

The Critical Path to IPv6

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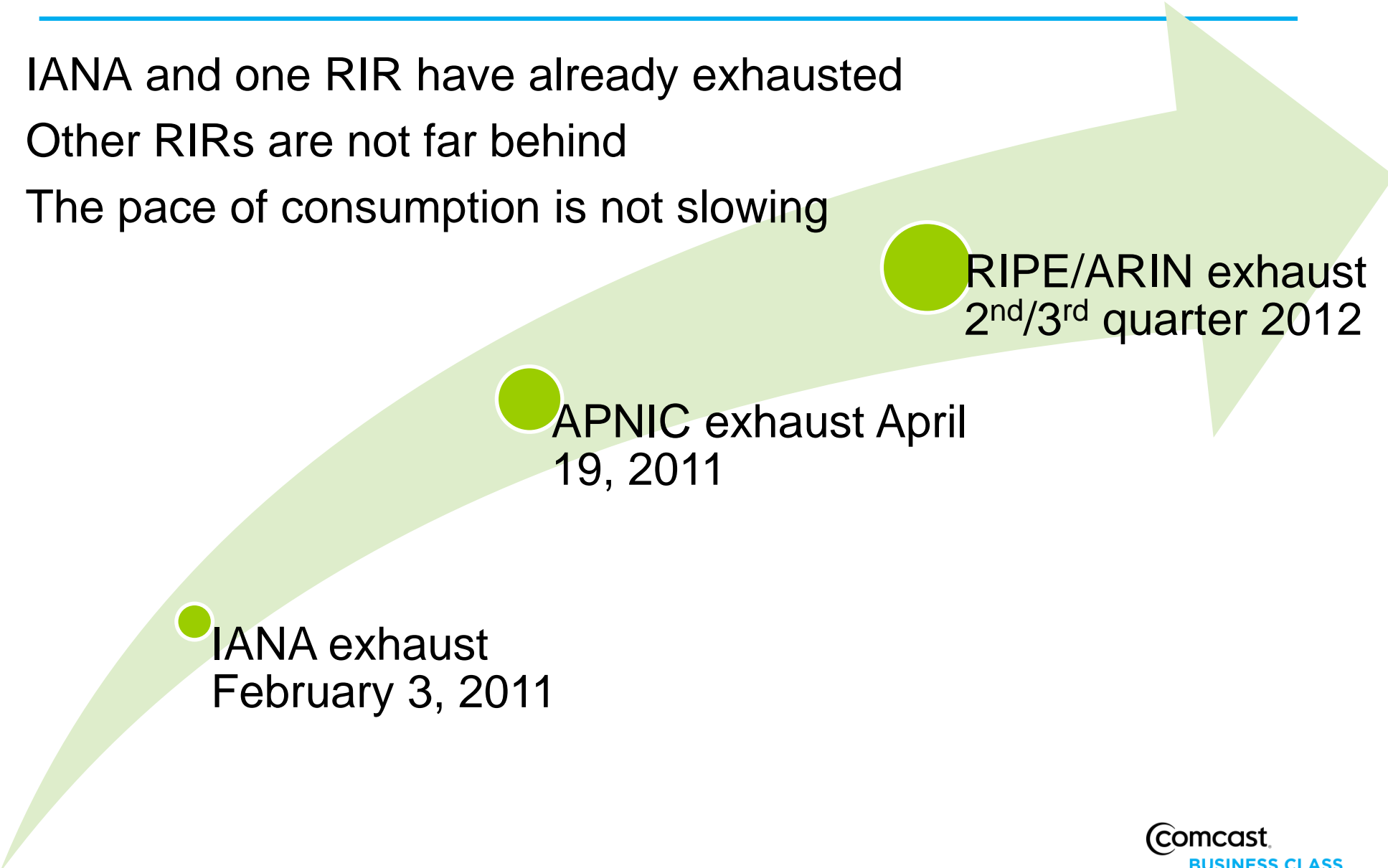
December 13, 2011

Overview

- Background
- Transition Technology Primer
- What to Ask Your Service Provider
- Enterprise/Corporate Considerations
- Comcast and IPv6
- Q&A

Background

- IANA and one RIR have already exhausted
- Other RIRs are not far behind
- The pace of consumption is not slowing



