After IPv6 Day, Rethink the Transition Strategy

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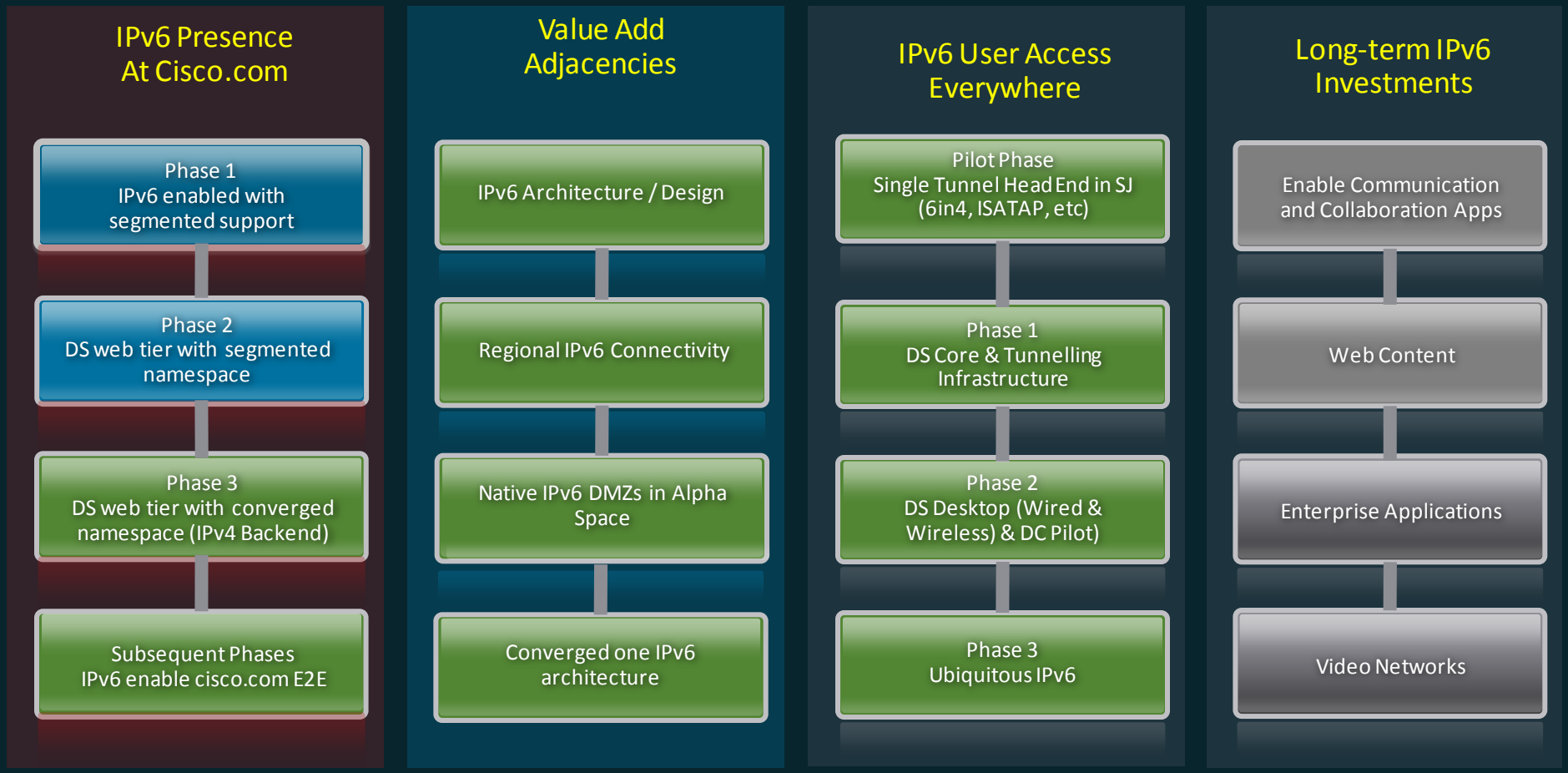
Content

- WORLD IPv6 DAY IN CISCO
- BIG PICTURE OF STRATEGY
- EXECUTION FOR TRANSITION

Cisco IT IPv6 Multiple-Phrase Plan



World IPv6 Day
Cisco's Participation

- Actively promoted & participated

  Together with ISOC , Cisco along with Google, Yahoo!, & other 434 participants for a 24-hour IPv6 "test drive" on June 6, 2011.

  We confirmed participation in Jan 2011 as the first equipment vendor

- Business drivers

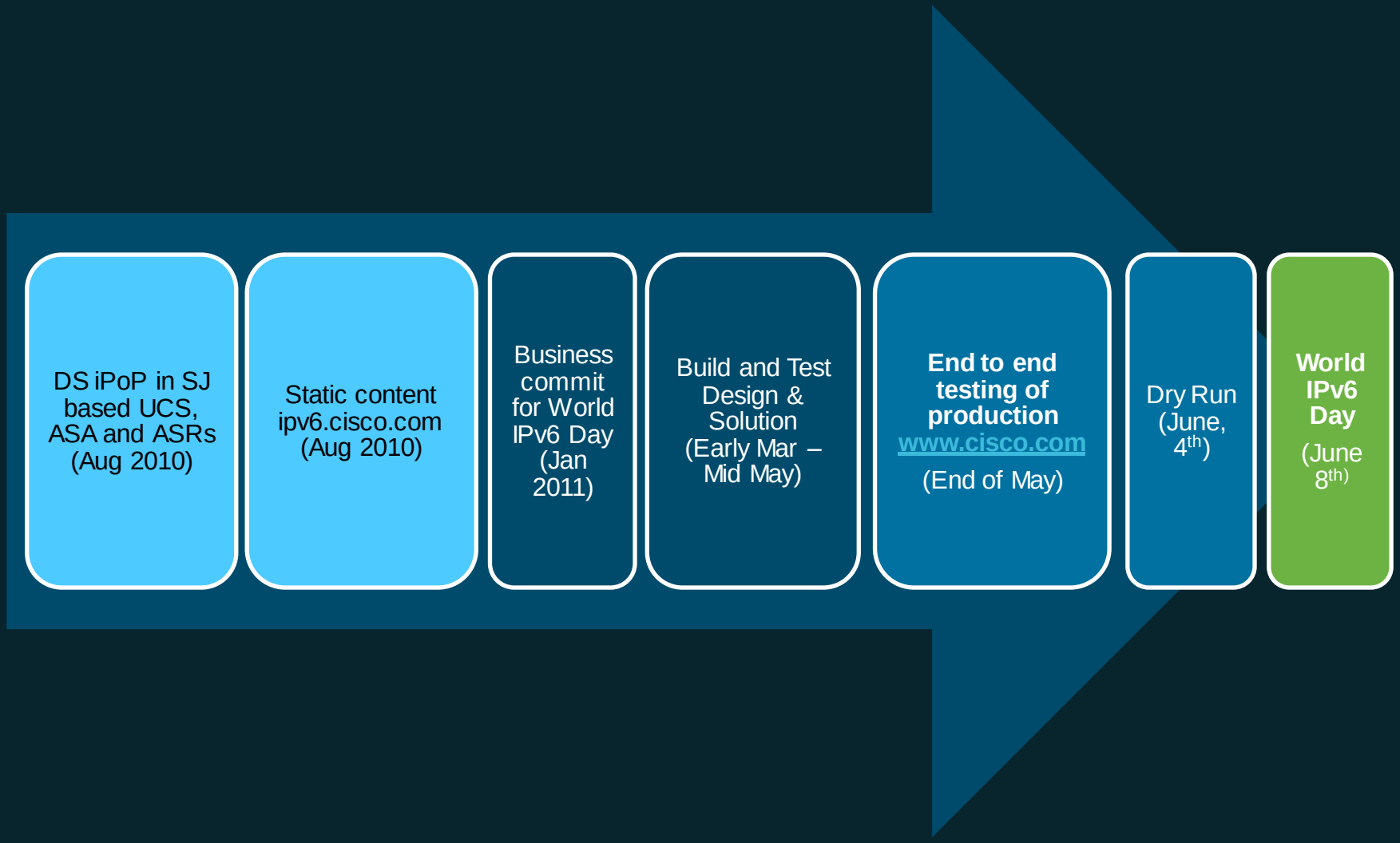
  Encourage broader adoption of IPv6 industry

