RESOURCE BROKER SYSTEM FOR SPLIT COMPUTING

AN APPROACH TO DISTRIBUTE CLOUD COMPUTING INFRASTRUCTURE

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WHAT ARE APPLICATIONS DEMANDING A NEW GENERATION OF NETWORKS?

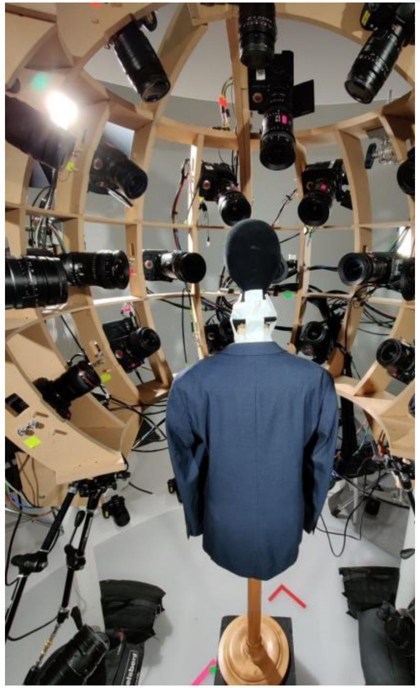
HOLOCOM: A FUTURE COMMUNICATION SERVICE

Volumetric Video Communication

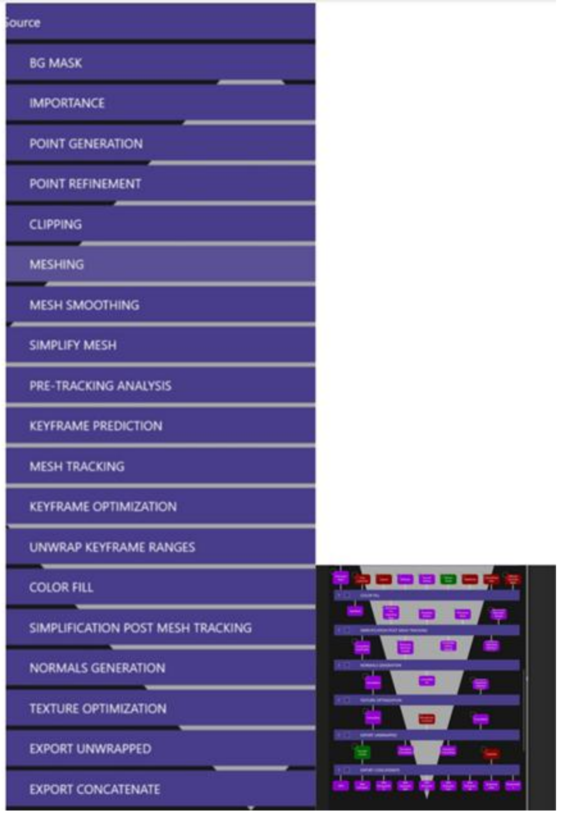
There are many processing steps for capturing, rendering and displaying 3D content:

- Some of the steps need a **tremendous amount of computing power**
- Not all processing steps can be handled directly on a client device, they need to be **computed** somewhere else
- A communication service calls for processing in (near) **real-time with minimum latency**

