FUTURE INTERNET TESTBEDS EXPERIMENTATION BETWEEN BRAZIL AND EUROPE

CNPq
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Pilot Use Case n.2
High definition content delivery
across different sites

Media aware SDN network

This use case focuses on steering media clients to appropriate content servers based on various network and streaming server load characteristics. The use cases make use of the FIBRE monitoring facility to discover high density traffic flows and re-route such flows through optical networks.

An OpenFlow-based application (i.e. a POX application) is interfaced to one or more **Content Delivery Servers** (CDSs) that form a Content Delivery Network (CDN). The POX application monitors the CDS performance by retrieving the related status, load and failures. When certain thresholds are exceeded (e.g. the load on CDS or its energy consumption), PNOX application will re-route one or more clients to another CDS located in another site.

It is important to note that the focus of the use case is not only to serve media requests but also to **adapt request to changing network and media server conditions**. A monitoring module in the POX controller collates all server and network resource information, evaluating if there is any possible problem (e.g. congestion, under/over utilization etc.) and then re-routing users to appropriate media content streamers.
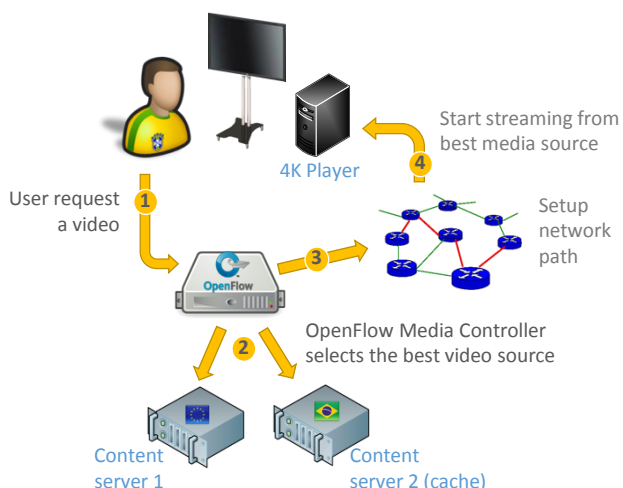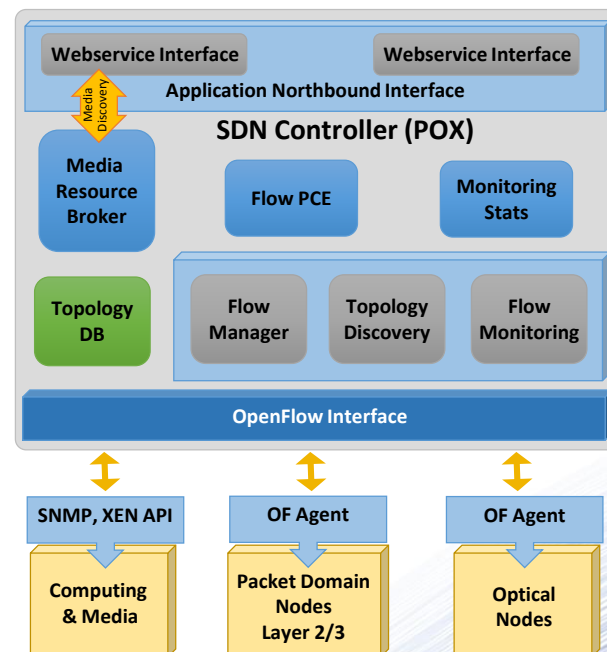
How it Works

1 Request a slice containing optical and media(pre-configured) resources from the FIBRE control framework.

2 Run a SDN controller with the media broker and monitoring application. The monitoring module will utilize both OpenFlow monitoring and FIBRE facility monitoring.

3 Run multiple media clients. The monitoring app detects server or network flow threshold crosses and requests media broker for reroute

4 Client are migrated to new server over rerouted paths

Underlying Components

Topology Discover: It uses the OpenFlow abstractions to read device information and construct the network topology. The discovered topology is stored in the MySql **Topology DB** and it is represented via the **DJANGO** web application.

Monitoring Stats: this function gets monitoring stats from two places one from the flow stats of OpenFlow and from the zenoss/sFlow stats.

User request a video ① → OpenFlow → ③ Setup network path

② OpenFlow Media Controller selects the best video source

④ Start streaming from best media source

4K Player

Content server 1   Content server 2 (cache)

| Webservice Interface | Webservice Interface |

Application Northbound Interface

Media Discovery

SDN Controller (POX)

| Media Resource Broker | Flow PCE | Monitoring Stats |

| Topology DB | Flow Manager | Topology Discovery | Flow Monitoring |

OpenFlow Interface

| SNMP, XEN API | OF Agent | OF Agent |

| Computing & Media | Packet Domain Nodes Layer 2/3 | Optical Nodes |

Content Delivery Software architecture

Flow Manager and Monitoring: these functions assist in pushing flows and then set the intervals to receive the flow stats (packet and byte counts).

Media Broker: Uses the REST API to receive media server and client requests. It has information on the location of the media servers along with their capabilities. Along with the PCE it finds the best path for rerouting clients.