

IPv6 Solution for 5G Edge Computing Sticky Service

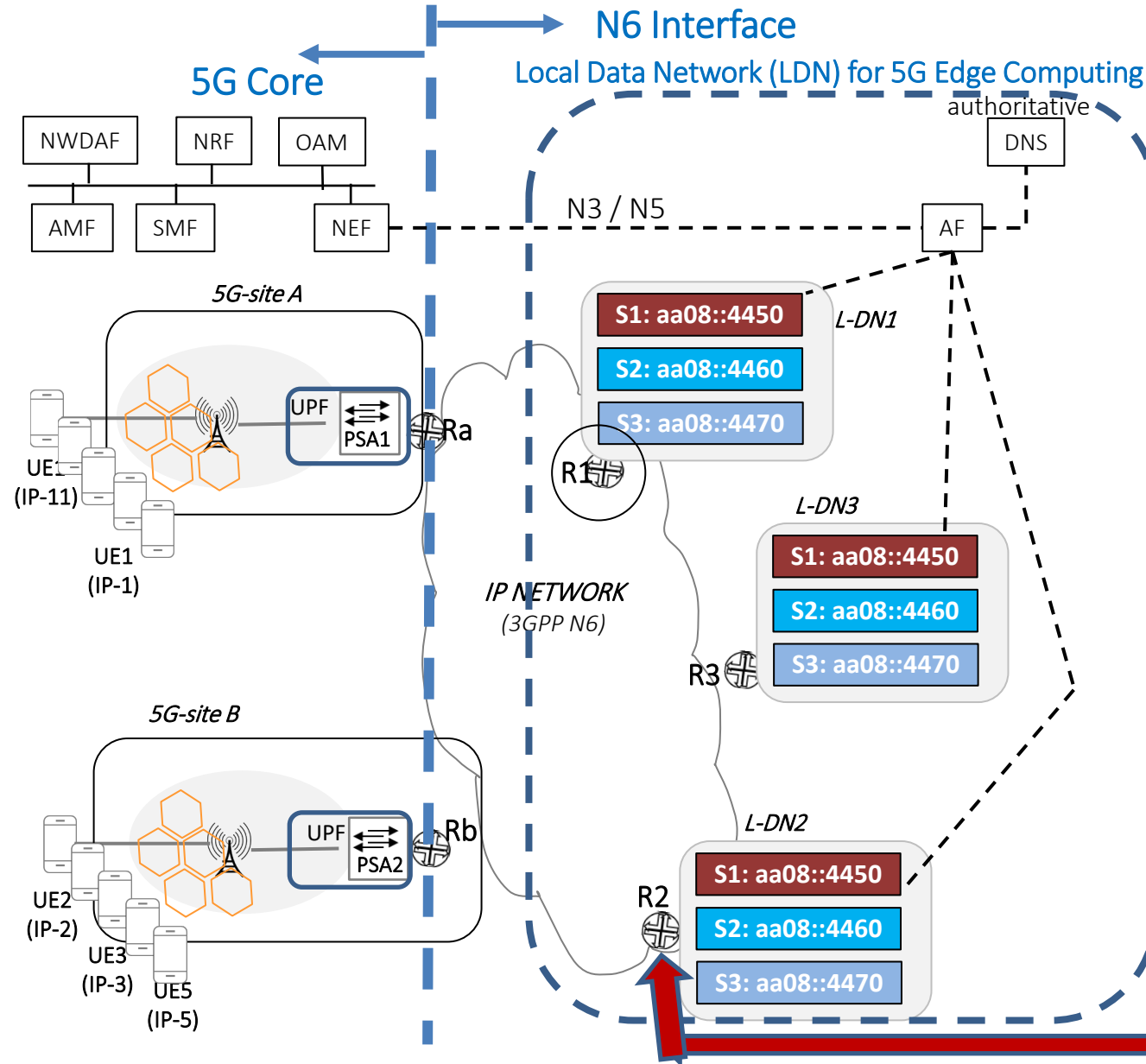
draft-dunbar-6man-5g-edge-compute-sticky-service-03

