Computing-Aware Traffic Steering (CATS)

CATS Chairs

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IETF-117 – San Francisco – July 2023

History

- Some drafts in 2020 on *Dynamic Anycast (Dyncast) for Compute First Networking*
- Renamed *Compute Aware Networking (CAN)*
  - BoF at IETF-113 online and in Vienna (March 2022)
  - Presented at RTGWG and TSVWG at IETF-114 in Philadelphia (July 2022)
  - Mailing list for CAN (created October 2022)
    - https://www.ietf.org/mailman/listinfo/can
  - BoF at IETF-115 in London (November 2022)
    - Clear interest in the work, but very unfocussed meeting
  - A pile of Internet-Drafts got written
    - https://datatracker.ietf.org/doc/search?&name=computing-aware&sort=&activedrafts=on&olddrafts=on
  - Draft charter for a CAN working group written by proponents
    - Reviewed by the IETF community
- Renamed to *Compute Aware Traffic Steering (CATS)*
  - Slightly more accurate name, avoids name conflict with Controller Area Networking
  - Area Directors decided to form a working group without further BoFs
    - First meeting at IETF-116 in Yokohama (March 2023)
  - Old drafts renamed, and many new drafts posted

Charter Scope

- There are often multiple service instances
  - Geographically distributed to multiple sites
  - A single site may support multiple instances of a service
- The services provided on computing platforms and are generically referred to as "compute services".
- The performance experienced by clients depends on:
  - Network metrics such as bandwidth and latency
  - Compute metrics such as processing, storage capabilities, and capacity
- How can the network edge *steer traffic* between clients of a service and sites offering the service?

But before we start - Groundwork

- CATS is not chartered to work on solutions
- Do the groundwork first
  - Problem statement
  - Use cases
  - Requirements
  - Framework and architecture
  - Metrics for Compute and requirements for distribution
  - Analyse usefulness of existing protocols and tools
- Only one RFC explicitly in charter
  - CATS Framework and Architecture

Current Status

- It’s early days
  - But some of the work has been around for a while
- Just adopted a draft for problem statement, use cases, requirements
- Meeting (tomorrow, Thursday, 9.30am)
  - Terminology
  - Use cases
  - Requirements
  - Metrics

So, what's it all about?

- Traffic targets a service that uses computing resources
- The local network edge selects a remote edge that provides access to one or more instances of that service
  - May select a specific service instance
  - Note that the application and host do not participate in this choice
- The local network edge steers the traffic to the remote edge
  - Network might also be traffic engineered
- The choice of instance depends on:
  - Service requirements
  - Capabilities of server
  - Load on server
  - Capabilities of network
  - Load on network

