5.3.2 First and last times # gives us what?

7.1 Verify Flow Entries in a Network Route/Slice

CAaaS

Verify Route REST API

The duration metric for each flow is the time since the flow was created. We can use this metric to verify that each switch flow entry for this flow has not been changed since it was created. For simplification a new flow can be created for data transfer, but an existing flow can also be used if the flow id is known. The route source address is inferred from the ingress device on the SDN network.

Input: destination address, caller address

Output: flow id, creationTime, durationTable, boolean routeVerified

1. The caller starts the verification process by sending the authentication server (CAaaS) a request to establish a route supplying a destination address. Source address can be inferred, since the engress point for verification must be the edge of the SDN network. The CA then establishes a route using the SDN controller for that network and notes the time it was created and the flow id. The CA then returns the FlowId to the caller.
2. The caller then transfers the data over the flow using the flow id.
3. The caller then requests verification from the CA using the creation time and flow id.
4. The CA then gets the route from the controller using the flow id.
5. Each switch in the route is then polled for the duration(time since creation) of the flow.
6. If each duration matches the creation time then a true verified flag is returned.
7. If any switch duration is different from the creation time, a false verified flag is returned with a table listing each switch id and duration for analysis by the caller .

Note: The caller can use an existing flow, for repeat operations. The creation time of the existing flow switches will be gathered. If the creation times are all the same, then this flow can be reused. If not, then a new flow will be created and flow id returned.

Validate Route using SDNTraceroute REST API

This API is designed to validate an existing route. The route is comprised of forwarding hardware(in this case, switches) that is known to the SDN controller. These device ids are pulled from the controller. Using the device ids, flow rules for the probe packet are installed on the switches. A probe packet is then sent to the destination address. SDNTraceroute maps the actual on ground route the probe packets takes across the forwarding plane using the actual flow rules installed on the switch. Each switch sends the probe back to the controller for logging. The route is recorded until the packet reaches the destination switch.

The CA then compares the actual route to the route that the SDN controller has. If the controller route is equal to the actual route, then this route can be said to have been proven on the forwarding device plane.

Input: call takes a destination address, takes or infers source address

Output: flow id, boolean routeValidated

1. Caller starts the validation process by supplying a destination address or a flow id.
2. CA then performs the SDNTraceroute.
3. Actual route is compared to the route that the controller has.
4. If the routes match then a validated true is returned, false if not. The two routes are also returned for analysis by the caller.