

MEC and edge computing. The importance of location

By Monica Paolini, Senza Fili

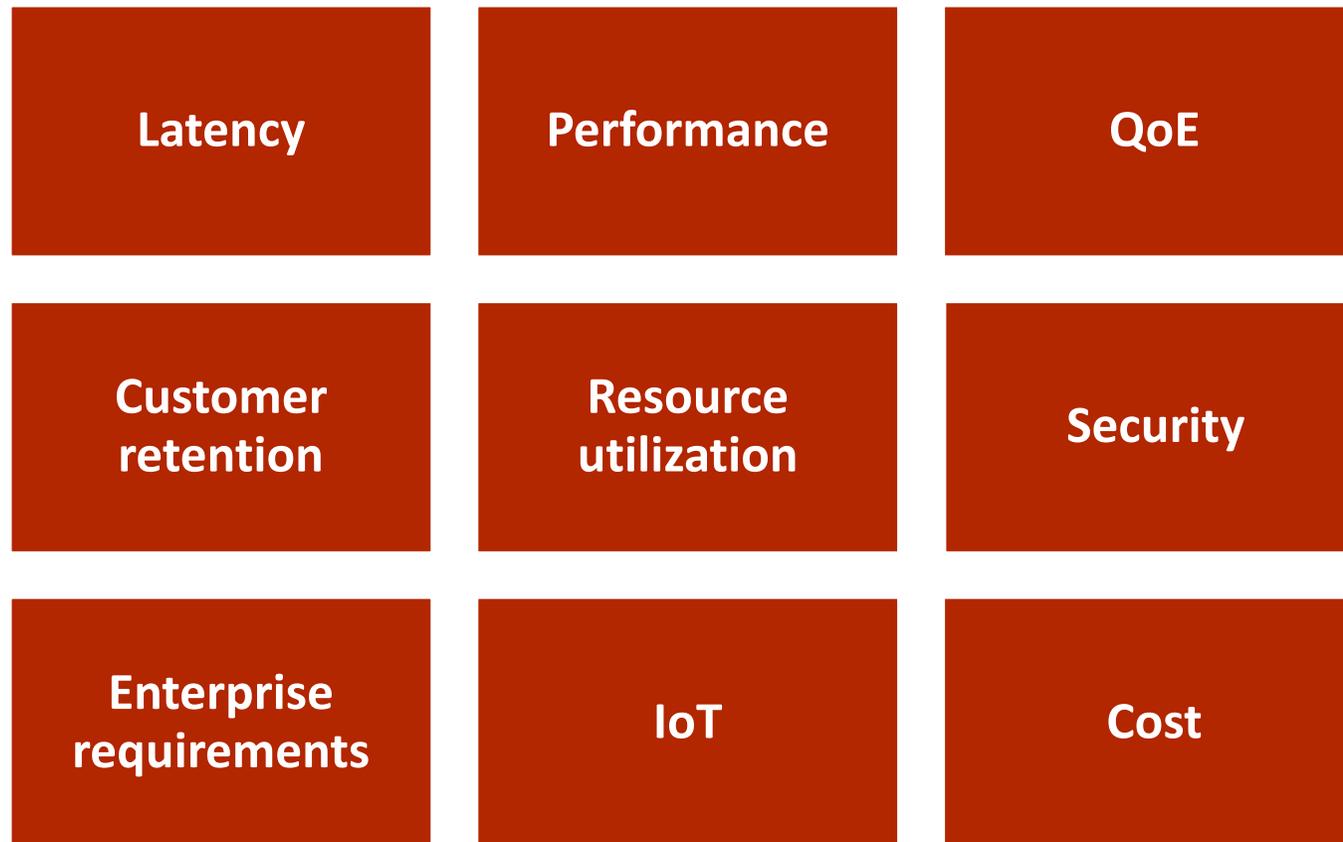
It all started in the cloud

- Virtualization releases us from many constraints of implementation
- Initial trends:
 - Move functionality to the cloud
 - Reduce costs
 - Agility
- The real cost
 - Increase in latency
 - Lower control on QoE
 - Less flexibility in managing traffic



