



RFC8273

Unique IPv6 Prefix per Host

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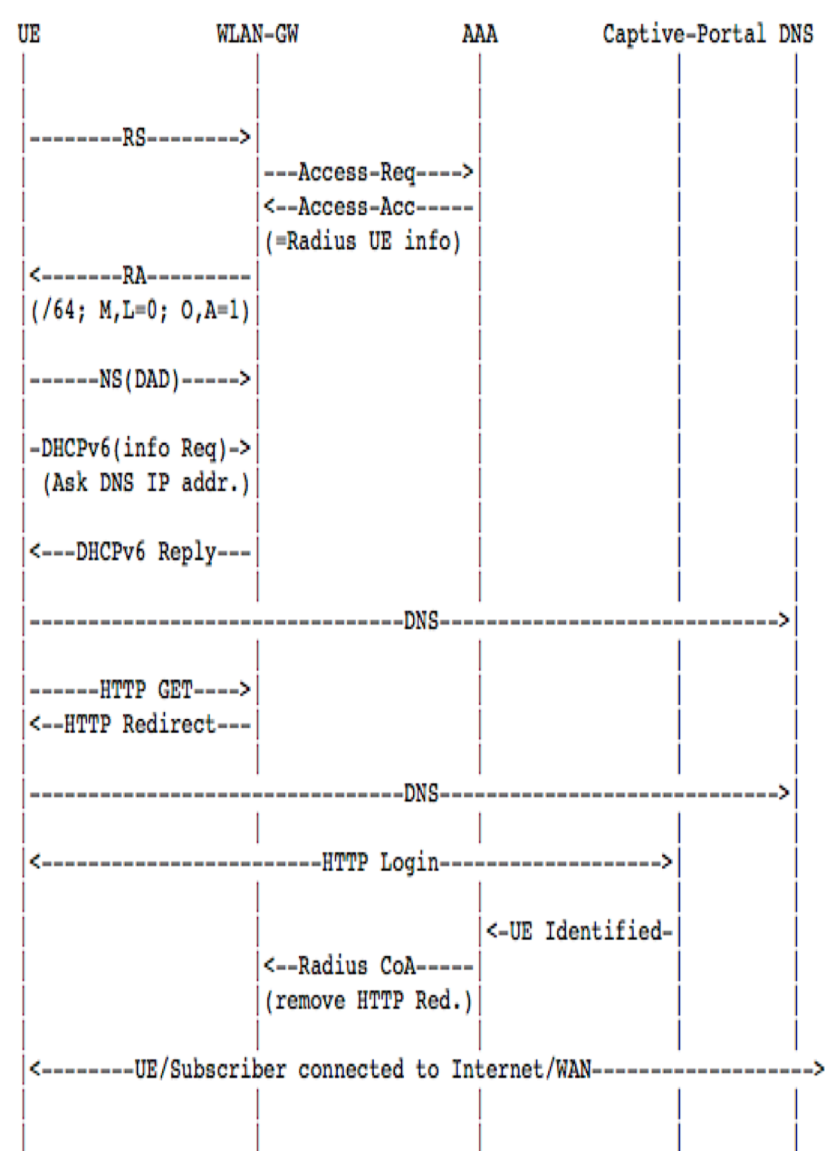
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RFC8273

- RFC8273: “Unique IPv6 Prefix per Host”
- Not a “new” protocol, so already widely supported
 - Use “existing IPv6 protocols” to allow a unique IPv6 prefix (instead of a unique IPv6 address from a shared IPv6 prefix) to be assigned to a host interface
- Allows improved host isolation and enhances subscriber management on shared network segments, such as Wireless networks, data centres, among others
- Provides a very simple mechanism for a single host or interface, to be able to run 2^{64} virtual machines, with their own global IPv6 address, not requiring to share a single one

“How To”



1. First-hop router is a L3 edge router
2. UE connects to the shared-access network and starts IP configuration with SLAAC RS
3. First-hop router sends solicited RA response ONLY to the requesting UE
 - Instead of using the link-layer multicast address (all-nodes group), using the link-layer unicast address of the requesting UE
 - The solicited RA contains the unique prefix (/64) and flags (to indicate if SLAAC and/or DHCPv6 should be used, etc.)
 - Prefix from locally/centrally managed pool, aggregate IPv6 block, ...
 - Flags, best practices:
 - M-flag = 0 (address not managed with DHCPv6, 1 for DHCPv6 prefix delegation)
 - O-flag = 1 (DHCPv6 used for other configuration information)
 - A-flag = 1 (UE can configure itself using SLAAC)
 - L-flag = 0 (prefix is not an on-link prefix, everything sent to the gateway)
4. Periodically unsolicited RAs follow same approach