Picture Source: Deutsche Telekom AG



Picture Source: Volucap



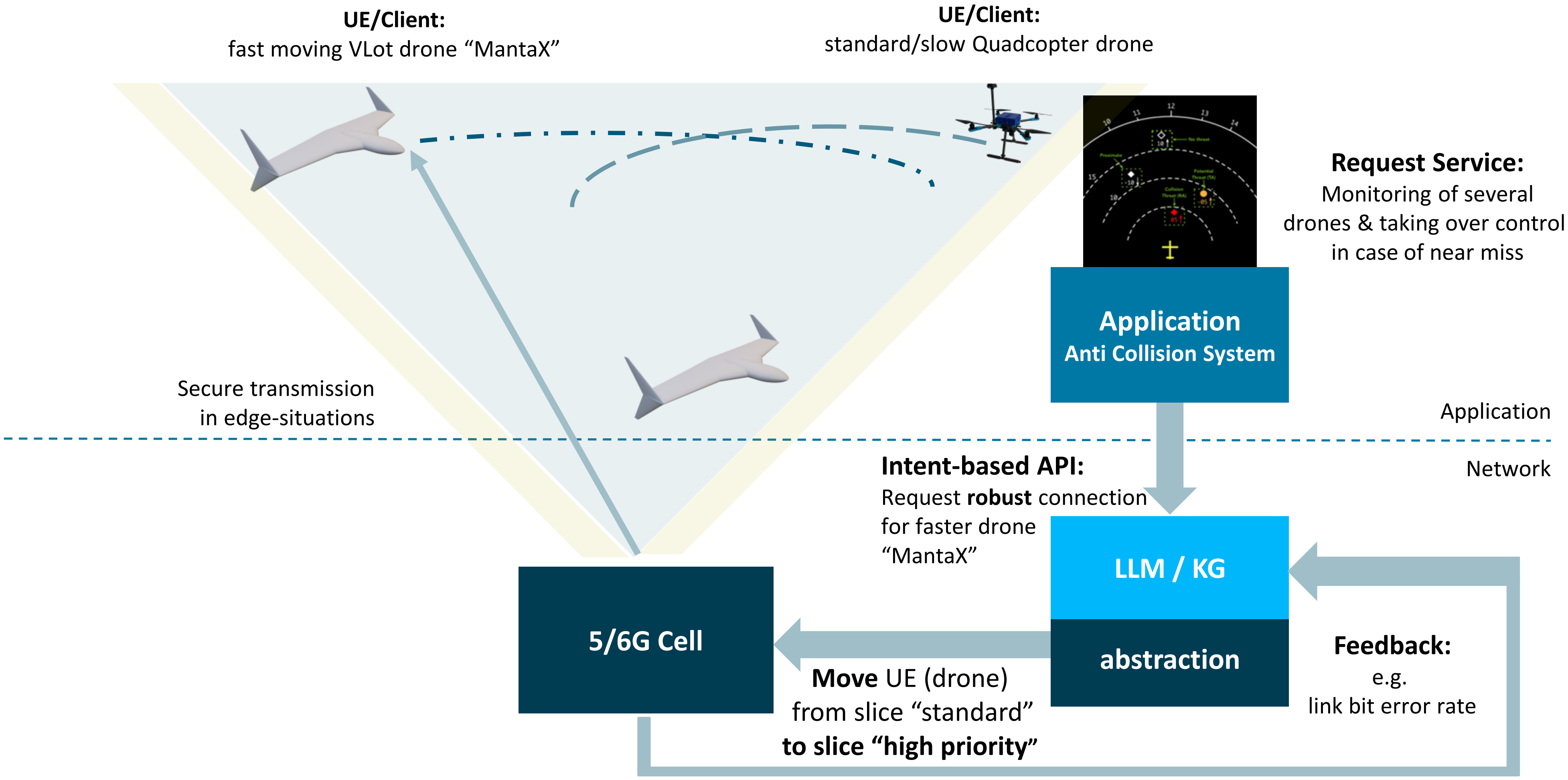
SMART DRONES: ANTI-COLLISION-SYSTEM FOR MIXED AIR TRAFFIC

6G NeXt is going to implement a new kind of Anti-Collision-System:

- Observing the traffic situation and **detecting / predicting dangerous situations** in the vicinity of an aerodrome
- **Calculate and fly the exit trajectory** in case of near miss
- **Calculation** of the trajectory **is off-loaded** to the most appropriate part of cloud (split computing)

