5G Technology Enablers for Content Production – Part II

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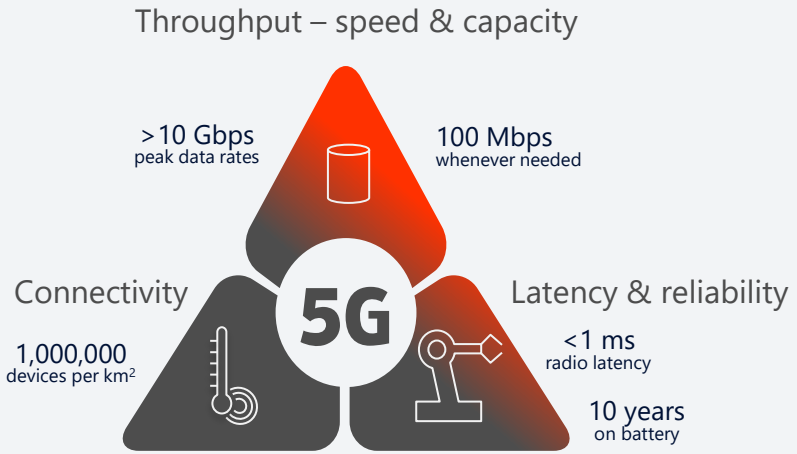
Better network performance for best QoE

What does 5G provide?

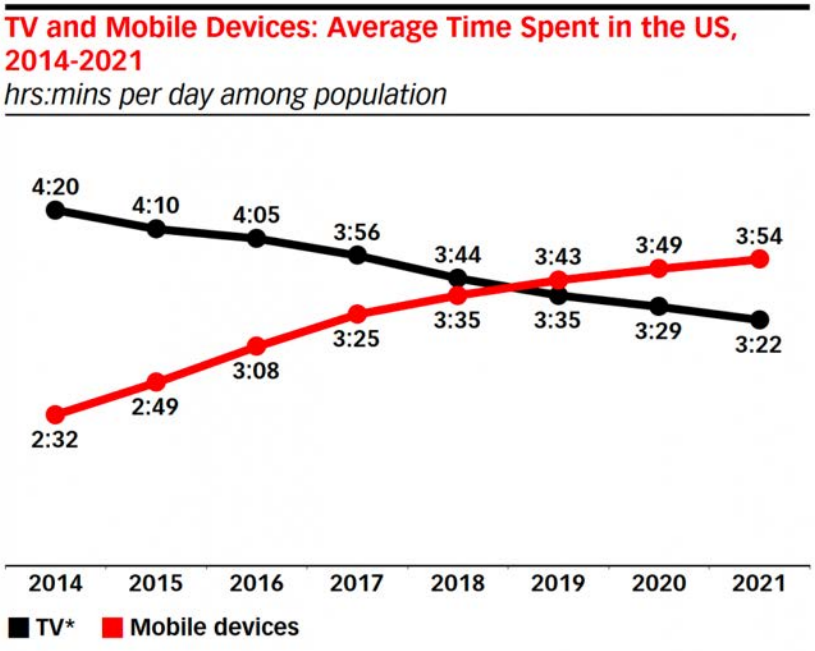


5G is faster & provides far better network and service performance versus 4G

	4G today	5G 2020-25
Users	10M people	+100M 'things'
Speed	100 Mbps	100x faster
Latency	>>10 ms	10x lower latency
NW service level	Best effort for all	Guaranteed service levels
Logical networks	1	Many logical network slices

5G enables professional use cases

LTE brought the generalization of consumer video on handheld devices



5G brings new industrial and professional use cases (“verticals”)

- Going from wired to wireless
- New workloads
- New (and demanding) QoE requirements
- Beyond consumer 5G deployments