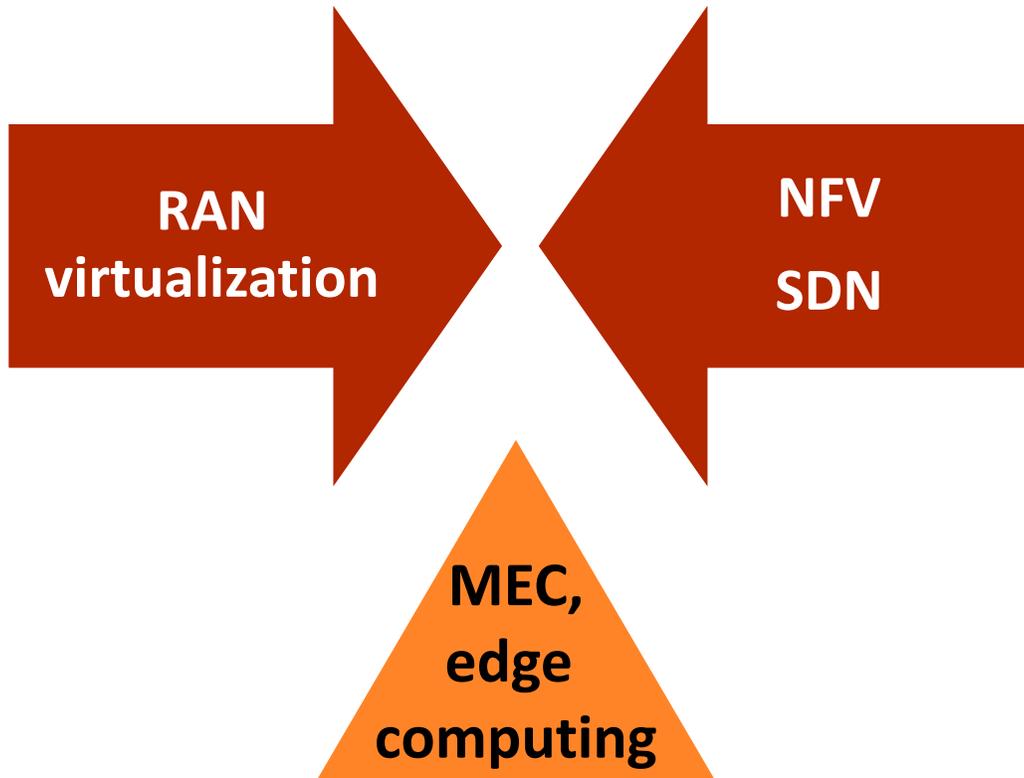
Moving functionality towards (not to) the edge is enabled and driven by a more mature virtualization approach

Does virtualization free us from the constraints of location?



Location relevance increases because we choose where functions reside

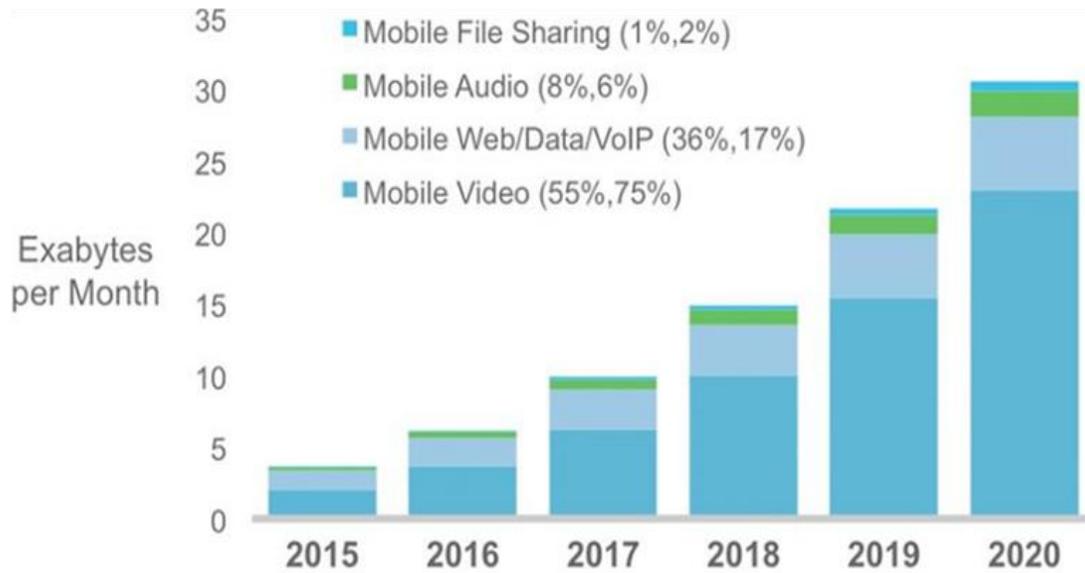
**With virtualization the core moves towards the edge,
the edge moves towards the core**