  Demonstrate Mindshare & leadership in IPv6

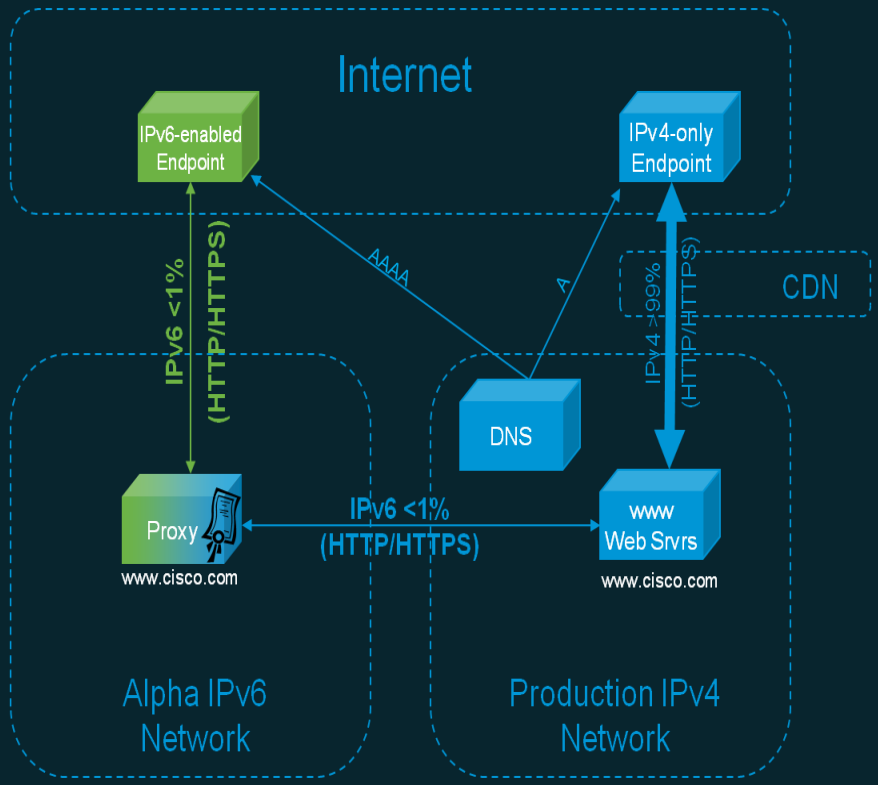
  Raise internal awareness & understanding to Executives at all levels

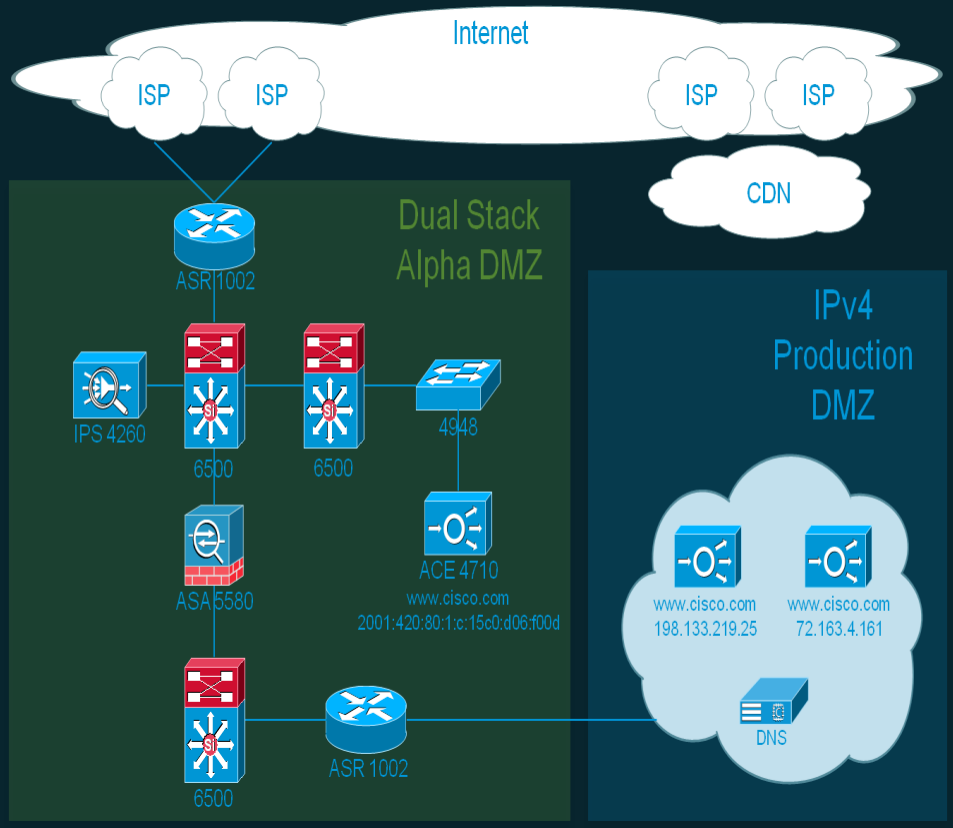
  Safe test-bed on design & solution in production in large scale

World IPv6 Day
www.cisco.com IPv6 presence – The timeline



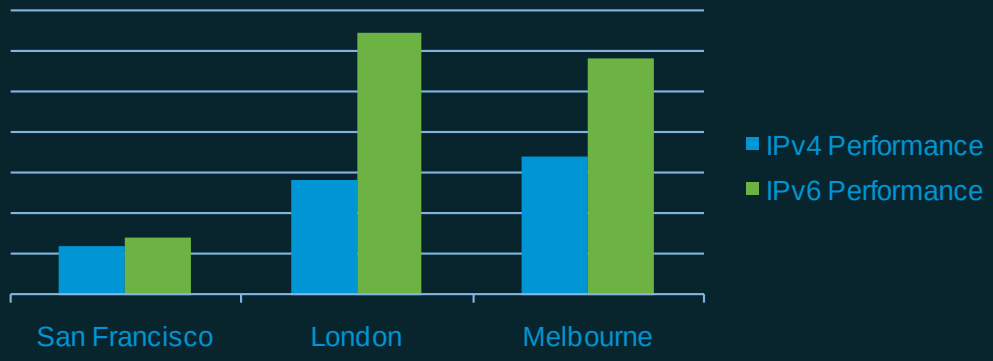
World IPv6 Day Solution & Design





Metrics Summary for World IPv6 Day

- Traffic: 1.11% of all traffic of www.cisco.com were IPv6 !
- Web analytics:
  - 1.49% of unique visitors
  - 1.33% of visits
  - 2.26% of users logged in
  - 1.29% of page views
- Support Cases: None !
- Performance: per page load times



IPv4: CDN providing globally
IPv6: No cached/accelerated.

Considerations & Lessons

- Principles
  - Does not jeopardize existing IPv4 services and applications
  - Preservation of cisco.com brand & control over the cisco.com experience
  - Does not reduce the corporate security posture
- Assumptions
  - Re-use of existing infrastructure, capabilities, content, and application environments whenever possible.
  - Willingness to sacrifice equivalent user experience, manageability, and service levels for near term IPv6 goals
  - Prioritized across all IT functions
- Need simple & deployable access service for any user !
- Estimating load and user experience, a lot tests !