Example: cloud-based wireless studio

5G enables cloud-based wireless production

Wireless

– mm-Wave and massive MIMO for high bandwidth

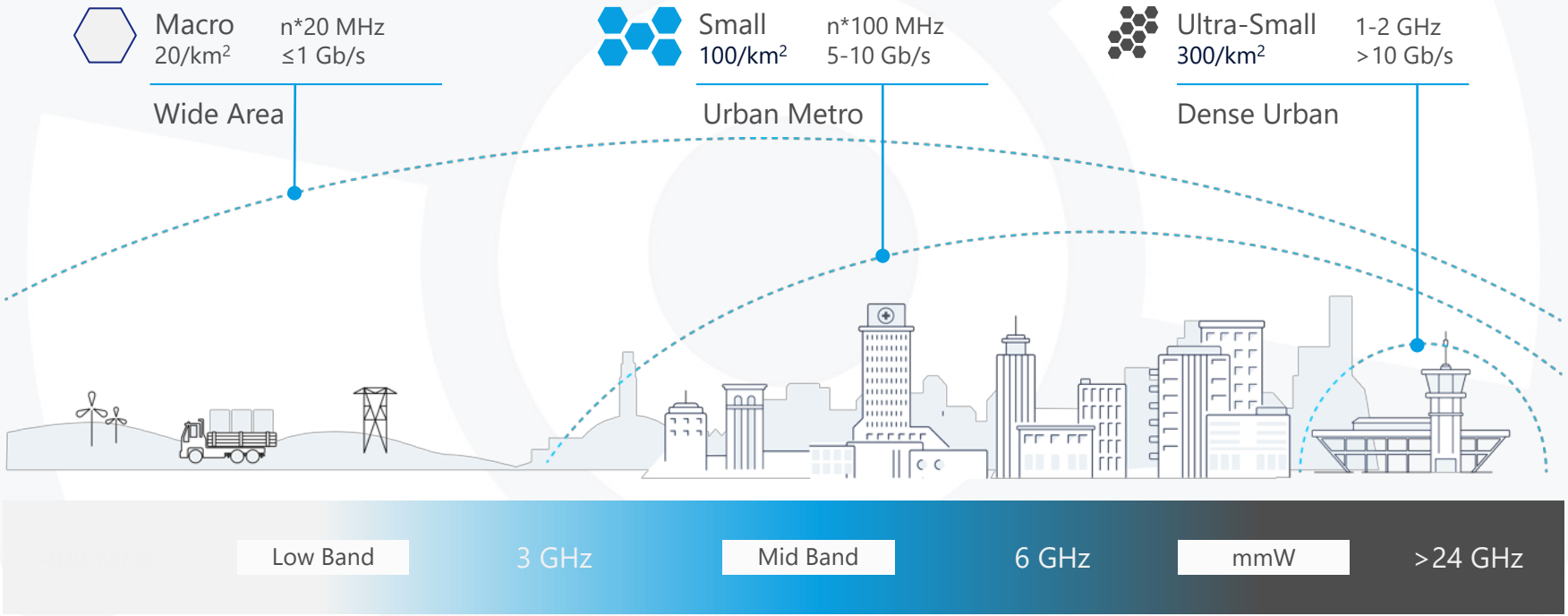
Cloud-based

– Edge cloud for low latency

Production

– End-to-end network slicing to scale and guarantee resources

5G spectrum and bandwidth

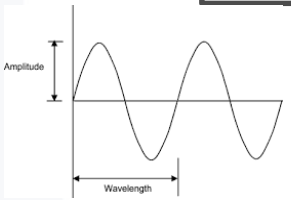


mmW – the principles

mmWave name comes from its wavelength, λ

Technically less than 1cm and greater than 1mm (30-300GHz). In 3GPP 5G this is extended down to 24.25GHz

$$\lambda = c/f$$

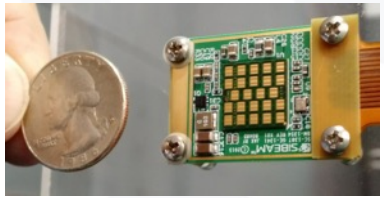


Problem: As frequency increases then coverage/cell sizes get smaller and you would need more sites

The wavelength determines the size of antenna elements

Half wave dipole Antenna Element sizes

26GHz = 6mm
3.5GHz = 42.8mm
700MHz = 214mm

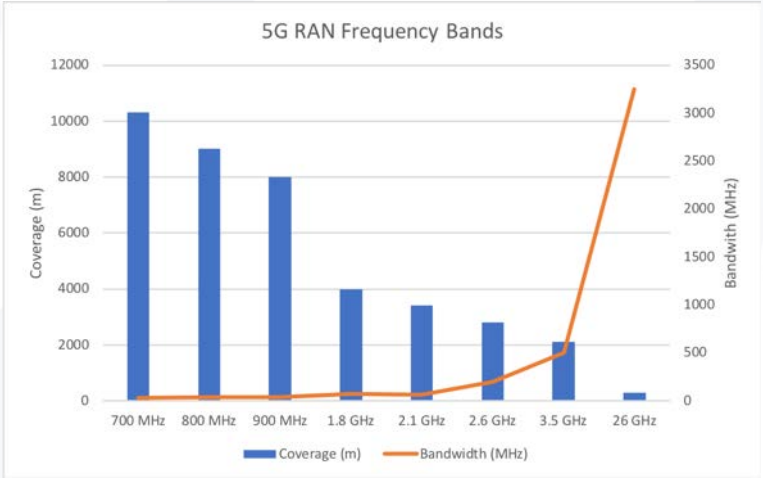


Solution: mmWave supports high gain beamforming antenna arrays to increase coverage/cell sizes.

