The case for 6G

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Why do we need 6G?

- 5G is still being rolled out in Europe
- 5G will offer 1GB/s, 6G is expected to do 10GB/s (I also read 20GB/s and even 1TB/s)
- 6G offers much lower latency
- 6G network require different business models and requires that Mobile Network Operator rethink their strategies
- 6G seems to offer a lot of promises. Too good to be true or do we just need to buy some time for more research?

What we heard in 2020 ….

Taken out of context

Kyle Malady, Executive Vice President and Chief Technology Officer, Verizon

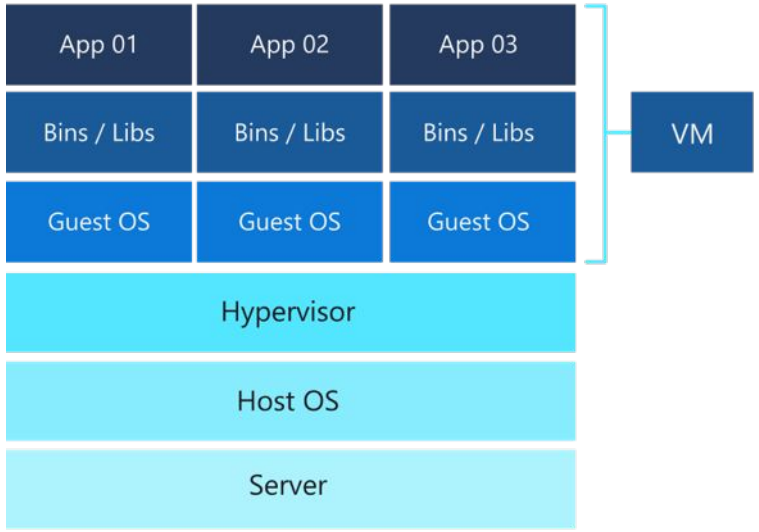
“I really don't know what the hell 6G is. We just put 5G in. And I think there's a lot of development still to come on that one.”

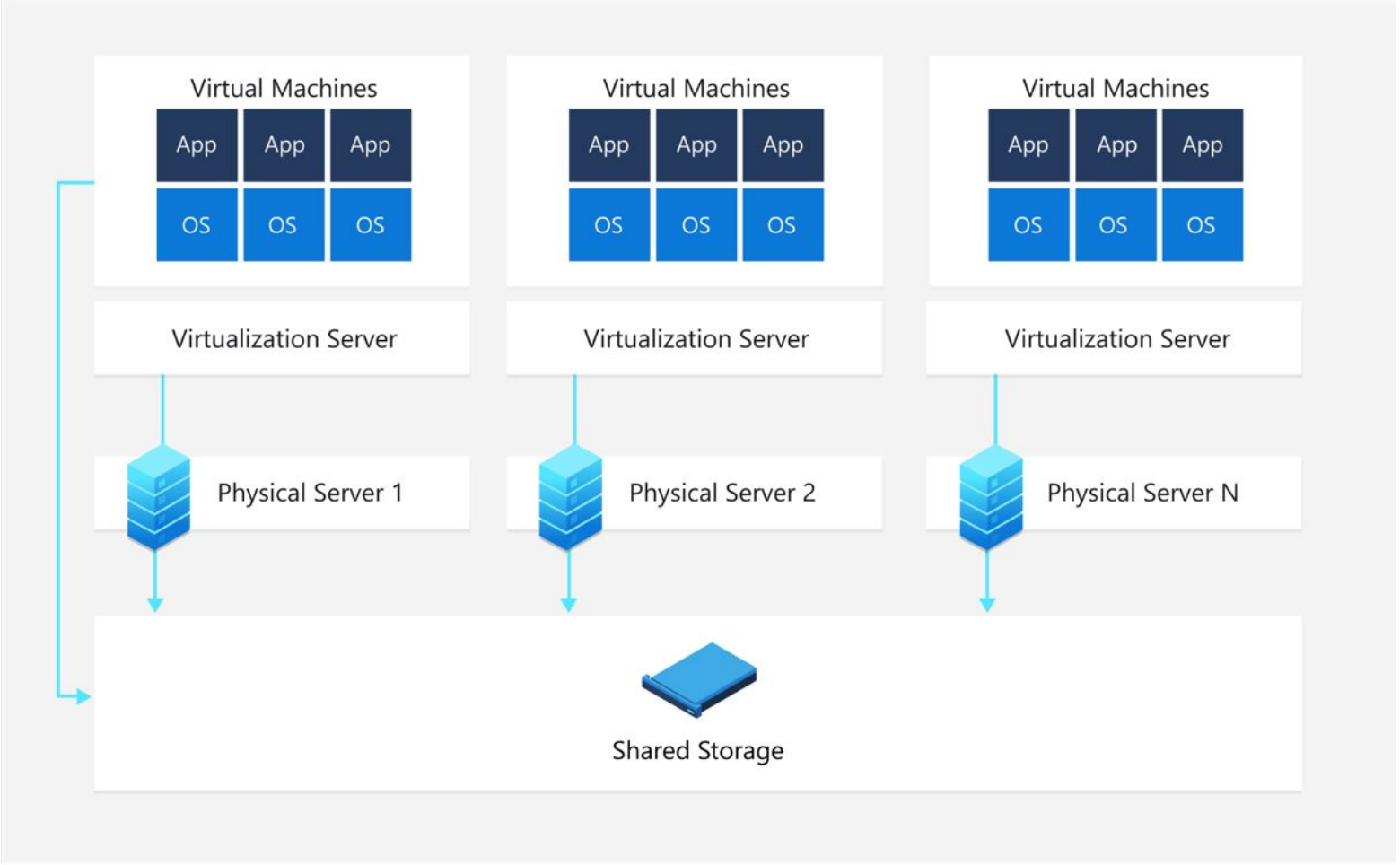
Karri Kuoppamaki, Senior Vice President, Technology Development & Strategy T-Mobile US

