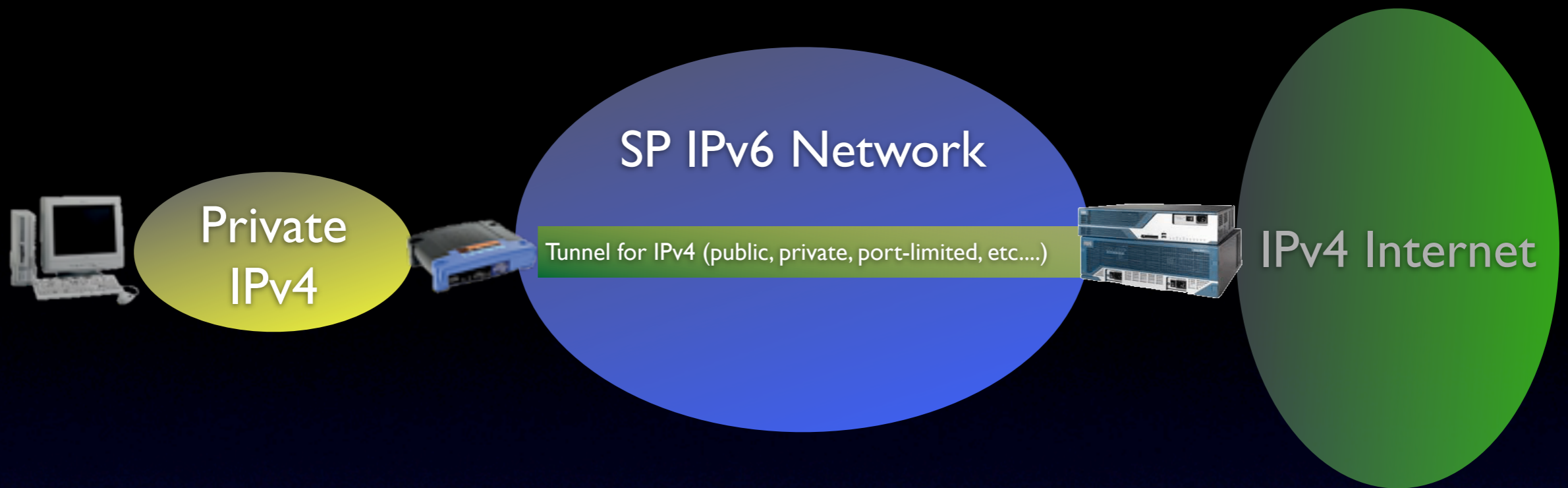# 1. IPv4 Sites Reaching Global IPv4 Internet

Private IPv4

NAT

IPv4 Internet

- Keep IPv4 service as unchanged as possible, even without enough addresses

- Single global IPv4 address shared across more than one subscriber

SP IPv6 Network

Private IPv4

Tunnel for IPv4 (public, private, port-limited, etc....)