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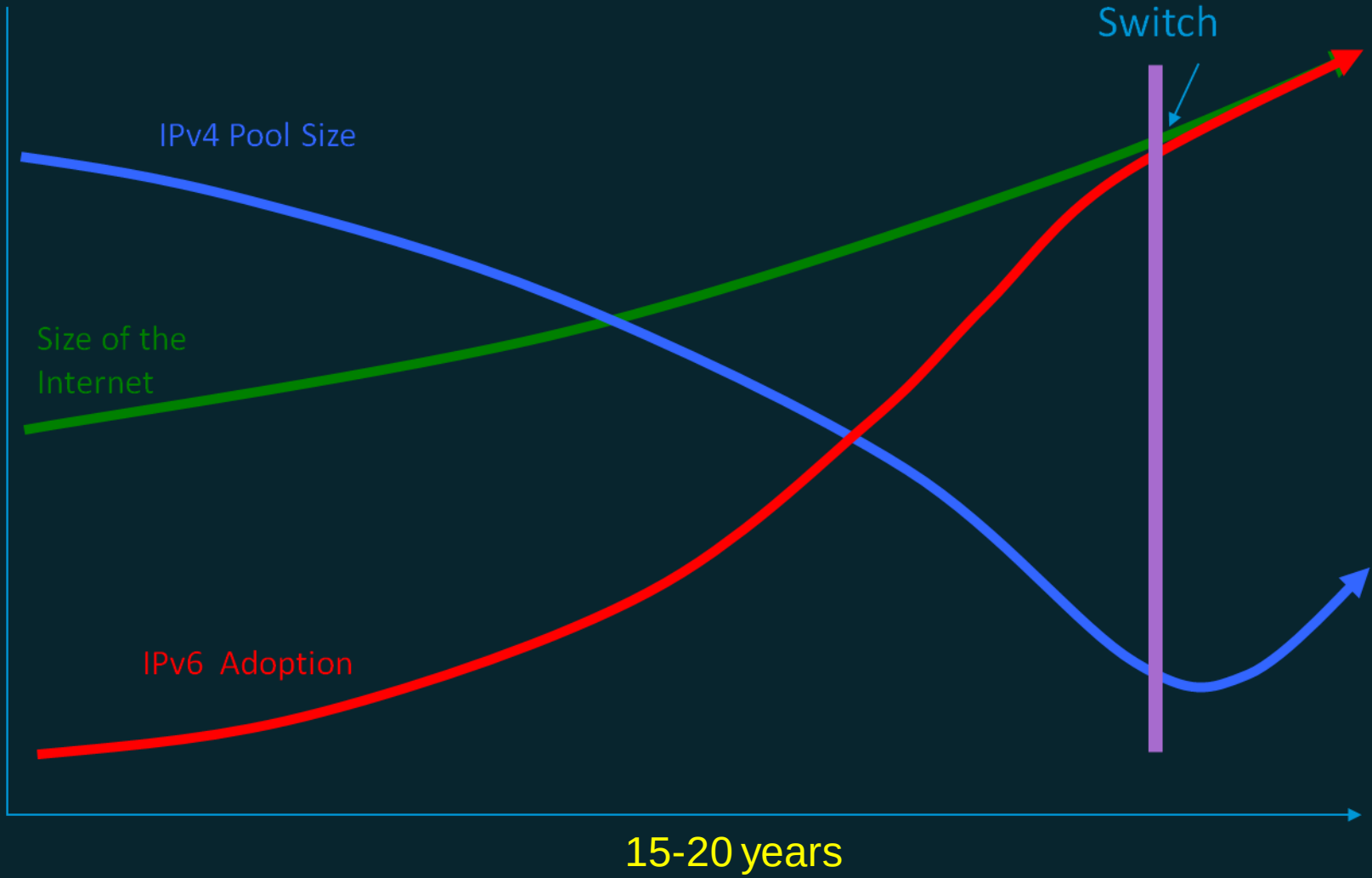
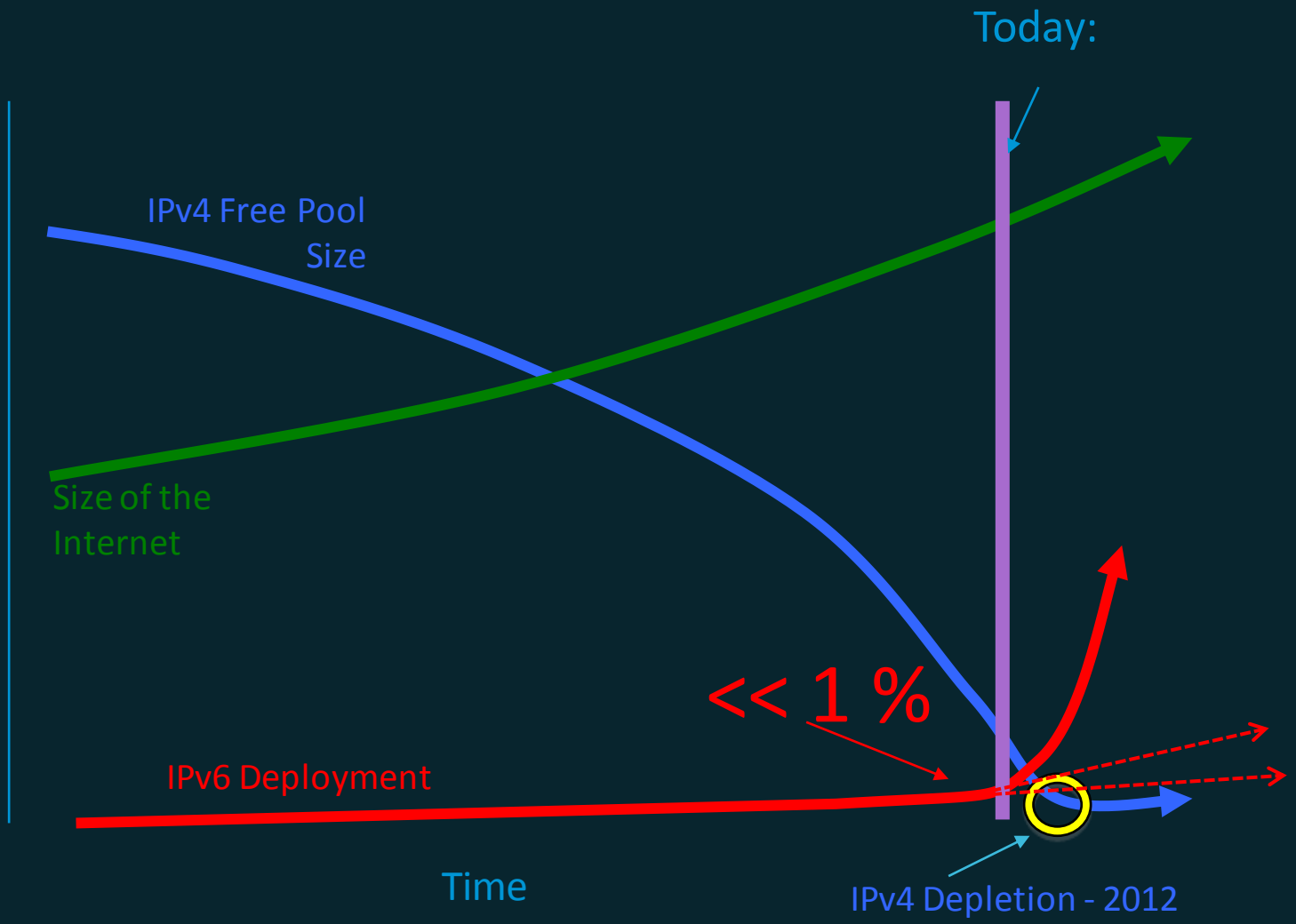
Ideal Transition Strategy…

Dual-Stack Everything !



Reality is more challenges



The road to IPv6 is a journey

Many obstacles, Need Market Leader to Lead the Way

- IPv4 traffic will never disappear, no rush to go to IPv6-only?
- Not sure how to cause transition, but let's stay where we are.
- Market will take care itself. The transition decision is based on business rather than technology.
- When IPv6 is cheaper, need the way to drive IPv6-only content.
- Fail to push for IPv6-only traffic, Internet may fail to grow entirely.
- Long time co-existence will need interconnecting between IP4 & IPv6.