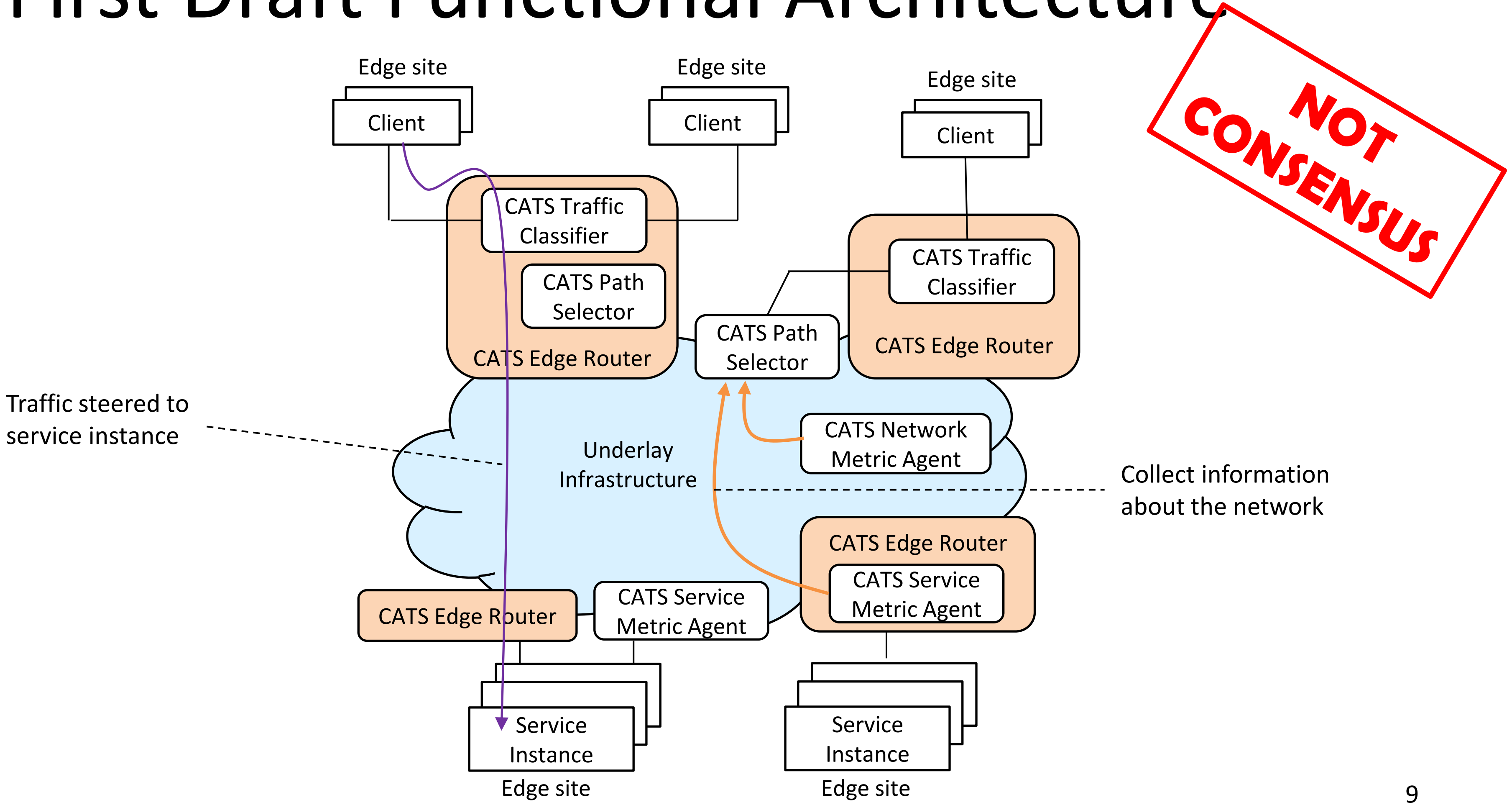
What are the Use Cases?

- Still firming this up
- Applications that have been mentioned…
  - Real-time image capture and processing
  - Interconnected and event-aware “smart cars”
  - Multi-player game servers
  - Networked AR/VR
  - Holographic presence conferencing
  - Digital twin
  - SD-WAN
  - Further uses cases being discussed
- Objective is not a complete list
  - We want a few compelling use cases
- Differences and commonalities
  - The use cases all have different network and service requirements
  - All need to move data, have it processed, and get a response

What are the Requirements?

- This is also work in progress – just a summary overview
- Mark traffic for a "group of service instances"
  - Anycast addresses are suggested
- Collect information from the network (topology and metrics)
  - Already do this, but may need supplements for (e.g.) latency
- Collect information from service instances
  - Service locations (membership of Anycast address group)
  - Service capabilities
  - Service location loading (metrics)
- We may also need to know:
  - Service demand requirements
  - A way of batching packets into service requests

First Draft Functional Architecture


NOT CONSENSUS
Edge site
Client
Edge site
Client
Edge site
Client
CATS Traffic Classifier
CATS Path Selector
CATS Edge Router
CATS Path Selector
CATS Traffic Classifier
CATS Edge Router
Traffic steered to service instance
Underlay Infrastructure
CATS Network Metric Agent
Collect information about the network
CATS Edge Router
CATS Service Metric Agent
CATS Edge Router
CATS Service Metric Agent
Service Instance
Edge site
Service Instance
Edge site