# CAN Gap Analysis and Requirements

# Gap Analysis

draft-liu-dyncast-ps-usecases-03

P. Liu, China Mobile
P. Eardley, British Telecom
D. Trossen, Huawei
M. Boucadair, Orange
LM. Contreras, Telefonica
C.Li,Huawei

# Existing solutions

Here we list some ‘existing solutions’ based on the assumption of supporting the network and computing joint optimization (futher assumption of appropriate extension if needed).

DNS：

- 'early binding' to explicitly bind from the service identification to the network address
- ‘geographical location’ to pick the closest computing resource
- ‘health check’ to realize load balance

Application based：

- such as k8s is also based on DNS system and may require multiple DNS resolutions

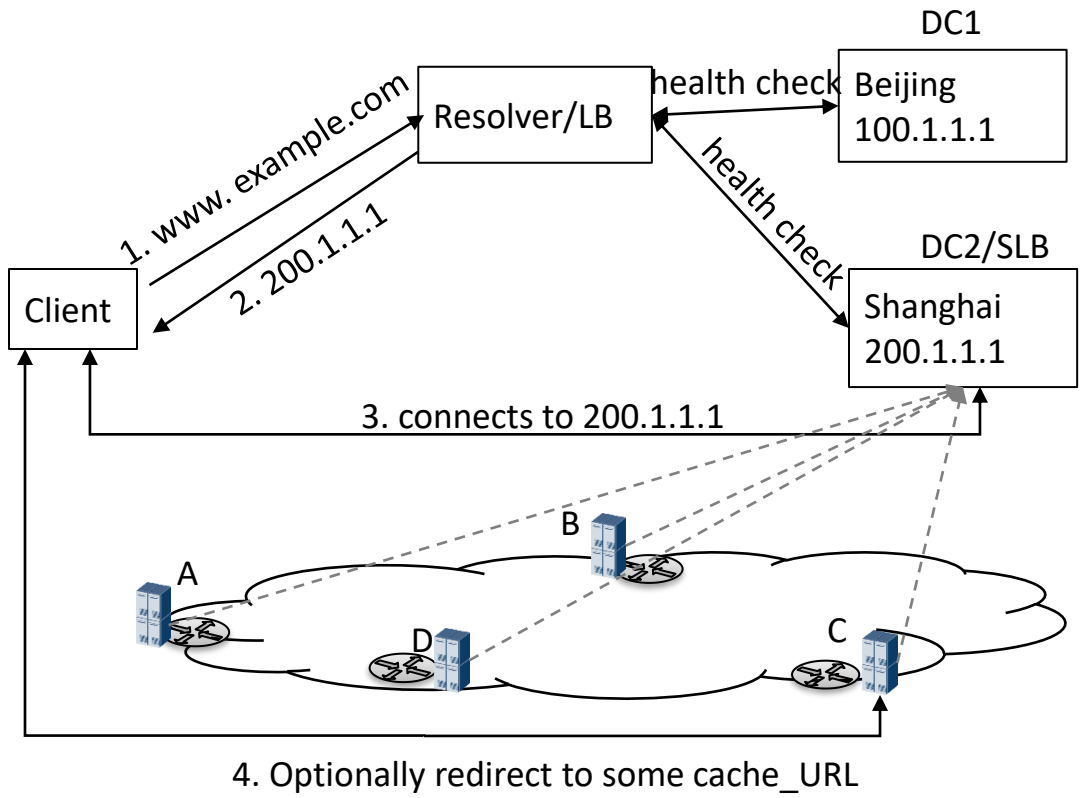
Message broker:

- collect the computing resource status by an agent

# Overall deficiency in existing solutions

- **Dynamicity of Relations:** Existing solutions exhibit limitations in providing dynamic 'instance affinity'
  - E.g., DNS is not designed for this level of dynamicity (i.e., minute level originally, client needs to flushing the local DNS cache, frequent resolving may lead to overload of DNS)
- **Efficiency:** Existing solutions may introduce additional latencies and inefficiencies (e.g., additional path stretch & more messages) in packet transmission
- **Complexity and Accuracy:** Existing solutions require careful planning for the placement of necessary control plane functions in relation to the resulting data plane traffic, which is difficult and may lead to the inaccuracy of the scheduling.
- **Metric exposure and use:** Existing solutions lack the necessary information to make the right decision on the selection of the suitable service instance due to the limited semantic or due to information not being exposed
- **Security**: Existing solutions may expose control as well as data plane to the possibility of a distributed Denial-of-Service attack on the resolution system as well as service instance.
- **Infra changes**: Existing solutions require changes to service and/or network infrastructure, with no solution limiting the necessary changes to the very ingress point of the network