No Backward Compatibility

Huge Investment For E2E Solution

Not Enough Time for Big Migration

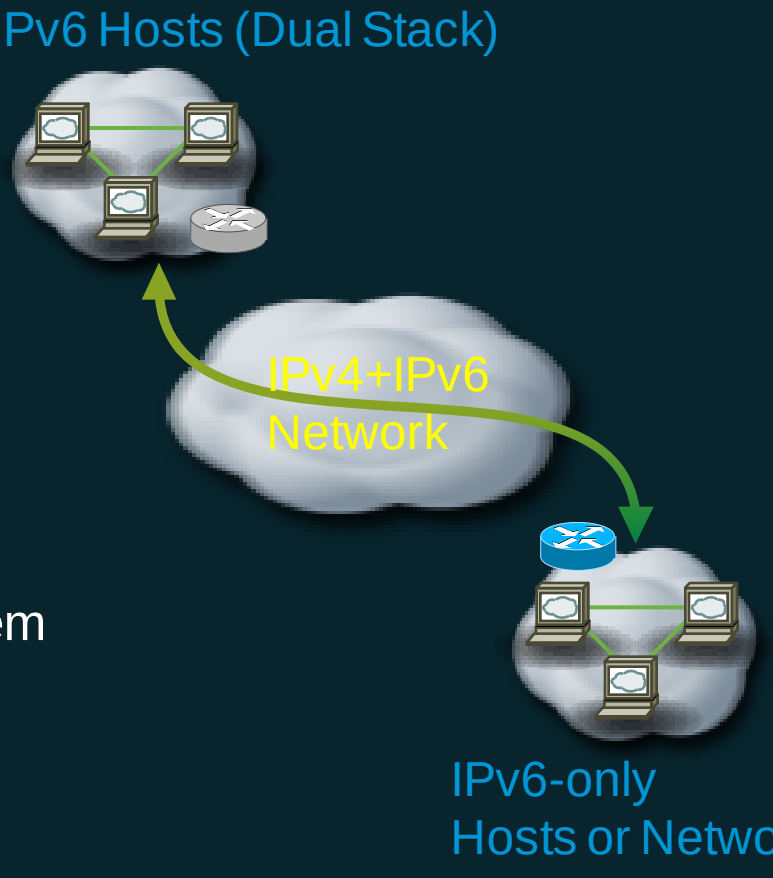
Incompatible Devices

Transition Solution Considerations
Simplicity Metrics: Place In Network (PIN)

	Scope & Ease of Deployment	Characteristics
No PIN	Continues (Simple)	**Have enough IPv4 & want to wait & see, "Head in Sand"**
1 PIN	Single Box (Medium)	**Translation:** Translators (AFT/XLAT/CGN/NAT) is typically housed in one place in the network.
2 PINs	Coordinated (Hard)	**Tunnels:** a classic, an early deployment technology via overlay network . a need for coordination between tunnel endpoints in different administrative domains.
Peering PINs	Coordinated (Harder)	**Trading:** Control Plane credentials (usually encrypted) need to be passed between federated entities to validate that a requested transaction is to be trusted
All PINs	Ubiquitous (Hardest)	**IPv6 Native / Dual-stack:** Support for Native IPv6 on all devices within a domain

Transition: DS as Recommended Approach
RFC 4213 Dual-Stack Deployment

- Dual-Stack Approach:
  - Hosts today are IPv4+IPv6:
    - Windows 7, OSX, Linux, BSD
  - Make the network IPv4+IPv6
- But…
  - An E2E effort, Cost in CAPEX & OPEX.
  - Not much incremental transition at all.
  - Did not solve address exhaustion problem
  - IPv4 run-out makes it untenable
  - DS is only part of transition tools.



We need necessary NATs

- Without IPv6 only content, no truly incremental transition !
- Without v4->v4 NAT, there will be not truly IPv6-only content !
- Without v6->v4 NAT, we can not roll out any IPv6 network !

- Almost nobody like NAT, but we use it everyday!
- If we has v4->v6 NAT work and IPv4 access to IPv6-only service is only slightly degraded, then we could significantly speed up the adoption of IPv6 for websites, application, service, peer to peer.

Enabling Tunneling Solutions

Deployable Solutions

- IPv6/IPv4 Tunnels
  - ✔ 6rd
  - ✔ Static Tunnels

Prototyping solutions

- 6to4, ISATAP, Teredo, …
- Avoid them
  - Routing is uncontrolled
  - Inconsistent user experience

Future Solutions

IPv4/IPv6 Tunnels

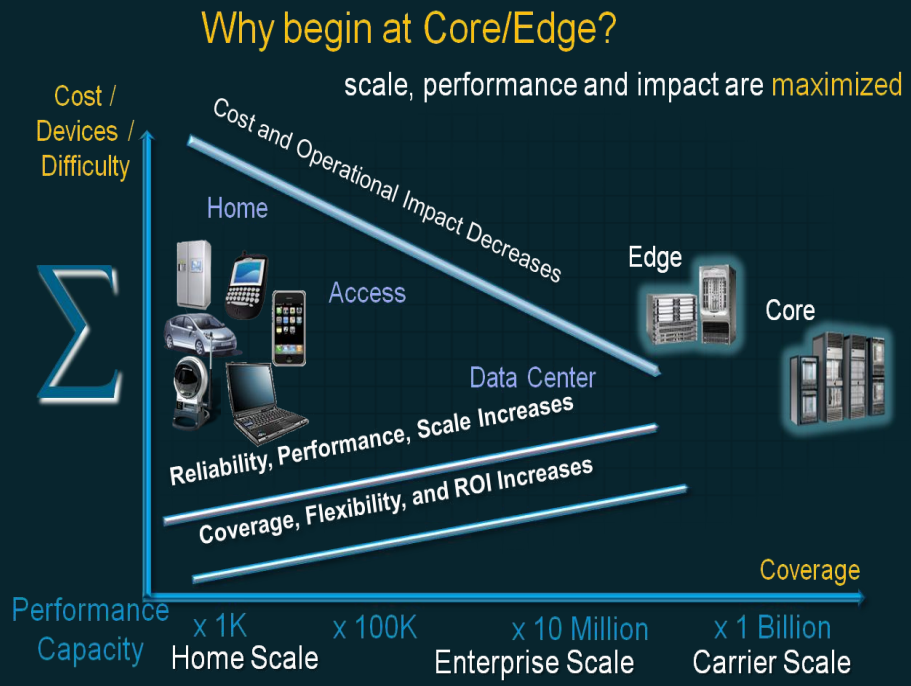
- 4rd, d-IVI, 4V6
- DS-Lite

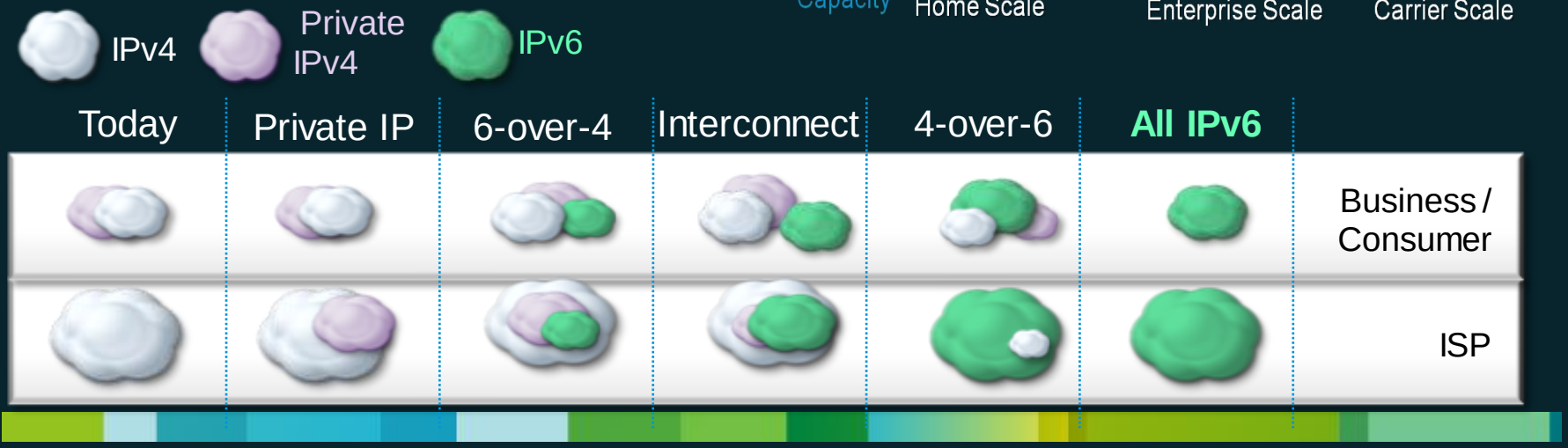
?