IPv4 Internet

- Scenario #2 - Service Providers Running out of Private IPv4 space

- IPv4 / IPv6 encapsulations/tunnels

- Tunnels setup by DHCP, Routing, etc. between a GW and Router

- Wherever the NAT lands, it is important that the user keeps control of it
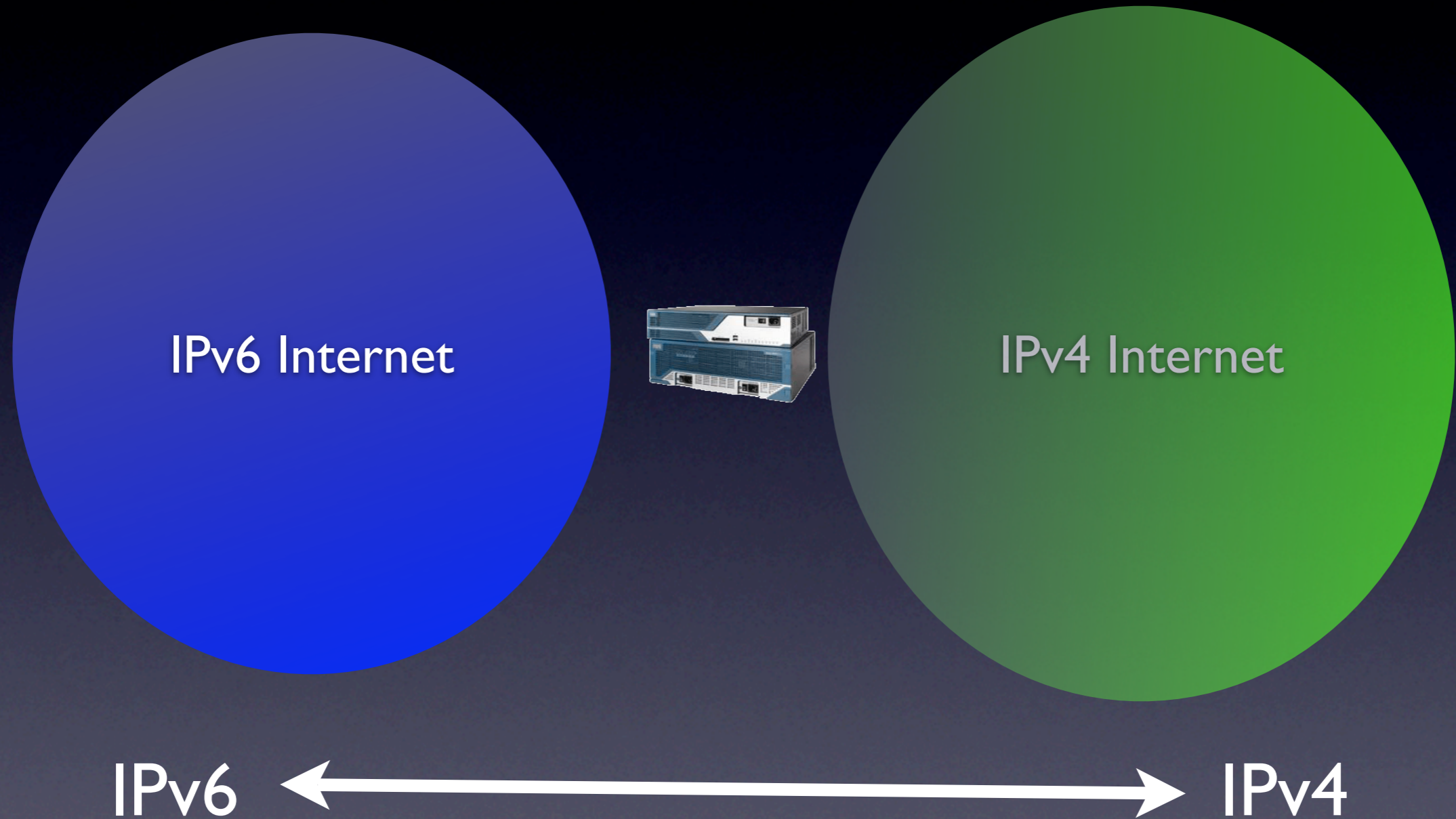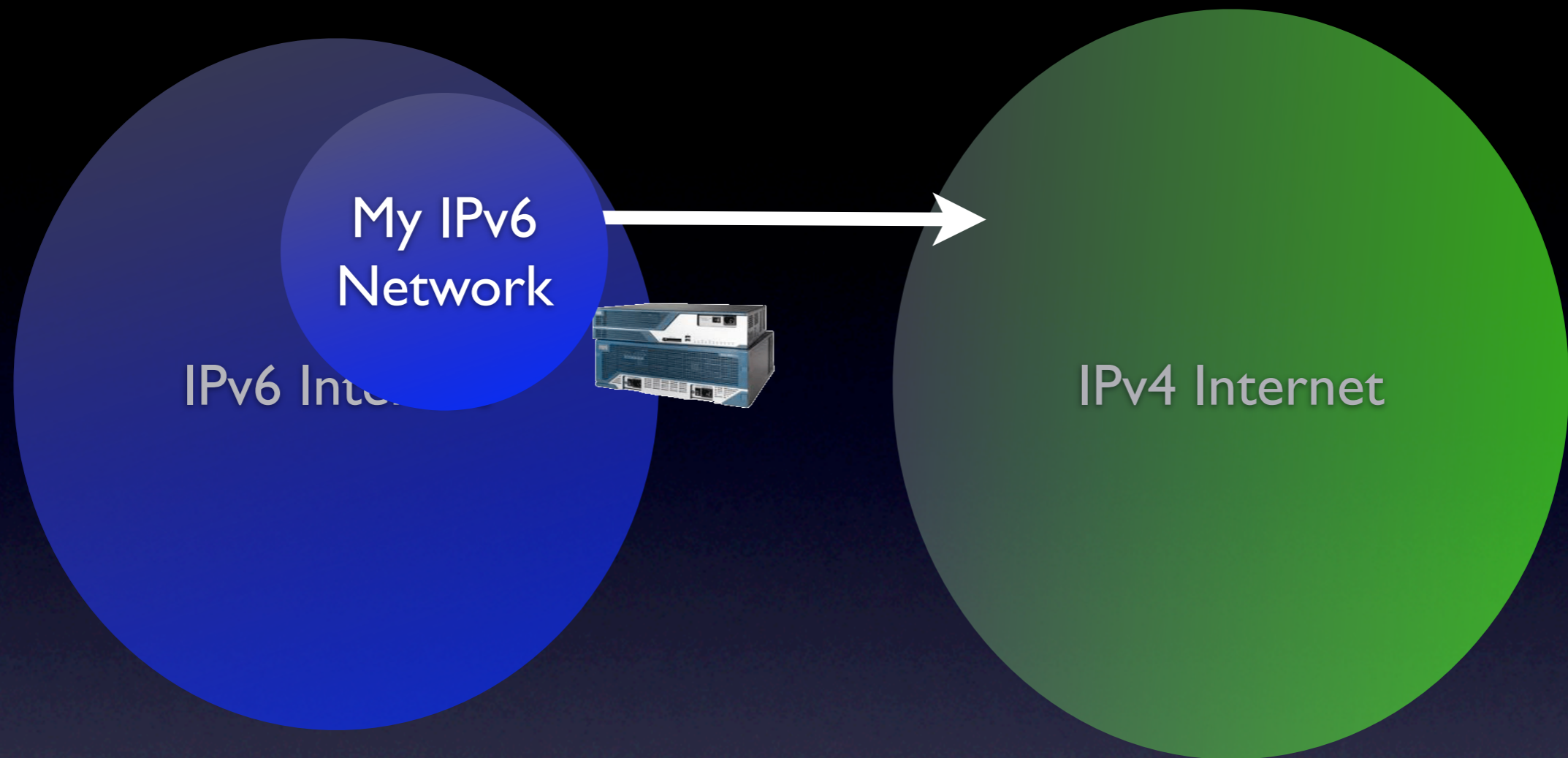
- Provides a path to delivering IPv6

