



Platform-as-a-Service and Telco cloud

Csaba Simon

Budapesti Műszaki és Gazdaságtudományi Egyetem
Villamosmérnöki és Informatikai Kar
Távközlési és Médiainformatikai Tanszék

BME-TMIT

TELCO GRADE PAAS

PaaS – what is missing,

Telecom requirements: PaaS is coming from the IT (web) world

- Usually there is a loadbalancer for HTTP only
 - Other protocols (SIP, diameter, TCP session) are not supported
- Internal state info to be stored in external DB/cache
 - Performance issues
- No guarantee on QoS/ response times
- VMs and networks completely hidden
 - Colocation of VMs that communicate a lot with each other?
 - No networkin optimization (e.g., intel DPDK)
- No standard PaaS
 - Migration from one operator to the other?

Requirements for a PaaS

- » What does it take to write a „PaaS-compatible” app?
- » Actually it is the same for any SaaS, PaaS,... app
- » <http://12factor.net/>

PaaS criteria 1/2

- » **I. Codebase**
- » **One codebase tracked in revision control, many deploys**
- » **II. Dependencies**
- » **Explicitly declare and isolate dependencies**
- » **III. Config**
- » **Store config in the environment**
- » **IV. Backing Services**
- » **Treat backing services as attached resources**
- » **V. Build, release, run**
- » **Strictly separate build and run stages**
- » **VI. Processes**
- » **Execute the app as one or more stateless processes**

PaaS criteria 2/2

- » **VII. Port binding**
- » **Export services via port binding**
- » **VIII. Concurrency**
- » **Scale out via the process model**
- » **IX. Disposability**
- » **Maximize robustness with fast startup and graceful shutdown**
- » **X. Dev/prod parity**
- » **Keep development, staging, and production as similar as possible**
- » **XI. Logs**
- » **Treat logs as event streams**
- » **XII. Admin processes**
- » **Run admin/management tasks as one-off processes**

Microservices

- » Micro services = software module implementing a given function
 - » Own states
 - » Multiple microservices cooperating to complete a complex task
 - » The change offered by microservice based architectures:
 - » Instead of a monolith, multiple smaller (micro) modules
 - » Scaling only the modules that run into bottlenecks
 - » Useful paradigm in telco world – deployment of a given microservices depending on the operator's needs

- » <http://martinfowler.com/articles/microservices.html>

TelcoGrade PaaS – examples

- » FeedHenry – Mbaas
- » <http://www.feedhenry.com/mobile-application-platform/mbaas/>
 - » (Twillio)
 - » <https://www.twilio.com/customers>