mmWave is needed to meet ultra-high broadband 5G speeds

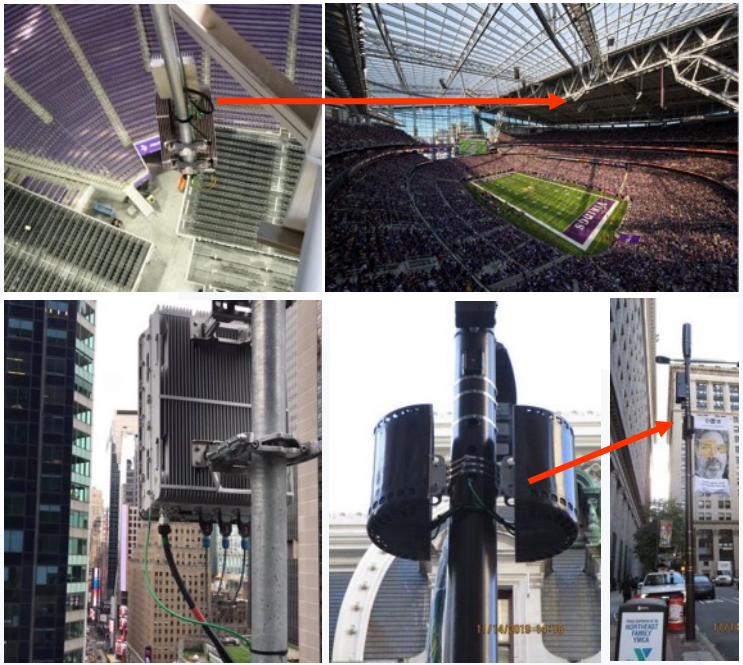
1GHz x 10bps/Hz

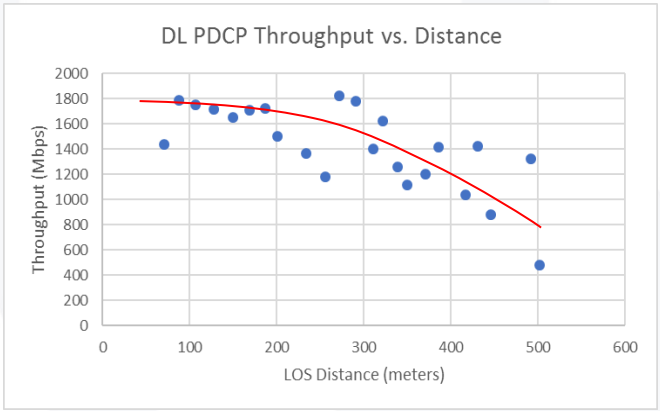
10Gbps



mmW today

- Deployment in dense urban areas and venues
- Few networks: USA, Australia, China, Korea…
- Optimized for downlink (DL)
- Main limitation: availability of user terminals