SP IPv6 Network

Tunnel for IPv4 (public, private, port-limited, etc....)

IPv4 Internet
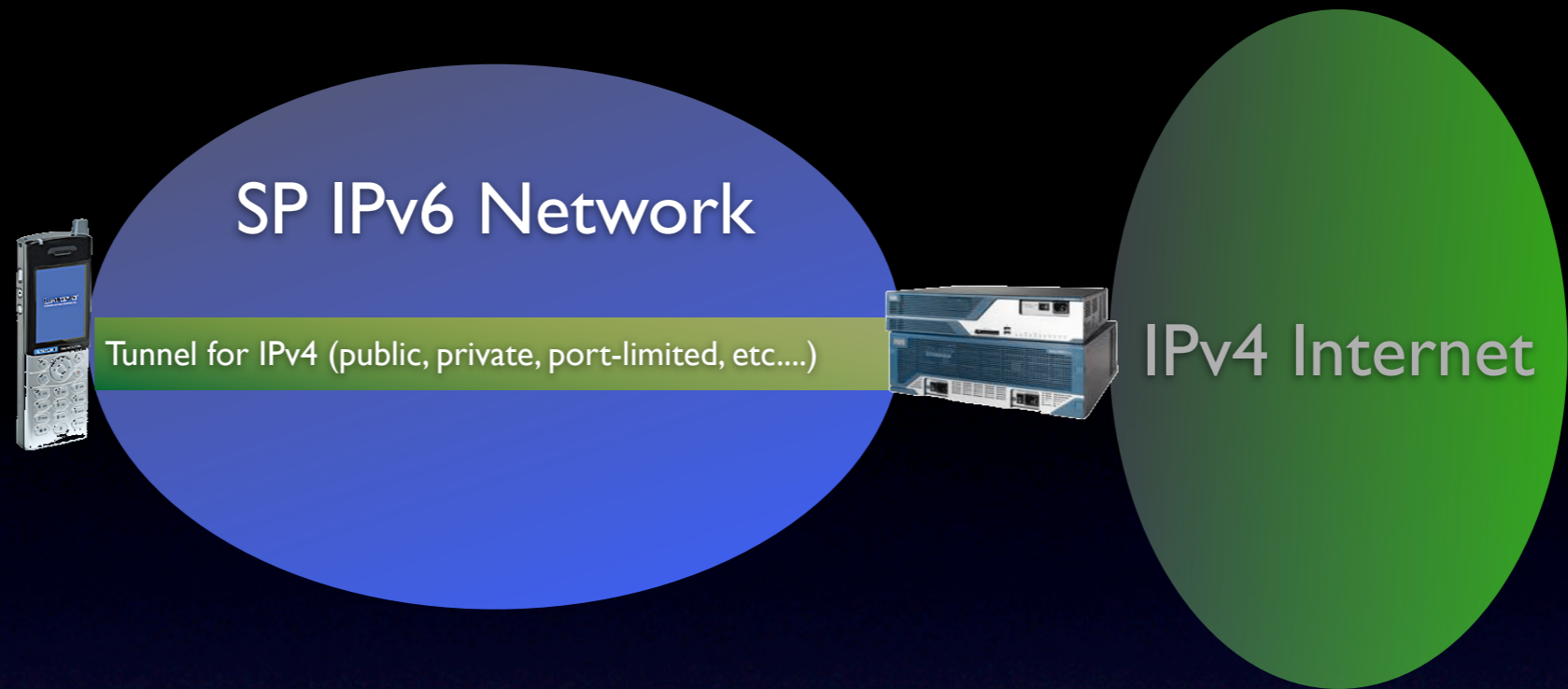
- Scenario #3a "Wireless Greenfield"

