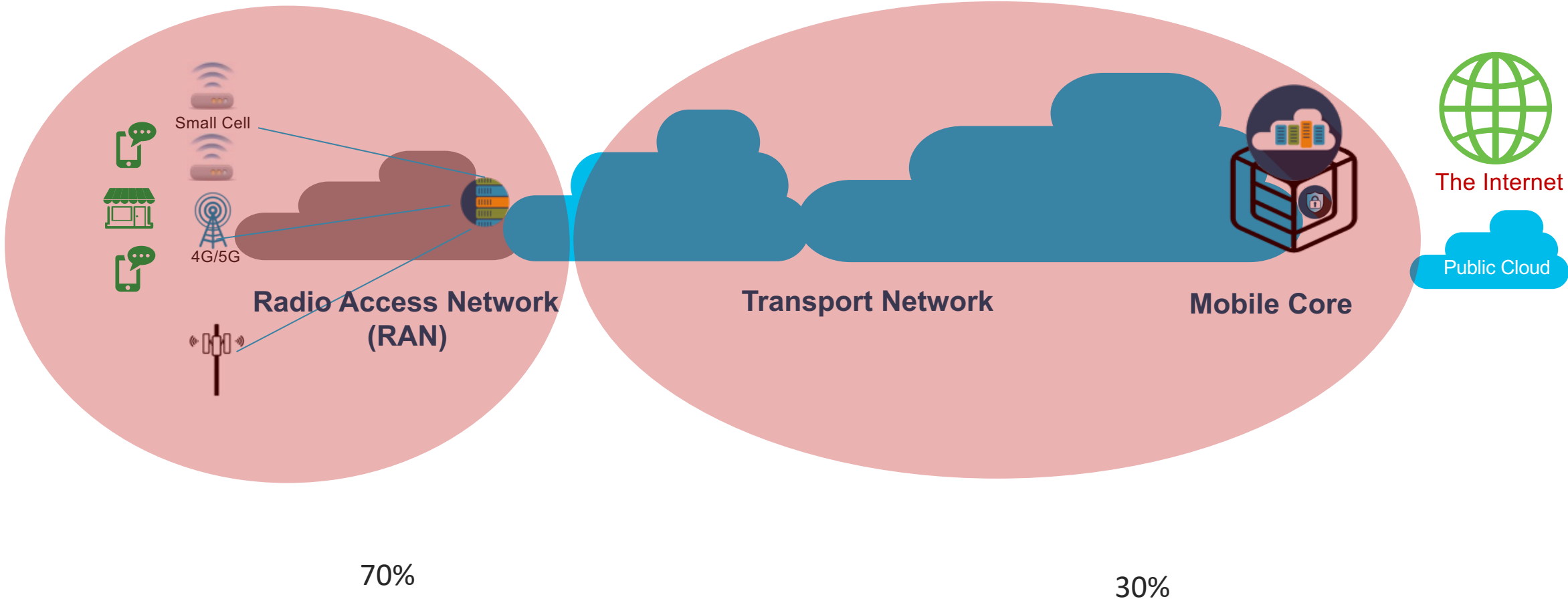
2021/10/29, 財經

Facebook母公司正式更名為「Meta」：邁向「元宇宙」虛擬世界，帶動5G基礎建設大爆發



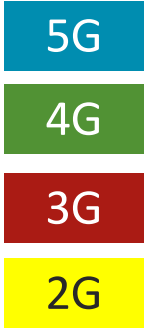
Disruption in Mobile Architecture

Basic Mobile Architecture



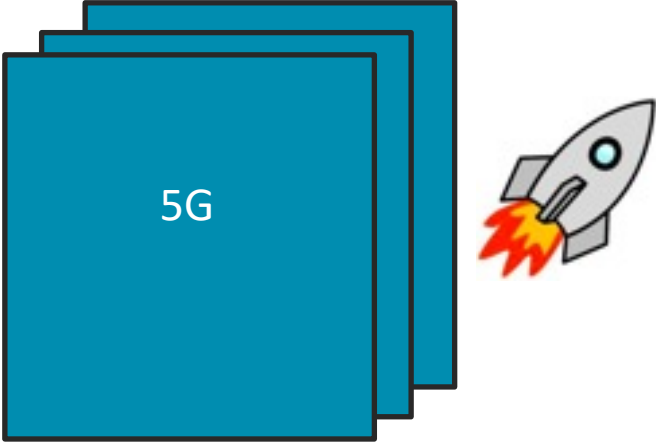
5G - RAN

Mobile Network Spectrum



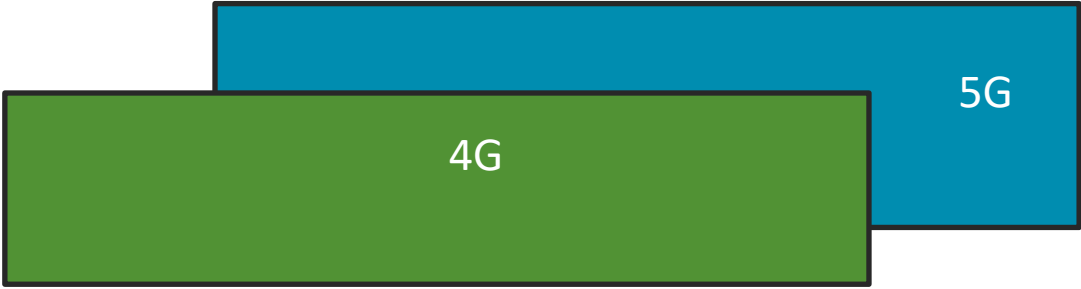
Frequency Range 2 (FR2)