**To optimize network utilization and QoE,
mobile operators need to actively decide where functions reside**

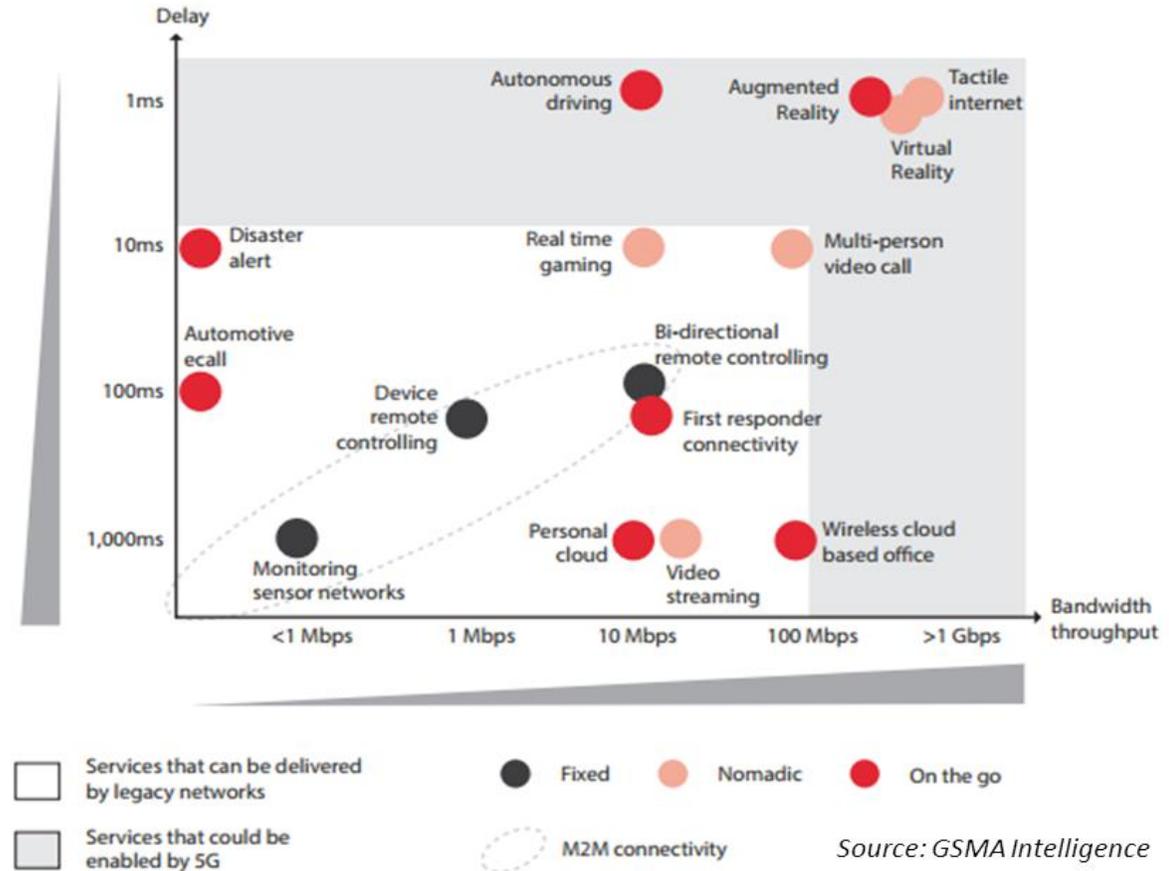
Location becomes relevant, because time has become crucial

Traffic continues to grow



Figures in parentheses refer to 2015 and 2020 traffic share.
Source: Cisco VNI Mobile, 2016

