The Cost of IPv6
Outline

• Deployment Cost
  – Data Center/Host/Content
  – ISP
  – Enterprise
• Operational Cost
  – Develop
  – Test
  – Operate/Troubleshoot
Acknowledgements (Gratitude)

- Arturo Servin
- Tina Tsou
- Diego Lopez
- KK Chittimaneni
- Victor Kuarsingh
- Richard Jimmerson and the Deploy360 team
Deployment Cost – Data center/hosting/content

- draft-lopez-v6ops-dc-ipv6
- Firewalls, Routers, Load balancers, Switches, security appliances
  - Security appliances: *Money*
- Servers
  - Front-end
  - Back-end
- Customer apps: *Development dollars*
  - Web site
  - Mail
  - Portals
  - Sales
  - Streaming
- Monitoring: *Development dollars*
  - For each app above

Capital expenditures are reduced if spread over a longer period of time, when upgrades were planned anyway.
So, start four years ago and it’s cheap.
Deployment Cost - ISP

- RFC6782 Wireline Incremental IPv6
- Backbone - $0 if network is less than ten years old
- Access Network – may require controller/line card upgrades. Money
- Data Center (see Data Center/hosting)
- Provisioning/OSS - $0 capital, some labor to customize/config
  - Billing fields (IPv6 y/n)
  - Customer device provisioning (modem, voice, video)
    - Firmware management
    - Configuration management
  - Monitoring
    - Portals
    - Provisioning OSS
    - Outage ticketing system
    - Customer trouble ticketing system
- CPE - Money

Capital expenditures are reduced if spread over a longer period of time, when upgrades were planned anyway.
So, start four years ago and it’s cheap.
Deployment Cost - Enterprise

- draft-ietf-v6ops-enterprise-incremental-ipv6
- External
  - Access provider
  - WAN
  - Data center/hosting
  - Anti-spam
  - Monitoring
- Internal
  - LANs
  - Workstations
  - Peripherals
  - Server room
Operational Costs - ISP

• Develop
  – New router/code? Test twice (or maybe three times):
    • IPv4
    • Dual-stack
    • IPv6
    • Probably 10% additional work; once the plan exists, repeating is incremental

• Test
  – Test twice
  – 10% incremental work

• Operate/Troubleshoot
  – Layer 1/Layer 2 problems: 1% incremental (ping6 OK? Also do ping)
  – Layer 3: 5% (ping6 OK? Also ping, troubleshoot)
Operational costs - Data center/hosting/content

• Develop
  – Apps – develop and unit test
    • IPv4
    • Dual-stack
    • IPv6
      • 10-30% additional work; once the plan exists, repeating is incremental

• Test
  – Test twice
  – 10% incremental work

• Operate/Troubleshoot
  – Layer 1/Layer 2 problems: 1% incremental (ping6 OK? Also do ping)
  – Layer 3: 5% (ping6 OK? Also ping, troubleshoot)
Operational Costs - Enterprise

• Systems, Workstations, Peripherals
  • IPv4
  • Dual-stack
  • IPv6
  • Probably 10% additional work; once the plan exists, repeating is incremental

• Support
  – Low incremental, few backhoes in the office building
## Summary

<table>
<thead>
<tr>
<th></th>
<th>Deploy</th>
<th>Operate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data center Hosting</td>
<td>Labor: Applications CapEx: Security Either: Monitoring</td>
<td>+5-10% annually</td>
</tr>
<tr>
<td>Content</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISP</td>
<td>CapEx: Access routers CapEx: CPE Labor: P/OSS</td>
<td>+5-10% annually</td>
</tr>
<tr>
<td>Enterprise</td>
<td>CapEx: Cheap Labor: Lots to do</td>
<td>+1% annually</td>
</tr>
</tbody>
</table>


DISCUSSION