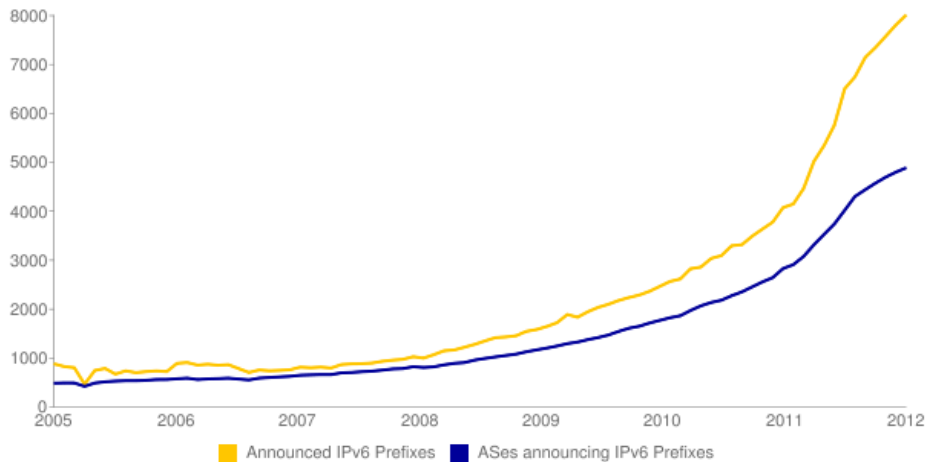
IANA exhaust
February 3, 2011

APNIC exhaust April
19, 2011

RIPE/ARIN exhaust
2nd/3rd quarter 2012

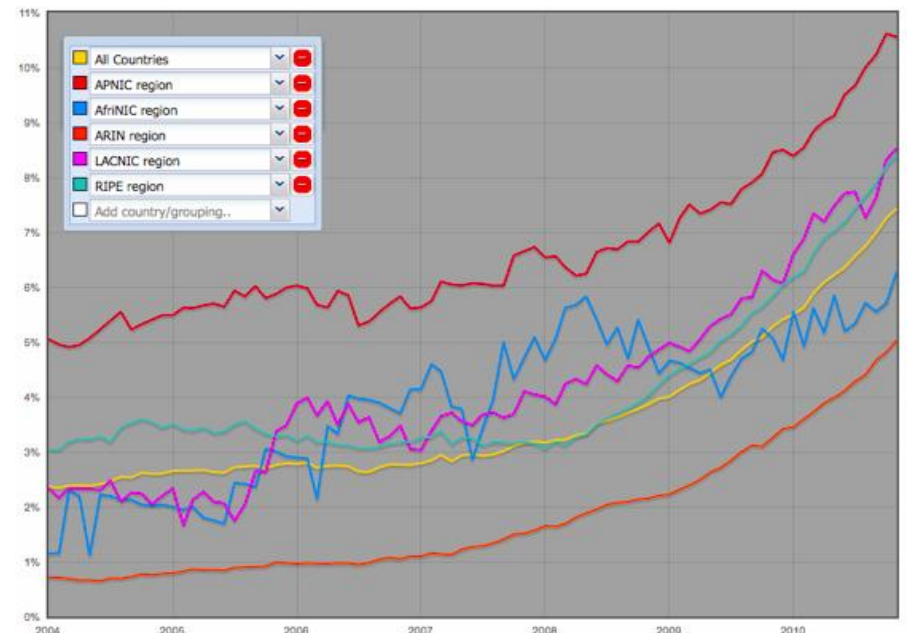
Impact of IPv4 Address Shortage

Depletion has triggered an increase in the rate of IPv6 deployment and adoption



www.ipv6actnow.org

v6asns.ripe.net



Making the Transition

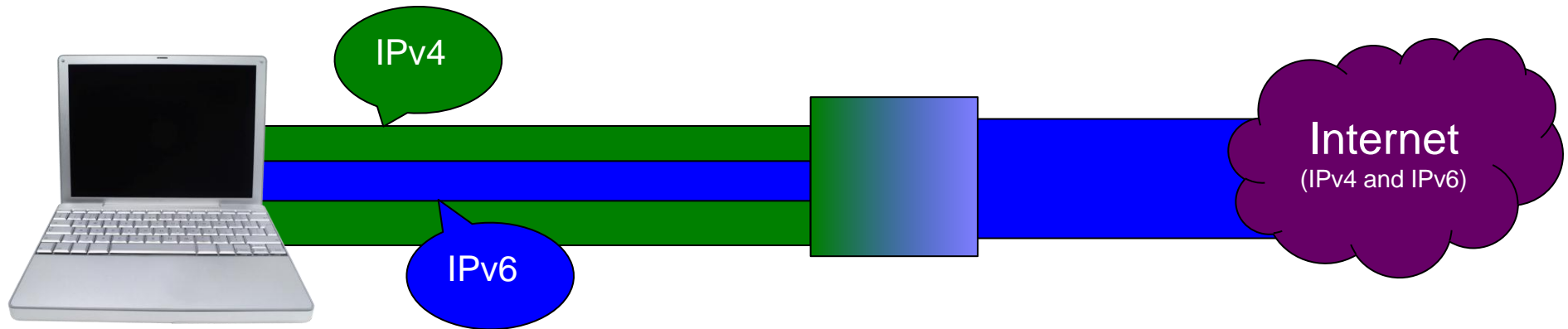
- IPv4 and IPv6 are not interoperable – enterprises must take action to allow ongoing access to content for both customers and employees