It must have IPv6-only content, tunnel become viable !

Risking the business on new IPv6 network

Transition: Orderly, Incrementally





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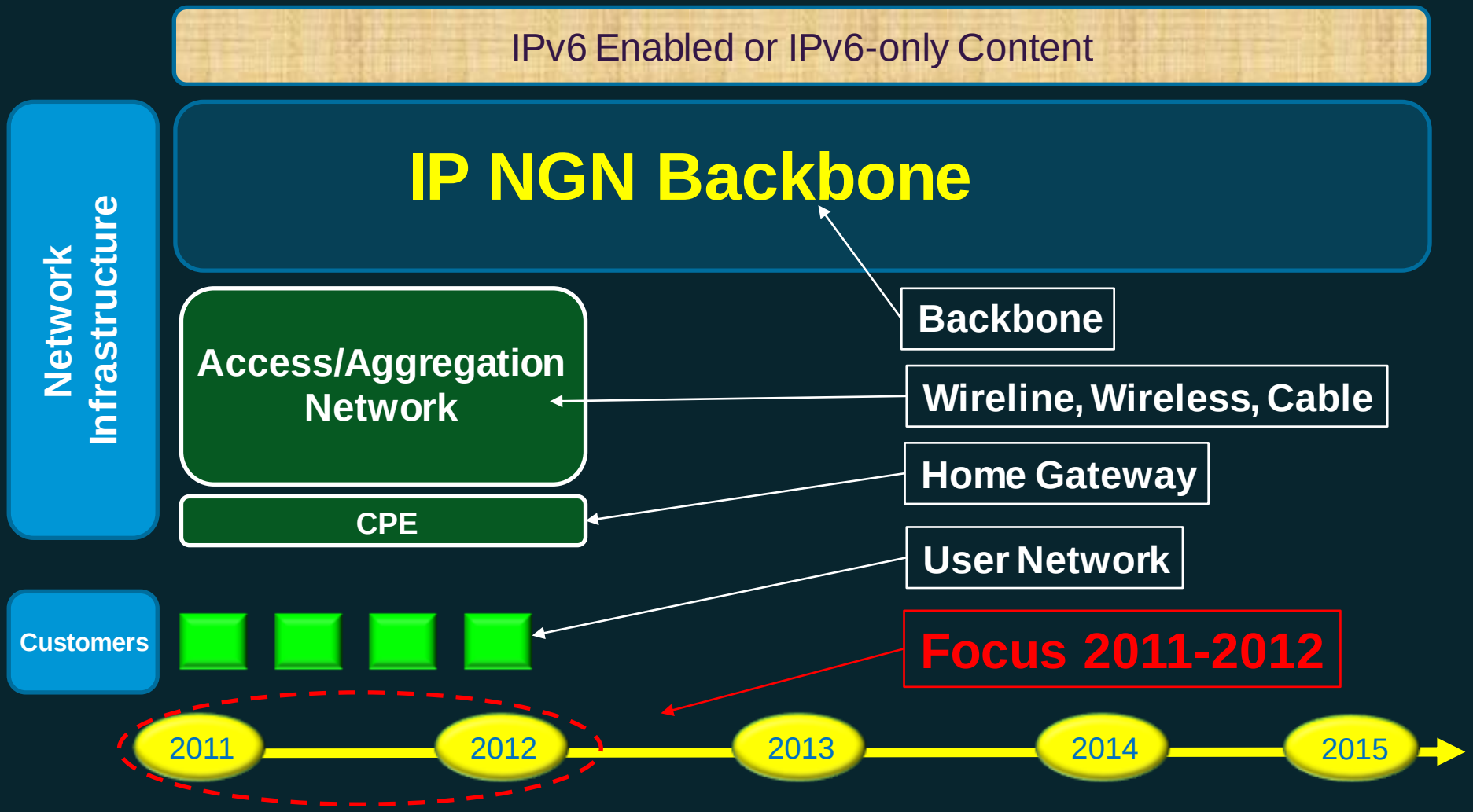
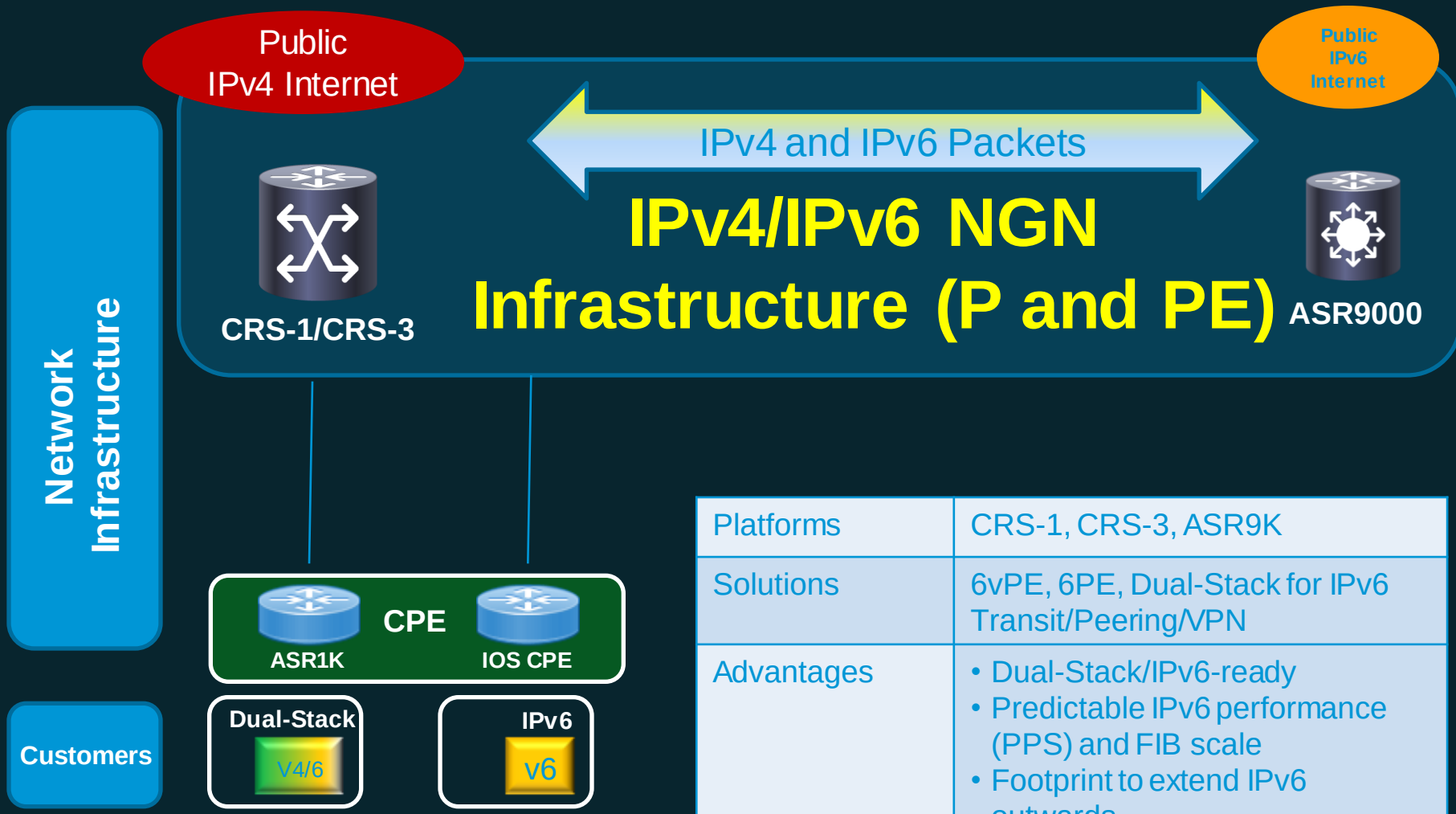
Focus Execution in 2011-2012