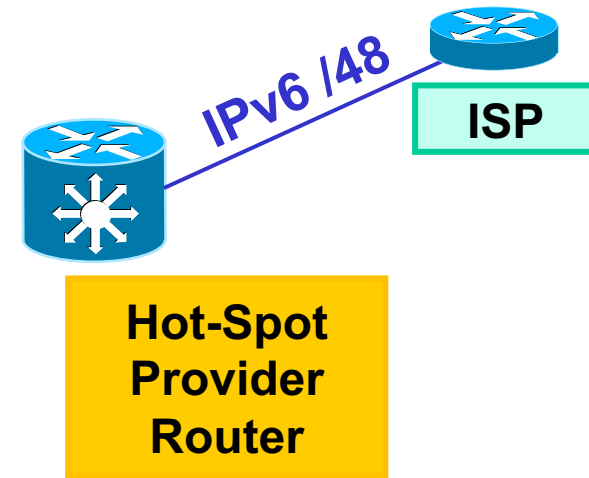
Usage Scenarios

- We are already doing in cellular:
 - /64 per PDP context
 - Prefix sharing with other devices (tethering)
 - Facilitate IPv6-only access (and IPv4-as-a-service)
- Allows extending same concept to other scenarios:
 - Hot-Spot
 - WiFi Calling: Secured Voice over WiFi over “untrusted” connection
 - IPv4 or IPv6 IPsec tunnels to the ePDG (evolved Packet Data Gateway)
 - Corporate networks
 - Data Center
- Allows also IPv6-only access and IPv4-as-a-service
 - Same concept as above for WiFi Calling
 - VPN “on demand” in “own” network for IPv4 services
 - No need for NAT44 (lowers logging costs and fragmentation issues)