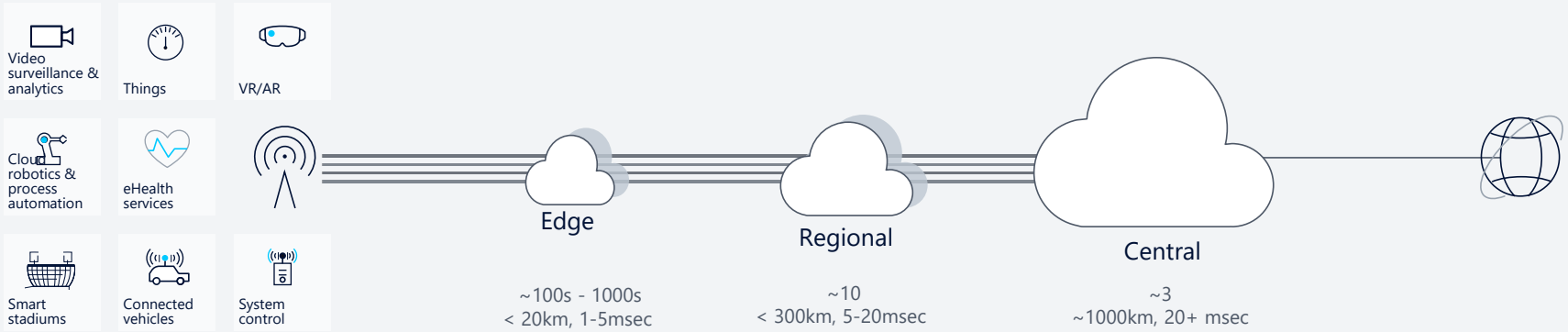
DL Peak rates 2.0 Gbps

500m range in line-of-sight

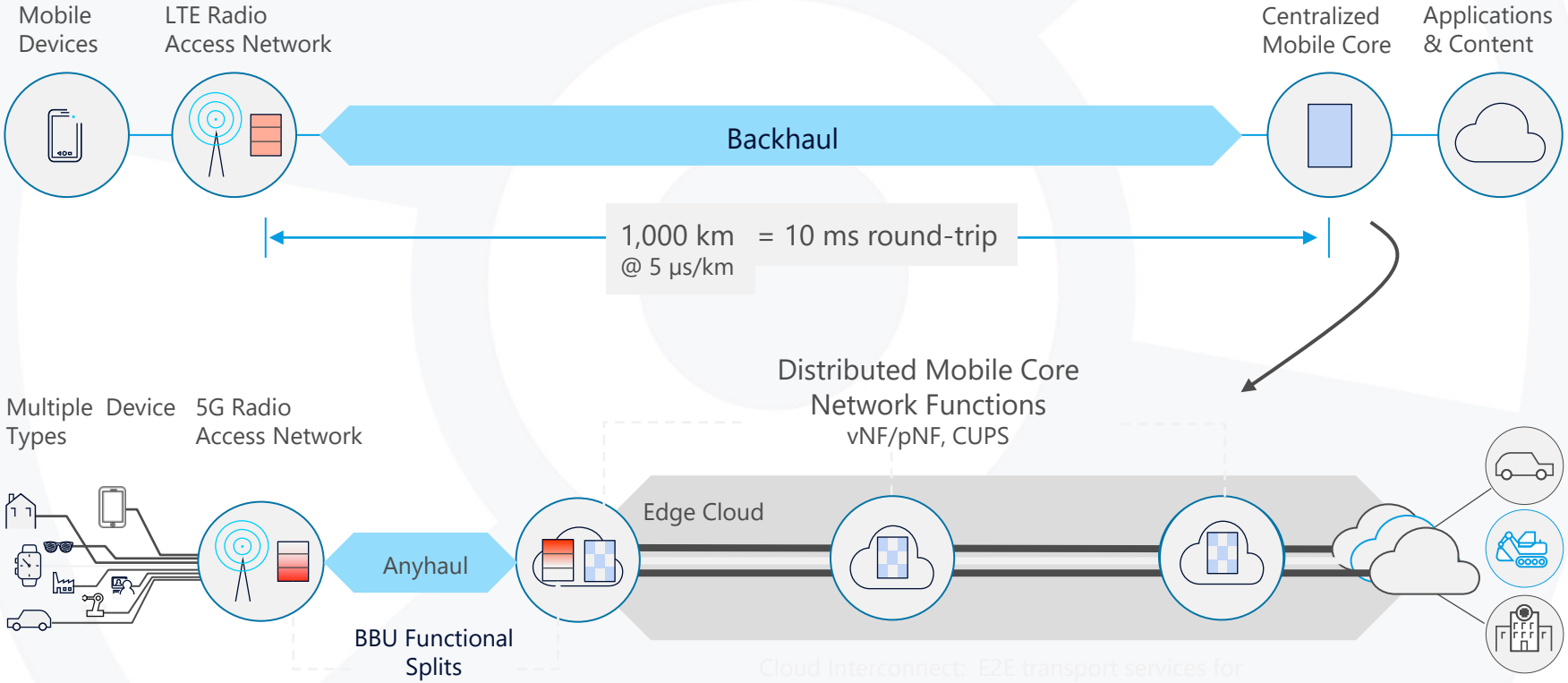
100-150m range in dense urban

MEC (Multi-Access Edge Computing)