- IPv4 / IPv6 encapsulations/tunnels

- Tunnels setup between a host and a Router

- IPv4 binding for host applications, transport over IPv6

- Wherever the NAT lands, it is important that the user keeps control of it
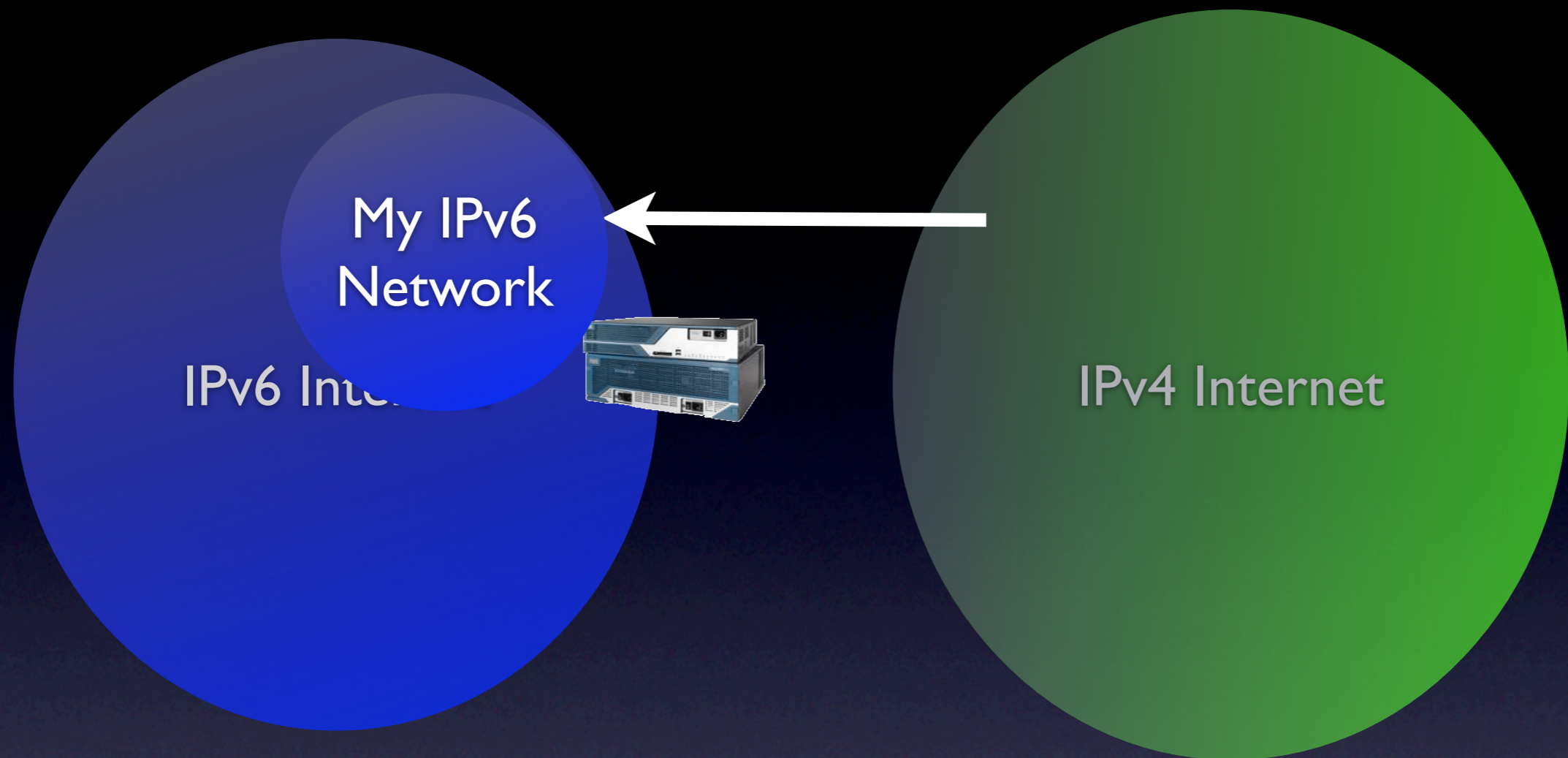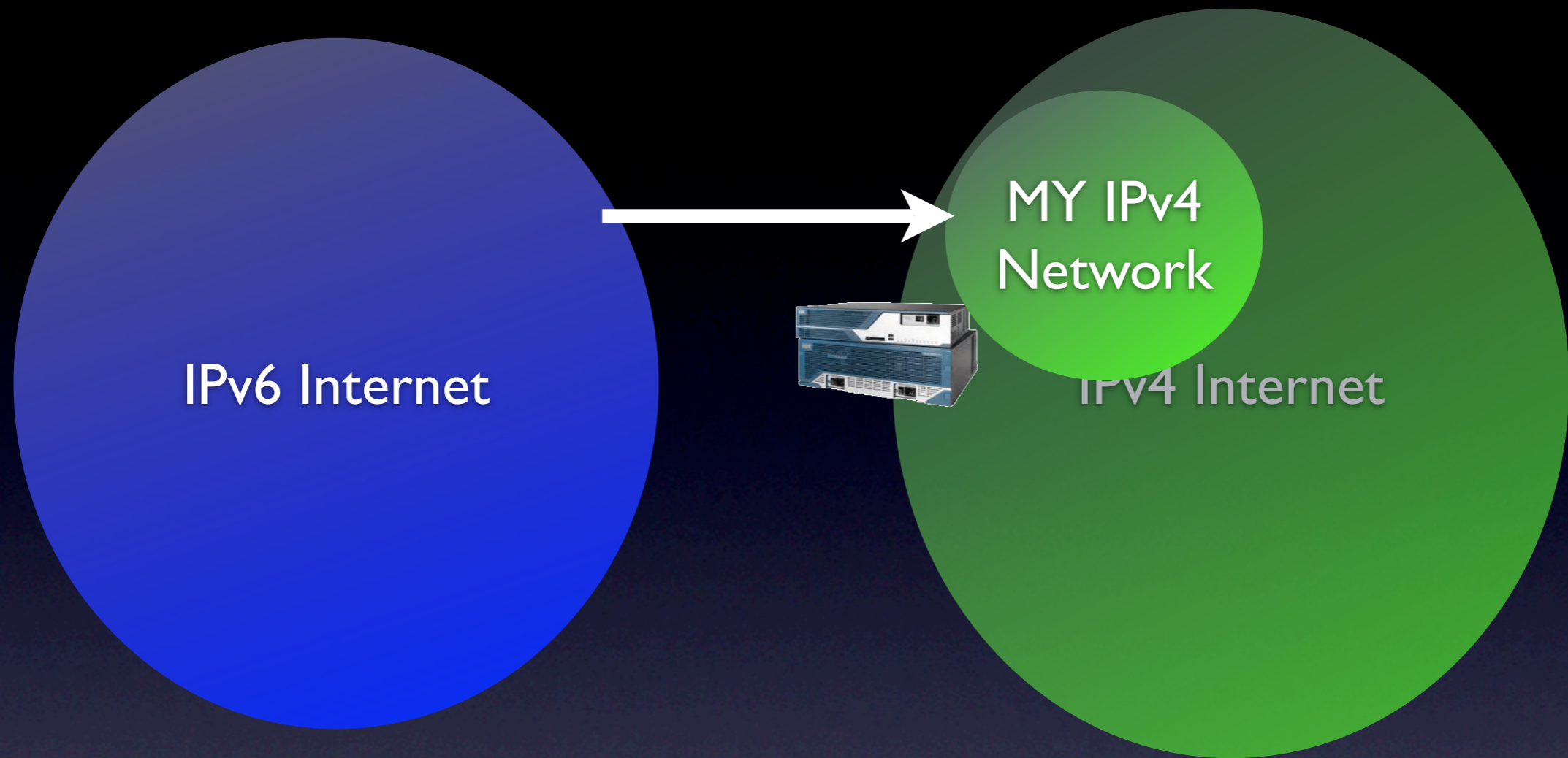
3 - 5   Translation Options

