# Dyncast Architecture
## (dynamic anycast)

draft-li-dyncast-architecture

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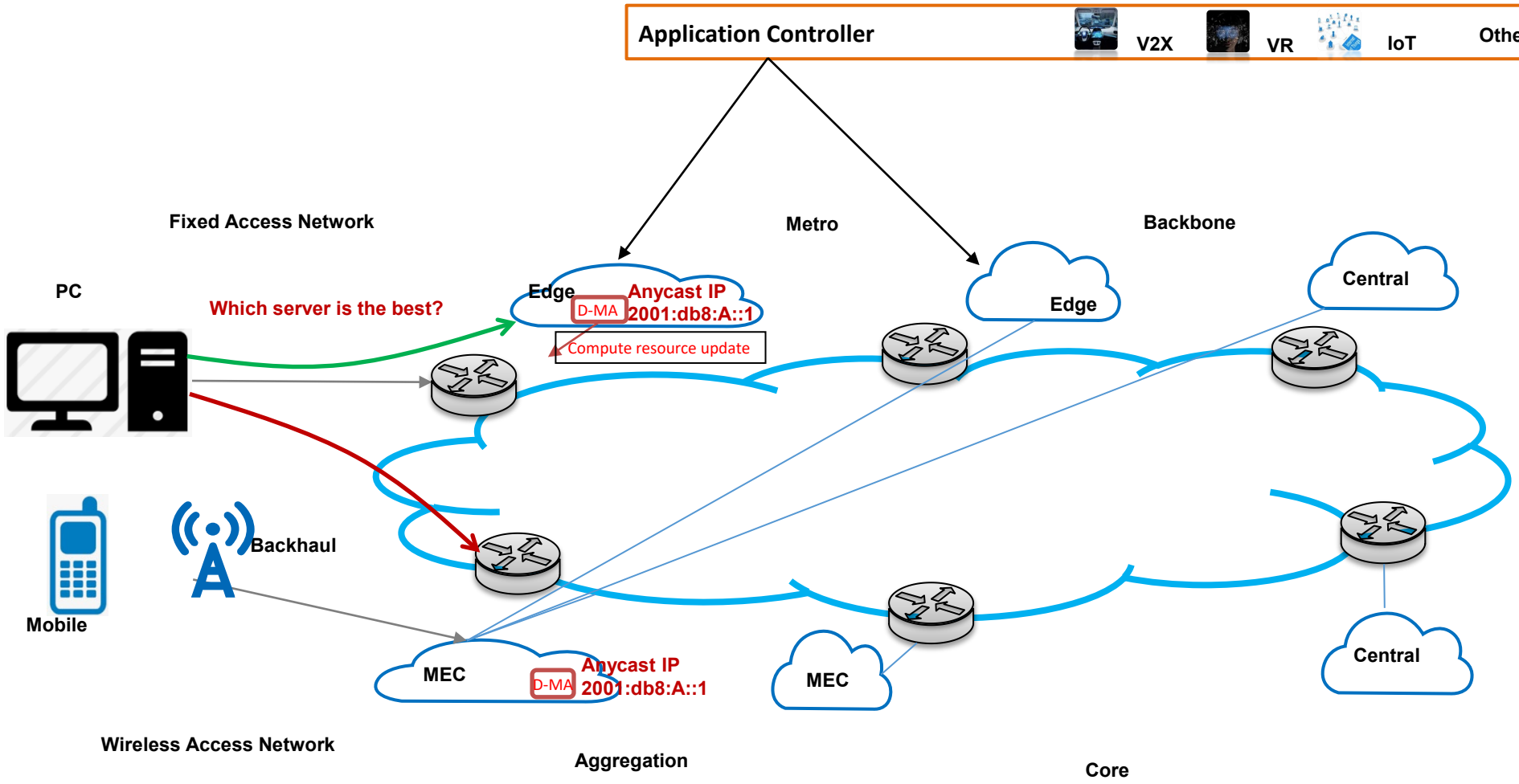
# Overview of Dyncast service model