- Firms are investigating and pursuing the use of various technologies to support their business during the transition
 - All technologies are not equal
 - Some of these technologies will have negative end user impact

Transition Technology Primer

The major technologies available to enable IPv4-to-IPv6 migration include:

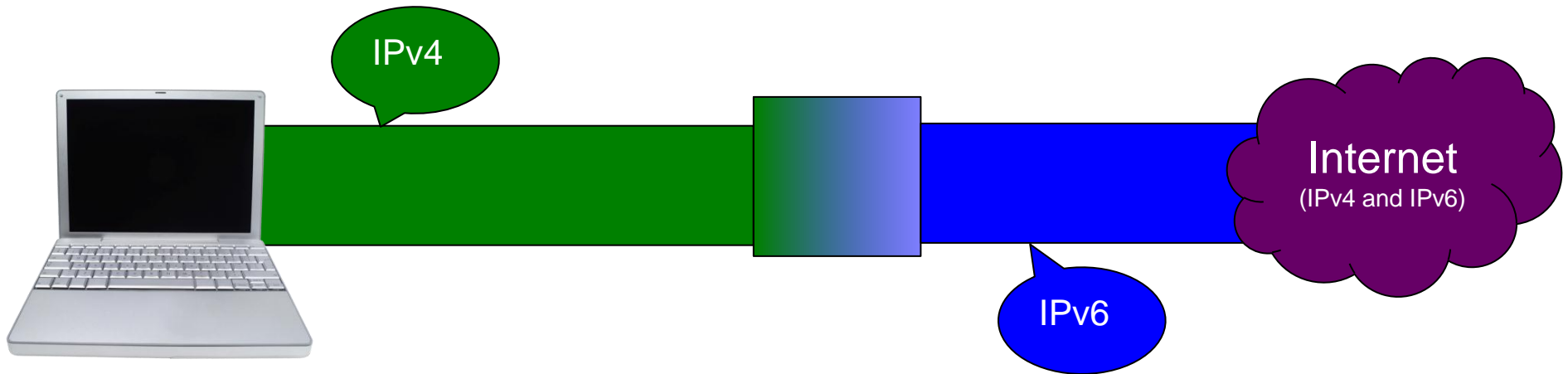
1. IPv6 Encapsulation
2. IPv6 Translation
3. Native Dual Stack