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5G Edge Computing (3GPP TR23.748)



One Application has multiple Application Servers located in Edge Computing DCs

Use Cases:

- Unmanned Aerial Vehicles (Drones) <-> Controller, Traffic Management, and App Servers [3GPP TR22.829]
- Virtual concert
- Virtual Interactive Conference
- Computing (e.g. the encoding, video stitching, compressing, etc.) processed by the servers in the edge DCs

Network Assumption:

All the servers are directly attached to the egress routers, The servers and the egress routers are co-located. May have a layer of Virtual Switch or ToR between the egress routers and the servers

ANYCAST in 5G EC

Benefits of ANYCAST

- Leverages the network layer,
- Eliminates the single point of failure and bottleneck at the DNS resolvers and application layer load balancer
- Avoid stale cache of some UEs

Problems of ANYCAST in 5G EC

- Small differences in routing distance to edge servers
- Unbalanced ANYCAST distributions due to UE mobility
- Server relocation, over utilization, etc.

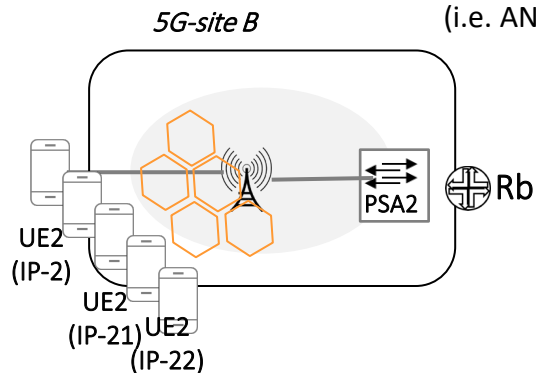
Sticky Egress for an AppServer with ANYCAST address

Assumption: not all edge computing services need to be sticky. ACL are used to filter out the services that need sticky

The server with ANYCAST address uses its default Gateway (R1 for L-DN1) as the STICKY Egress for service continuity.