# Deficiency in existing solutions-DNS




- Use geographical location, pick closest
  - Edges are not so far apart. Locations do not matter most.
- Health check in an infrequent base (>1s), switch when fail-over
  - Limited computing resources on edge, change rapidly (<1s)
- Random or round robin pick, network cost is not a concern or updated infrequently just to keepalive
  - Edges are not deployed in equal cost way, network status is considered at a later stage not at the same time
- Centralized determination, good for content retrieval.
  - Not be as good as for computation which has more dynamic nature and larger number
- Early binding: clients query first and then steer traffic.
  - Edge computing flow can be short. Early binding has high overhead.
- Caching at the client.
  - Stale info could be used.
- Others:
  - Network based solution uses least network cost, computing load is not considered
  - Traditional anycast bases on single request/reply packet, no flow affinity

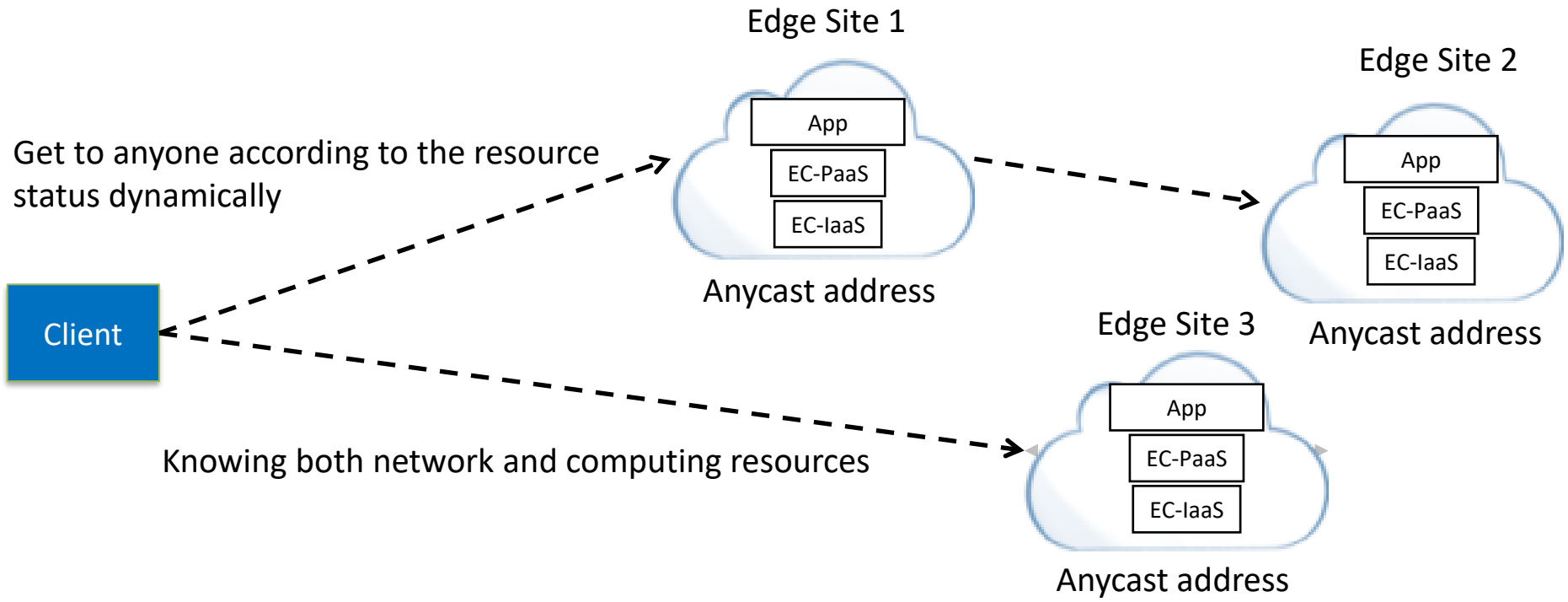
# Requirements

draft-liu-dyncast-reqs-02

P. Liu, China Mobile
T. Jiang, China Mobile
P. Eardley, British Telecom
D. Trossen, Huawei
C.Li,Huawei

# Main goals

- **Anycast: considering to access the location of multi-computing resource**
- **Dynamiclly: considering to select the appropriate computing resource dynamiclly**
- **Multi-metric: considering both the network and computing resource statues**



# Potential requirements

- **Support joint scheduling and optimization of network and computing**
- **Support considering and using both network and computing metrics**
- **Support the session continuity and service continuity**
- **Support management of computing and network**
- **Support the interface between network and computing components**

# Thank you!