

# 5G: towards hyper-elastic networks

JSC Ingenium commits solidly to 5G technology, for its completely disruptive philosophy, and for its super abilities to create a new concept of mobile networks.

## New networks

- that **adapt automatically and smartly to any service environment**
- that allow **network segments that are independent, isolated and customisable** to be created according to our needs
- that are **able to work on any 2G/3G/4G**, and of course, **5G radio technology**
- that allow **new tailored services** deployment
- that collaborate actively in their own operating and maintenance through **assisted diagnosis smart systems**
- that allow **continuous updates of their elements and services** for being always up-to-date
- that are **configurable autonomously**, directly by the client's personnel, without the need for qualified technical staff.



## Network Slicing Technology

Opting for this technology allows us to segment the Network in a cost-efficient way, and to create all the “network slices” that we need, which are different from one another, completely independent, customisable, and offer distinct features and services.

## Network Virtualisation

Our commitment to the virtualisation of networks will put an end to network capacity tyranny. Virtual networks adapt automatically and smartly to service demands at all times, by scaling out/in, activating and deactivating new network elements according to the service load.

# Can you imagine being able to have a wide range of fully independent networks with different services?

The hyper-elasticity provided by 5G will enable us to deploy several customisable networks at the same time, in order to meet the needs of not only our main business, but also new super specific niche businesses.

Networks that will make it possible to isolate groups of subscribers to try new services, price plans, and the like. Networks that will be islands from a security perspective, facilitating the creation of secure end-to-end environments.

## Multi-tenant networks

5G will allow us to deploy as many networks at the same time as we have different brands and businesses.

Each client will be able to define what network infrastructure and configuration they need, according to the type of business they would like to run.

- New virtual networks, completely isolated, in which each brand may execute as many different configurations, updates and changes on the network as it needs, in which we can roll out new and innovative services in a safe way, without compromising the other brands at any time.

## Use cases

5G technology makes it possible to approach in a quick and simple way new use cases that are revolutionary and disruptive, which go beyond the super high speed and the super low latency, and with a total independence of the radio network - 2G, 3G, 4G, 5G, LoRa... - on which the service is operating.

A model of private network - exclusive for emergency teams - that is deployed in the event of a catastrophe. We prioritise the services and communications of the emergency staff over everyone else's.



European Industry 4.0 actors are starting to roll out their own private 5G networks. Highly automated factories with hundreds of sensors deployed that need extremely fast, reliable, secure communications.

## New MVNOs Ad Hoc

The new 5G technology will enable MVNOs to have alternative networks to:

- focus on new business opportunities addressed to cover temporary, specific needs; or
- have a real test scenario that allows them to check whether a certain model will work or not.