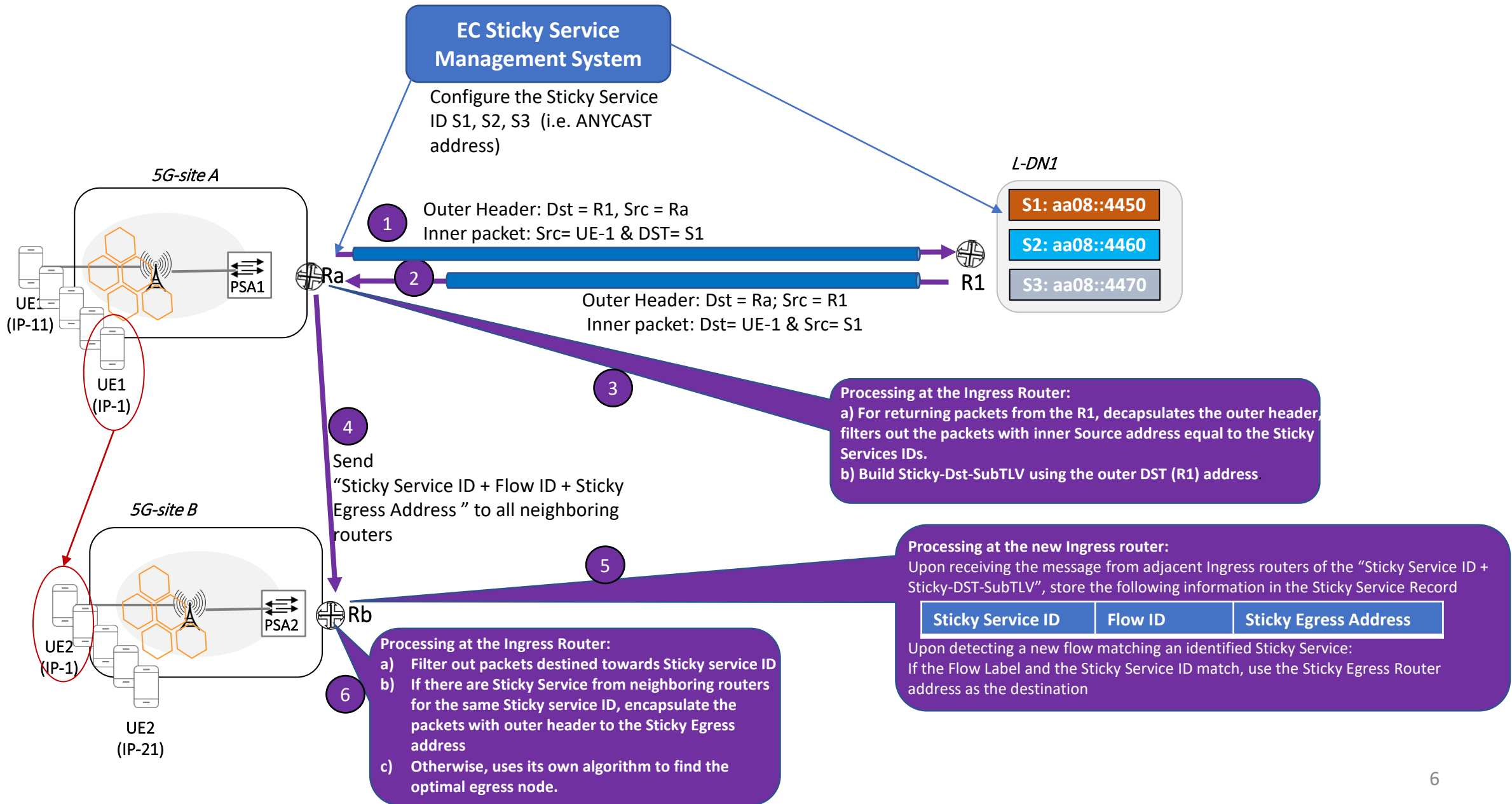


Configure the Sticky Service ID S1, S2, S3 (i.e. ANYCAST address)