PaaS a in practice

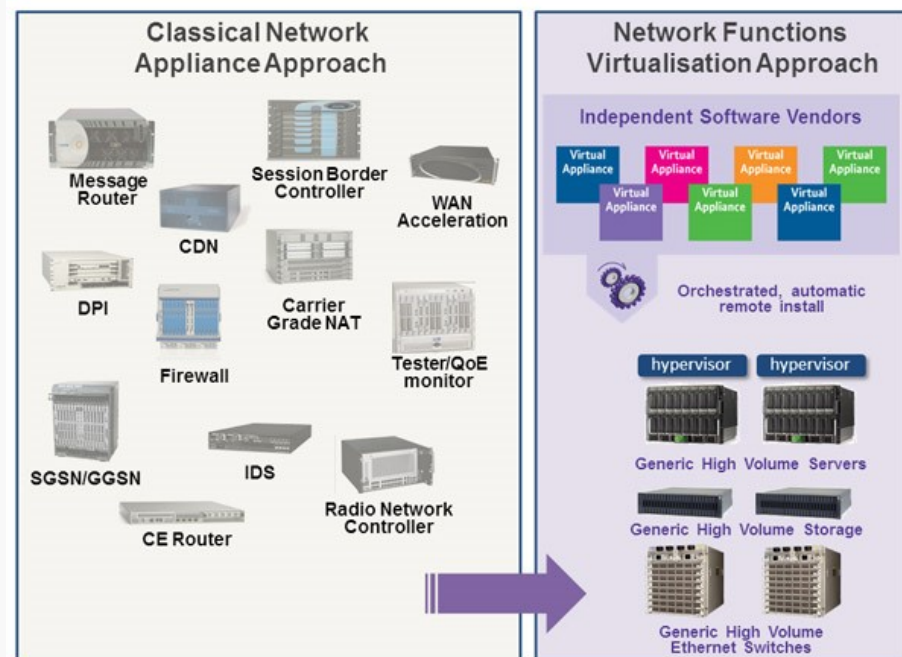
» PaaS based on a set of requirements

» <http://www.paasify.it/vendors>

Network Function Virtualization

Network Functions Virtualization – NFV

- » Network Functions Virtualization – NFV
 - » Network function (e.g., cache, firewall) independent from the hardware
 - » Functionality implemented in software
 - » Running over a generic server architecture (e.g., no need for ASICs)
- » Operator point of view / Motivation
 - » Reduce the CapEx/OpEx
 - » Faster service instantiation
 - » Flexibility, adaptation
- » Standard groups
 - » ETSI NFV
 - » Open Platform for NFV (OPNFV)

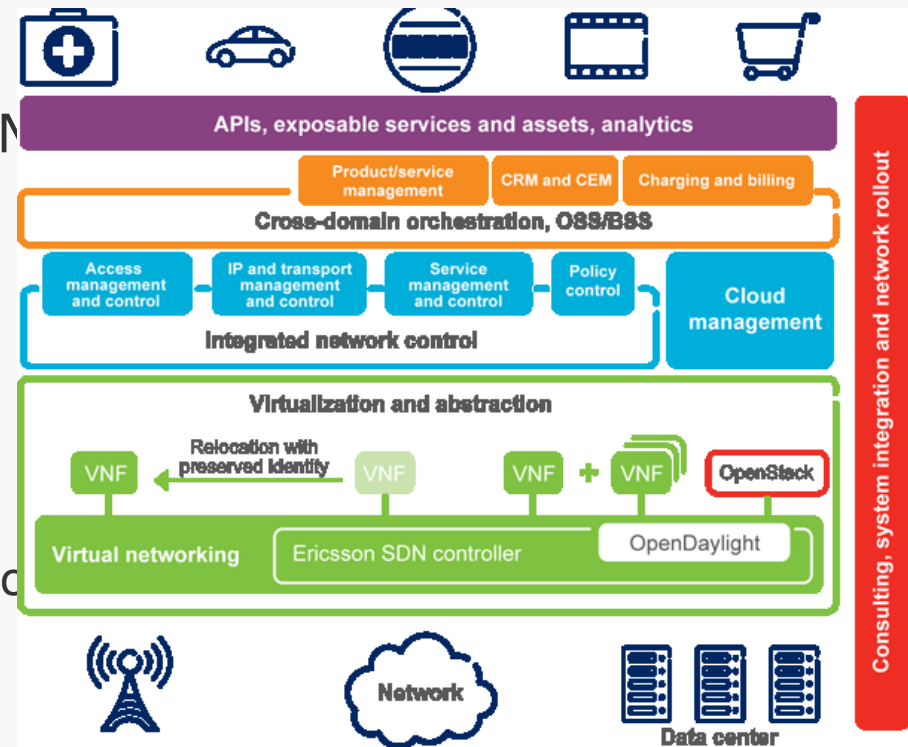


Telco cloud

- » Virtualized telco functions
 - » Packet switched core (EPC)
 - » IMS/VoLTE components (CSCF, HSS,...)
 - » Content Delivery Networks (CDN)
 - » Deep Pckt Inspection (DPI)