Picture Source: TH Wildau

A LOCAL ANTI-COLLISION SYSTEM FOR DRONES



Local control in
critical situations

to

Remote control in
critical situations

Client / UE requests
connectivity upgrade

to

Application requests
connectivity upgrade

THE BROKER

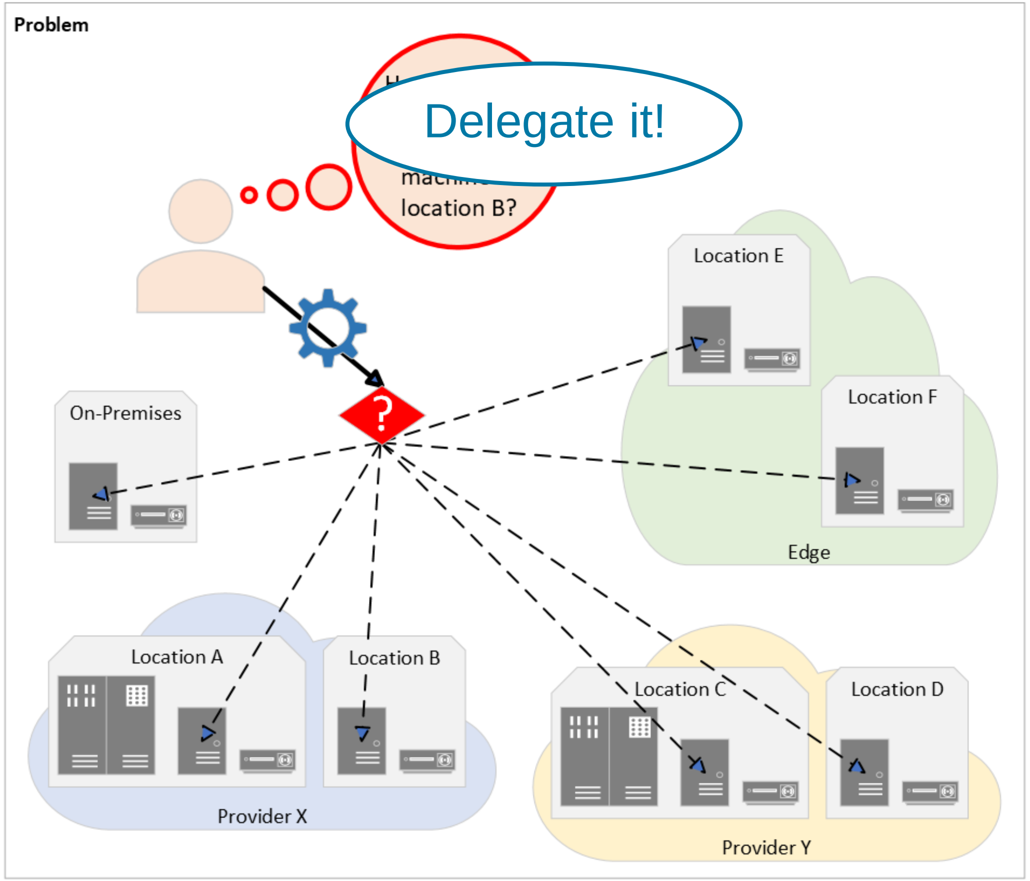
THE RESOURCE BROKER BRINGS THE WORKLOAD TO WHERE IT CAN BE PROCESSED

- A state-of-the-art Micro Service Architecture often has a Discovery Service providing other services with information where to connect to

- **We extended this idea:** A **new designed Broker Service**
  - provides clients with the **optimal service endpoint**
  - provides service with information **where to start** a new instance
  - helps services in **starting** new instances
  - manages resources in **different cloud** environments
  - looks for **optimal connectivity** and makes **QoS reservation** if possible