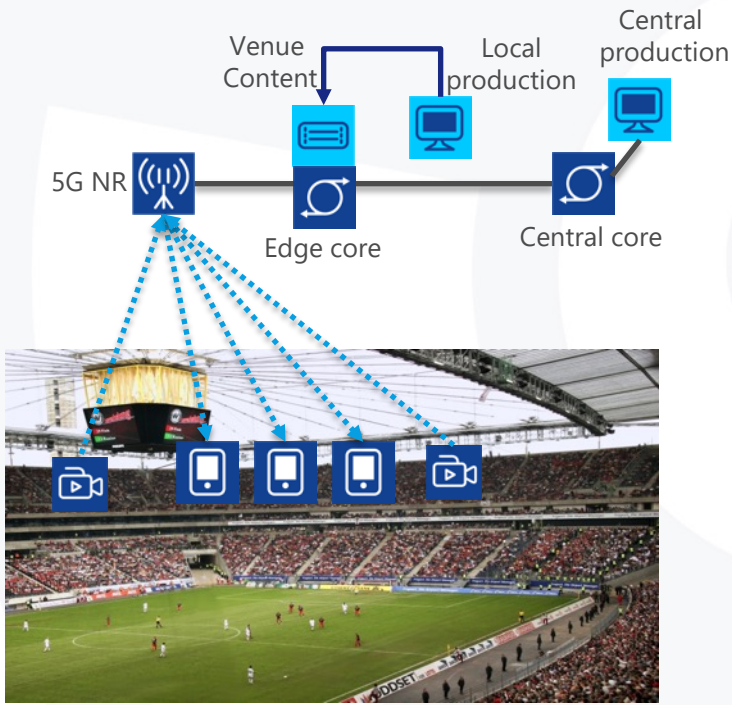
- An open and standardized IT service environment within the operator's networks
- Hosts third-party applications
- Distributed cloud for highest flexibility
  - Edge cloud (MEC): lowest latency, highest bandwidth



Edge cloud requires distributed 5G core



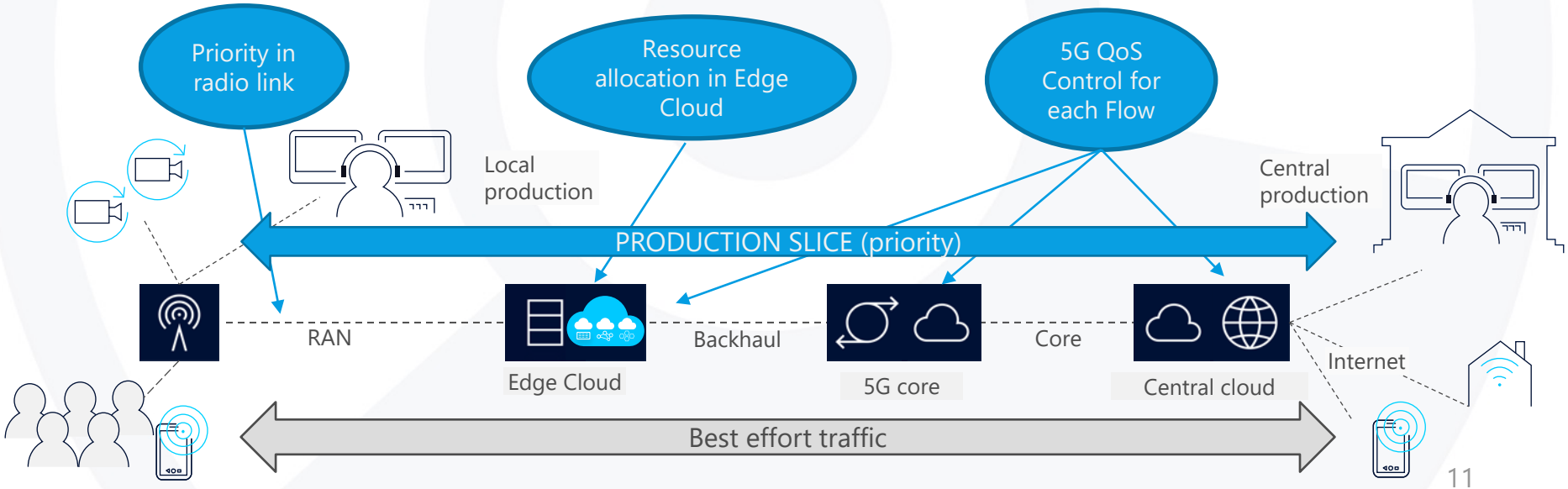
Use case: cloud production in local units



- 5G-enabled sports venue
  - mmW radio
  - Available MEC resources
- 5G-enabled local production unit
  - 5G wireless cameras
  - Cloud-based workflow running on MEC
- 5G-enabled audience
  - High-speed internet access via mmW
  - Added-value services running on MEC
- We need to prioritize production wrt users → network slicing

End-to-end Network Slicing

- Allocate resources / priority classes across the network for some traffic flows, effectively creating a “virtual network” (a network slice) with QoS guarantee
- Requires coordination (“orchestration”) of resources → Software Defined Network



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Thanks for your attention!
Any questions?

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