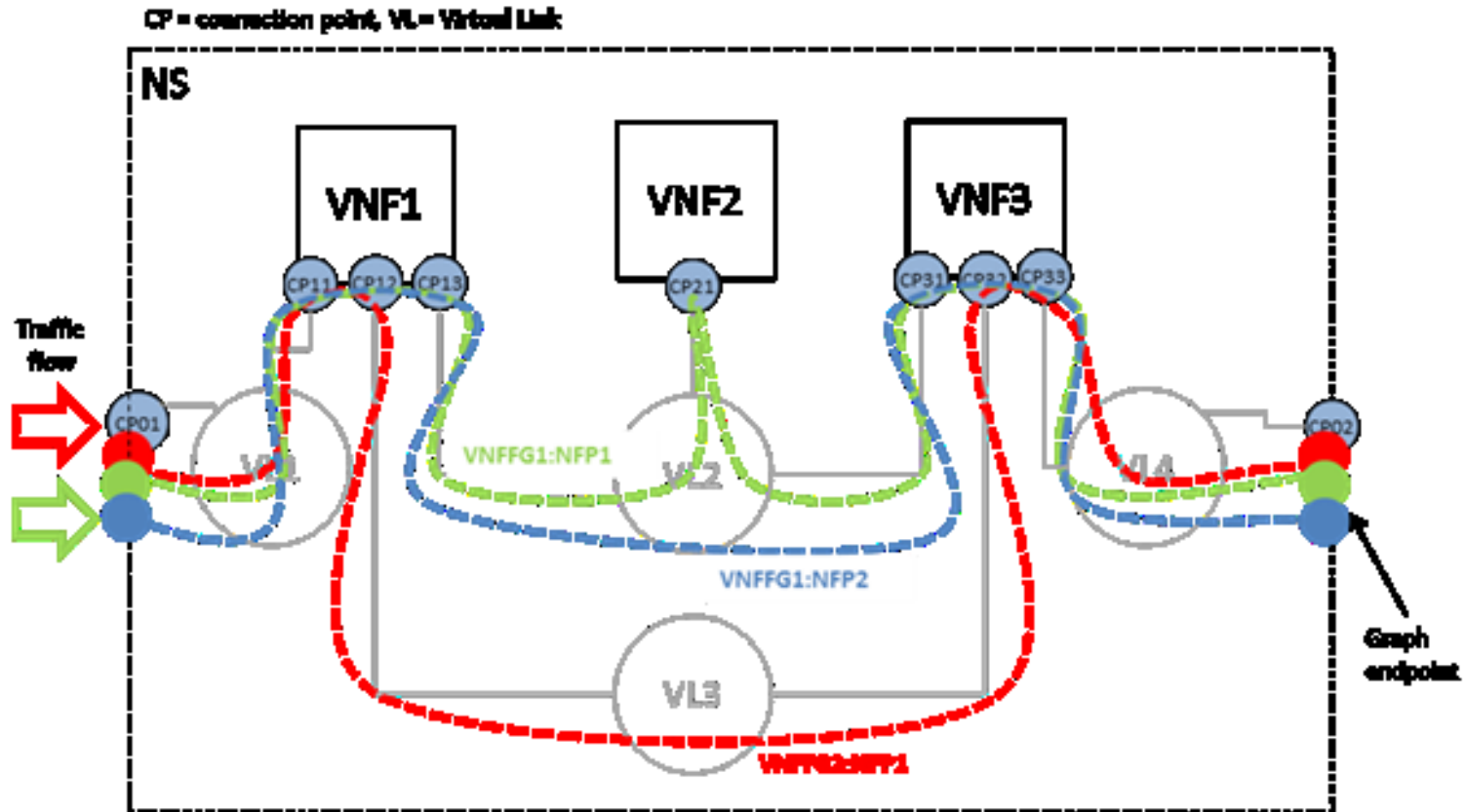
- » Performance
 - » Load balancing, scalability
 - » VNFs moved to end users
 - » TelCo grade service
 - » Deployment, monitoring, resilienc
 - » billing...
 - » Hardware acceleraration?
 - » Virtual switch, network card