High Bands (mm Wave)
24GHz and above
New

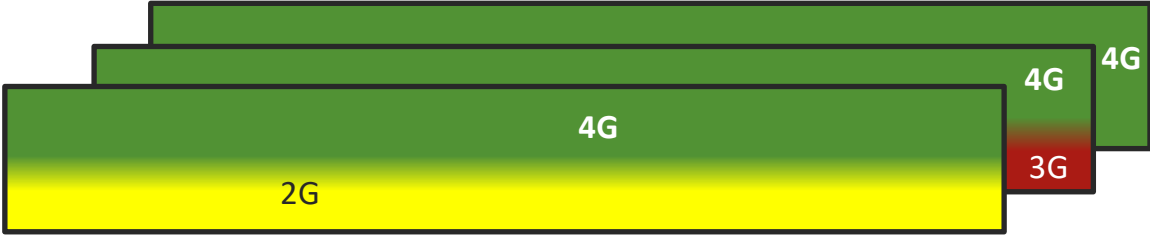


Frequency Range 1 (FR1)

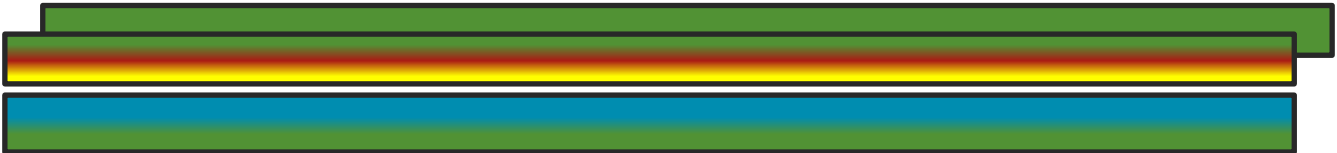
Mid Bands 3-6GHz
New



Existing
Mid Bands 1-3GHz



Existing & New
Low Bands below 1GHz





數量競價結果-得標者名單、得標頻寬、單價及總價

單位：新臺幣億元

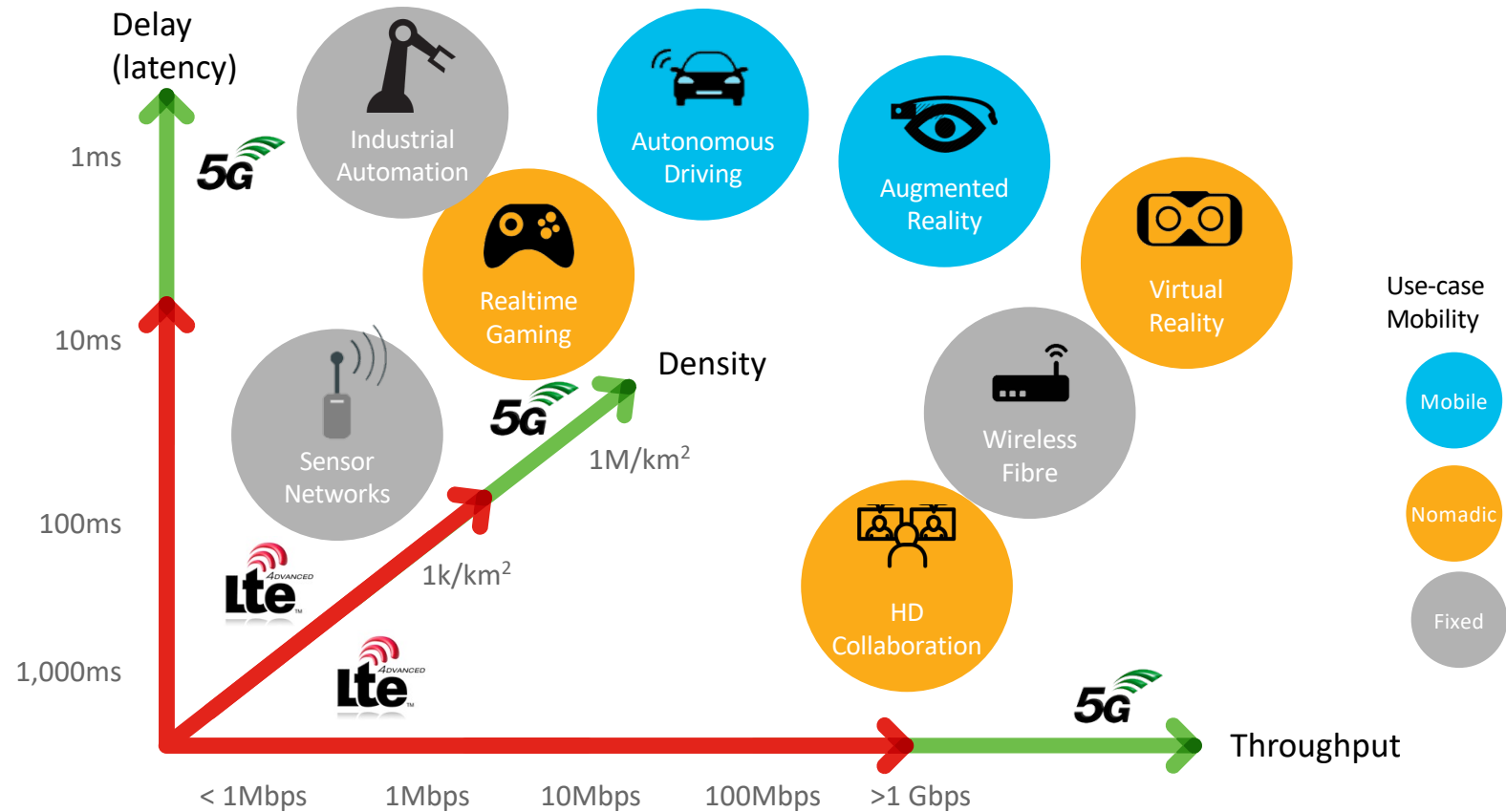
頻段	得標者名單	得標頻寬	得標單價	得標總價	各頻段總價
1800MHz	無得標者	上下行各 10MHz	0	0	0
3500MHz	中華電信	90MHz	50.75	456.75	1364.33
	台灣大哥大	60MHz	50.75	304.5	
	台灣之星	40MHz	49.27	197.08	
	遠傳電信	80MHz	50.75	406	
28000MHz	中華電信	600MHz	1.03	6.18	16.48
	台灣大哥大	200MHz	1.03	2.06	
	亞太電信	400MHz	1.03	4.12	
	遠傳電信	400MHz	1.03	4.12	
					總標金：1380.81