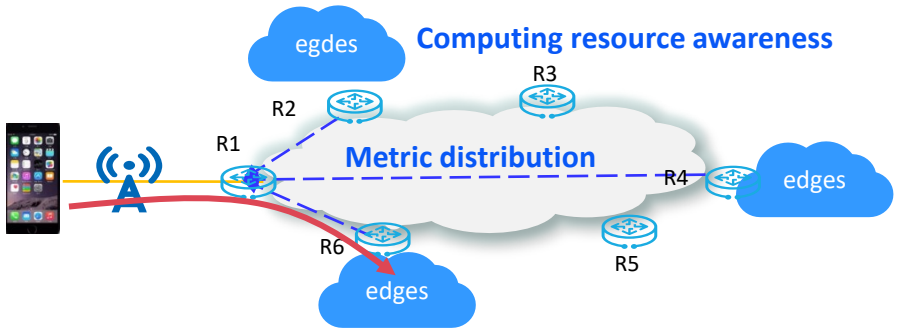


# Terms definition

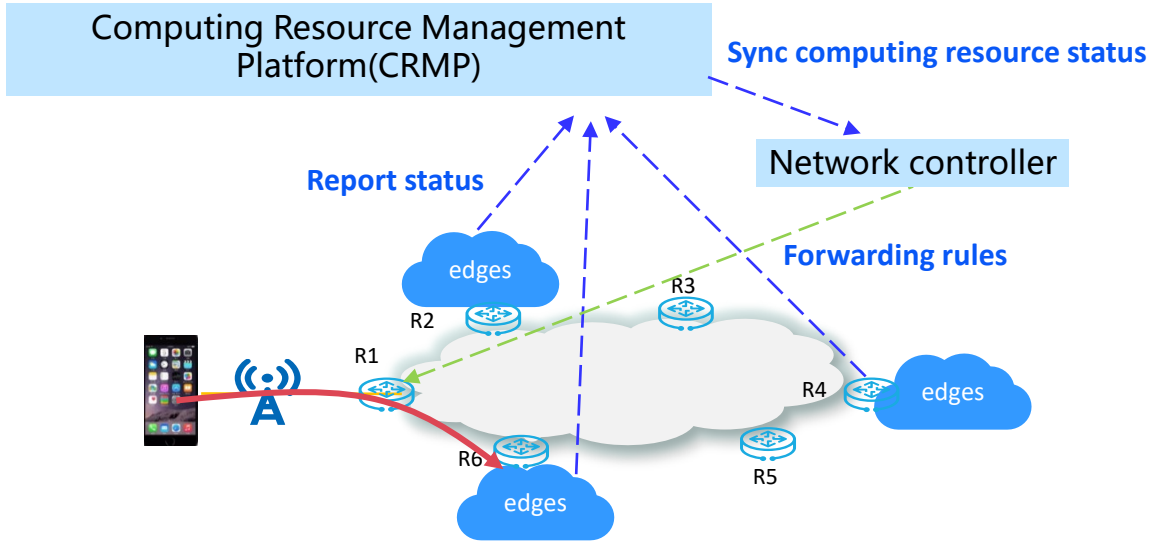
- **Service**: a monolithic functionality that is provided by an endpoint according to the specification for said service. A composite service can be built by orchestrating monolithic services.
- **Service instance**: a running environment (e.g., a node) that makes the functionality of a service available. One service can have several instances running at different network locations.
- **D-Router**: Dyncast Router, a node supporting Dyncast functionalities as described in this document.
- **D-MA**: Dyncast Metric Agent, a Dyncast specific agent able to gather and send metric updates but not performing forwarding decisions.
- **Dyncast Service Identifier (D-SID) :** An anycast address identifying a service in Dyncast. All service instances running the same service are identified by the same D-SID.
- **Dyncast Binding Identifier (D-BID)** : a unicast address to reach a service instance for a given D-SID. The same Service instances running on different nodes are bound to node identifier D-BID.

# Dyncast architecture: Distributed and Centralized modes

**Distributed mode**




**Centralized mode**




**Distributed mode:**

- Dyncast nodes are aware of status of computing resources
- Metric will be distributed among the Dyncast capable nodes