- » Ericsson: real-time cloud
 - » Combining SDN, NFV and cloud



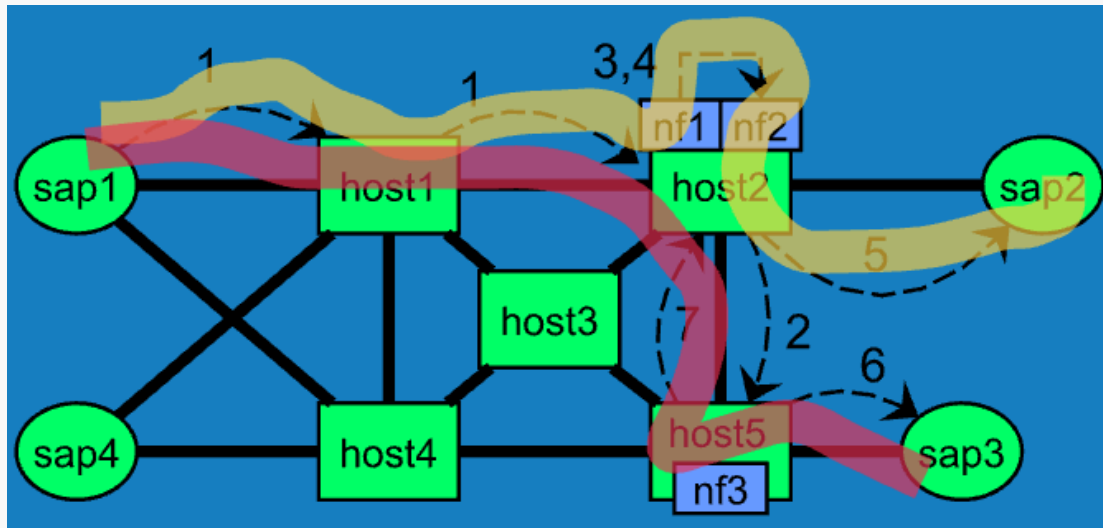
Dynamic service chaining

- » New service (NS) = linking the VNFs
 - » VNF Forwarding Graph



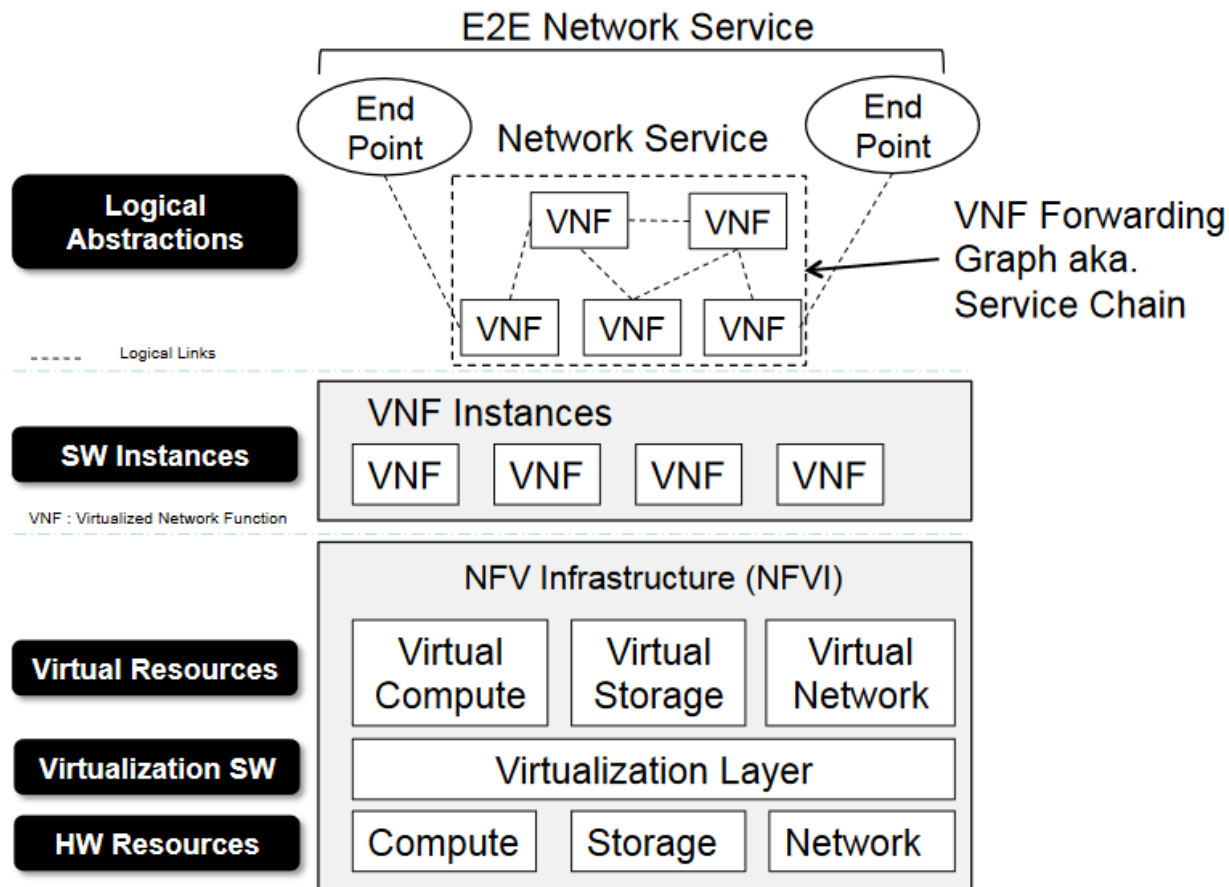
Service Function Chaining

- » VNF management
- » QoS enforcement
- » Monitoring
- » Data and Ctrl Plane optimization
- » Scalability, Reliability