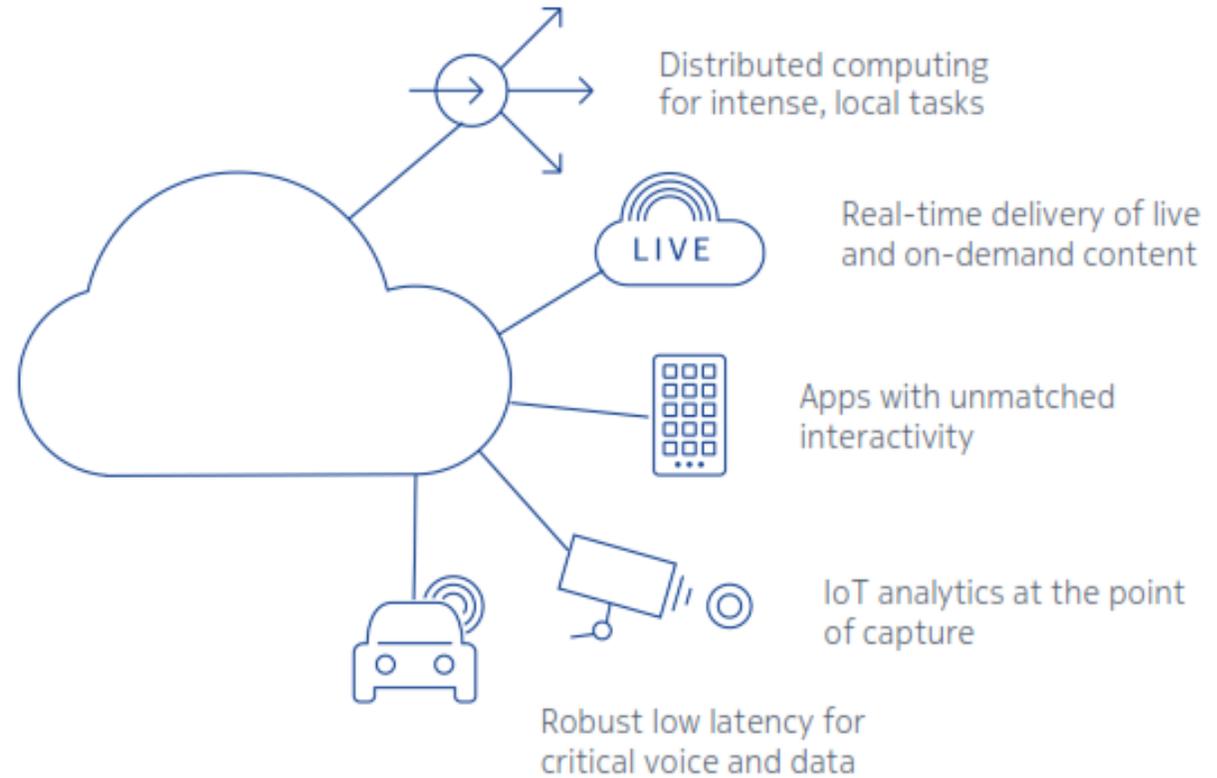
Bandwidth and latency requirements by application



Real-time content requires networks to manage traffic in real time

With MEC and edge computing, the RAN and the core meet to improve performance and QoE

- MEC: the value proposition from ETSI
 - Ultra-low latency
 - Proximity
 - High bandwidth
 - Real-time traffic management
 - Location awareness
- What is it good for:
 - Subscriber experience
 - Service creation and support
 - Resource utilization