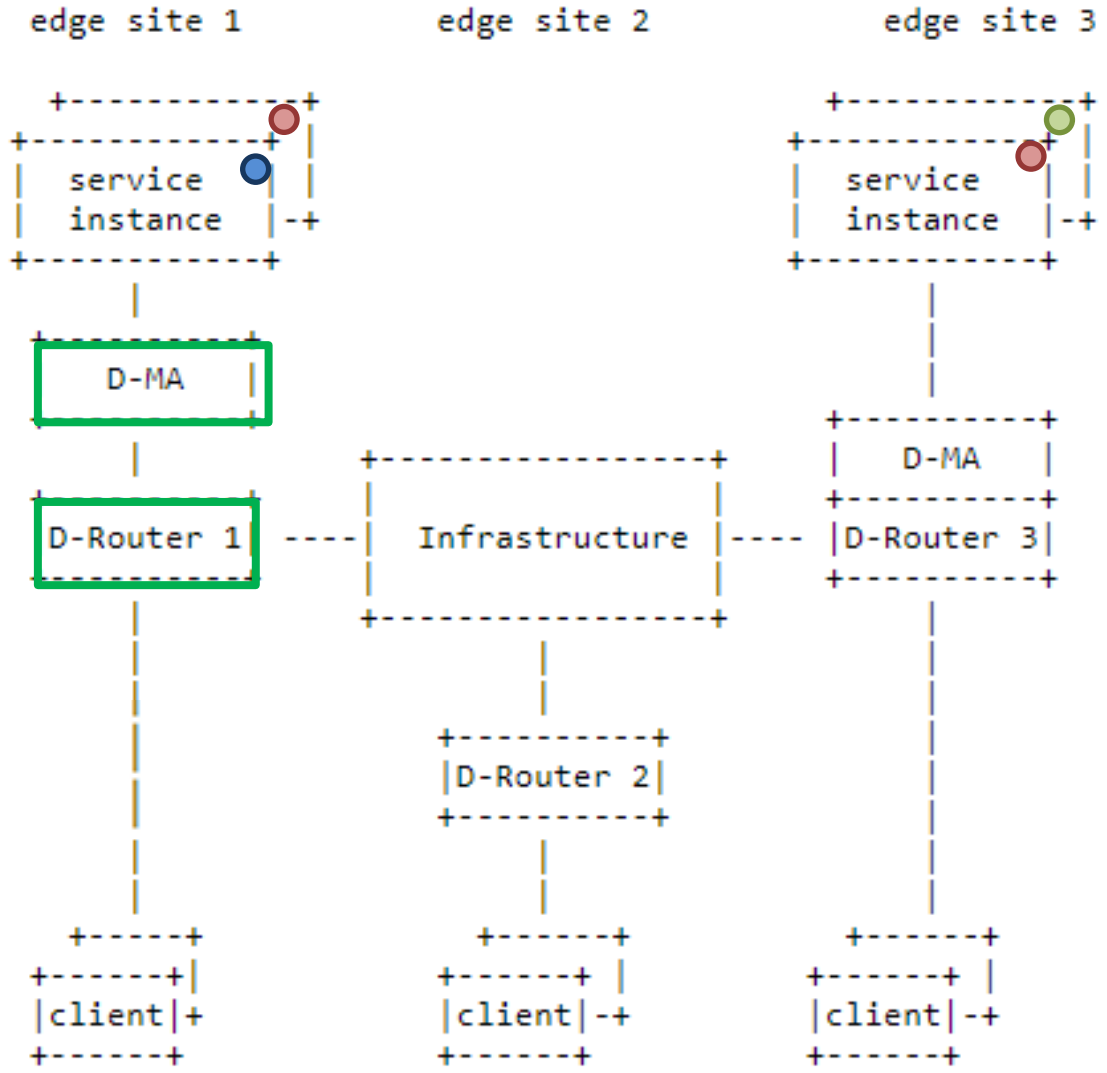
**Centralized mode:**

- CRMP collects status of computing resources and send to network controller
- Network controller compute the forwarding policy based on the network information and computing resource status information.

# Dyncast distributed mode

- **Dyncast Metric Agent (D-MA):** A Dyncast specific agent able to gather and send metric updates but not performing forwarding decisions. May run on a D-Router, but it can be also implemented as a separate module(e.g., a software library) collocated with a service instance.

- **D-Router:** A node supporting Dyncast functionalities. Namely it is able to understand both network-related and service-instances-related metrics, take forwarding decision based upon and maintain instance affinity, i.e., forwards packets belonging to the same service demand to the same instance.