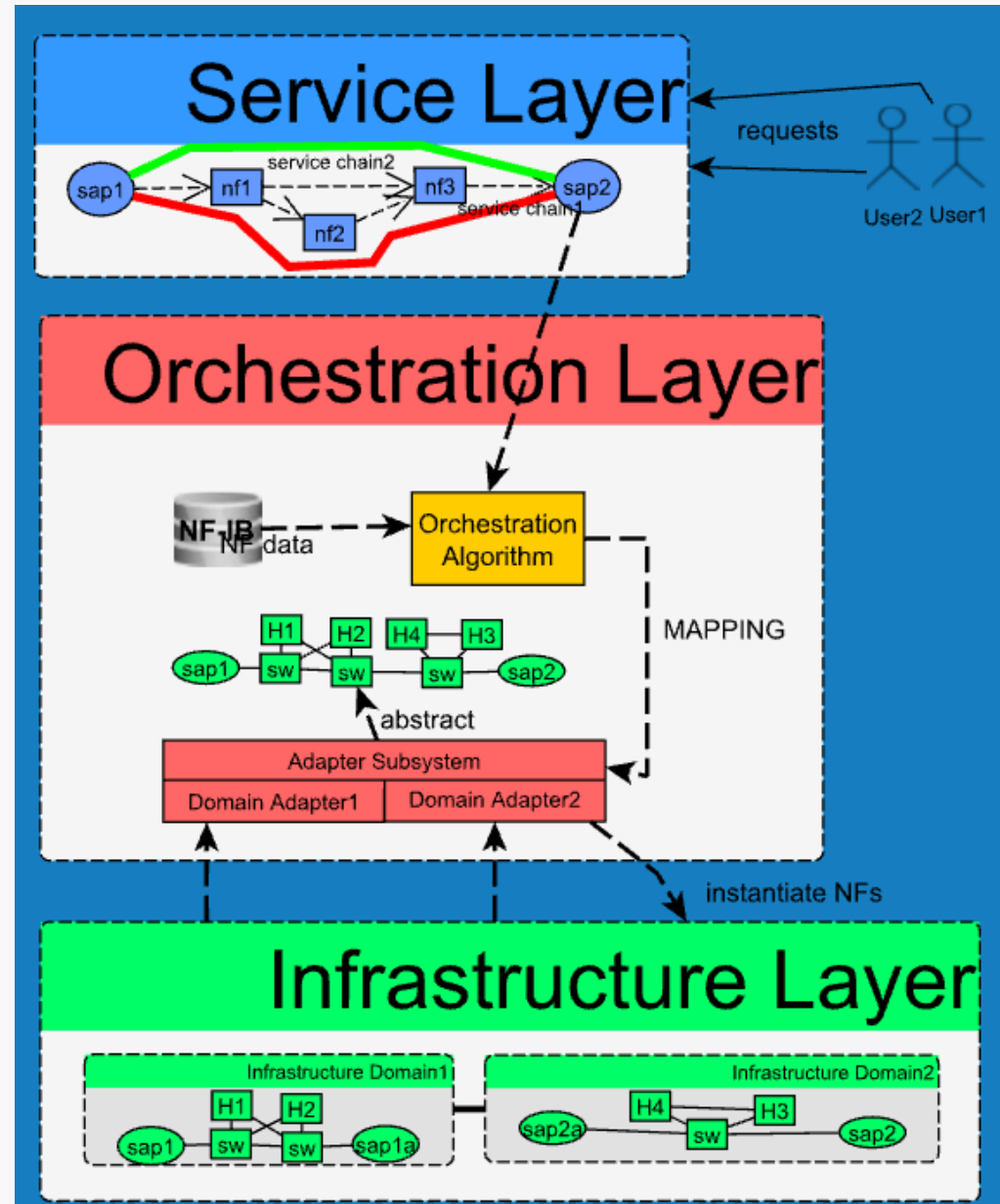
Dynamic service chaining

» New service = Linking the VNFs



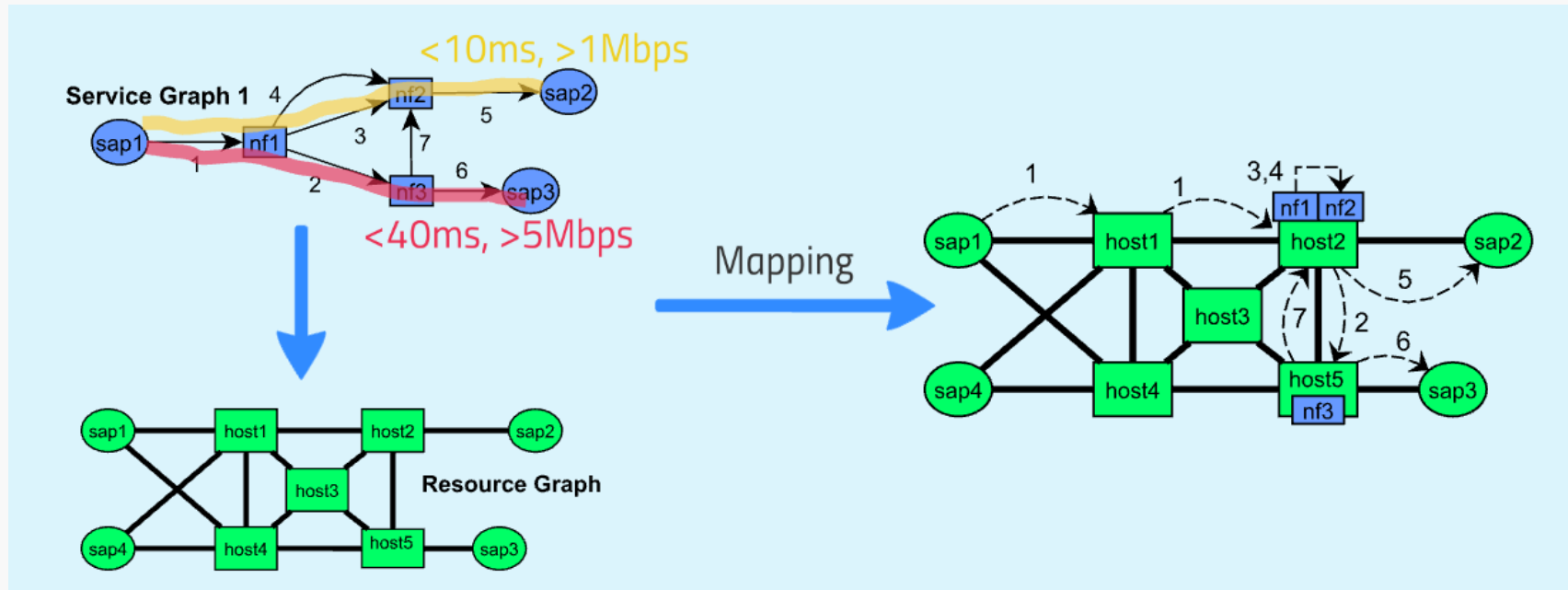
Dynamic service chaining

- » Orchestration
- » Mapping to resources
- » Infrastructure