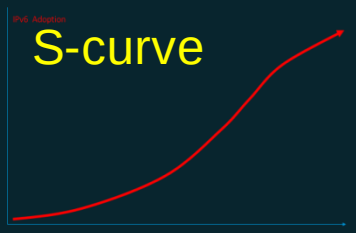
IPv6 Backbone Strategy

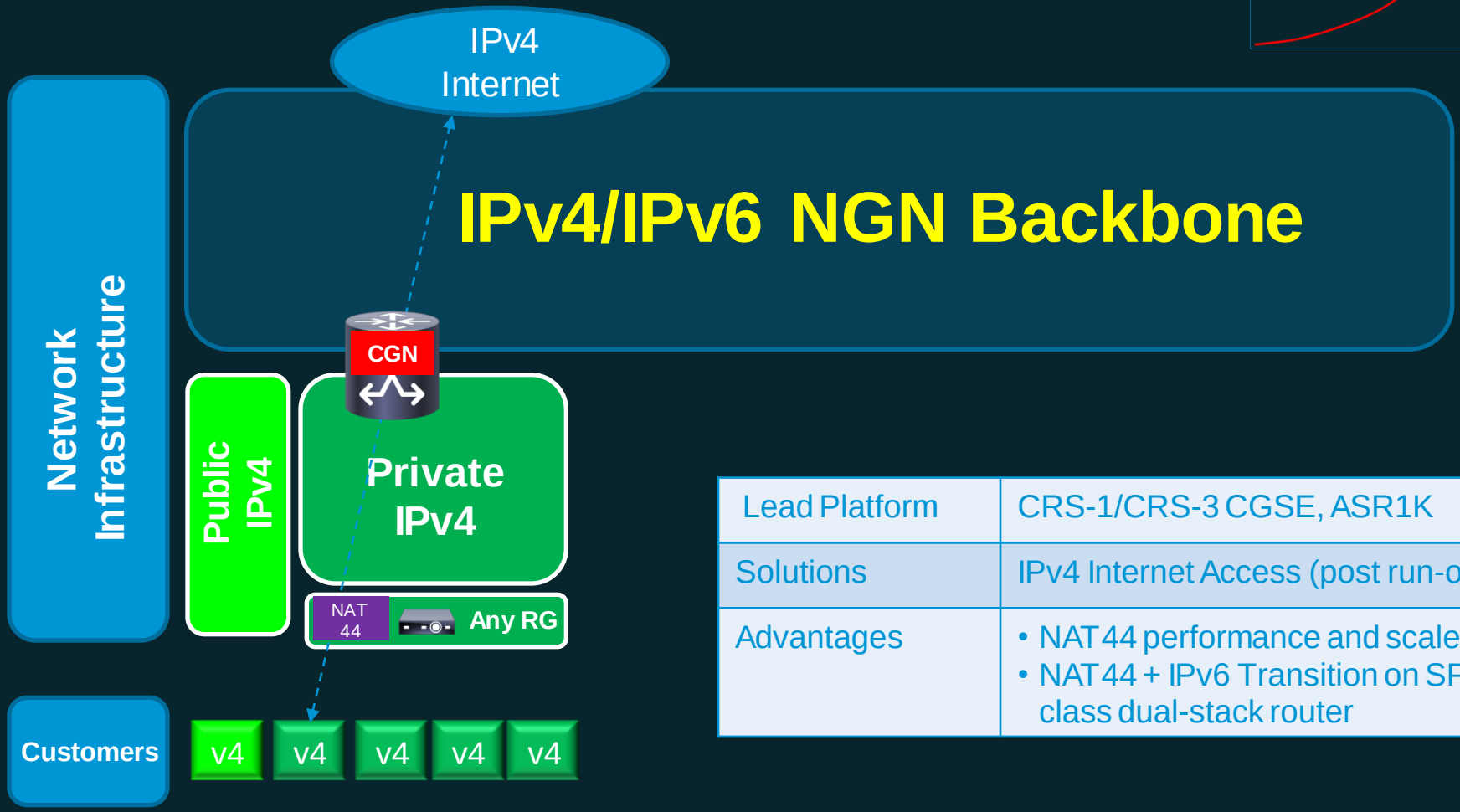


Platforms	CRS-1, CRS-3, ASR9K
Solutions	6vPE, 6PE, Dual-Stack for IPv6 Transit/Peering/VPN
Advantages	• Dual-Stack/IPv6-ready • Predictable IPv6 performance (PPS) and FIB scale • Footprint to extend IPv6 outwards