註：得標者名單依筆畫排序

What is 5G?

Capability beyond 4G/LTE for the next decade

Access Requirements of potential 5G use cases

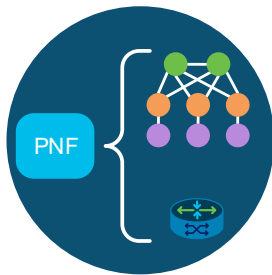


Three Fundamental Technology Transitions



Decomposition

Network functions are decomposed into multiple entities for optimization of resources and improvement of service



Disaggregation into SW + HW

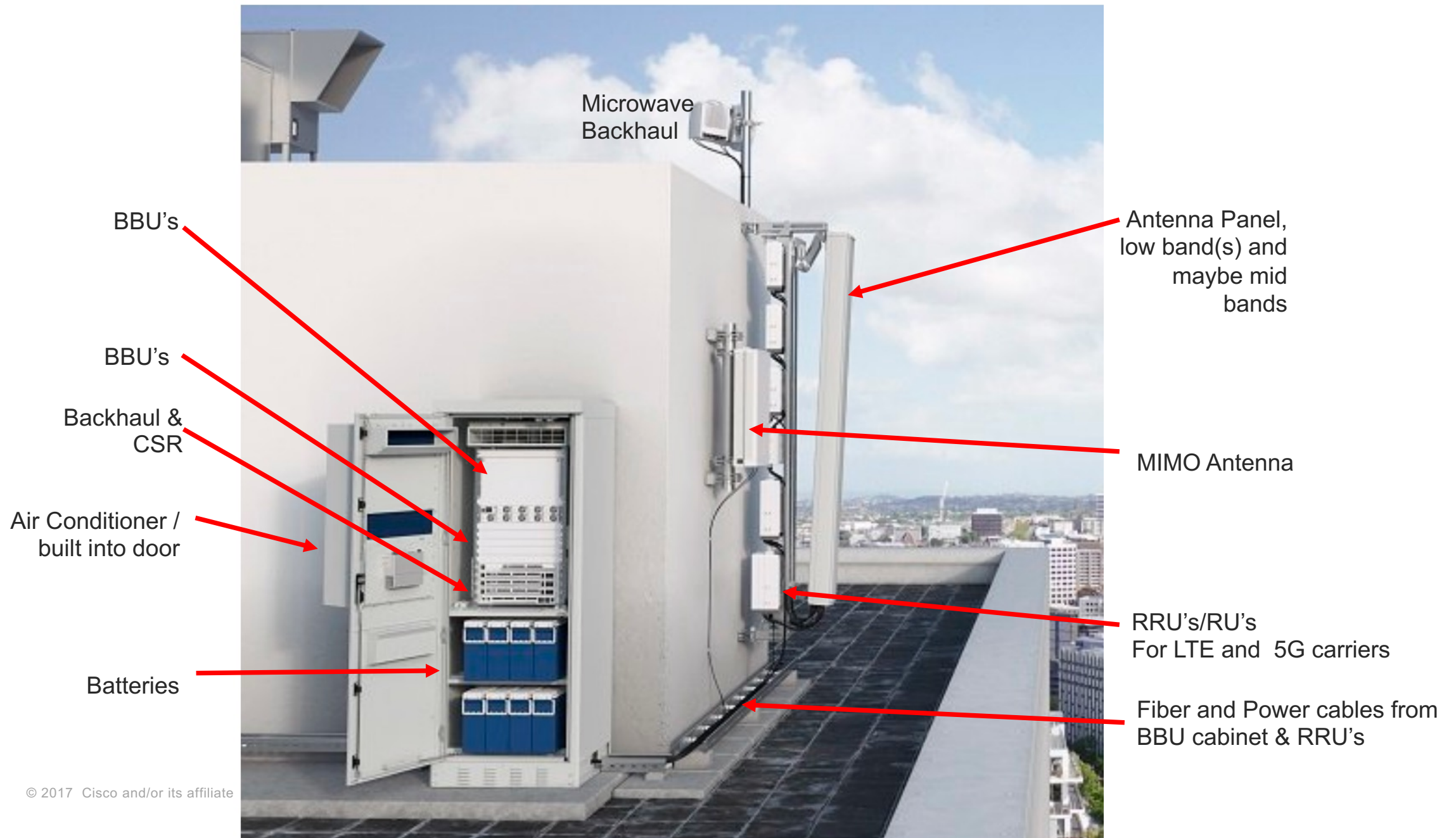
Software-centric solution using COTS hardware which can be procured separately