Resource mapping

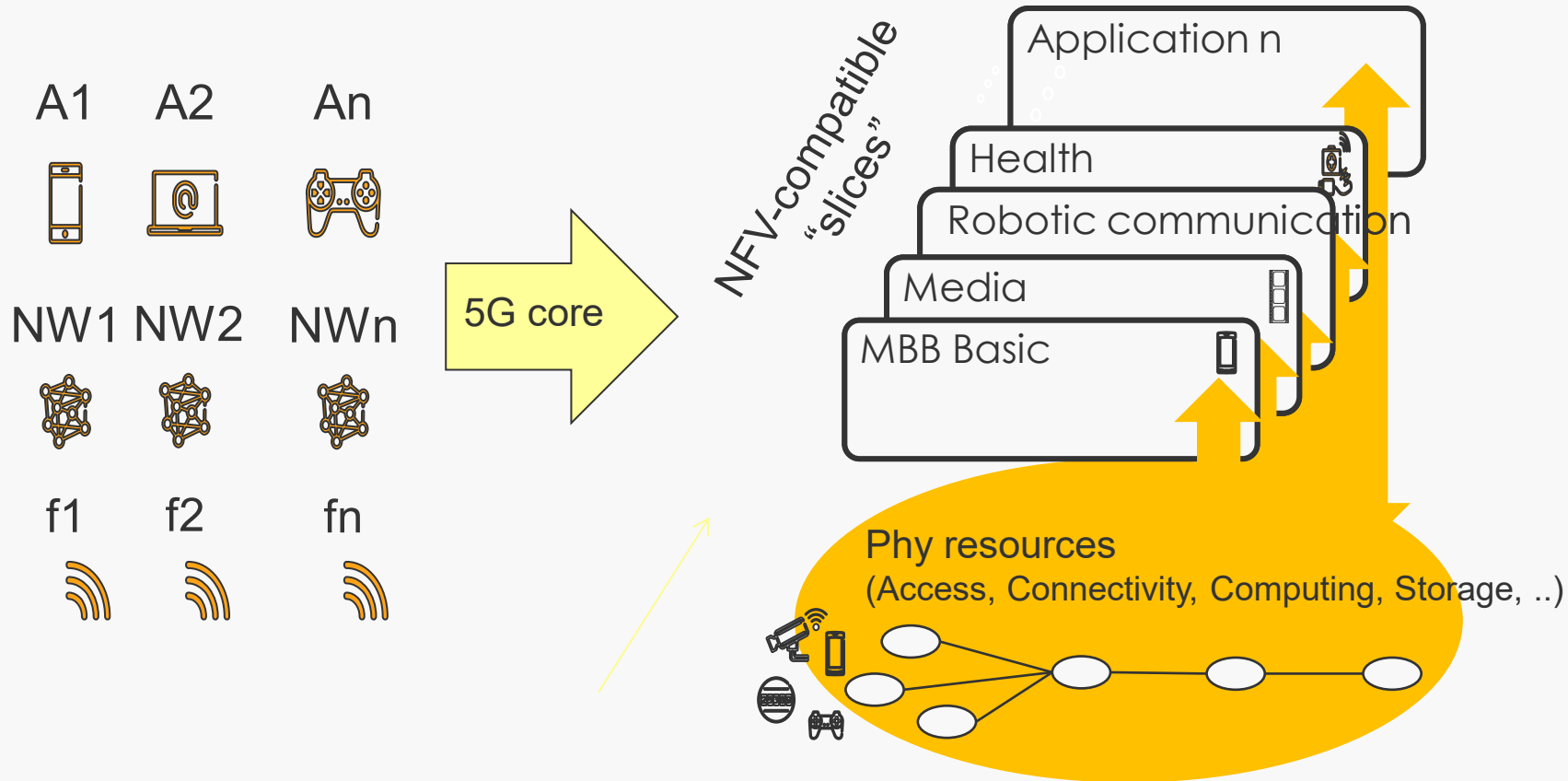
- » Preferences, limitations
- » Service Access Points
- » Resource mapping decisions



More networks over the same infra

Dedicated physical network with own