Cloud Services Enhancements Through Application Specific Routing in MobilityFirst FIA

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Motivation
- The goal of this project is to design and develop a virtual network (VN) architecture to be deployed on top of MobilityFirst.
- Support for range of application specific routing metrics and algorithms.
- ASR gives service providers flexibility to incorporate parameters which allow for utilizing intelligence about layers 4-7.

Network Virtualization
- Network virtualization - running multiple logical networks atop (parallel) a common physical substrate
- Routing decision taken on the virtual layer which defines a virtual path for message
- Provides a secure/reliable connection among the virtually connected nodes.

Application Specific Routing (ASR)
- ASR - routing decisions that use combination of network layer metrics and application specific metrics.
- Application specific metrics - Statistical measures identifying network elements service states that can be meaningful as part of routing algorithms.
- The routing fabric is deployed with sets of available routing algorithms. Periodically, applications report to the Virtual Network components the most current state of prearranged statistics.
- To illustrate ASR operation we implemented two basic algorithms.

High Level Design
- Central coordinator selects appropriate resources and informs the concerned nodes about the VN details.
- A Virtual GUID is assigned to uniquely identify the VN.
- A Global Name Resolution Service (GNRS) is exploited to store Virtual Network Topology information and dynamically resolve mappings between virtual names and physical ones.
- Enabled nodes implement both normal and virtual routing planes.

Tables
- The virtual route is defined by ASR while the forwarding packet to the next virtual hop is achieved by GSTAR.
- Encapsulated packet sent to the next virtual hop.

MobilityFirst Background
- Separation of names (ID) and network addresses (NA).
- Public Key Based Globally Unique Identifiers (GUIDs) for network objects.
- Global Name Resolution Service (GNRS) for GUID <-> NA mappings.
- Storage-informed segment transport, edge-aware routing.
- Extensible in-network services.

Demonstration Details
- The topology is deployed on the Orbit testbed at Rutgers University.
- A service is replicated at two different locations ([node10-11] and [node10-17]).
- Servers report load measurements to the VN control plane.
- Load on servers is emulated by generating local requests with different periodic intervals.
- A request by the service client [node1-20] is routed to the appropriate server based on described application specific routing algorithms.

References