CGN NAT44 Positioning

Preserve Growth

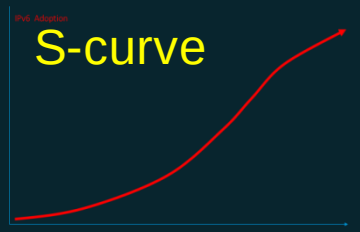


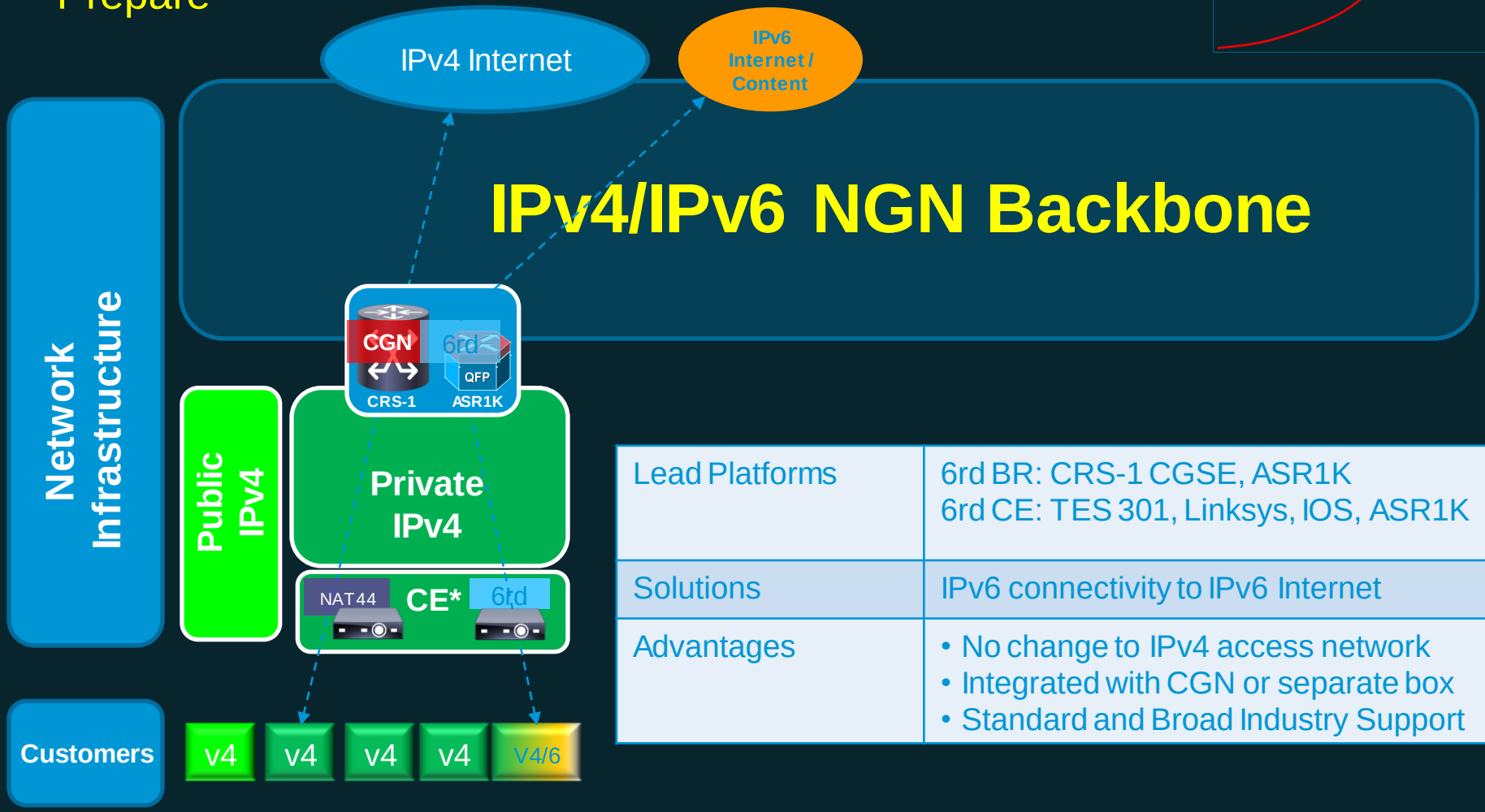


Lead Platform	CRS-1/CRS-3 CGSE, ASR1K
Solutions	IPv4 Internet Access (post run-out)
Advantages	• NAT44 performance and scale • NAT44 + IPv6 Transition on SP-class dual-stack router