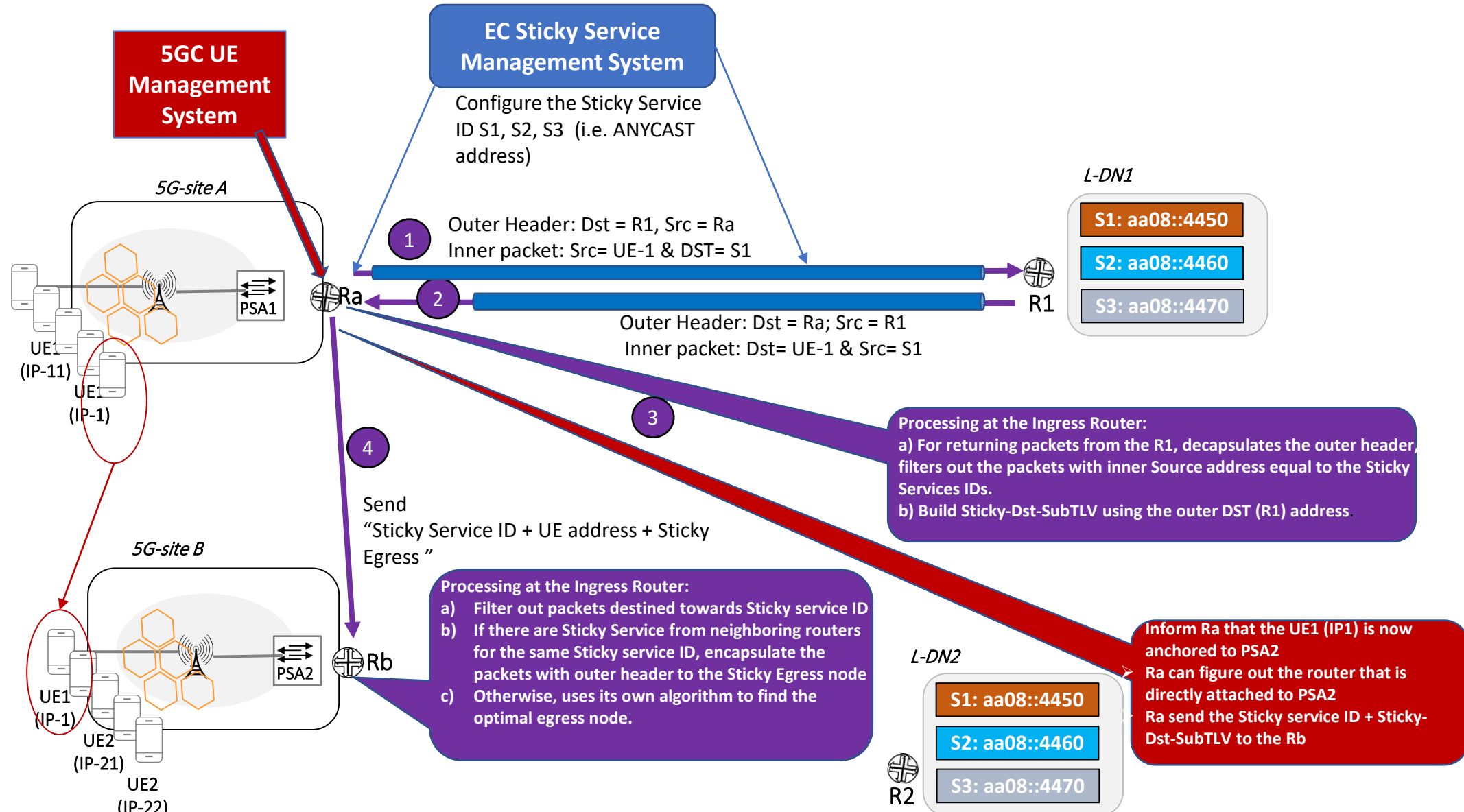
IPv6 based solution

Using Tunneling to Achieve Sticky Service

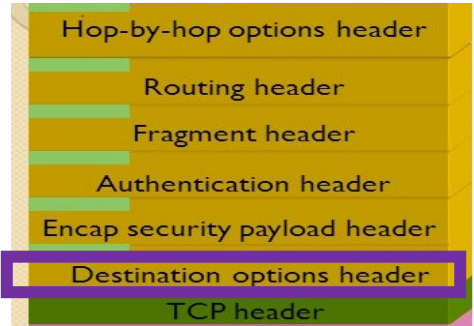


Using Tunneling to Achieve Sticky Service without dependence on UE behavior

Case 2: Ingress router notified by 5GC, either by the directly connected PSA, or by 5G traffic management system, of UE being moved to the new location

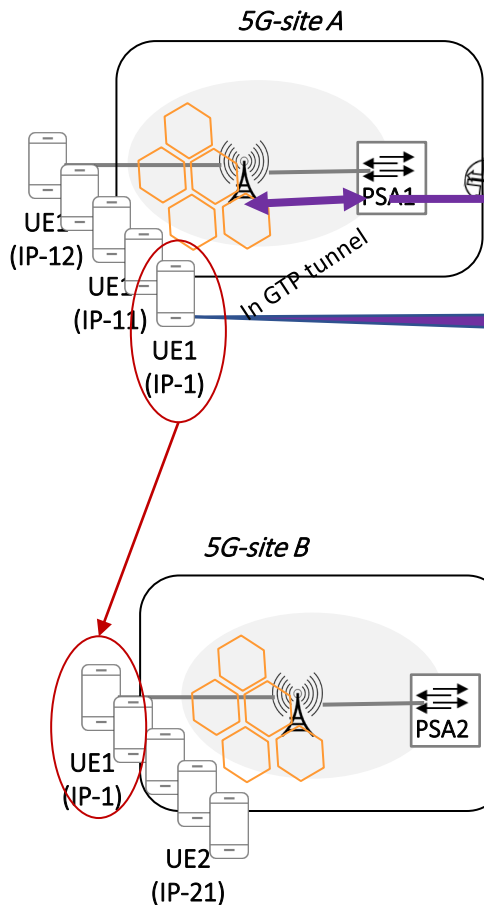


Achieve Sticky Service with the Destination Extension Header



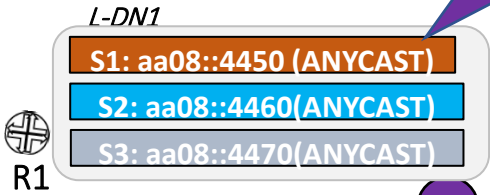
EC Sticky Service Management System

Configure the Sticky Service ID S1, S2, S3 as ACL (i.e. ANYCAST address)