IPv6 Encapsulation



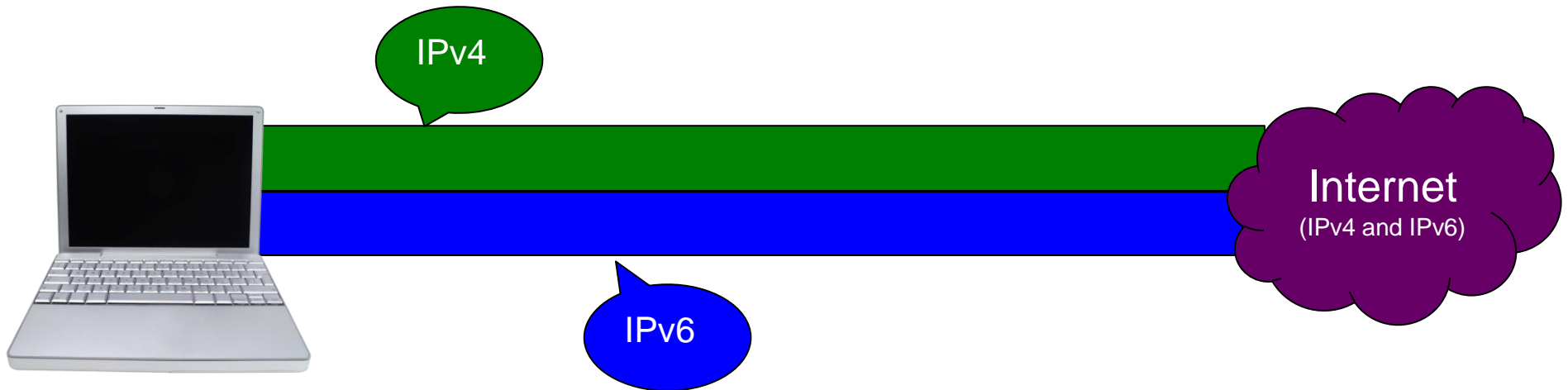
- IPv6 can be tunneled or encapsulated over IPv4
 - Depending on adopter, may be easier to deploy than alternatives
 - May be costly to introduce intermediate encapsulation elements into the network
 - Performance and end user experience differences
 - Examples include 6RD and 6to4

IPv6 Translation



- May be costly to introduce intermediate translation elements into the network
- Performance and end user experience differences
- Does not facilitate or encourage the true adoption of IPv6 for the end user
- Examples include NAT64

Native Dual Stack



- Allows the existing IPv4 connectivity to remain in place
- Incrementally introduces support for IPv6
- Where IPv6 is not available end-to-end, seamless fallback to IPv4
- Requires planning and technology readiness

Transition Technology Conclusion

The major technologies available to enable IPv6 include:

1. IPv6 Encapsulation
2. IPv6 Translation
3. Native Dual Stack

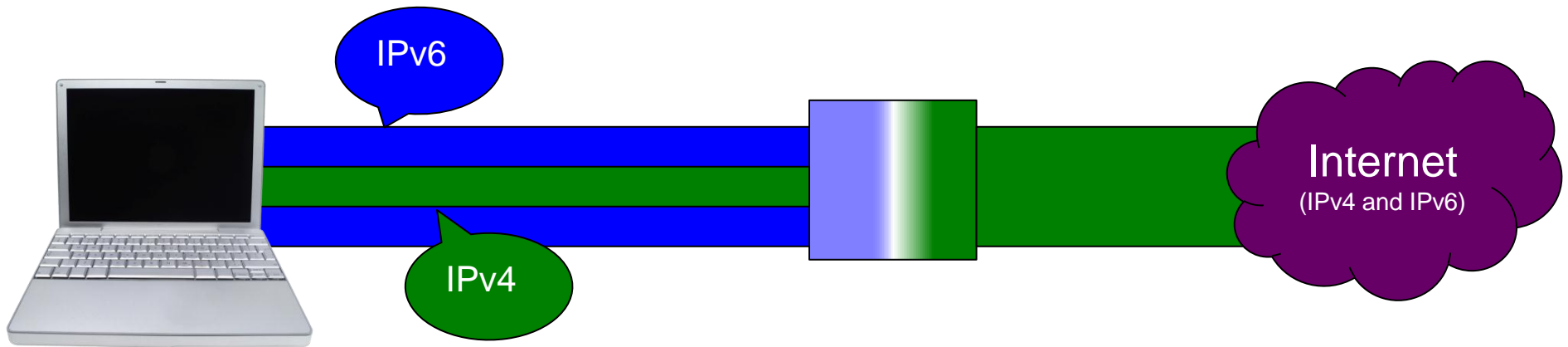
**Comcast recommends Native Dual Stack as
the best overall solution**

Elongating the Life of IPv4

Technologies available to prolong the use of the IPv4 address space include:

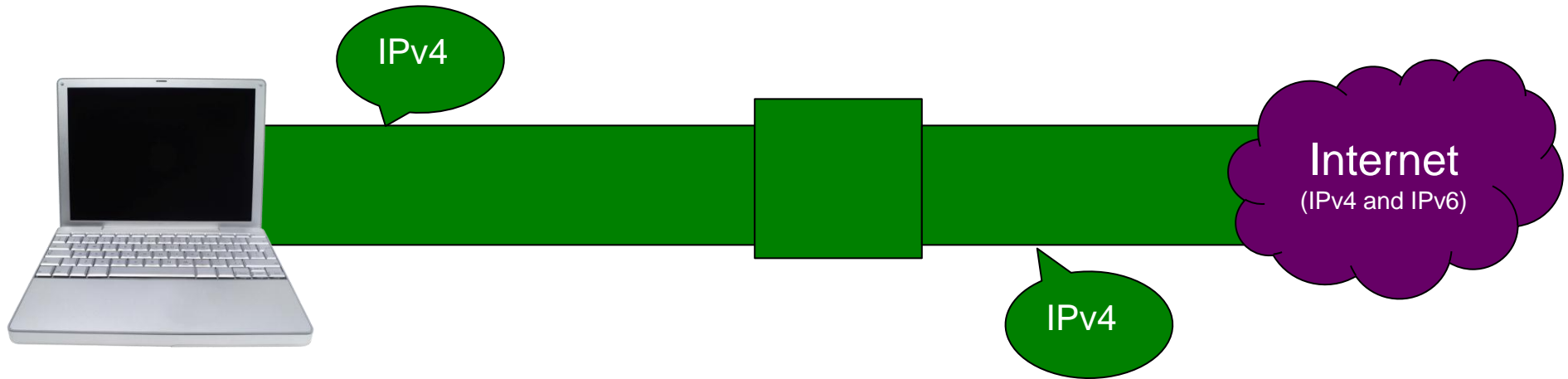
1. IPv4 Encapsulation
2. IPv4 Translation

IPv4 Encapsulation



- IPv4 can be tunneled or encapsulated over IPv6
 - IPv6 must be available
 - May be costly to introduce intermediate encapsulation elements into the network
 - Performance and end user experience differences
 - Examples include Dual Stack Lite

IPv4 Translation



- May be costly to introduce intermediate translation elements into the network
- Performance and end user experience differences
- Does not facilitate or encourage true adoption of IPv6 for the end user
- Examples include NAT444

What to Ask Your Service Provider

- Service provider IPv6 capabilities are essential to IPv6 transition planning
- Upstream service provider support of IPv6 has bearing on end user migration techniques

Support for IPv6

- Tunneled?
- Translated?
- Native?

Support for IPv4

- Required to ensure access to IPv4 Internet resources during transition period

IPv6-capable CPE

- Is the CPE provided by the SP or the Enterprise?
- Does it meet end user requirements?

Additional Service Provider Questions

How is your provider implementing provider-to-provider IPv6 network connectivity?

- Essential to ensure your employees have access to Internet resources over IPv6

What is plan for customer-facing DNS services over IPv6?

- Important to facilitate full transition to IPv6 over time
- How will your customers find you?

How will e-mail and messaging be supported over IPv6?

- During transition, how will your provider ensure you can begin communicating electronically using IPv6?

Enterprise/Corporate Considerations

- Enterprises play a critical, active role in the transition to IPv6
 - Understanding the demarcation between the service provider and enterprise is key