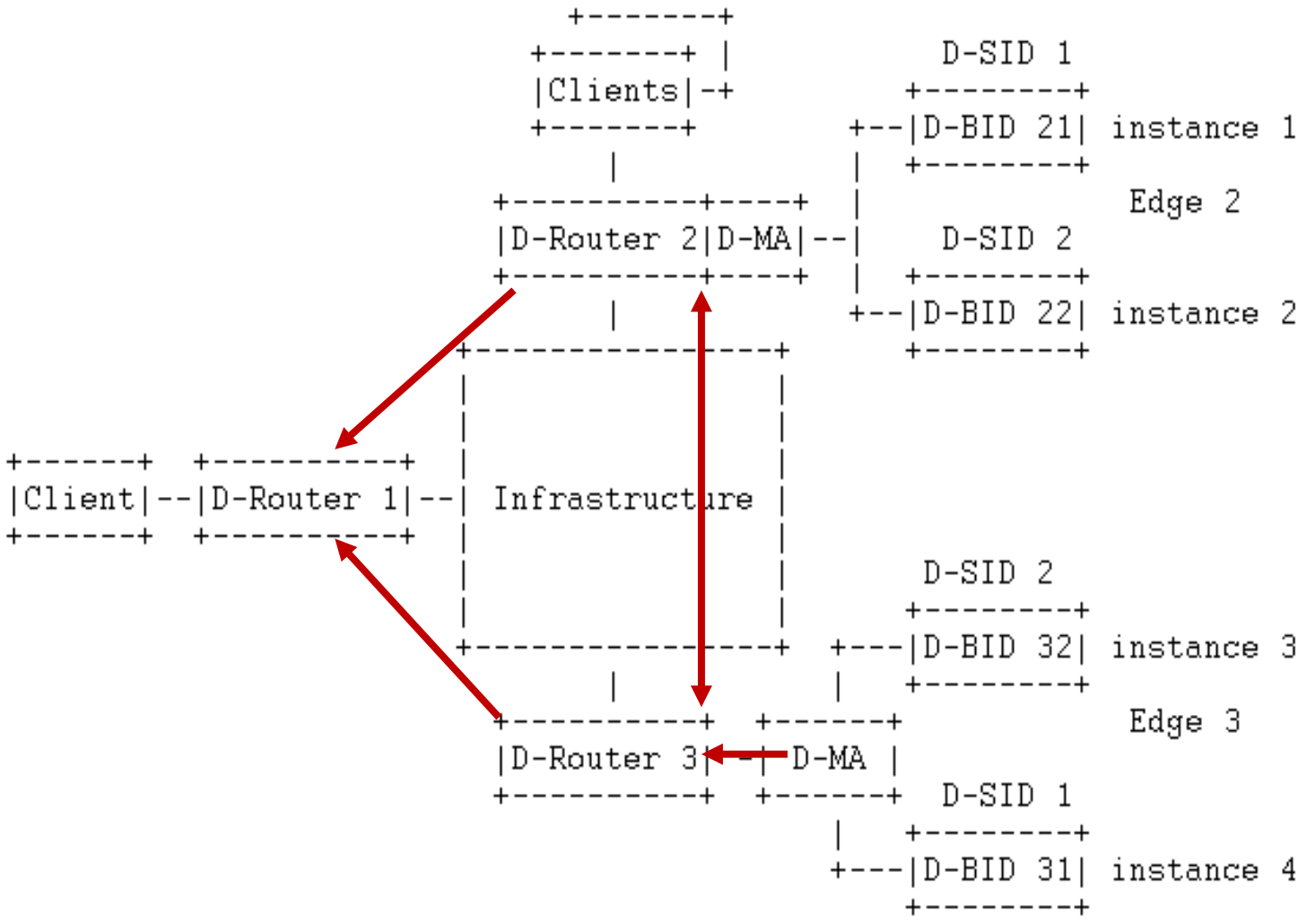
# Service/Metrics Information

- In order to supporting Dyncast, a metrics associated to D-SID and D-BID should be calculated and advertised. The Service instance and metrics mapping shows below:

| D-SID | D-BID | Metrics |
|---|---|---|

- For example a mapping can be: (2001:db8:A:A, 2001:db8:1:1, X).
  - 2001:db8:A::A is an anycast IPv6 address identifying a service
  - 2001:db8:1::1 is a unicast IPv6 address identifying a service instance
  - X is a metric, it can be a number or a tuple with multiple numbers. This will be discussed in the future.