IPv6 Internet

IPv4 Internet

IPv6 ←————————————————→ IPv4

My IPv6
Network

IPv6 Inter

IPv4 Internet

- "Scenario #3"

- NAT64/DNS64.... - Stateful, DNSSEC Challenges, DNS64 location, etc.

My IPv6
Network

IPv6 Inte...

IPv4 Internet

- "Scenario #5"

- IVI - NAT-PT..... Expose only certain IPv6 servers, etc.

IPv6 Internet

MY IPv4 Network

IPv4 Internet

- "Scenario #4"
- NAT64 - 1:1, Stateless, DNSSEC OK, no DNS64

IPv6 Internet

MY IPv4
Network
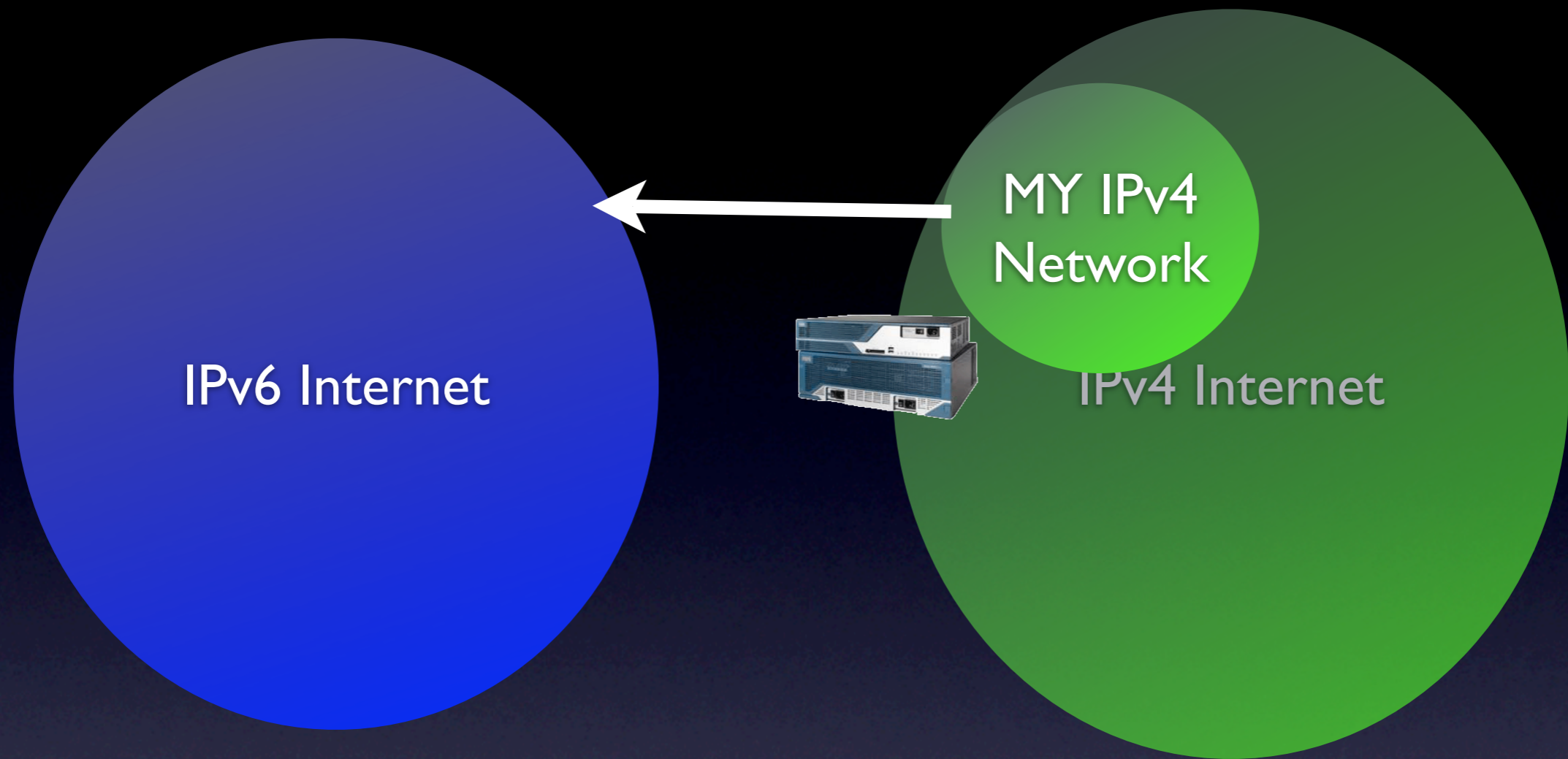
IPv4 Internet

- Already solved by existing transition mechanisms?? (teredo, etc).