End user considerations

- Applications in use
- Connectivity required
- Web sites accessed

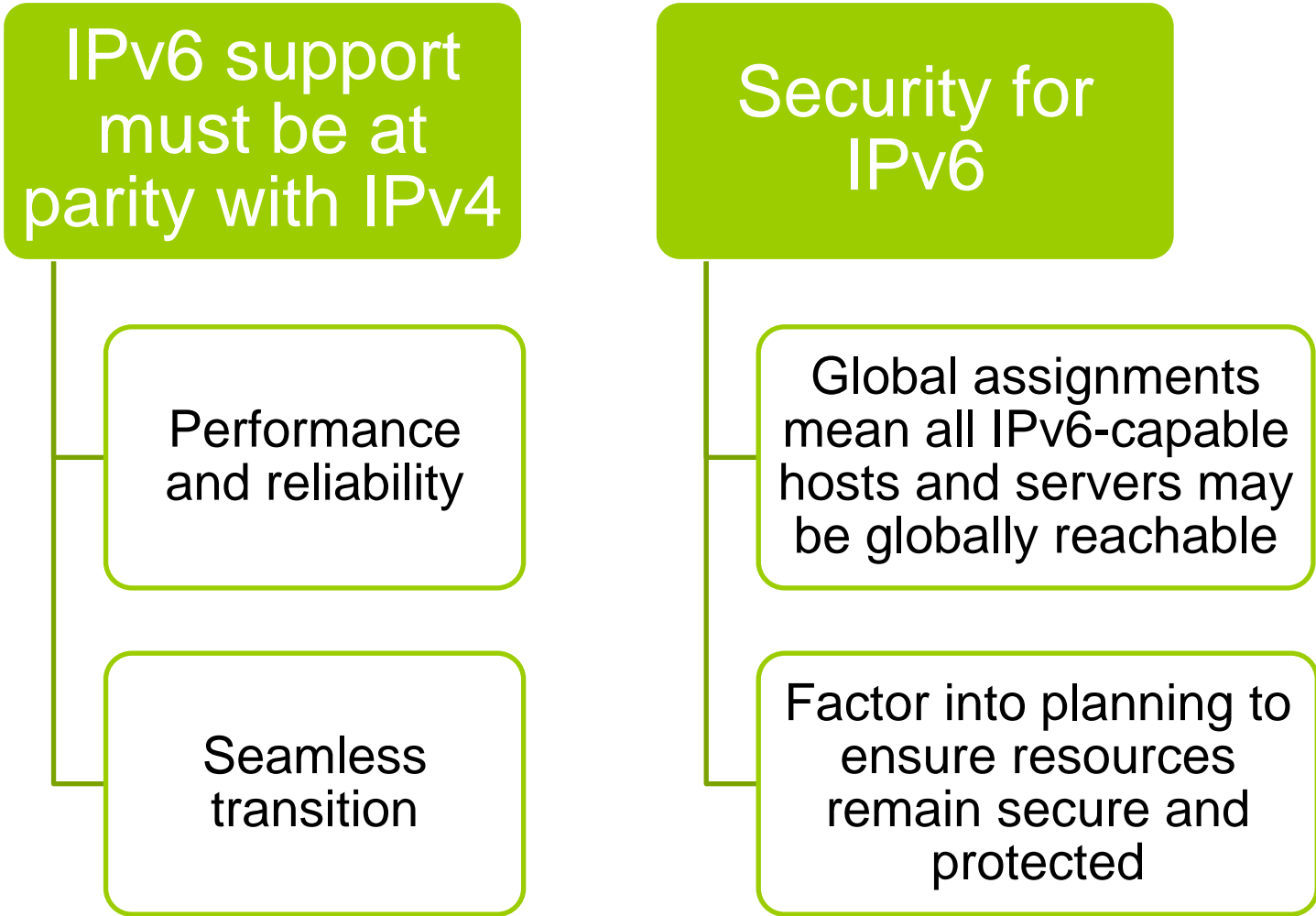
IPv6-enabling Internal Network Infrastructure

- Network hardware
- Network software
- Do not assume support is present by default

