

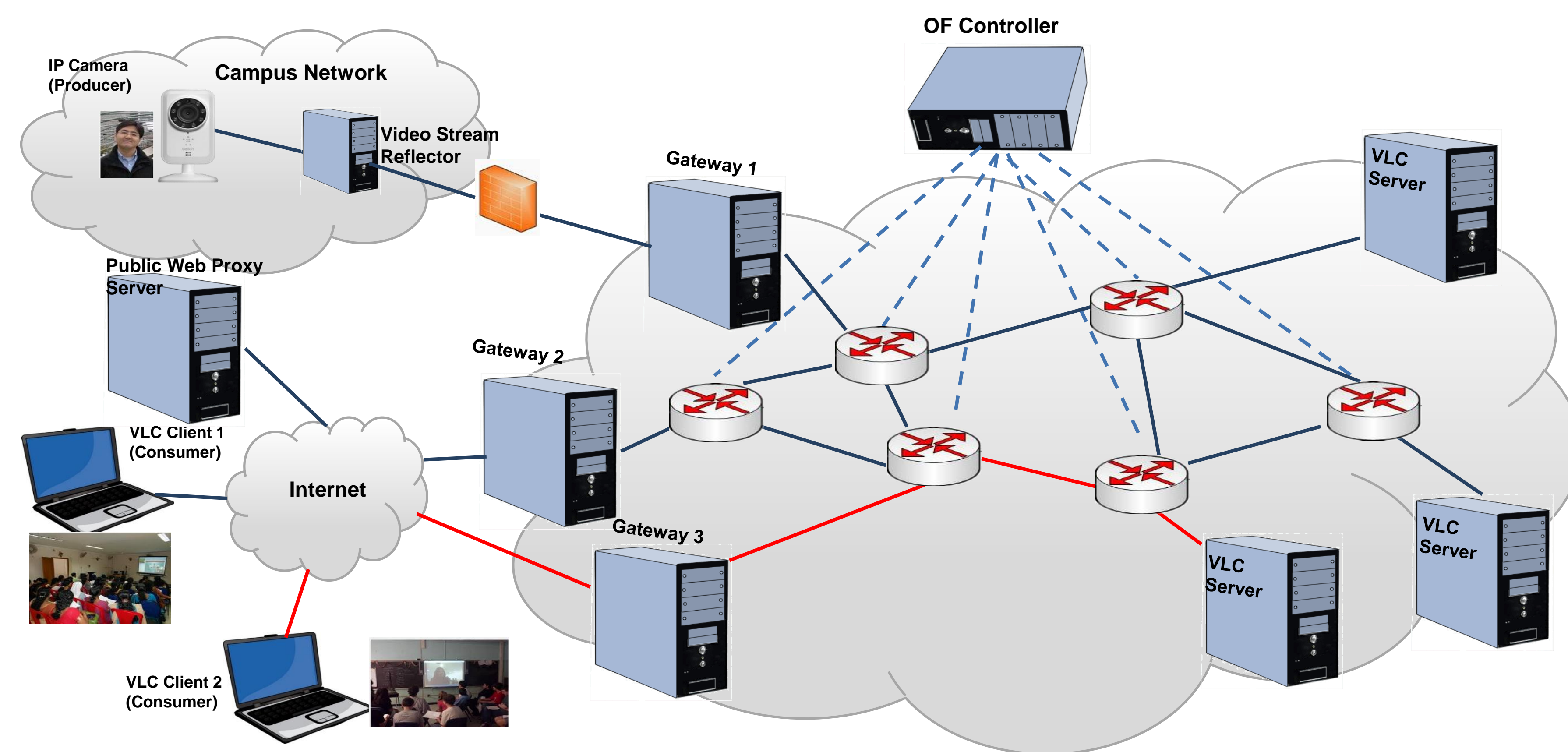
## Goals and Motivation

Goal: Provide a service for GENI that support seamless live broadcasting video streams for a large number of clients from different places.

Motivation:

- 1) Broadcast live video stream service via SDN and OpenFlow networks
- 2) Cloud-based video streaming service on GENI network
- 3) Real time on-line class as an education service on GENI network
- 4) Scalable video streaming service via OpenFlow Controller and OVS bridge
- 5) Seamless video streaming based on efficient adaption to channel bandwidth via OpenFlow network