**Rolling out new networks and recycling them will be extremely fast and simple.**

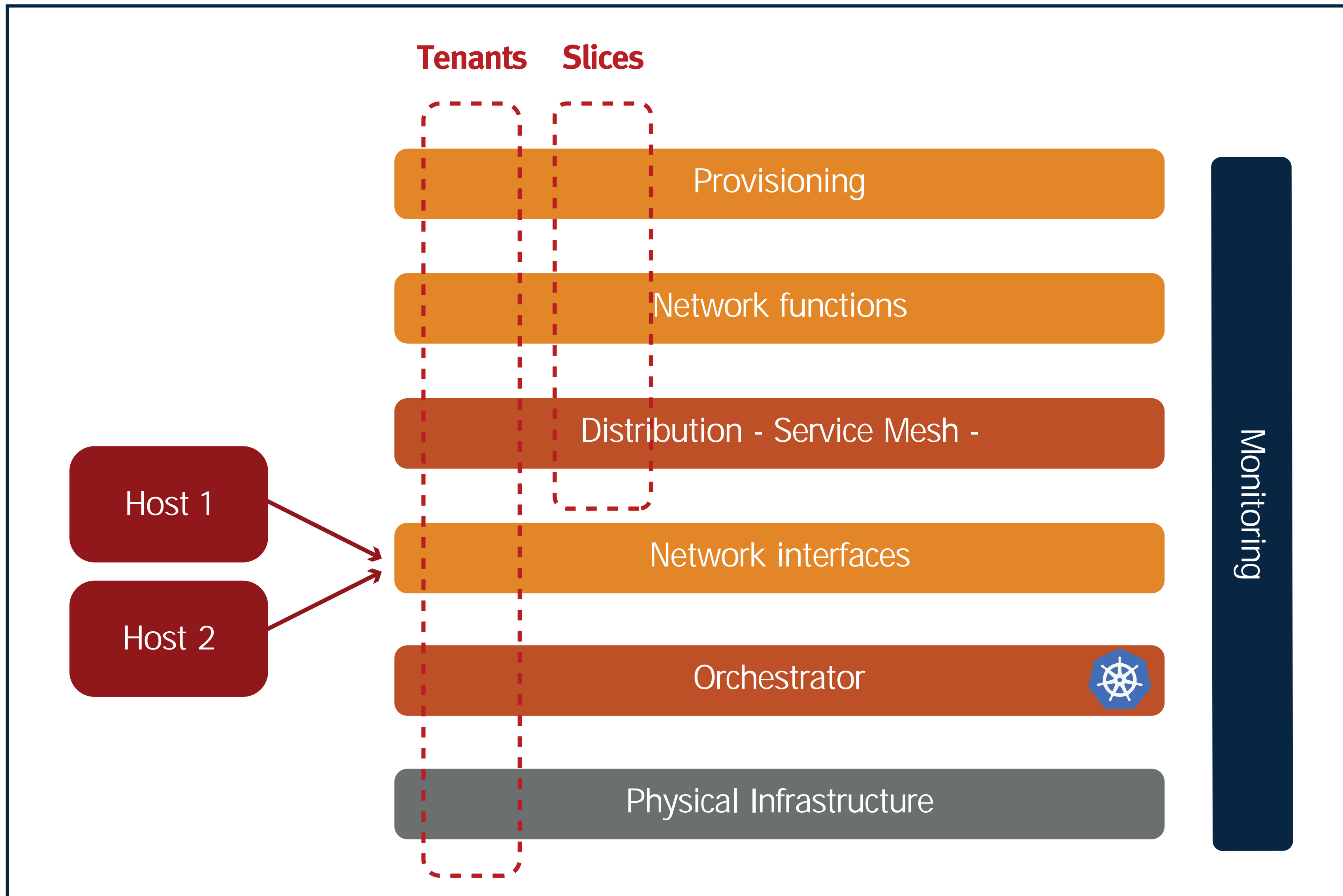
# Towards the MVNO of the future

Extreme versatility on both the control and the user planes.

Customised smart provisioning: my whole network – and just my network – in a single access point.

5G Network Slicing automatization capability.

Designed for the Cloud, tailored roll-out: public, private or hybrid.



Kubernetes-based orchestrator extended to Telco sphere.

Standard Telco network interfaces: the cloud anchors.

Telco Service Mesh: From virtual network functions to the completely virtual network.

Stateless network functions: design resilience.

## Multitenancy in the 5G era: When different tenants need different topologies

MVNOs with their own interconnections, light, full, specific solutions... Different segments of a virtual network make it possible for each tenant to have a tailored environment. Everything is configurable through Web/API, and of course, for all technologies: 2G/3G/4G/5G and specific technologies.

## The new paradigm: The auto-adaptive network

An auto-scalable virtualised network means that the use of resources can be planned in an optimal way, knowing the expected load on each network function at all times, and balancing the available capacity between the different functions. In unforeseen cases, the network will increase the capacity of the critical functions, and will decrease the capacity of the non-critical ones, in order to go back to normal as soon as possible.

Everything is automatic, according to the technical staff's instructions, since in these circumstances there is no time to lose.

## Complex networks: computer-assisted monitoring

A hyper-elastic network must be maintainable: the network itself must cooperate. Each element must monitor its own performance and that of those around it. The core intelligence collects all the information and generates multiple traces: Communication traces (Brain) for an interactive diagnosis, service graphics, real-time traces, running within threshold, and the like. Most importantly, it will constantly determine whether the network is working as expected, and it will actively provide information about any anomaly. Because not every anomaly has to do with working thresholds.

## Continuous integration: always up-to-date

Although the task of updating Telco nodes has always been an issue, keeping up-to-date is crucial in the 5G age. Hyper-elastic networks will solve this conundrum by collaborating actively in their updates: by providing "Canary Deployments" to verify changes, compensating the load progressively to the new versions, monitoring at all times whether the running is as expected and, if something fails, executing proactively a rollback of changes. Ongoing yet secure updates. Autonomously configured.