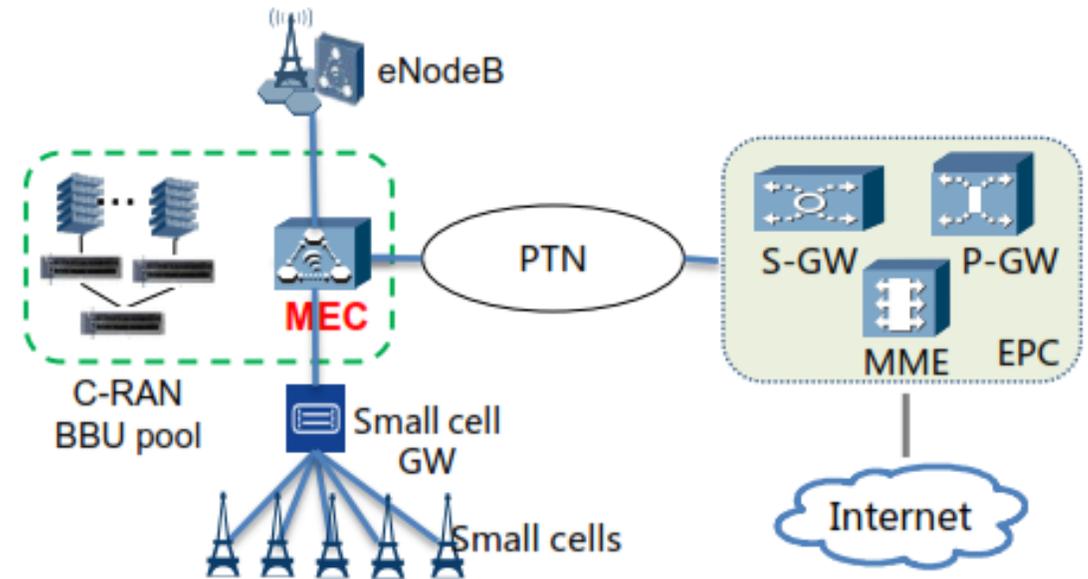


Source: Nokia

**Better use of network resources means later network expansion, lower per-bit costs
And maybe higher profitability?**

With MEC and edge computing, operators squeeze a better performance and QoE from their networks

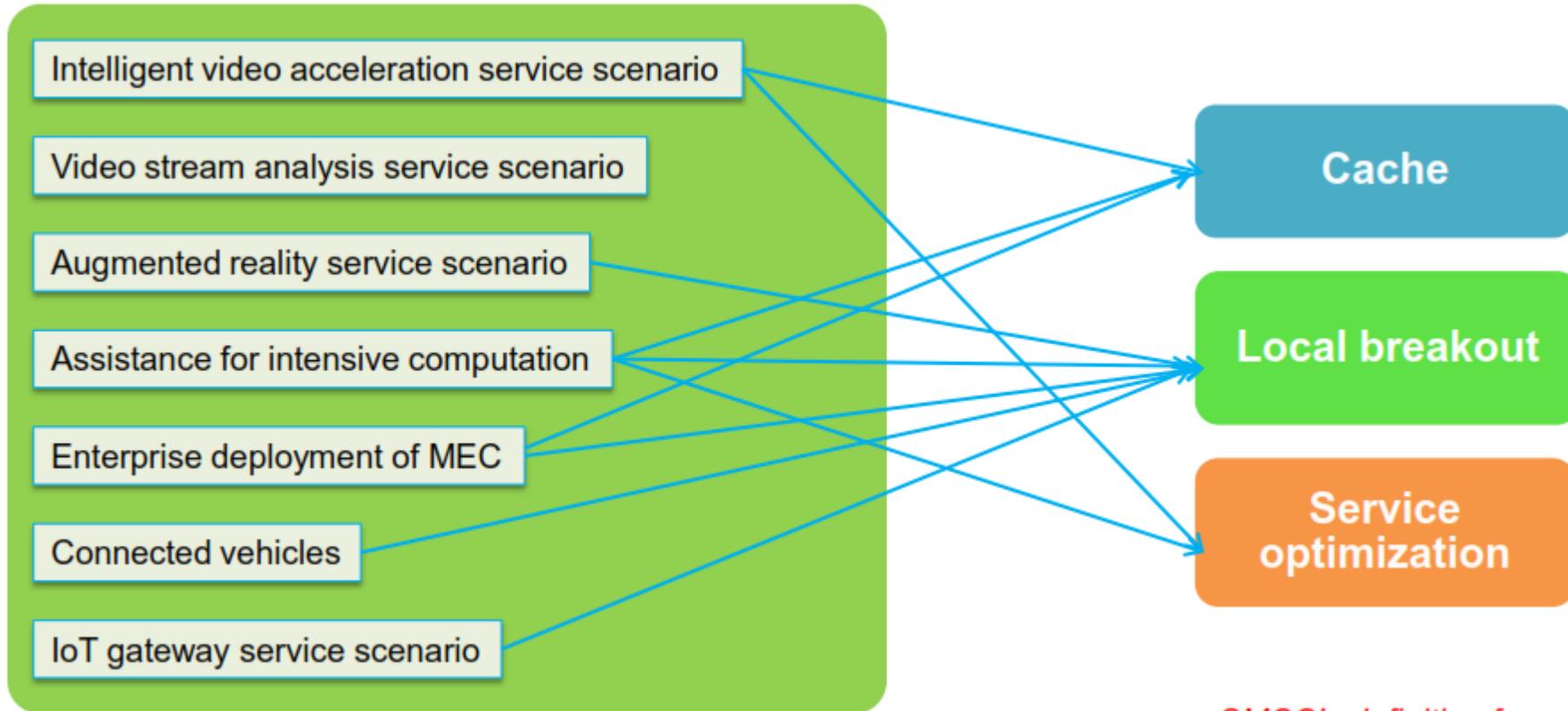
- Latency is becoming just as important as capacity
 - Capacity is the foundation
 - But low latency is crucial to QoE
- Brute-force approach to increase capacity to keep latency down is no longer sufficient
 - High cost
 - Inefficient use of network resources