Infrastructure Convergence

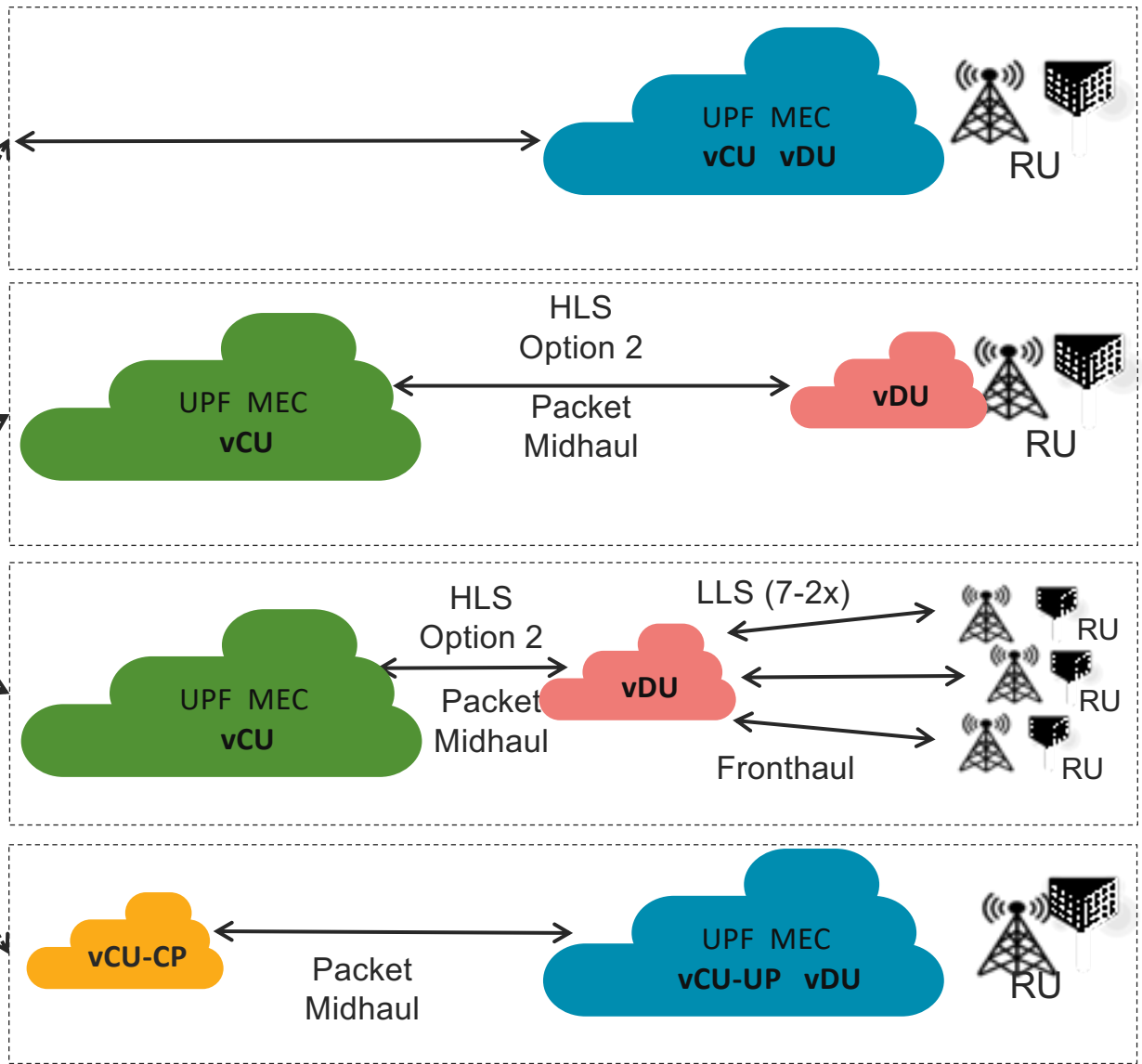
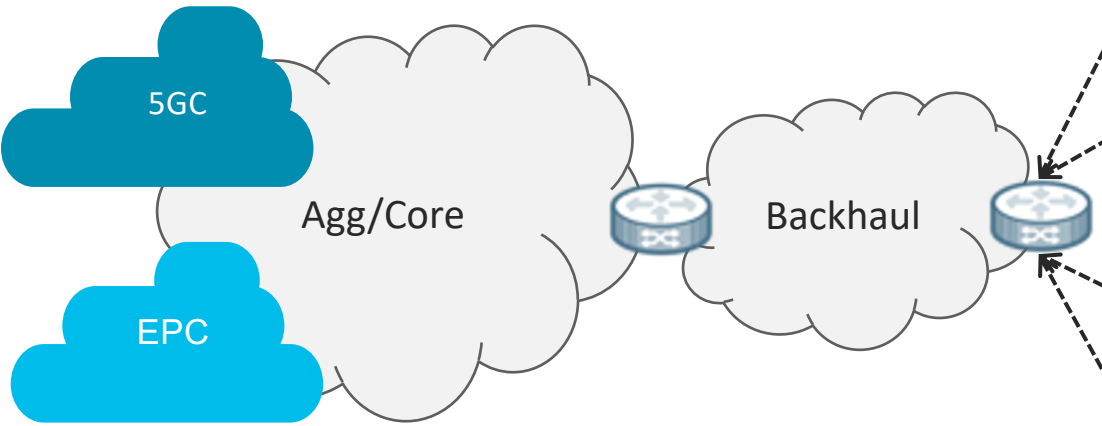
Fixed and mobile networks to share a common 5G core-based infrastructure for higher efficiency