“Why do we need 6G? I believe 5G has a long and bright future ahead of it. ”

src: https://www.lightreading.com/aiautomation/a-network-operators-view-of-6g/a/d-id/771810

What is so special about 6G?





Machine Virtualization

Cloud based Virtualization

What is so special about virtualization?

- **Cost savings—**running multiple virtual environments from one piece of infrastructure means that you can drastically reduce your physical infrastructure footprint.

- **Agility and speed—**Spinning up a VM is easy and quick

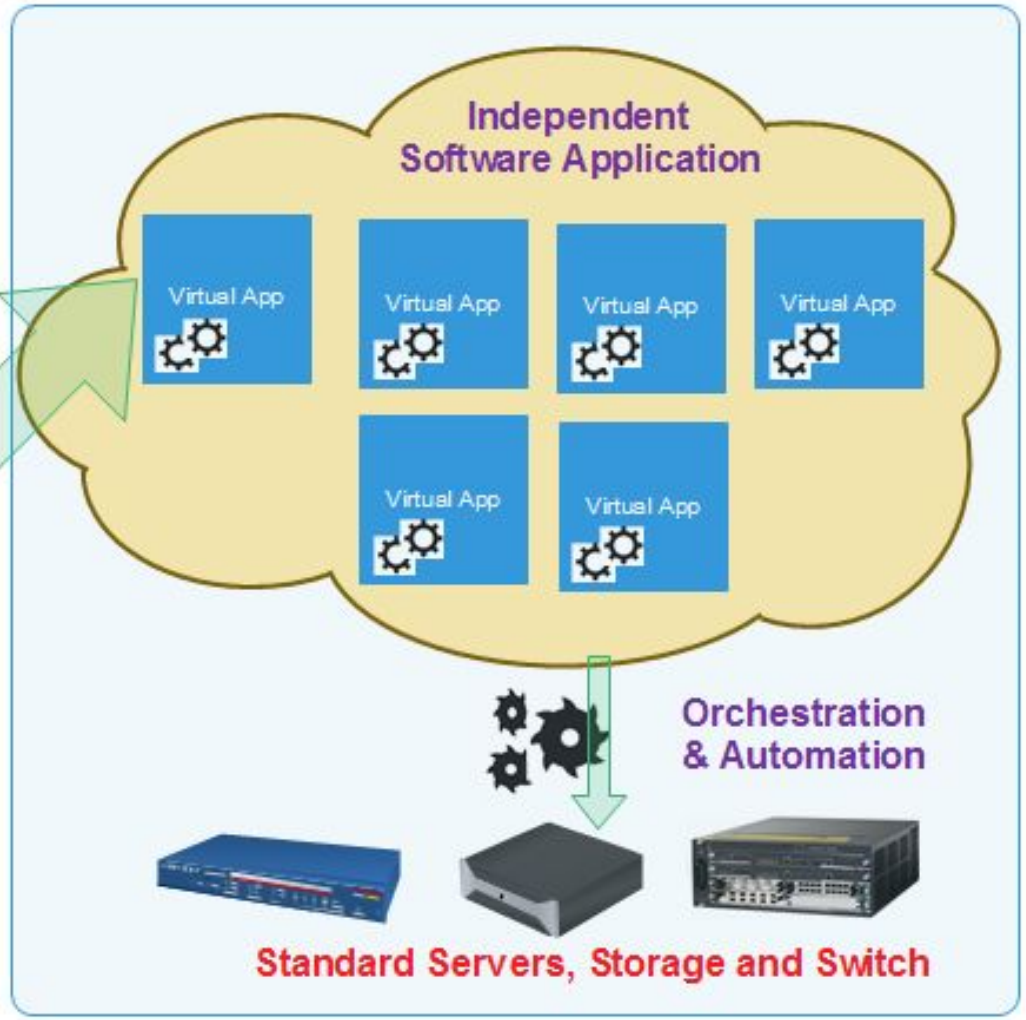
- **Lowered downtime—**VMs are so portable and easy to move from one hypervisor to another on a different machine

- **Scalability—**VMs allow you to more easily scale your apps by adding more physical or virtual servers to distribute the workload across multiple VMs

- **Security benefits—** Because virtual machines run in multiple operating systems, all guests are isolated from each other