Source: China Mobile

**Better use of network resources means later network expansion, lower per-bit costs
And maybe higher profitability?**

Use cases go beyond latency and video caching: enterprise, IoT, security

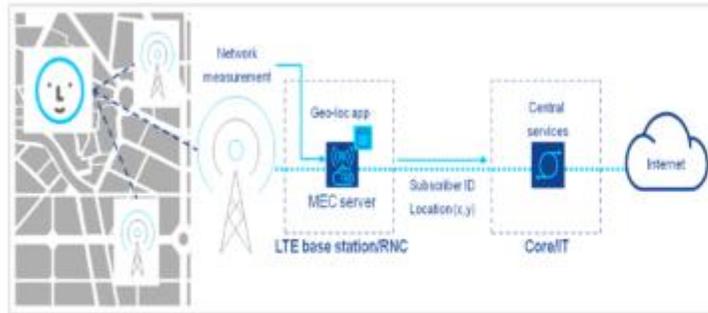


Service scenarios defined in ETSI MEC ISG

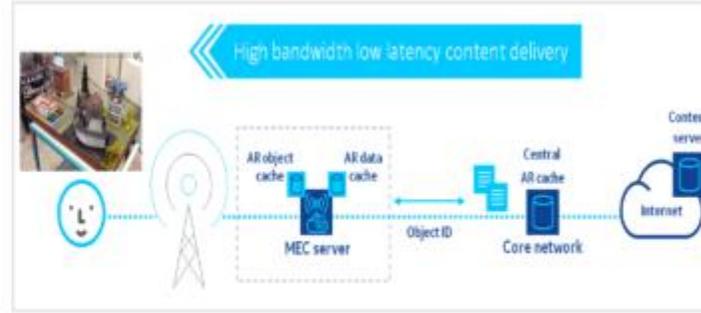
*CMCC's definition from
technical perspective*