Photo simulation of a D-RAN Architecture site (Single Sector)



vRAN Architecture Refresher

Flexible Architecture Options



Automation and Orchestration

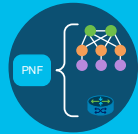
Security, Management, and Support

Open vRAN and a New End-to-End Mobile Network



Functional Decomposition

Functions Separated to Allow Flexible Placement and Optimization



Disaggregation into SW + HW

Software-Centric Solutions Leveraging COTS Hardware



Open

Modular, Open, Multi-vendor, More Options = Flexibility and Lower Cost



Multi-Use Case

5G NR, LTE, Small Cell, Indoor/Outdoor, mMIMO, Multi-band, mmWave, Private/Public, Enterprise/Consumer, etc.



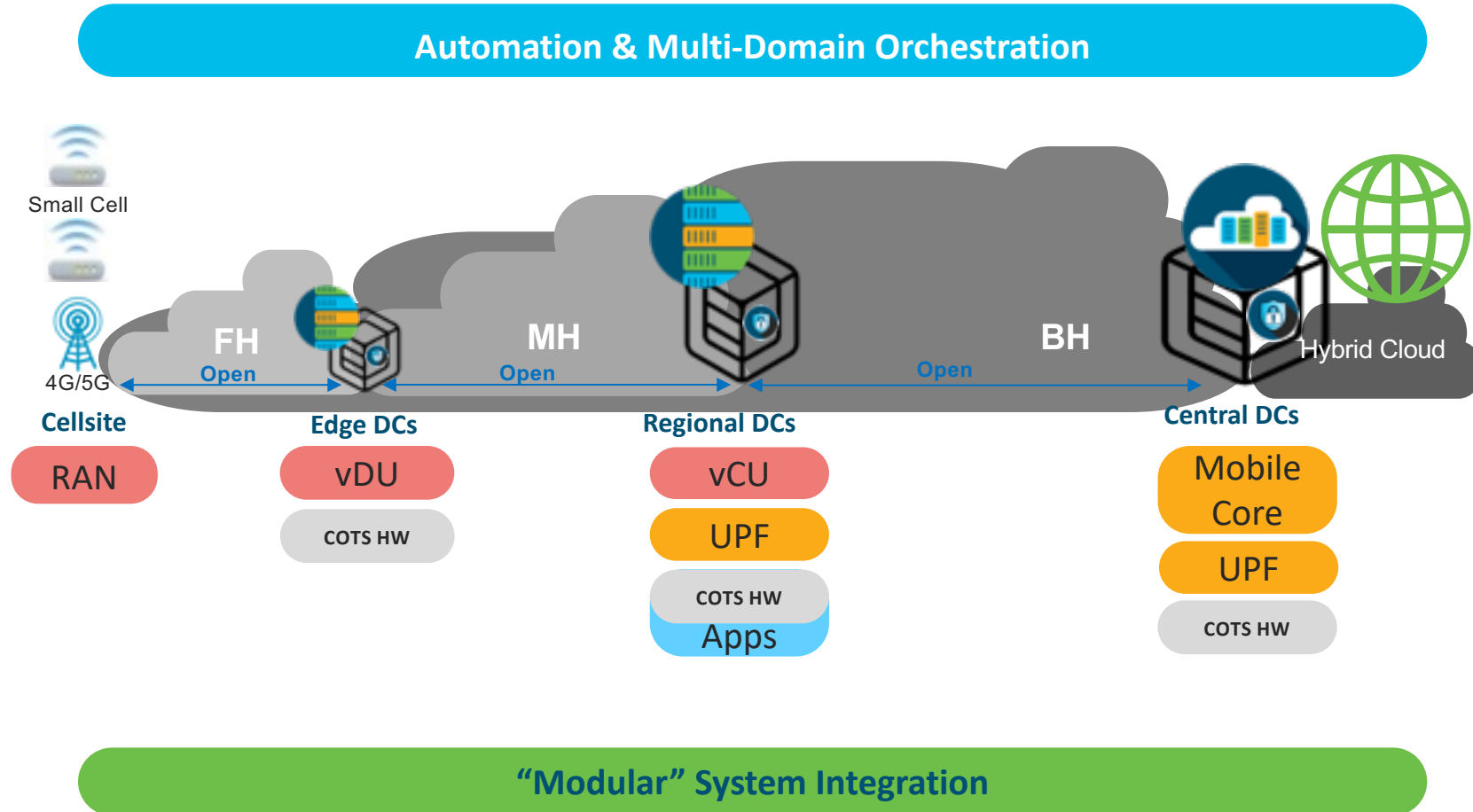
Optimize for Lower Cost Operations

Agility, Lower TCO, Increased Automation



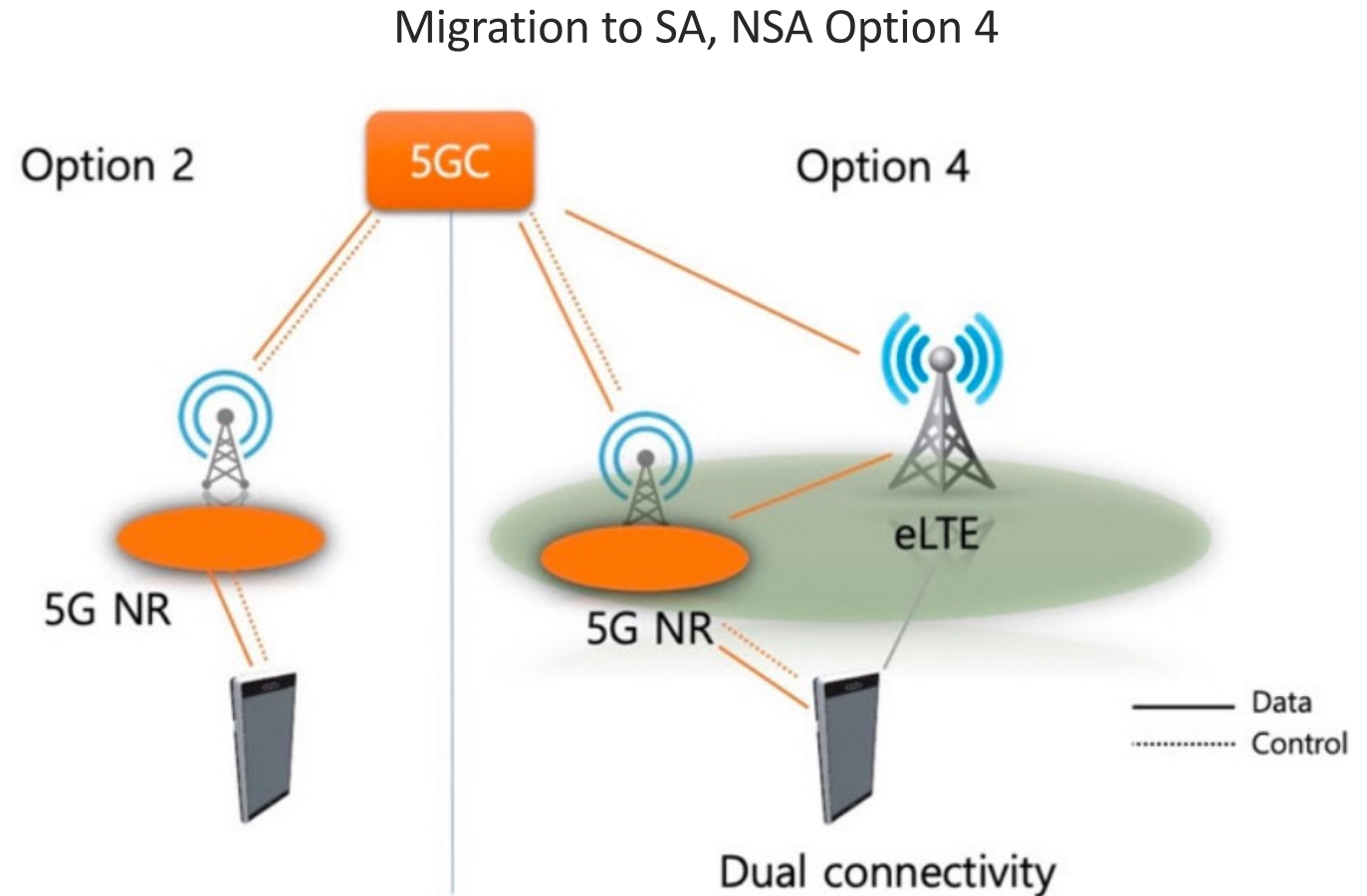
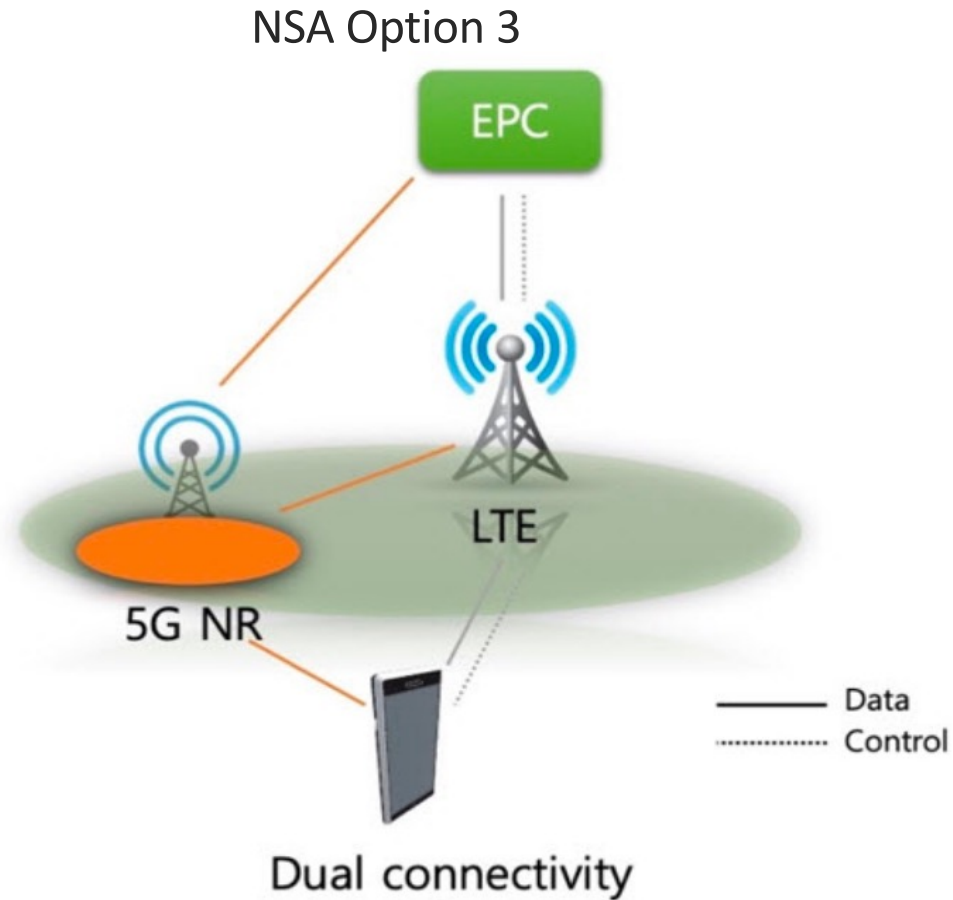
Enable New Services