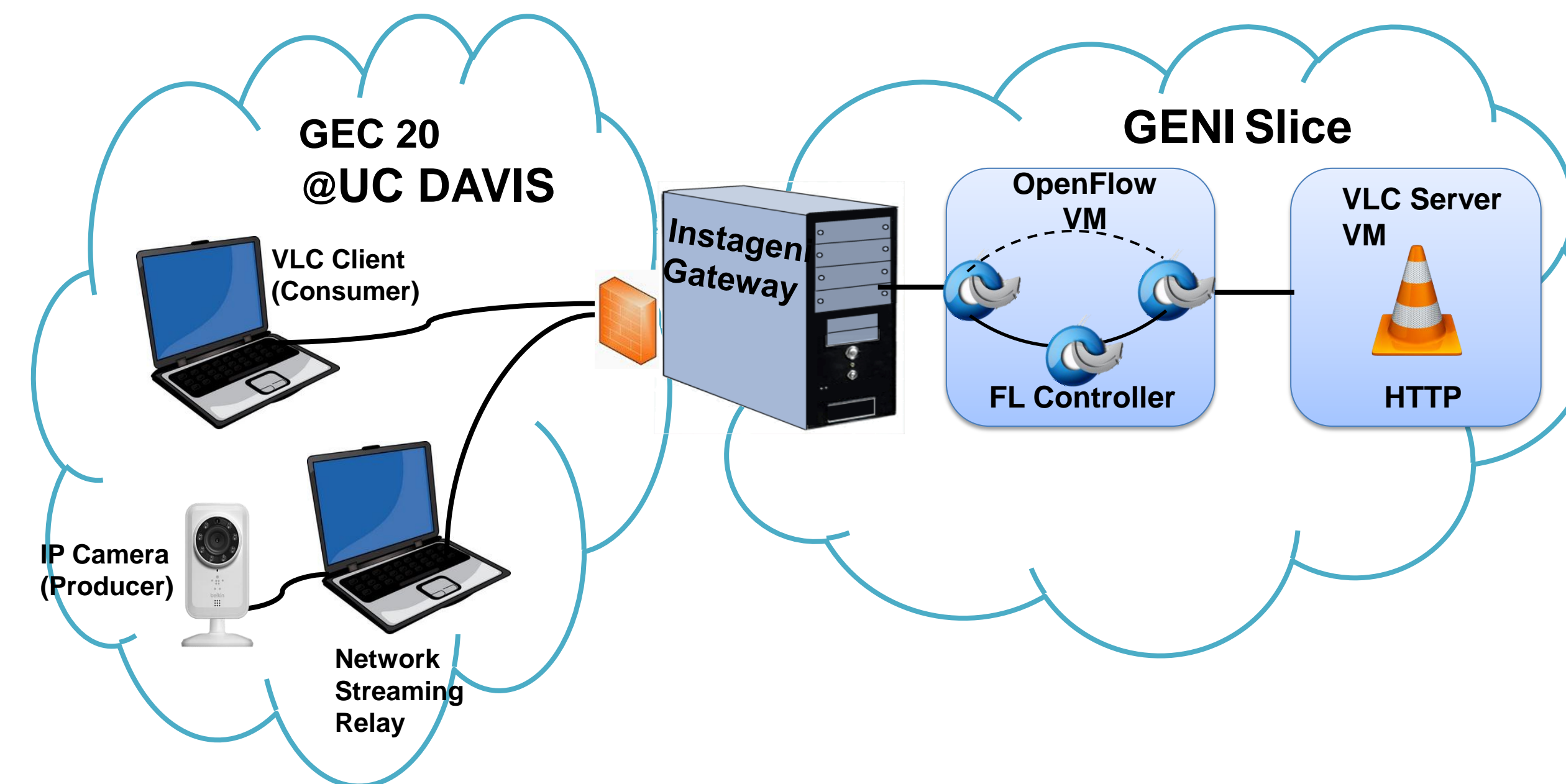
## Project Objective / Architecture



Main Architecture:

- 1) GENI network that has many computing and storage resources could be reserved
- 2) Video streaming is uploaded to nearby Gateway, and broadcasting to multiple VLC servers via OpenFlow controller
- 3) VLC server listens to the request from clients
- 4) Public web proxy server interacts with service users, it selects nearby gateway of user, establishes and stops the connection of video streaming
- 5) Video streaming is multicast streamed to the selected nearby gateway via OpenFlow controller, and relay to the user

## Project Demo Scenario



Configuration:

- 1) Network streaming relay @Davis: VLC relay server
- 2) Insta GENI rack gateway @Stanford: Linux NAT
- 3) OpenFlow VM @Clemson: 3 OVS bridge + Floodlight controller
- 4) VLC Server VM @Boston: VLC HTTP server + NAT

**Video Upload Procedure:**

- 1) RTSP video streaming from camera
- 2) Stream transcoded video from relay server to gateway
- 3) GC Gateway automatically relays broadcast video stream towards VLC video servers
- 4) OF controller selects flow path between gateway and video server

**Video Request Procedure:**

- 1) Client connects to public server and select pre-record or live video of interest
- 2) Client receive address of nearby GENI Cinema gateway. Client sends video request to gateway.
- 3) Gateway automatically send request to appropriate video server. OF controller select path between gateway and appropriate video server
- 4) Video server sends the video stream back to gateway. Gateway relays video stream to client

## Summary

A typical conceptual video streaming produce/subscribe service on SDN and OpenFlow based GENI network. Video is live and has a good quality.

## Future Work

Public web proxy server that interacts service users  
Seamless video streaming based on efficient adaption to channel bandwidth