Operational Support Plan for IPv6

- Planning ahead
- Purchasing decisions
- Addressing
- Desktop/server support

Enterprise/Corporate Considerations



Enterprise/Corporate Considerations

IPv6 address assignment and configuration for corporate/enterprise environments

Impacts hosts and servers supporting IPv6

Varies from deployment to deployment based on adopter requirements

Unrelated to the service provider; strictly a corporate/enterprise consideration

Comcast and IPv6

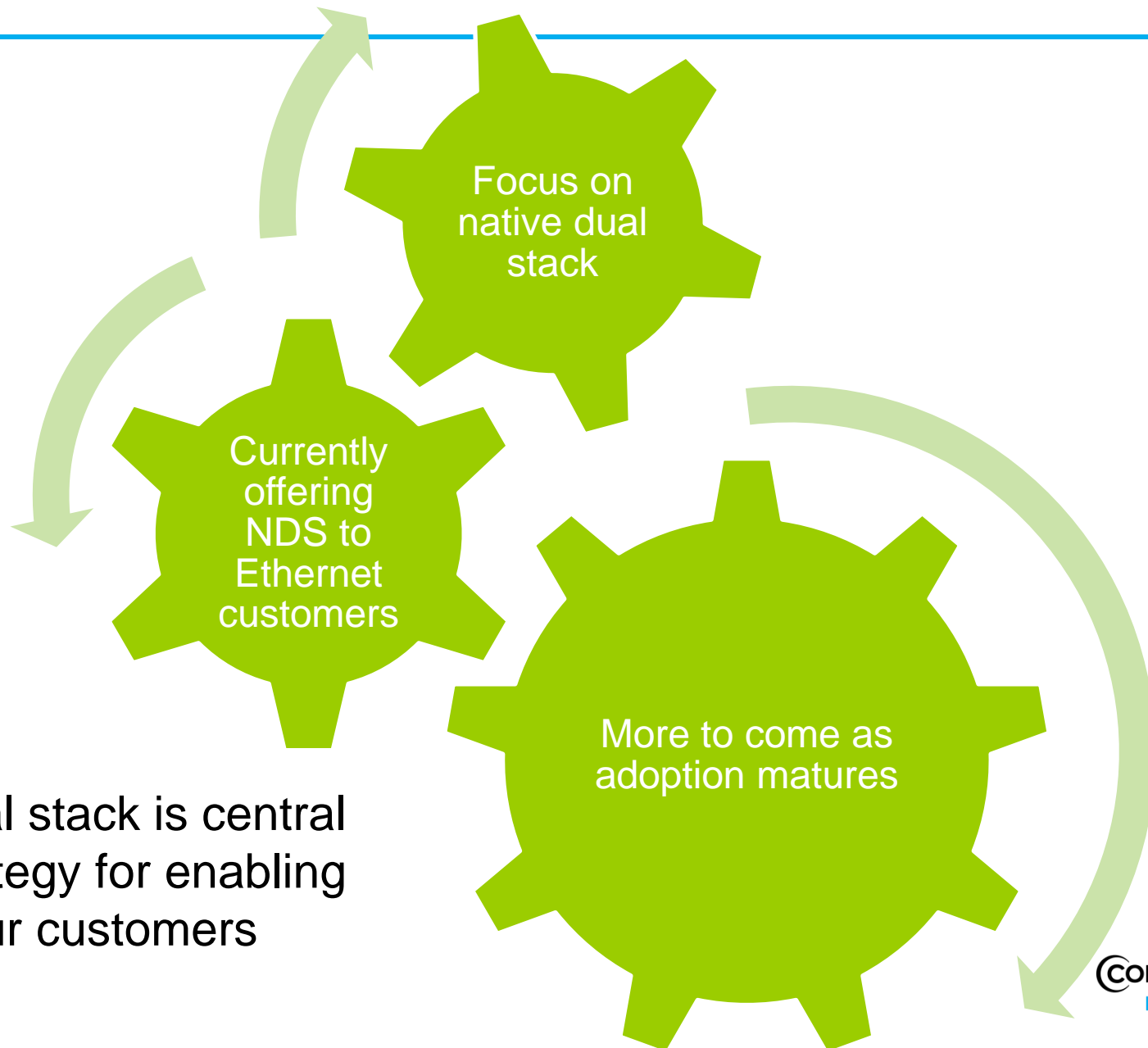
Comcast's IPv6 planning and deployment have been underway since 2005

- Leading adoption of IPv6
- Encouraging the development and deployment of IPv6 across the Internet ecosystem
- Leveraging deployment program to learn and share information about the challenges and benefits of IPv6

Comcast's IPv6 deployment program has many facets

- Core and access network
- OSS and BSS

Comcast and IPv6



Native dual stack is central to our strategy for enabling IPv6 for our customers

Comcast and IPv6

Comcast's IPv6 objectives

- Ensure solutions meet needs of Comcast and Comcast's customers
- Balance resource demand through incremental deployment
- Ensure introduction of IPv6 does not disrupt customers

IPv6 technology trials initiated in early 2010

- Trials included 6RD, 6to4, Native Dual Stack among others
- Results of trials support conclusions presented here today

For more information

- www.comcast6.net

The transition has really just begun!

Thank You!

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<http://www.comcast6.net>