Improving Network Management with Software Defined Networking

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19 SLIDES
Outline

• Informative Summary
• Why SDN
• Problems in network management
• SDN
• Procera
• Application
• Future Work
• Conclusion & Discussion
Summary

- Software Defined Networking
- Concept
- Benefits
- Procera
- Applications
Why SDN?

- Previous proposals
- Stop-gap solutions
- Changing infrastructure
Problems in network management

• Frequent changes

• Configuration

• Visibility and control.
Benefits of SDN

• Introducing new ideas.
• Centralised approach.
• Network policies in high level policy language.
• Easy to determine the source of performance problems.
SDN Architecture

- Sensors
- Uls
- ... (Intermediate layer)
- Config files
  - Policy layer (e.g., FML, Procera)
  - Controller (e.g., NOX, Floodlight, Maestro...)
  - Programmable switches (e.g., OpenFlow)

Northbound Interface

Southbound Interface
Southbound and Northbound

- Open Flow is southbound SDN interfaces.

- Hence, Procera is one effort to define a northbound interface.
Procera

• A network control framework
  • Express event-driven network policies
  • High level functional programming language

• Glue between high-level policies and low-level configuration.
Control Domain

- Set conditions and assign correspond packet forwarding actions

<table>
<thead>
<tr>
<th>Control domains</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Peak traffic hours, academic semester start date</td>
</tr>
<tr>
<td>Data usage</td>
<td>Amount of data usage, traffic rate</td>
</tr>
<tr>
<td>Status</td>
<td>Identity of device/user, distinct policy group, authentication status</td>
</tr>
<tr>
<td>Flow</td>
<td>Ingress port, ether src/dst, ether type, vlan id, vlan priority, IP src/dst, IP protocol, IP ToS bits, port number src/dst</td>
</tr>
</tbody>
</table>
Architecture
Campus Network Deployment

- Campus network policies complex and error prone
Campus Network Deployment...
Case Study: uCap

Current situation:

We need:

• System to monitor data usage
• Allocate data usage capacity, caps etc.
Case Study: uCap...
Future Work

• Performance and scalability.
• Expand the control domain.
• Enrich Procera’s set of actions.
Conclusion

• Difficulties
  • Continually changing network status
  • Low-level per-device network configuration

• SDN
  • Decouple data plane and control plane

• Procera
  • Event driven network control framework
Q&A