control plane and per-app resources and services

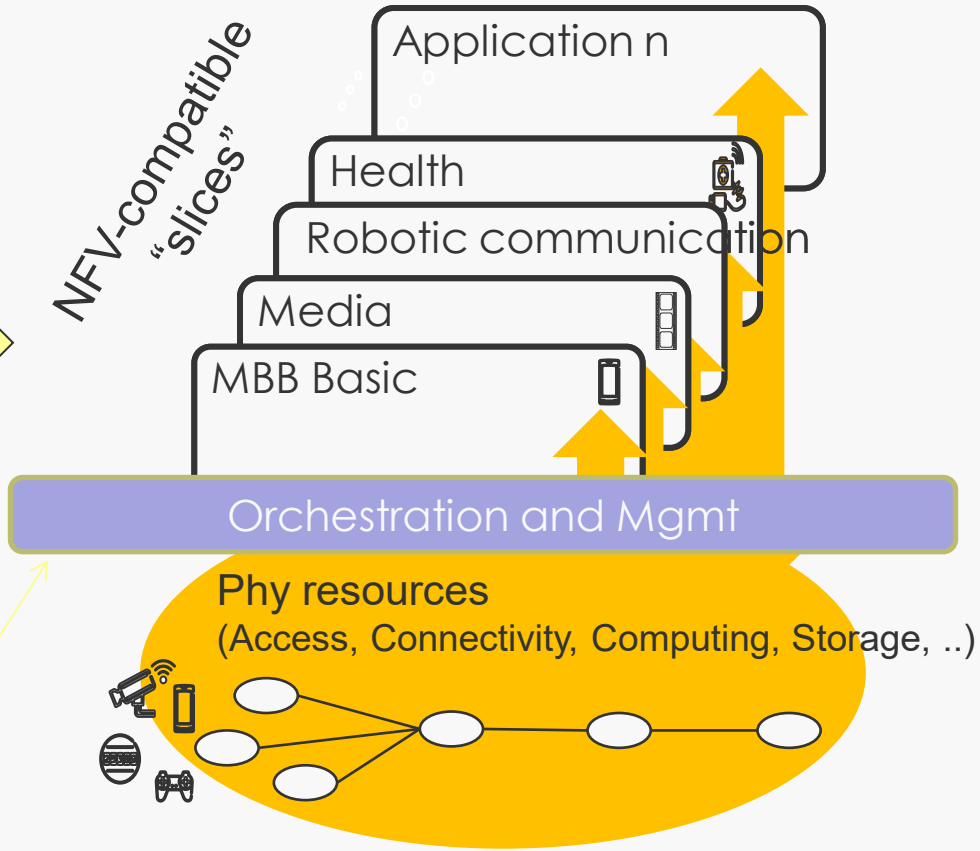
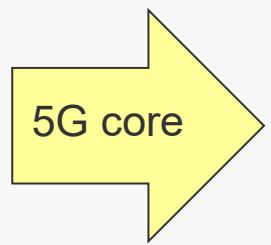
“Network factory”, market of resources and Service, abstraction levels for resources and services