- 1 Src= UE-1 & DST= S1
- 3 Src= UE-1 & DST= S1
Dst Extension Header with Sticky-Dst-SubTLV

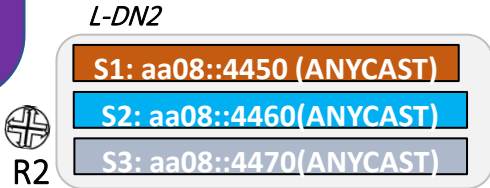
2 Processing at the Destination:
a) Build Sticky-Dst-SubTLV using the Sticky Egress address and insert the Sticky-Dst-TLV into the IPv6 Dst Extension Header.



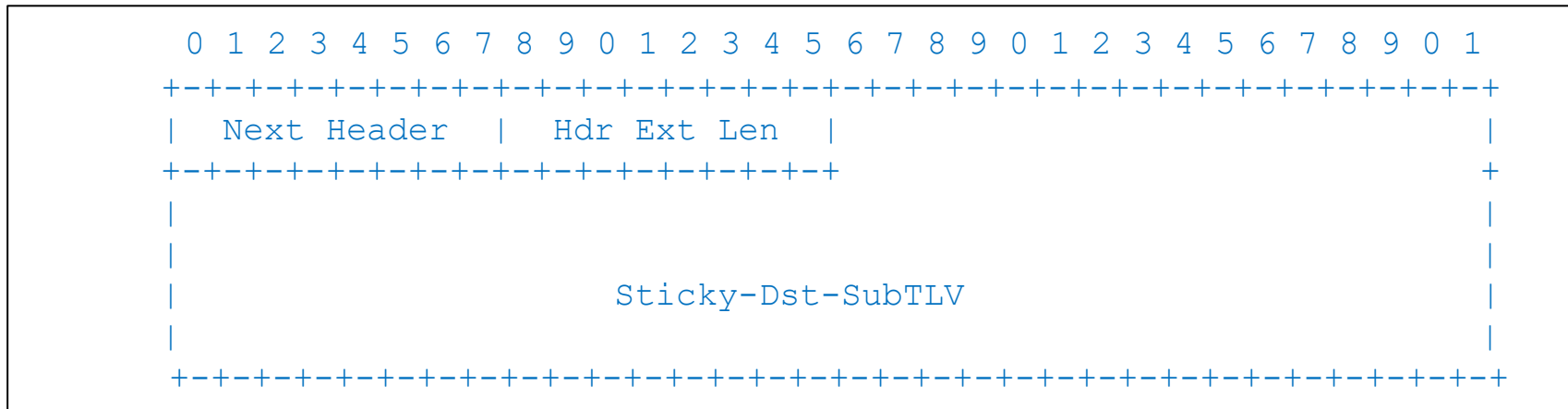
4 Processing at the UE:
Copy the Dst Extension Header in the IPv6 header received from the EC Server to the header of the subsequent packets in the flow that need Sticky service