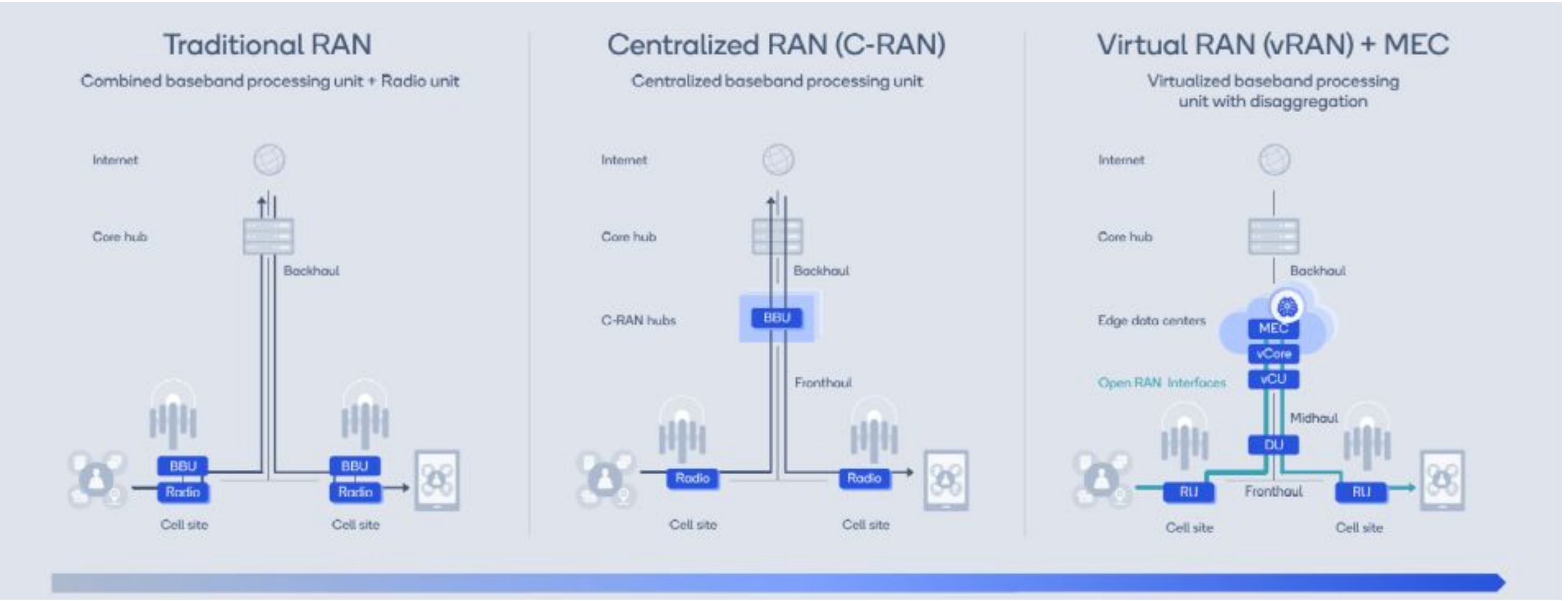
6G Network Virtualization

Traditional Network Appliance Approach



Network Virtualization Approach

6G Virtual RAN



For better coordination, scalable capacity, faster deployments, lower latency and new use cases

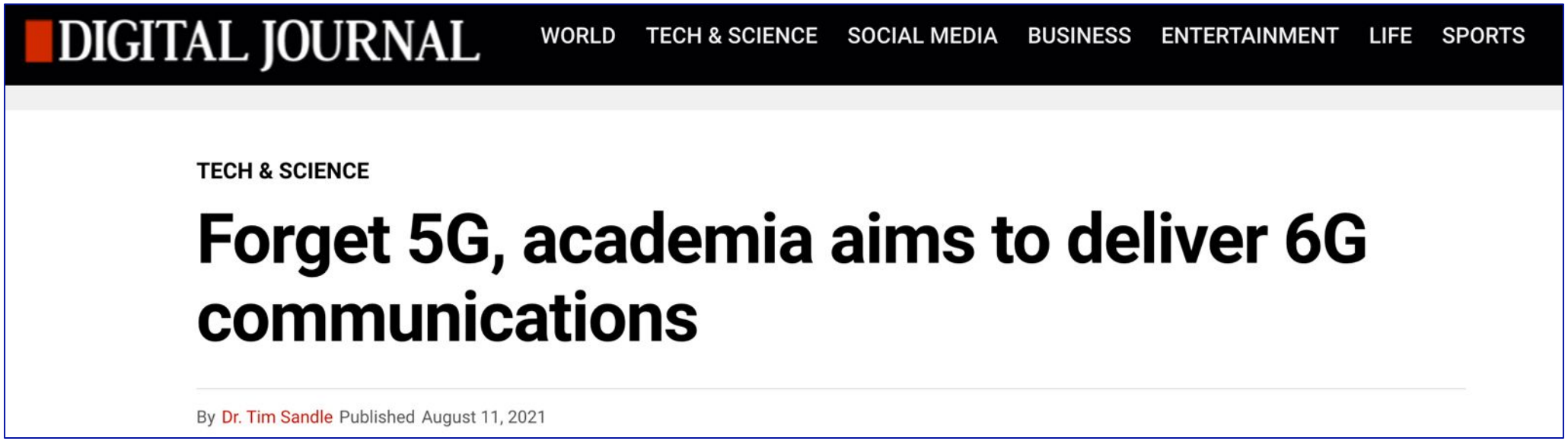
Virtualization for the Network Operator

- In 6G, virtualization is not an option (unlike 5G)
- It will use resource provisioning mechanisms based on self-managed reliable and trustworthy AI algorithms
- Networks need to adapt dynamically to the required demand and requirements, and must do so without interrupting the service

- This means that the classical overprovisioning approach for the network is no longer viable. (This is a good thing, overprovisioning costs a lot of money)
- This requires new business-models and opportunities for the operators.
- Invest in the network “as you grow” model

Virtualization for Industry/Academics

- Virtualized cloud-services are easy to update
  - When a manufacturer has solved some bugs, this can be easily deployed
- Virtualization isolates the various services, so it becomes easier to test out new ideas or technologies.