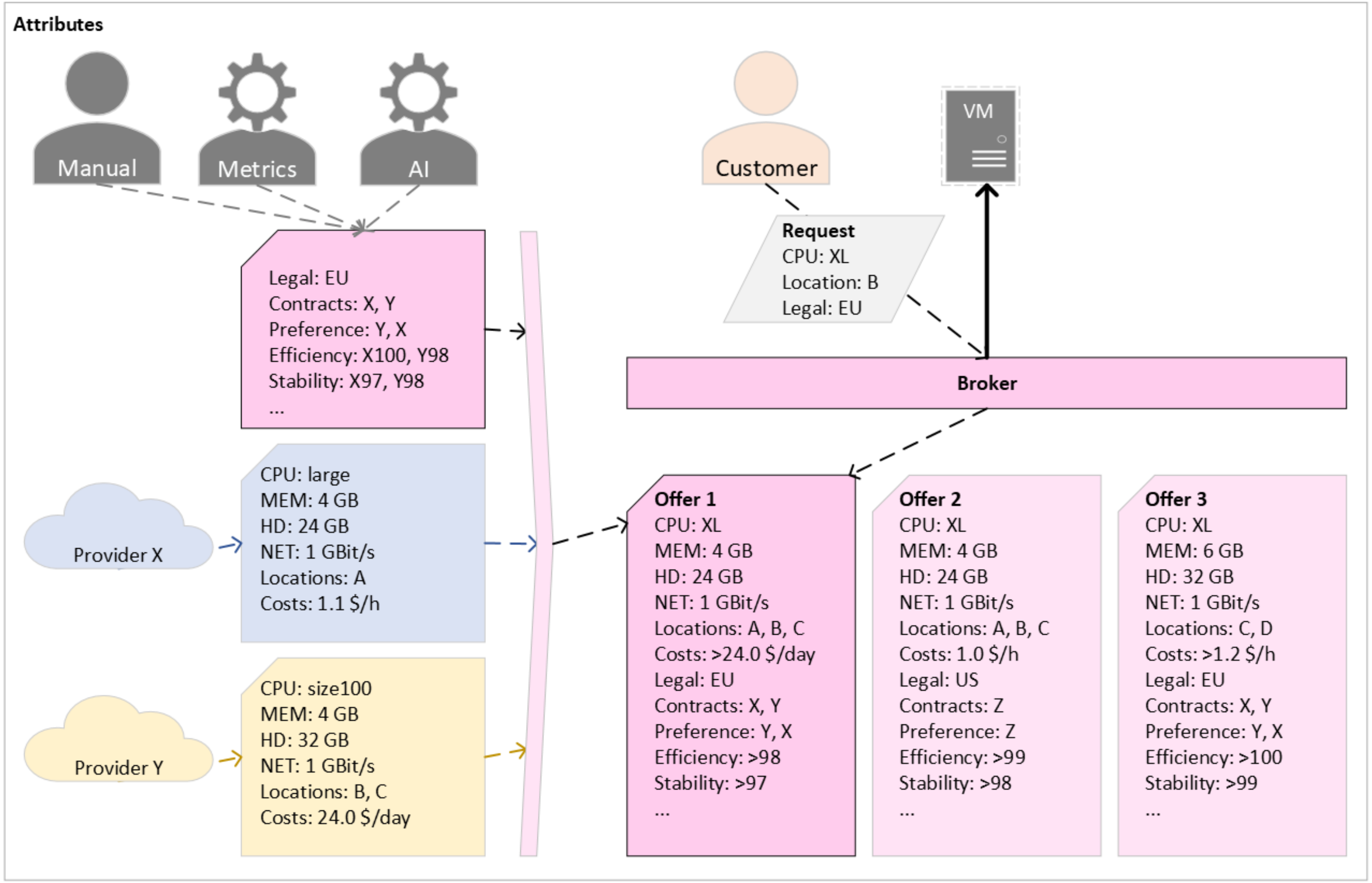
Picture Source: Chat GPT

BROKER AS AN ABSTRACTION TO THE INFRASTRUCTURE



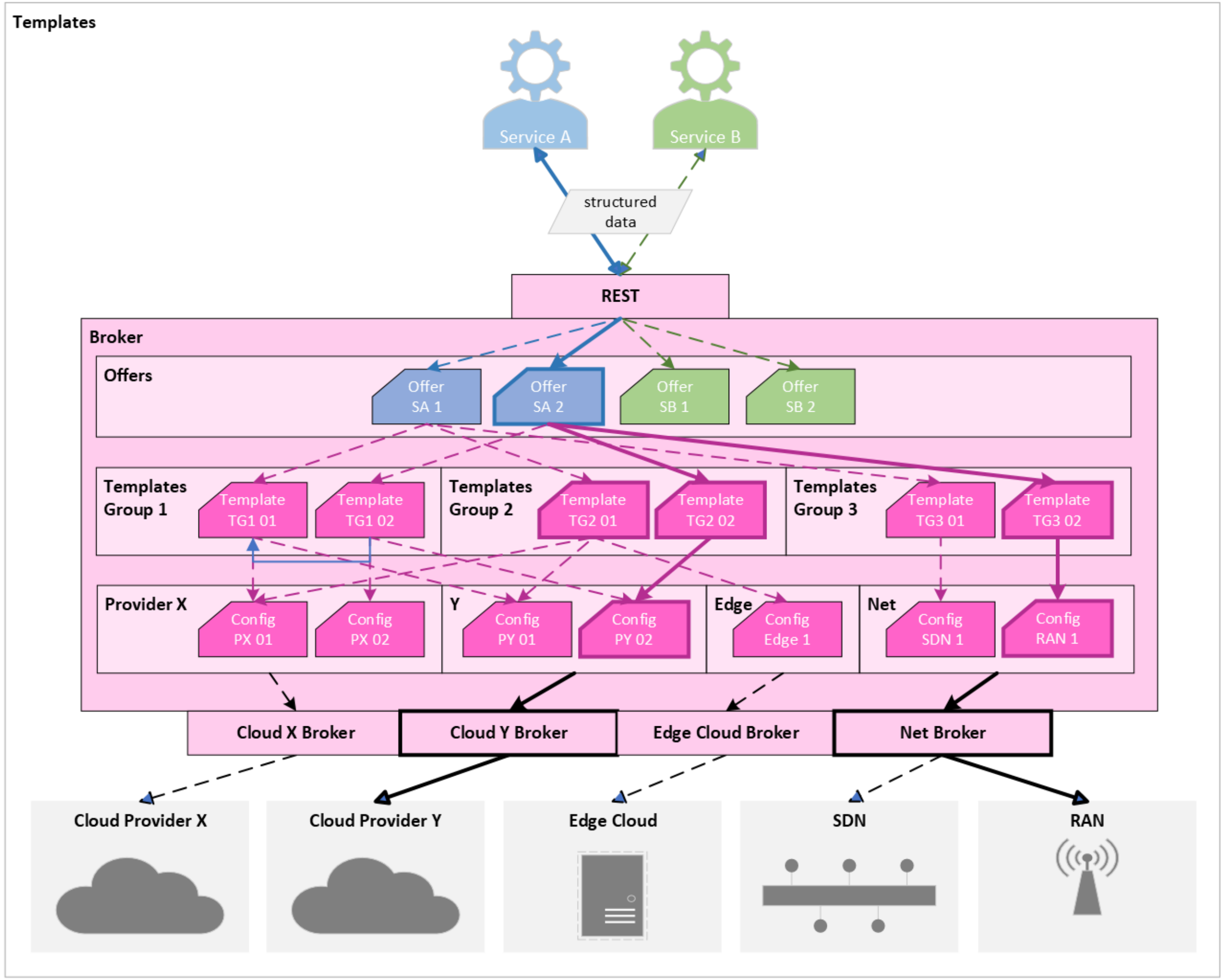
- The service should not need to know the capabilities of the underlying infrastructure. It should simply express its requirements regarding compute and network resources.
- For example, "I need to start an XR cloud-render" I need GPU support and broadband connection but no QoS

