How to realize CDN Interconnection (CDNI) over OpenFlow

Dukhyun Chang, Junho Suh, Hyogi Jung, Taekyoung Kwon and Yanghee Choi

2012.09.12
Presenter: Hyogi Jung
Contents

• Content delivery in a domain
• Content delivery across multiple domains
• Conclusion
Introduction

• OpenFlow provides programmability and controllability with commodity switches
  – representative component for SDN
  – scalability problem

• Some studies are carried out to mitigate the controller overhead
  – Devoflow (hotnets 2010), Hyperflow (INM WREN 2010), Onix (OSDI 2010), etc.

• SDN/OpenFlow can be leveraged for efficient content delivery
C-flow

• We propose C-flow
  – the framework to deliver content efficiently with OpenFlow in a domain
  – inter-controller signaling framework to deliver across domains
Content delivery in a single domain

• It provides framework for efficient content delivery over OpenFlow
• OpenFlow controller sets up path between an end user and the content
• It maps an IP address to an item to be delivered
  – emulates route-by-name
  – is capable of caching and retrieving content
Content delivery in a single domain

- **Controller**
- **Content request flow**
- **Content data flow**
- **FIB setup**
- **In-network storage**

**Content request flow**:
1. End user 1
2. R1
3. R2
4. R3
5. R4
6. Controller
7. In-network storage
8. End user 2

**Content data flow**: 
- From R1 to R2
- From R2 to R3
- From R3 to R4
- From R4 to Controller
- From Controller to In-network storage

**FIB setup**: 
- From R1 to R2
- From R2 to R3
- From R3 to R4
- From R4 to Controller
Content delivery across multiple domains

• It provides inter-controller signaling for content delivery across domains
• it supports some features of CDN interconnection (CDNI)
  – Request routing interface
• inter-controller agent (ICA)
  – establishing SSL connection btw. ICAs
  – exchanging content distribution metadata
• may reuse OpenFlow signaling without modification
Content delivery across multiple domains

**Domain A**
- Node A1
- Node A2
- Inter-controller agent (ICA)
- Controller

**Domain B**
- Node B1
- Node B2
- Inter-controller agent (ICA)
- Controller

**Flow Diagram**
- Content request flow
- Content data Flow
- FIB setup
- Inter-controller signaling

**Key Points**
- End user
- Content server
- Node A1 communicates with Node B1 through ICA and controller.
- Node A2 communicates with Node B2 through ICA and controller.
- Processes 1 to 8 labeled on the diagram.
Conclusion

• We map an IP address to an item to deliver it efficiently
  – emulate route-by-name

• We propose the framework to deliver content across domains
  – CDNI

• Mobility support and multicasting across domains are in progress