# Dyncast metric distribution




**Service/Metrics Information**

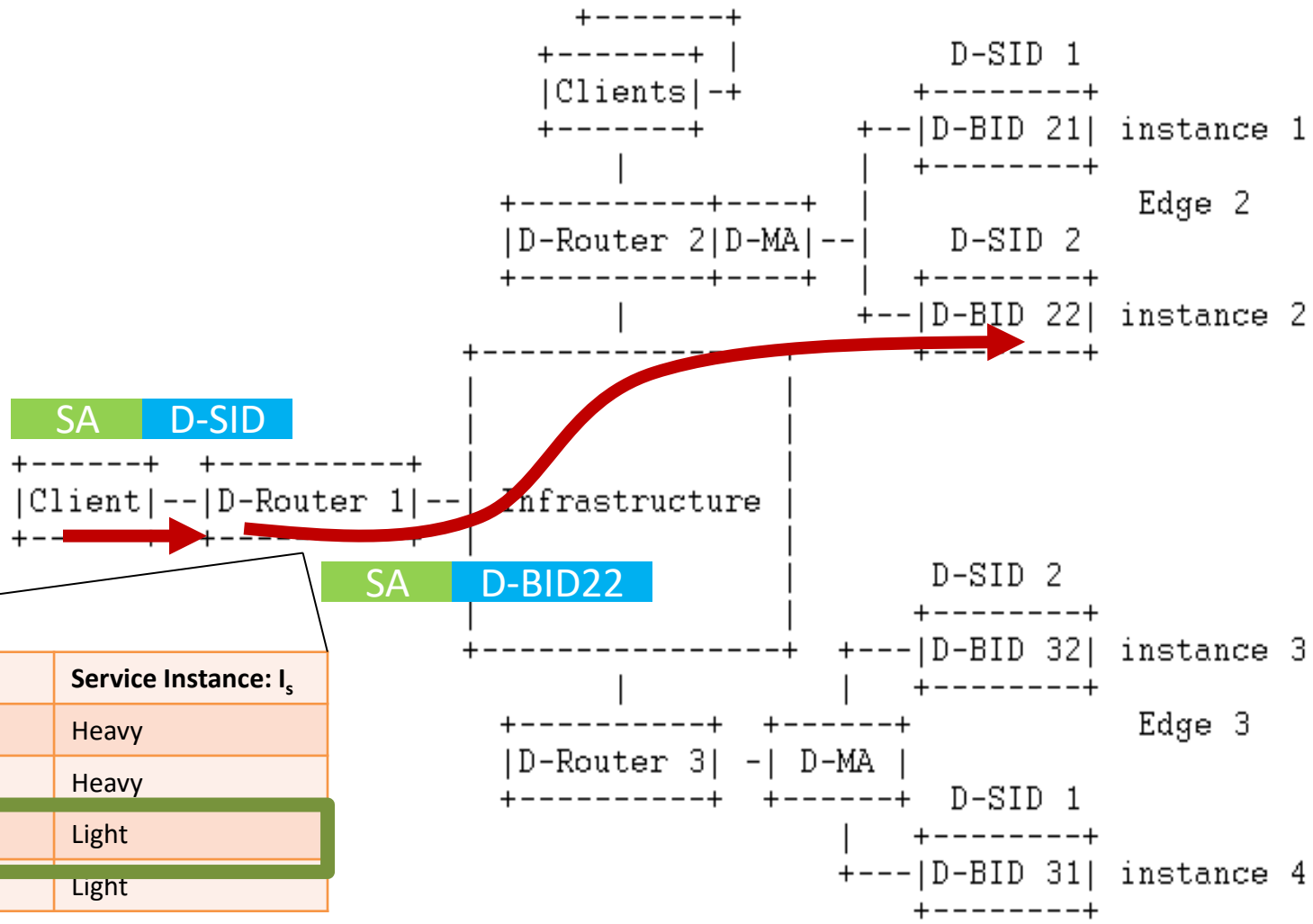
- (D-SID 1, D-BID 21, <metrics1>)
- (D-SID 2, D-BID 22, <metrics2>)

**Service/Metrics Information**

- (D-SID 1, D-BID 31, <metrics3>)
- (D-SID 2, D-BID 32, <metrics4>)

# Flow handling: routing based on Dyncast metrics

A service demand with D-SID 1




| D-SID | D-BID | Network: $N_s$ | Service Instance: $I_s$ |
|---|---|---|---|
| 1 | 21 | normal | Heavy |
| | 31 | Congested | Heavy |
| 2 | 22 | normal | Light |
| | 32 | Congested | Light |

- $N_s$: Network Metrics (congestion, latency….)
- $I_s$: Instance Service Metrics (load, resources available, …)

# Potential work: Flow Affinity & Binding Table

- Flow affinity is one of the critical features that Dyncast SHOULD support
  - Group all the packets for a single service request to go to the same destination.
- Flow binding table allows to determine the most appropriate egress and service
- A flow entry in the flow binding table can be identified using the classic 5−tuple value
  - different services may have different granularity of flow identification

| Flow Identifier | | | | | BID | timeout |
|---|---|---|---|---|---|---|
| src_IP | dst_IP | src_port | dst_port | proto | | |
| X | SID2 | - | 8888 | tcp | BID22 | xxx |
| Y | SID2 | - | 8888 | tcp | BID32 | xxx |

Figure. Example of a Binding Table in Ingress D-router

Note: The discussion of affinity is still open since last side meeting, we need to work on it more.

# Comments are welcome

Any questions or comments?


# Thanks