b<>com introduction
b<>com is a private French innovation center designed to boost innovation in digital technologies

A unique co-investment model that provides knowledge, know-how and technology

General philosophy
- know-how + speed = agility
- skills x experiences = diversity
- ISO 9001 + ISO 13485 = quality
- **2012** year of creation
- **7000** m² scientific campus
- **250** people (25 PhD students)
- **14** nationalities
- **35** shareholders
- **15** technological solutions
- **200** papers & reports
- **10** European projects
- **66** transferred technologies
- **4** sites

https://b-com.com/en#catalogue
3GPP 5G-Core
Service Based Architecture
- **Internal Communication between Core Network Functions**
  - SBA, Service Based Architecture
  - SBI, Service Based Interfaces

- **External Communications (RAN, SGI, ...)**
  - N1, N2, N4 interface
**From SOA to SBA**
- Access & Contract Coupling

**Light-weighted service based interface**

**Not monolithic**
- more granular, decoupled, openness
- “A service is an atomized capability in a 5G network, with the characteristics of high-cohesion, loose-coupling, and independent management from other services (NGMN)”

**Techno (web services)**
- REST API, Yaml
- HTTP/2 Protocol
Road to CNFs
**General Industry move from Virtual Machine to Container**
- For applications
- For datacenters

Benefits are to reduce infrastructure cost & improve deployment updates. Kubernetes is the defacto standard for deploying container applications.
(drawbacks exists : maturity, security, network)

**Telecom operator goes this way**
- Kubernetes Telecom Group in kubecon 2019

From VNFs to CNFs on going move
For all applications, Cloud means:

- Deploy services over the internet. Adoption of Cloud infrastructure
- More Elasticity(dynamicity), easy to deploy, Faster to deploy and update

- Adopt DevOps Process & Tools intensively for implementation and deployment
- Orchestration

- VNF to CNF

Evolving from VNFs to CNFs

Cloud native network functions

For CNCF Telecom User Group (TUG)

- **Best practice for gold CNFs functions**
  - Stateless
  - Security (unprivileged)
  - Scaling
  - Configuration & lifecycle (installation) ➔ the ZeroConf objective

- **Observability**
  - Monitoring
  - Debugging
  - Tracing
  - Logging

As regular software but as highly disaggregated, mandatory requirement to keep control
Micro Services architecture and development framework is tightly coupled to Cloudification
- Scalable per definition
- Auto-repair per definition (High Availability)
Each micro service can be scaled/replicated driven by orchestration
- Smaller so fast deployment

Core characteristics is stateless application.
5GCore SBA & MicroServices
On going activities at ETSI and 3GPP
- From VNF to CNF
- MANO adapted to CNF
  > Orchestration to be adapted to containers
- NRF (service registry) mandatory?
- ...

GAP between VNFs and CNFs impacts?
- Description of CNFs (network interfaces, scalability –flavors, ...)
- Hybrid deployment mixed technologies (infrastructure, VNF/CNF)
- ..
Some Micro-Services Challenges

- **Mapping from AMF radio interfaces to stateless SBA architecture definition of AMF**
- **Persistency Network functions (UDM/UDR) integration**
- **Which Granularity to implement from one NF several Microservices?**
  - (per interface, per function, others, ...)
  - Too many micro services introduces too many interfaces (complexity, performance)
  - Keep each micro-service stateless (more effort)
b<>com activities & target
Focus

- Opensource ambition (OSA)
- “Near” Product Maturity
- Full Platform operational for « live » experimentation
  - Devops for continuous integration
  - automated configuration and deployment
Strong involvement in 5G-Core implementation with OpenAirSoftware Alliance to implement a 5G-Core software
- using micro services approach
- Ready to be deployed onto Kubernetes

Currently focus on NRF and AMF
- NRF first implementation available: move to openair-cn git in progress
- AMF Micro services based development on going (reusing libs with 5G-CN community)
  (Also involved in nb-iot implementation, RAN part)

(refer to Tuesday workshop presentation)
Wireless Edge Factory* A Connectivity Enabler for Private Networks

Security
EAP-AKA, EPS-AKA
Integrated stateful FW
Verticals Isolation
Built-in Resiliency

Smart
Intelligent Functions
Distribution & Routing
E2E QoS management

Satisfaction
Compatible to COTS Aps,
eNodeBs, IoT GWs
Supported by b<>com
Researchers / Engineers

Simplicity
Easy Service
Deployment &
provisioning
Simple Dashboards
- Platform deployed with official France 4G License for experimentation

- Experimental platform to implement use cases providing connectivity (LTE, Wi-Fi, IOT) and datacenter resources to host applications

- Able to manage multi sites (thanks to CUPS design): multi RAN/datapath and centralized control plane hosted in cloud datacentre

- This Platform may be used by partners to evaluate use cases (service offer)
Short/Mid Term target

- Additional Architectures to merge MEC-like edge applications implementing also Micro Services
- Programmable services chaining and slicing from edge to core
- Accelerated UPF
Merci / Thanks

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