Scenarios 1 - 5

1. IPv4 Sites Reaching Global IPv4 Internet

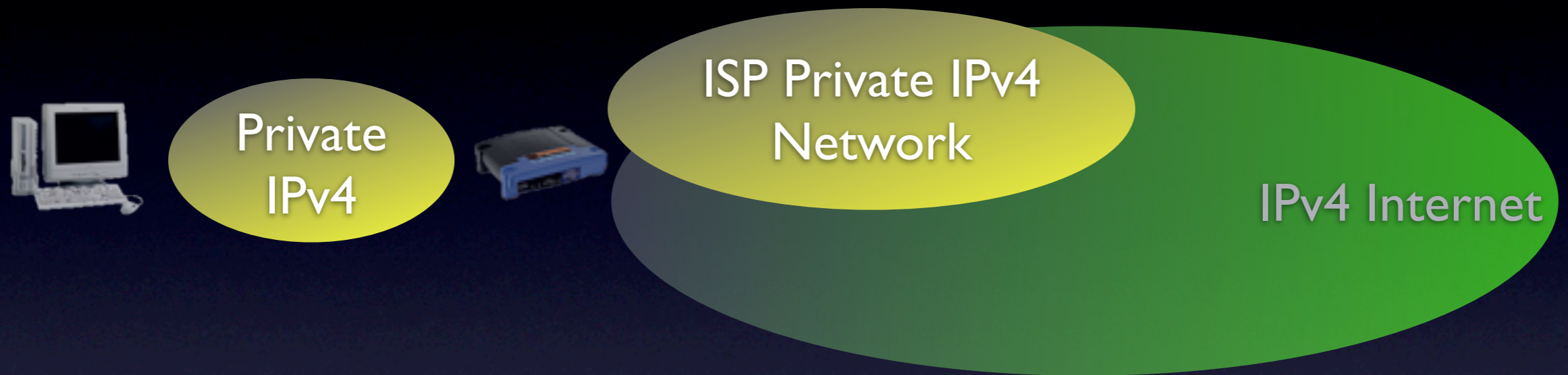Private IPv4 — NAT — IPv4 Internet

- Keep IPv4 service as unchanged as possible, even without enough addresses

- Single global IPv4 address shared across more than one subscriber

2. Service Providers Running out of Private IPv4 space

Private IPv4

ISP Private IPv4 Network

IPv4 Internet

- Service Providers with large, privately addressed, IPv4 networks

- Organic growth plus pressure to free global addresses for customer use contribute to the problem

- The SP Private networks in question generally do not need to reach the Internet at large
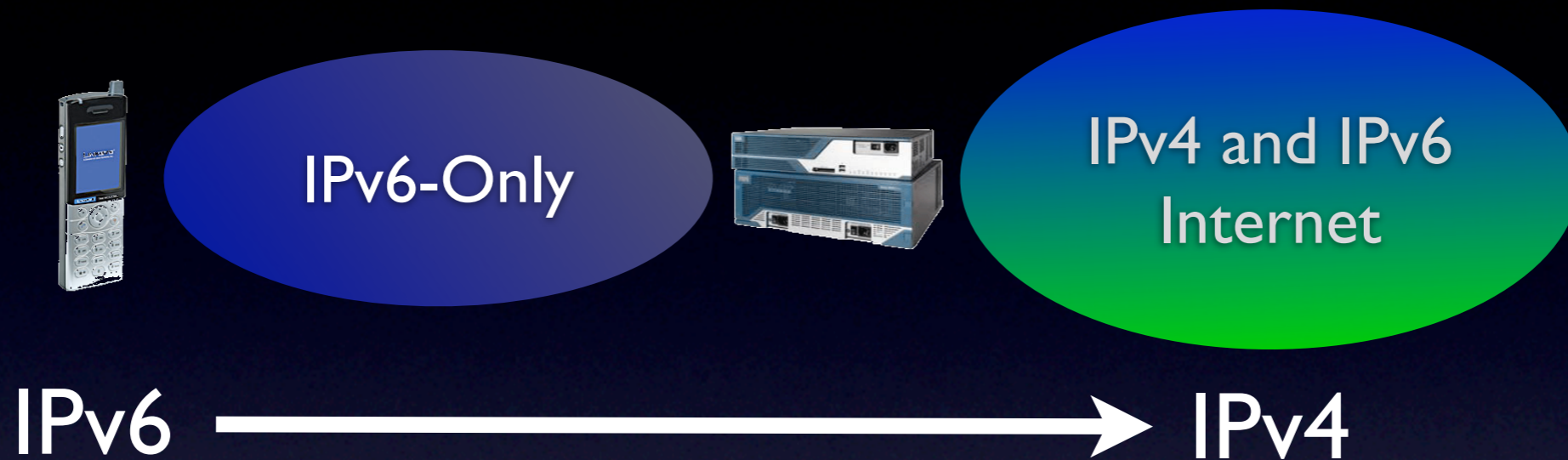
3. Enterprise "Greenfield" IPv6-only Networks