BROKER: MADE TO MEASURE SERVICE OFFERINGS



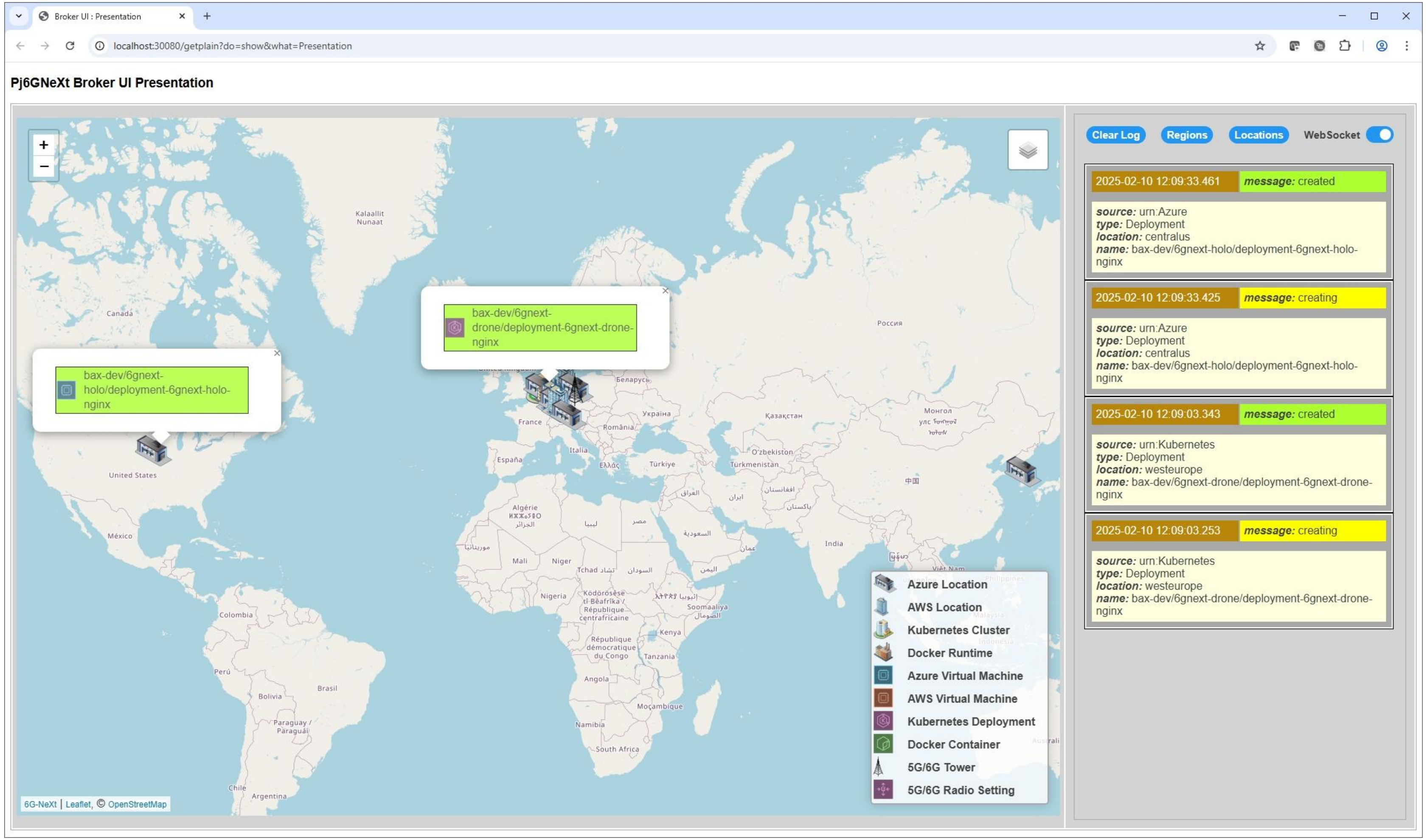
- For example, VM selection should consider not only core parameters but also soft attributes like general or energy efficiency, even if values are estimated or derived.
- Providers need to expand their offerings with detailed descriptions, including prioritization, pricing frameworks, and legal compliance (e.g. EU or US regulations).

BROKER: CHAIN OF TEMPLATES



- To define service offers, the broker compiles a chain of templates, starting with standardized customer templates and concluding with the specific data needed by the underlying providers

BROKER: GLOBAL AND SEAMLESS MANAGEMENT OF RESOURCES



- User Interface

SUMMARY

Resource broker as the key to efficient resource management

- Unifies diverse infrastructures, enhancing scalability and interoperability
- Clearly separates service operation from resource provisioning
- Enables easy integration of new infrastructures and services
- Uses templates to abstract and combine real resources flexibly
- Allows dynamic shifting of load peaks to more cost-effective or external providers
- Provides partners access to own infrastructure through standardized offerings
- Leverages event- and data-driven processes for easy onboarding of new providers

THANK YOU!

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