6rd Positioning

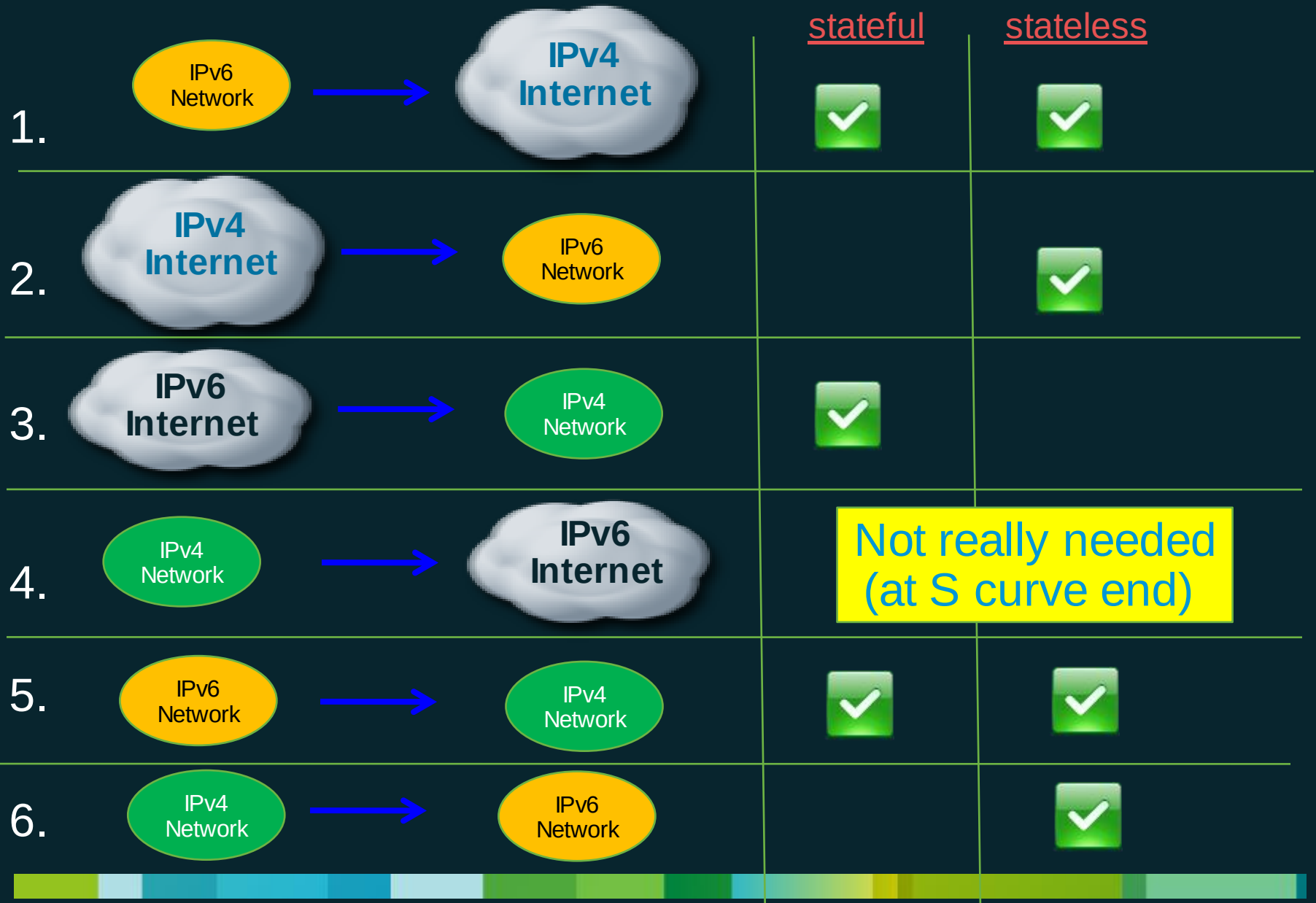
Prepare



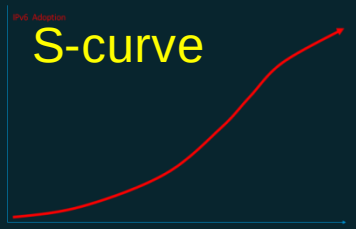


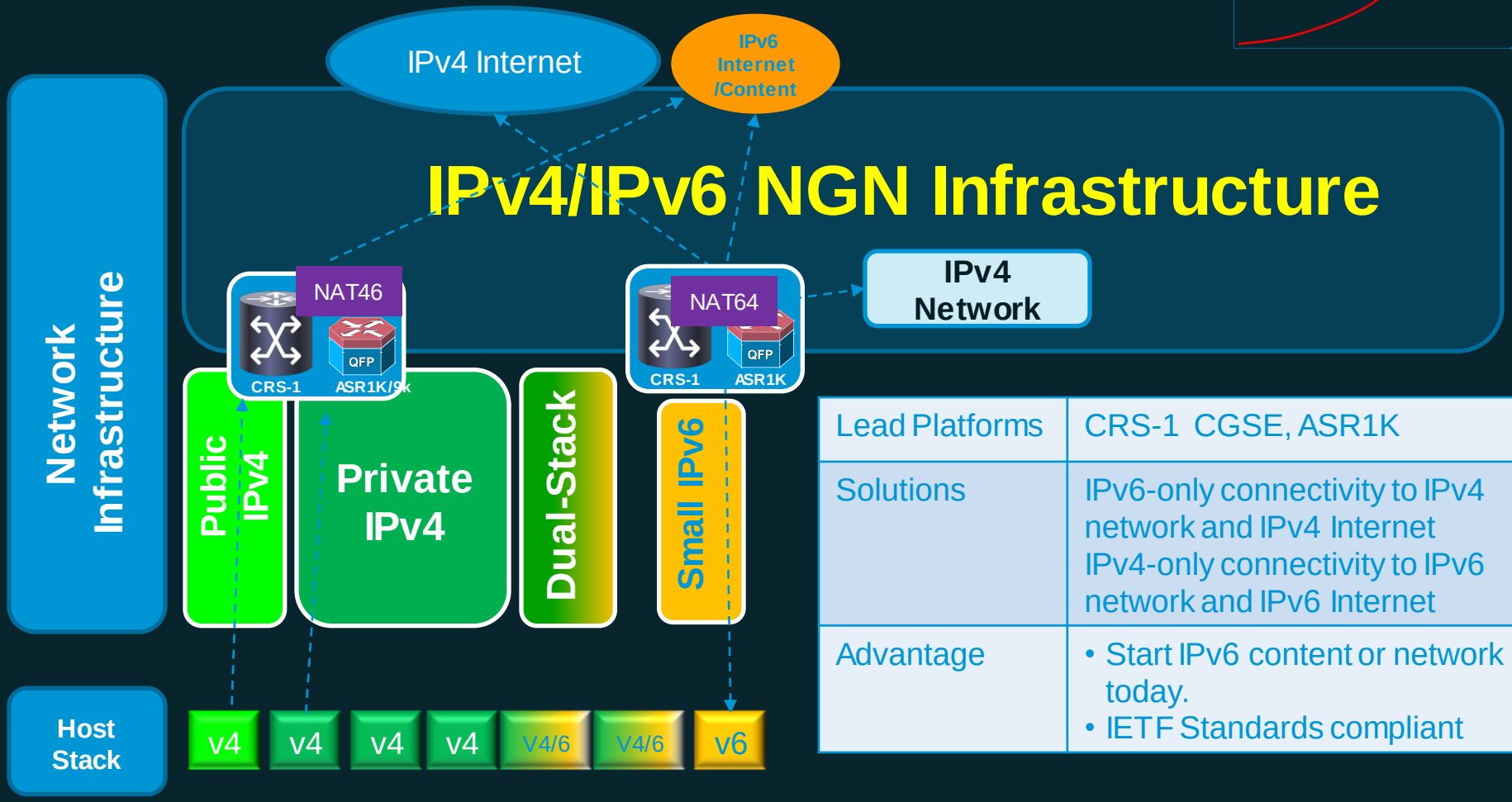
Lead Platforms	6rd BR: CRS-1 CGSE, ASR1K 6rd CE: TES 301, Linksys, IOS, ASR1K
Solutions	IPv6 connectivity to IPv6 Internet
Advantages	• No change to IPv4 access network • Integrated with CGN or separate box • Standard and Broad Industry Support

Translation Scenarios (RFC6144)



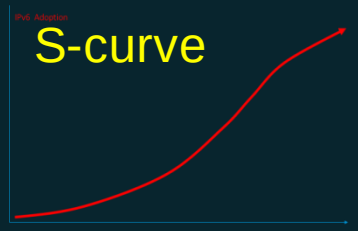
NAT46 & NAT64 Positioning

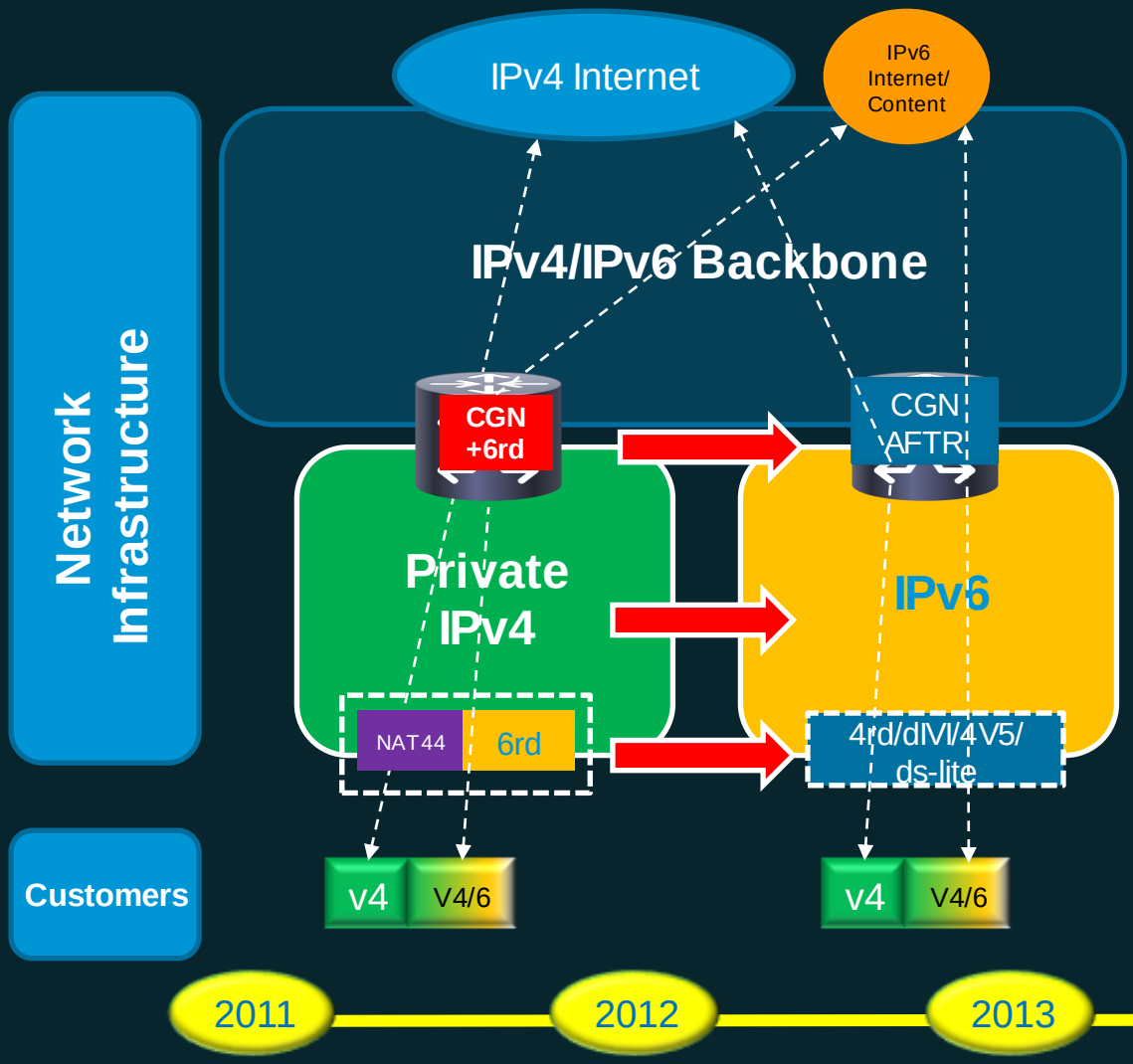




Lead Platforms	CRS-1 CGSE, ASR1K
Solutions	IPv6-only connectivity to IPv4 network and IPv4 Internet IPv4-only connectivity to IPv6 network and IPv6 Internet
Advantage	• Start IPv6 content or network today. • IETF Standards compliant

4rd/d-IVI/4V6 vs DS-Lite ?





- DS-lite now ?:
- Access/metro IPv6 build-out
- Scalable enough ? Stateful
- Requires CPE
- Same service as CGN +6rd

- In future, competitive stateless solution will merge
- 4rd/d-IVI/4V6

Summary

- Why rethink IPv6 transition strategy now ?

  Run out of IPv4 address ! Old strategy no longer valid !

- Goal of Transition Strategy

  Provide IPv6 service, Sustain IPv4 service with necessary NATs

- Overview of Transition Execution

  De-couple strategy for ICP & ISP.

  Carrier Grade NAT (CGN) not just for NAT44

  - 6rd with NAT to provide IPv6 access service.
  - NAT46 for IPv6-only content or network
  - NAT64 for IPv6-only user / network

Thank you.