More networks over the same infra

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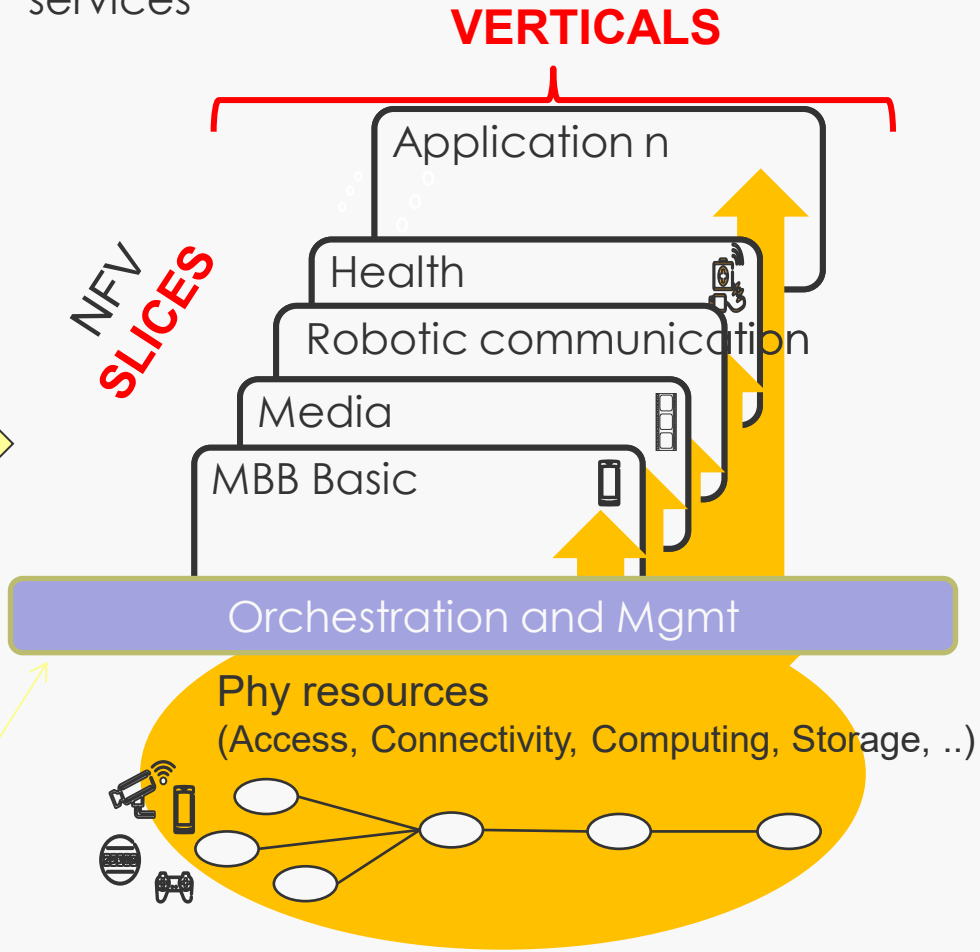
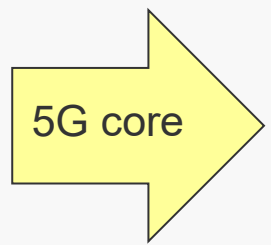
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NFV architecture