5 Processing at the new Ingress Router:

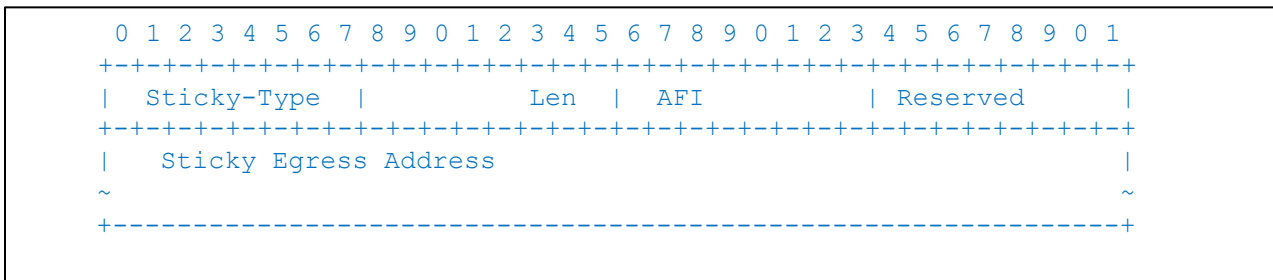
- Use ACL to filter out the packets belonging to Sticky Services
- Extract the Sticky-Dst-TLV from the IPv6 Dst Extension Header.
- use Tunnel encapsulation with Outer DEST = Sticky Egress address filtered from b) or use the SRv6 to make the packets destined towards the Sticky Egress Address



Using Destination Extension Header



Sticky-Dst-SubTLV is specified as:



Sticky-Type = 1: Edge Computing Server performs the insertion of the Sticky-Dst-SubTLV

Sticky-Type = ?: for future usage

Expanding APN6 for 5G EC Sticky Service

Sticky Service ID in the Application-aware ID

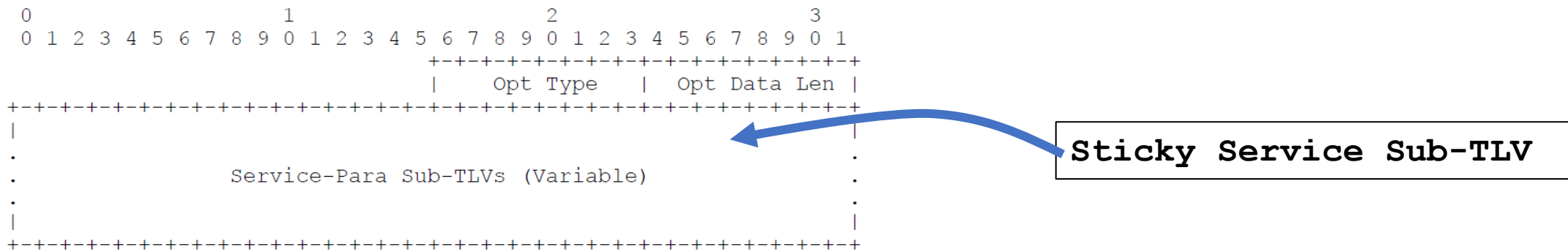
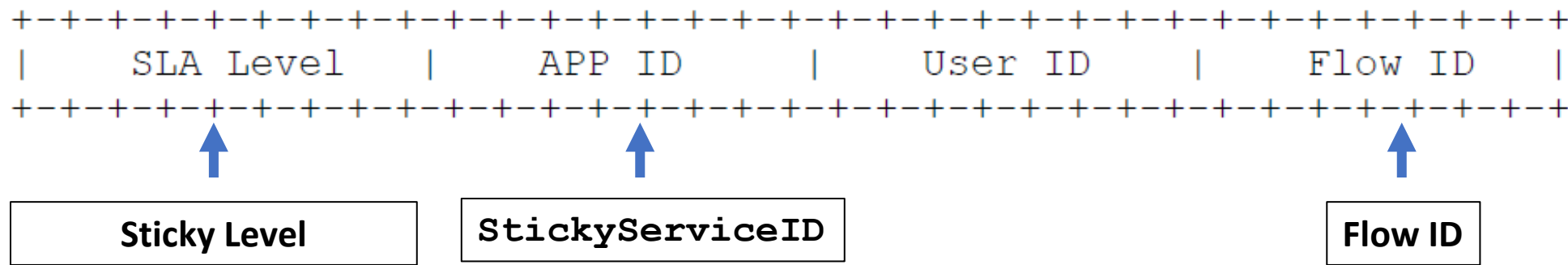


Figure 7. Service-Para Option

Next step:

- Need your feedback
- Ask for WG adoption