Increased Service Flexibility, Velocity

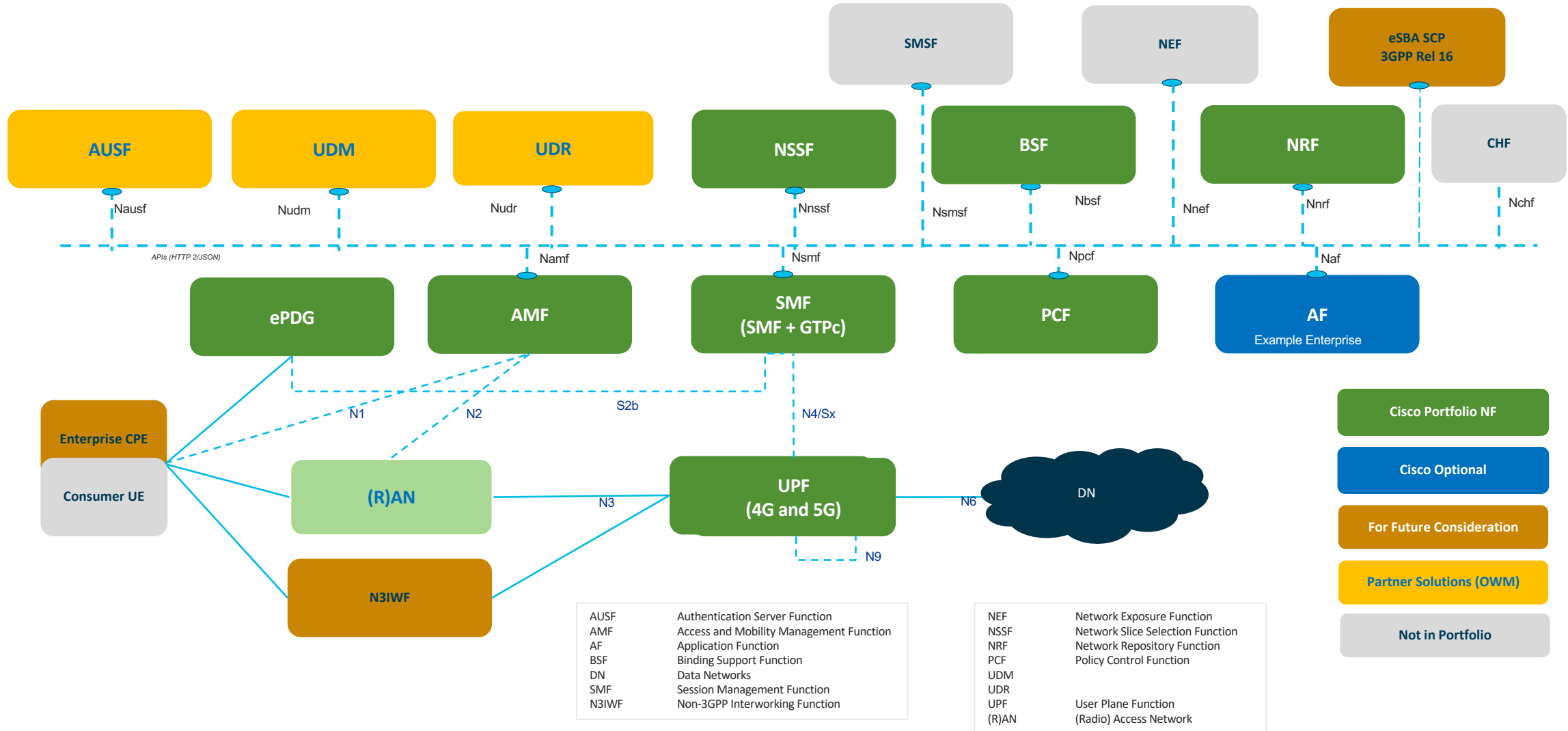


5G - Core

5G NSA Refresher



Cisco 5G SA Core Portfolio



Software



RAN

```

cloud-user@cn5g1k8s-master1:~$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
activemq-0                          1/1    Running   0           6d4h
admin-db-0                           0/1    Pending   0           4d13h
admin-db-1                           1/1    Running   0           6d4h
base-entitlement-pcf-68d75b7fcf-pht8r 1/1    Running   0           6d5h
cdl-ep-session-c1-d0-6ccf888c6d-nx8w5 1/1    Running   0           6d4h
cdl-index-session-c1-m1-0             1/1    Running   0           6d4h
cdl-slot-session-c1-m1-0             1/1    Running   0           4d13h
consolidated-logging-0               1/1    Running   1           6d4h
crd-api-pcf-data-pcf-engine-app-pcf01-56749cc78b-b2qsw 2/2    Running   3           6d5h
db-admin-0                           1/1    Running   0           6d3h
db-admin-config-0                    1/1    Running   0           4d13h
db-spr-config-0                      1/1    Running   0           6d3h
db-spr1-0                            1/1    Running   0           6d3h
documentation-f94788d6b-rszt4        1/1    Running   0           6d5h
etcd-pcf-data-etcd-cluster-0         2/2    Running   2           6d4h
grafana-dashboard-cdl-pcf-data-5458d9dcd-q55rz 1/1    Running   1           6d4h
grafana-dashboard-pcf-66c6977577-jdf7d 1/1    Running   1           6d5h
kafka-0                              1/1    Running   0           4d13h
lbvip02-848bc49956-lrwlb             1/1    Running   0           6d4h
network-query-5hdnp                  1/1    Running   2           14d
network-query-rlqsh                  1/1    Running   2           14d
ops-center-pcf-data-ops-center-6b58b444f4-jgmsx 5/5    Running   5           6d5h
patch-server-pcf-data-cnat-cps-infrastructure-6f9c8cf954-cvrfv 1/1    Running   1           6d5h