Source: China Mobile

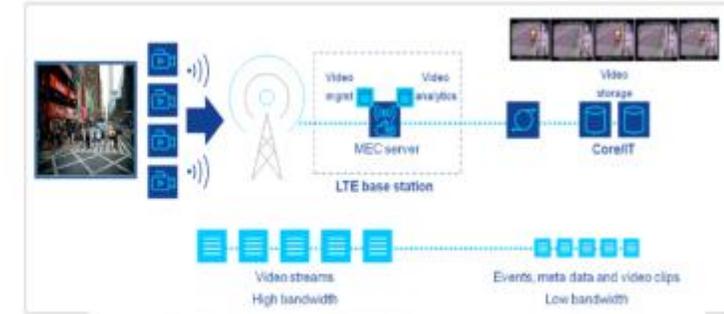
MEC use cases



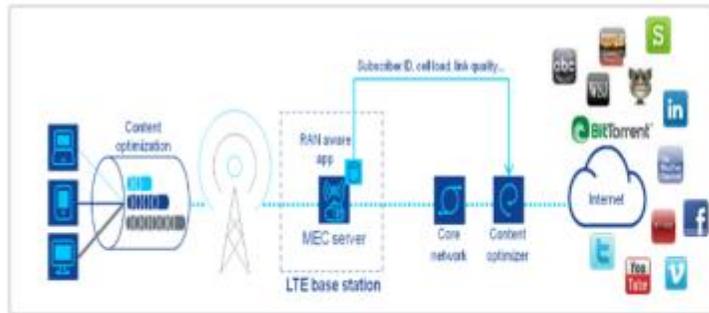
Active Device Location Tracking



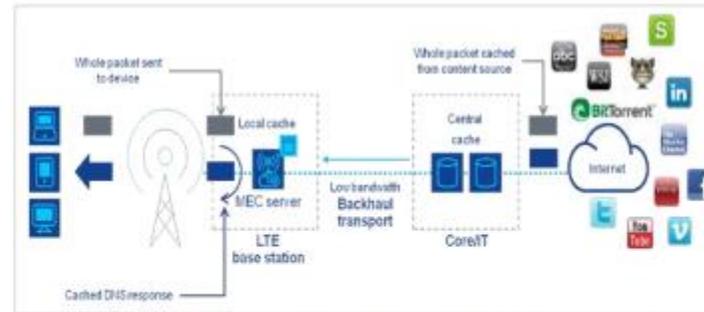
Augmented reality content delivery



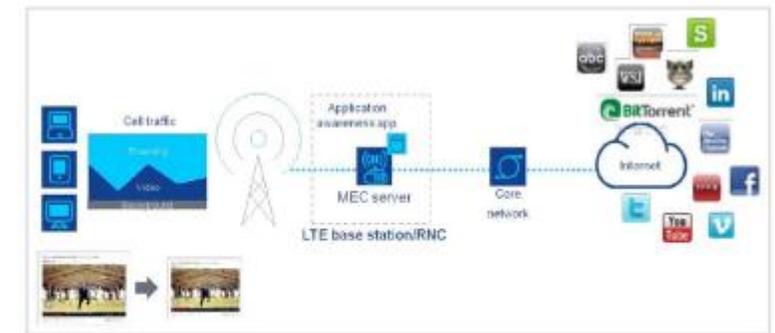
Intelligent Video analytics



RAN-aware content optimization



Edge content and DNS caching

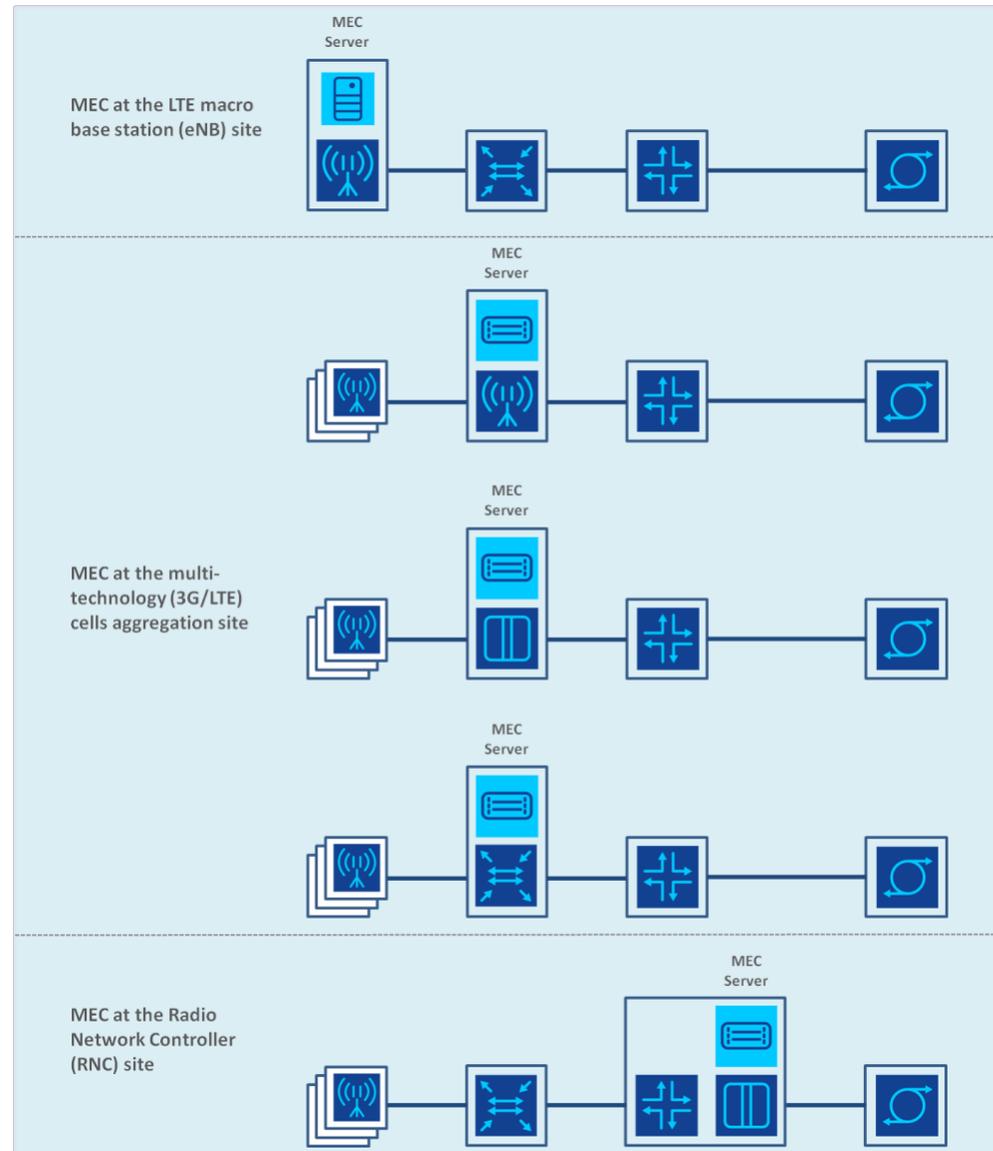


Application aware performance optimization

Source: ETSI

Where should we deploy MEC?

- We have the freedom to choose location
- This does not mean we know how distributed or centralized the networks should be
- Where should the MEC server go?
 - No single answer
- Tradeoffs to be evaluated
 - Cost / performance
 - Services, applications requirements
 - Traffic concentration
 - Network topology



Source: ETSI

Edge computing pushes further evolution in the relationship with the enterprise

The enterprise's perspective

“What I'd really want is one provider that could give me one system on which I could put multiple carriers. I don't necessarily want to run the system myself, but I want the benefit of being able to add services as small-cell companies add features.

The carrier is not going to offer them at the same rate I want to consume them at. Additionally, if each carrier used different solutions I would not be able to offer the same enterprise features for all employees.

In the area I'm in, Verizon uses Ericsson. AT&T leads with a Nokia solution. Because they're two disparate solutions, they offer different services.

The technology actually may offer some of the same services, but again, carriers only implement the ones they're comfortable with and they're willing to support. That means that, even if the technology could support a service, I can't leverage it, because the carrier decides not to offer it.” – Anonymous at US-based global manufacturing and retail corporation