- Built from the ground up to run IPv6 only

- Operational overhead of dual-stack considered high

- Ability to specify what equipment is used or not used

- Internal traffic IPv6, but still need to reach IPv4 Internet access

3(a). Wireless "Greenfield" IPv6-only Networks

IPv6-Only

IPv4 and IPv6 Internet

IPv6 ——————————————→ IPv4

- Topologically similar to Enterprise case

- In Wireless, there may be more control over end-devices than in an Enterprise

# 4. IPv6 Hosts Reaching Private IPv4-Only Servers

IPv4 and IPv6 Internet

Private IPv4

IPv6 ──────────────────▶ IPv4
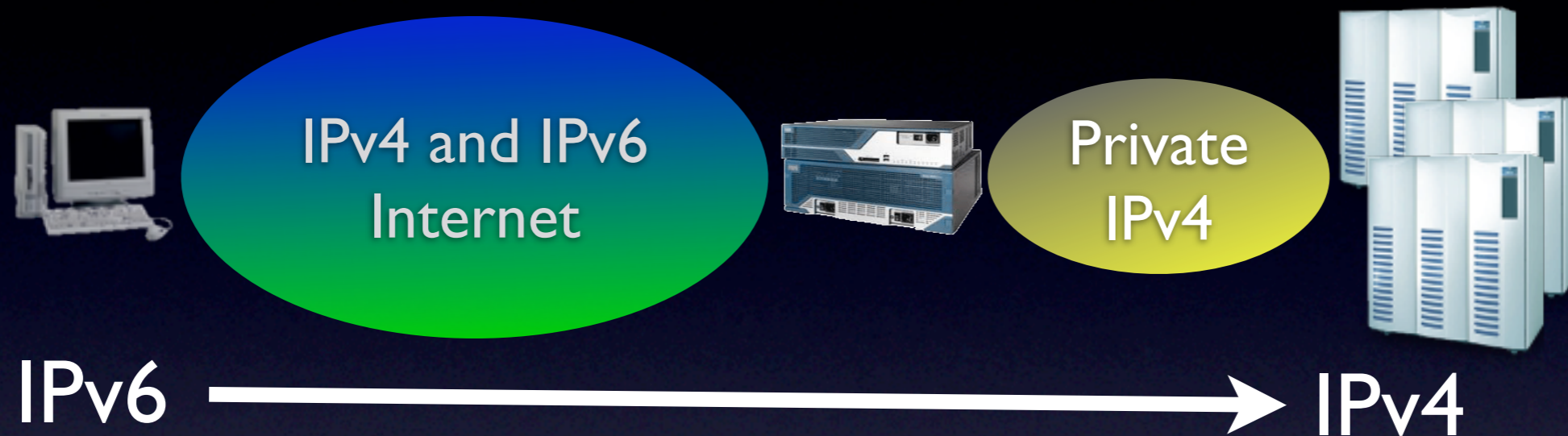
- Multiple servers, running different applications

- Need global reachability, but sufficient if only to hosts that are IPv6 capable (native or via a tunnel over IPv4)

- Similar in function to #3, but with a much smaller target IPv4 network

5. IPv4-Only Hosts Reaching IPv6-Only Servers

IPv4-only

IPv4 and IPv6 Internet
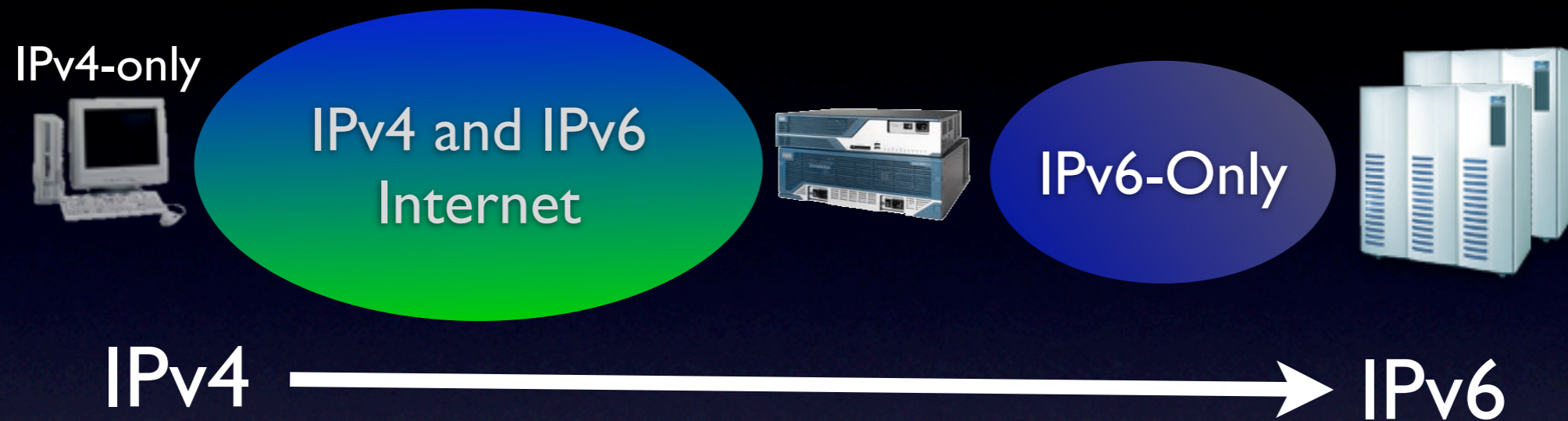
IPv6-Only

IPv4 ➝ IPv6

- Exposing IPv6-only servers to the IPv4 Internet

- IPv6 servers share a global IPv4 address for reachability

- Obvious solutions in this space are few (it's considered "hard")