src: https://www.digitaljournal.com/tech-science/forget-5g-academia-aims-to-deliver-6g-communications/article

Virtualization for the End-Users

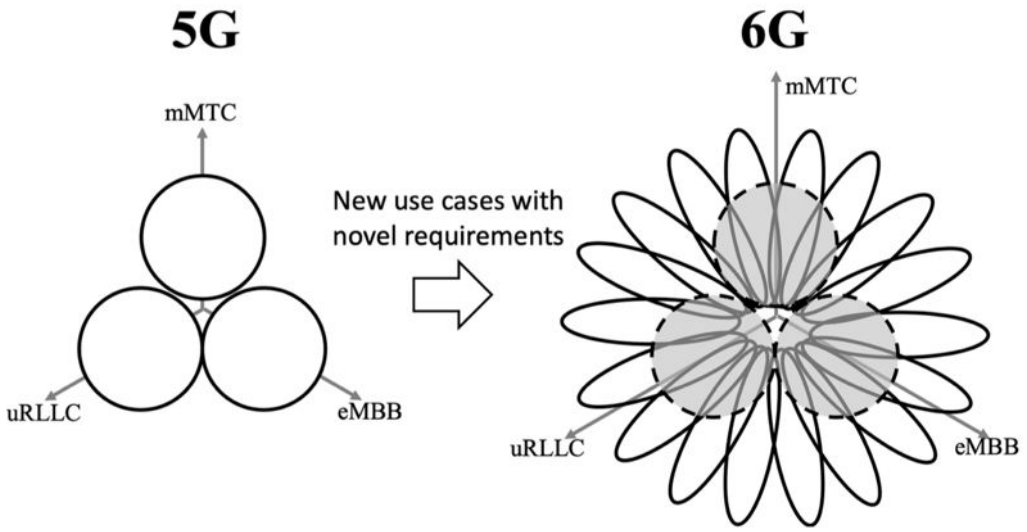
- Currently all operators offer the same product/features for the same price (at least in Portugal)

Gas price comparison (2005)

Operator price comparison (2021)

Virtualization for the End-Users

- Virtualization allows for new (Virtual) Mobile Network Operators to enter the market
- Virtualization allows operators to differentiate on use-cases



- Now, at least we should get a decent choice

Virtualization for the End-Users

- Perhaps we will have several contracts with (different) operators
  - A youtube contract (no more adds, flat fee)
  - A Virtual LAN “slice” contract so I can take the companies network home
  - A phone slice for work
  - A phone slice for personal connections
  - Etc.