pcf-engine-pcf-data-pcf-engine-app-pcf01-666b6fc77-rz8qn 4/4    Running   0           4d13h
pcf-rest-ep-5b6645bdff-t2qr7         1/1    Running   3           6d4h
policy-builder-pcf-data-pcf-engine-app-pcf01-75bcf64d7d-j7nbl 1/1    Running   10          6d5h
prometheus-rules-cdl-77b46b6fc8-469m8 1/1    Running   1           6d5h
redis-keystore-0                     2/2    Running   0           4d13h
redis-keystore-1                     2/2    Running   0           6d4h
redis-queue-0                        2/2    Running   0           4d13h
redis-queue-1                        2/2    Running   0           6d4h
redis-queue-2                        2/2    Running   0           6d3h
rs-controller-admin-7f764f7859-5hq51 2/2    Running   0           6d4h
rs-controller-admin-config-7ffd4bb964-vnlht 1/1    Running   0           6d4h
rs-controller-spr-config-6668f56764-rbb7t 1/1    Running   0           6d4h
rs-controller-spr1-5577c89979-drx2n   2/2    Running   0           6d4h
smart-agent-pcf-data-ops-center-65568f7fcd-6jj44 1/1    Running   0           6d5h
svn-0                                 2/2    Running   2           6d4h
traceid-0                            1/1    Running   0           6d4h
zookeeper-0                          1/1    Running   0           6d4h
cloud-user@cn5g1k8s-master1:~$

```



Mobile Core



Software Defined Programmable Infrastructure

AI/ML in Education

- Personalized learning programs adapted to each student's ability and goals
- On-demand tutoring via AI chatbots and software-driven tutors
- Automation that can cut through bureaucratic red tape — for example, automated chatbots that can answer frequently asked questions
- Time-management benefits for teachers, due to smart automation of tedious, time-consuming tasks, like record-keeping

Challenge for New Age Education

Verification of learning result

Digital divide on city and country

Teaching diversity



The bridge to possible