*Carolina Panthers Bank of America stadium in Charlotte.
Source: Carolina Panthers*

Neutral host models become more attractive

...but what about 5G?

- It is all about 5G
 - Gradual transition
 - No big switch-off day, parallel evolution and innovation tracks
- MEC and edge computing are integral part of 5G
 - Latency requirements
 - QoE
 - Multi-layer networks
 - RAN optimization



MEC and edge computing are a foundational block for 5G, available ahead of 5G

And finally something for your weekend reading

- Latest report on densification
 - Analyst paper on RAN evolution towards massively densified networks: drivers, technologies, market requirements
 - 13 in-depth video/transcribed interviews with report sponsors, operators and enterprises
- Download the report on RCR Wireless News and Senza Fili website and sent to webinar participants
- Extra credit: where did I took the photo on the cover?



Massively densified networks

Why we need them and how we can build them

Monica Paolini, Senza Fili



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Next reports: backhaul/fronthaul/mmW, MEC, 3.5 GHz



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Monica Paolini, PhD, is the founder and president of Senza Fili. She is an expert in wireless technologies and has helped clients worldwide to understand technology and customer requirements, evaluate business plan opportunities, market their services and products, and estimate the market size and revenue opportunity of new and established wireless technologies. She has frequently been invited to give presentations at conferences and has written several reports and articles on wireless broadband technologies. She has a PhD in cognitive science from the University of California, San Diego (US), an MBA from the University of Oxford (UK), and a BA/MA in philosophy from the University of Bologna (Italy). You can contact Monica at monica.paolini@senzafiliconsulting.com.