- We will become part of 6G

Conclusions

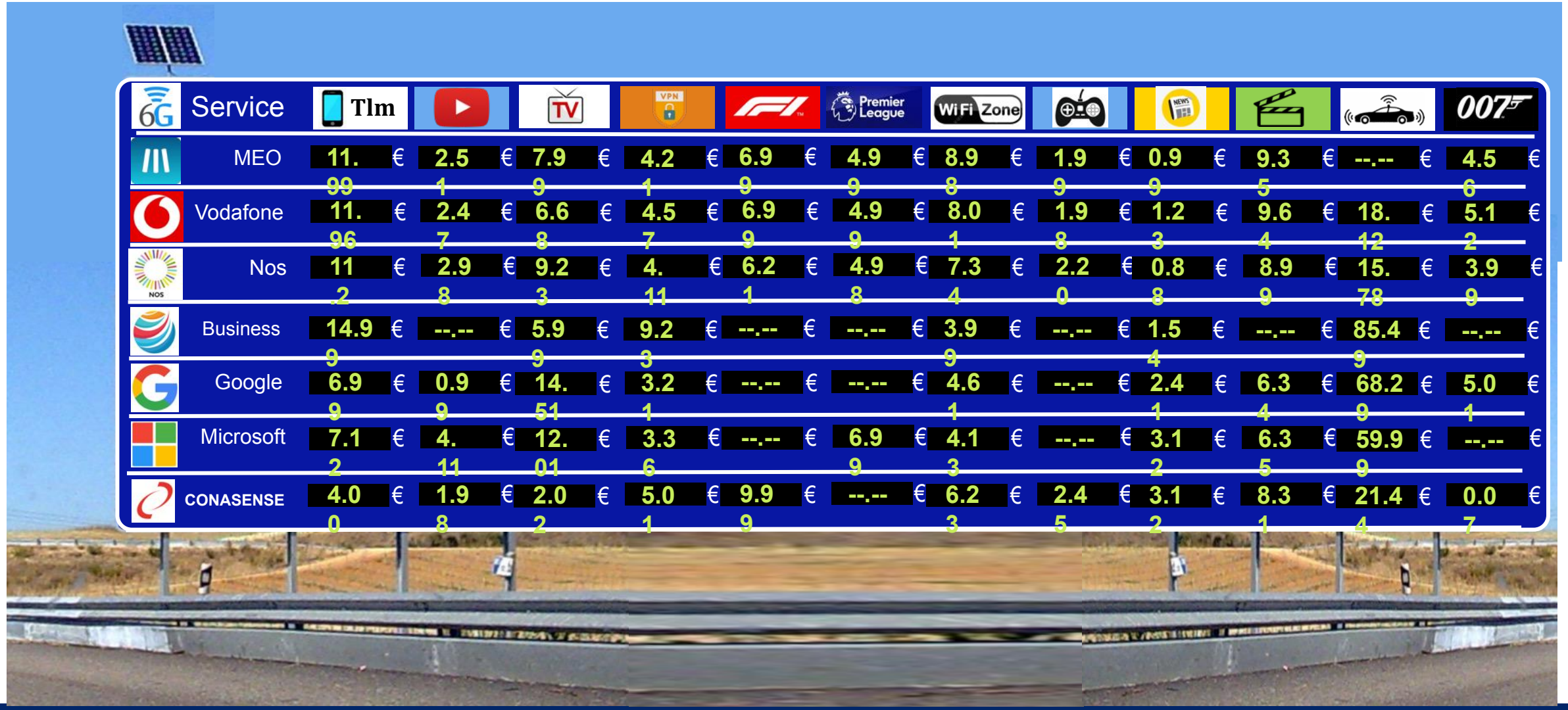
- Virtualization is the cornerstone of 6G
- It is the enabler of 6G
- It is the reason we should invest(igate) in 6G
- 6G allows to “reset” our thinking and come up we new solutions

"The best way to predict the **future is to invent it**."

Alan Kay, XeroxPARC, Atari, Apple and a few more

Let’s invent 6G together

Will this be our future?



6G Service	Tlm		TV	VPN	F1	Premier League	WiFi Zone		NEWS			007
MEO	€ 11.99	€ 2.51	€ 7.99	€ 4.21	€ 6.99	€ 4.99	€ 8.98	€ 1.99	€ 0.99	€ 9.35	€ --.--	€ 4.56
Vodafone	€ 11.96	€ 2.47	€ 6.68	€ 4.57	€ 6.99	€ 4.99	€ 8.01	€ 1.98	€ 1.23	€ 9.64	€ 18.12	€ 5.12
Nos	€ 11.2	€ 2.98	€ 9.23	€ 4.11	€ 6.21	€ 4.98	€ 7.34	€ 2.20	€ 0.88	€ 8.99	€ 15.78	€ 3.99
Business	€ 14.99	€ --.--	€ 5.99	€ 9.23	€ --.--	€ --.--	€ 3.99	€ --.--	€ 1.54	€ --.--	€ 85.49	€ --.--
Google	€ 6.99	€ 0.99	€ 14.51	€ 3.21	€ --.--	€ --.--	€ 4.61	€ --.--	€ 2.41	€ 6.34	€ 68.29	€ 5.01
Microsoft	€ 7.12	€ 4.11	€ 12.01	€ 3.36	€ --.--	€ 6.99	€ 4.13	€ --.--	€ 3.12	€ 6.35	€ 59.99	€ --.--
CONASENSE	€ 4.00	€ 1.98	€ 2.02	€ 5.01	€ 9.99	€ --.--	€ 6.23	€ 2.45	€ 3.12	€ 8.31	€ 21.44	€ 0.07