

The Case for Software-Defined Networking in Heterogeneous Networked Environments

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I - Introduction

What is Software-Defined Networking?

✤ Software-Defined Networking (SDN) has been proposed as a method of programmatically controlling networks by decoupling control from the data forwarding plane

In addition to network management, SDN may allow rapid deployment of new applications and services aimed at decreasing costs or increasing security, stability, or availability



- Networking in heterogeneous environments Multiple domains
 - Traffic and services likely span multiple control domains
 Emerging networks
 - The rise of mobile devices may enable the formation of ad hoc networks (MANETs / VANETs)
 - Devices with multiple interfaces may create hybrid environments, consisting of both infrastructure-based and infrastructure-less networks



II – Use Cases

- Expanding network coverage beyond traditional infrastructure-based networks
 - Service provider can be made aware of additional users connected ad hoc, while maintaining network policies and provisioning network resources
 - o Users may seamlessly connect to Internet from "anywhere"
- Service optimizations
 - Mobile data-offloading
 - Multicast on-the-fly
- Emerging applications
 - Participatory sensing
 - Vehicular communication
 - Information-centric networking

III – Challenges

Heterogeneous characteristics

- o Diverse device power, storage, interface capabilities
- o Different underlying physical mediums and mobility
- Delay and disruption tolerance

✤End-device deployment

- Security and capability concerns
- Incentives to participate in ad hoc extensions and follow directions from a controller

Network service control

- Services need a clear interface to access underlying network controllers and their associated networks
- Services that span multiple domains require cooperation between independent controllers



- Services
 - Handle inter-domain control coordination (if applicable)
- Accesses information about the underlying network via the controller and converts high level policies into controller actions



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