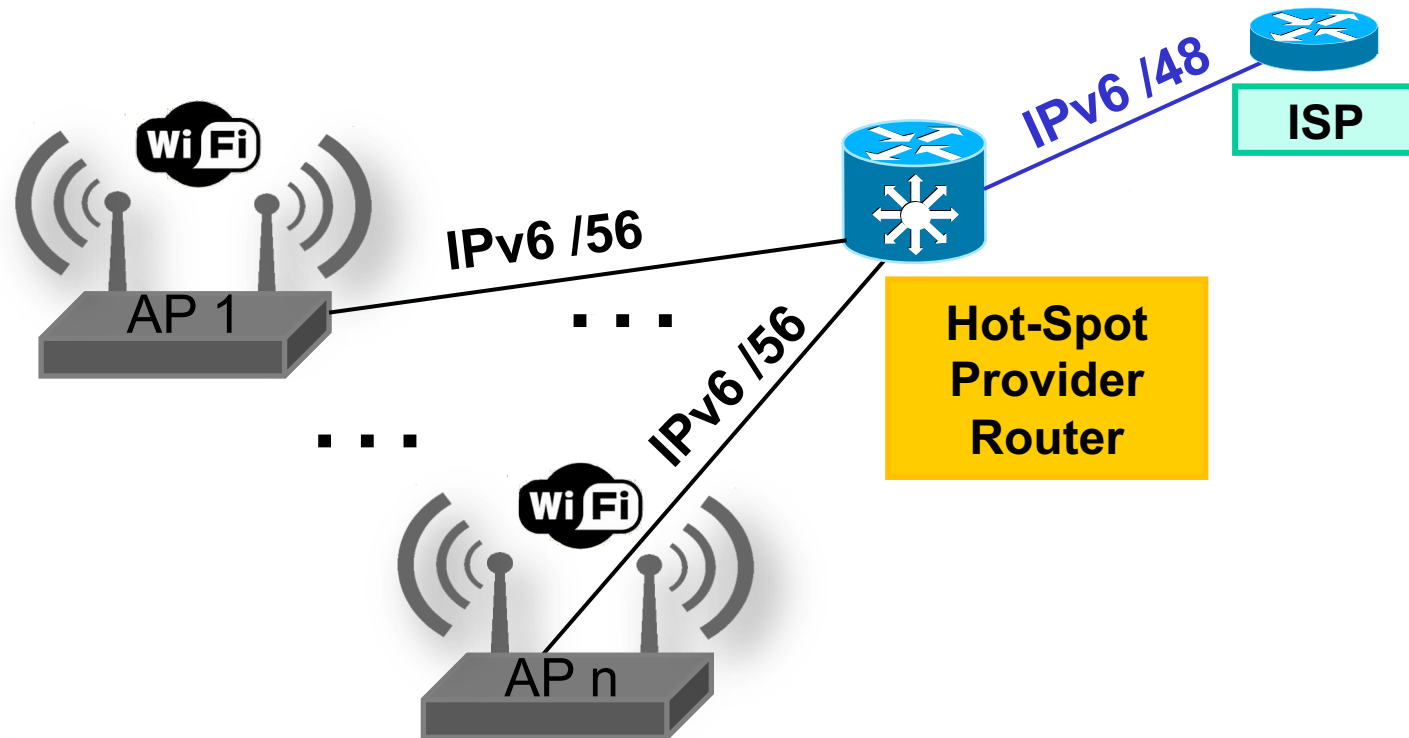
Hot-Spot Usage

- WiFi shared-access L2 network
- Provide isolation between user devices either due to legal requirements or to avoid potential abuse
- By using “unique IPv6 prefix per host”, devices only can communicate thru the first-hop router
- Automatically avoids attacks based on link-local ICMPv6:
 - DAD reply spoofing
 - ND cache exhaustion
 - Malicious redirects
 - Rogue RAs
- Better scalability and robustness than DAD proxy, forced forwarding, ND snooping, etc.

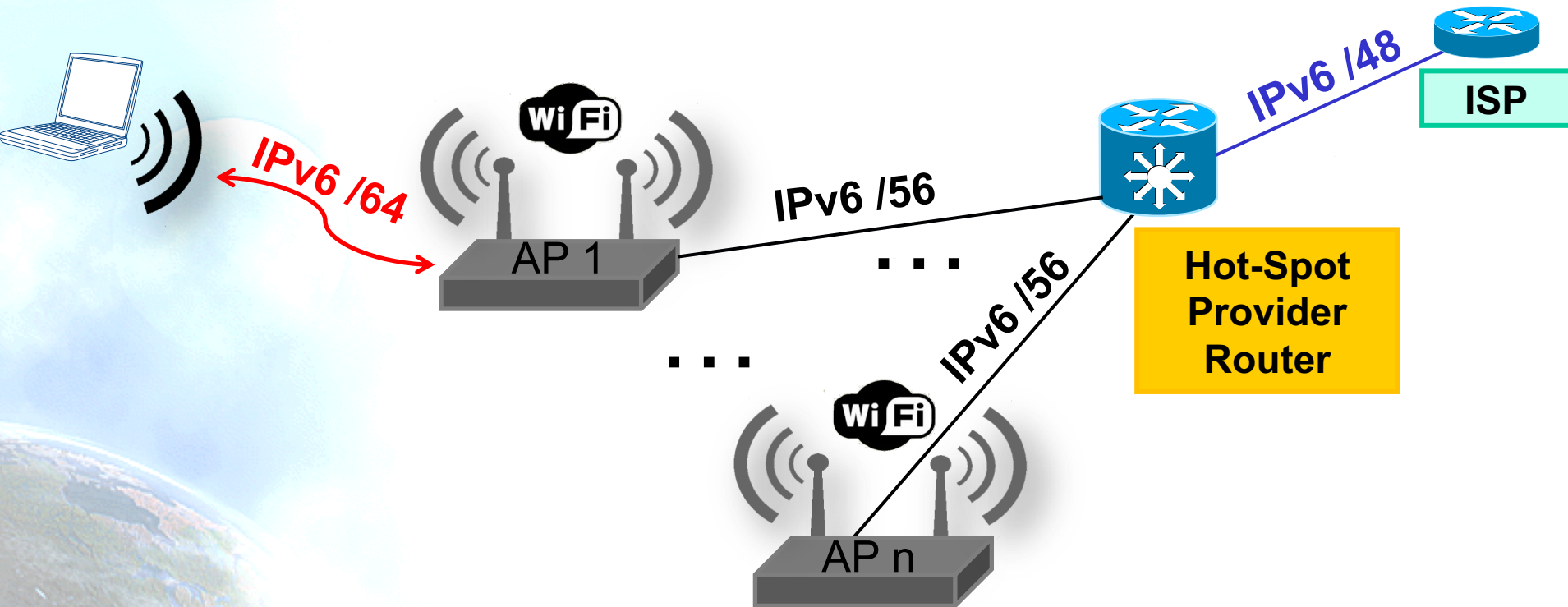
Hot-Spot Example



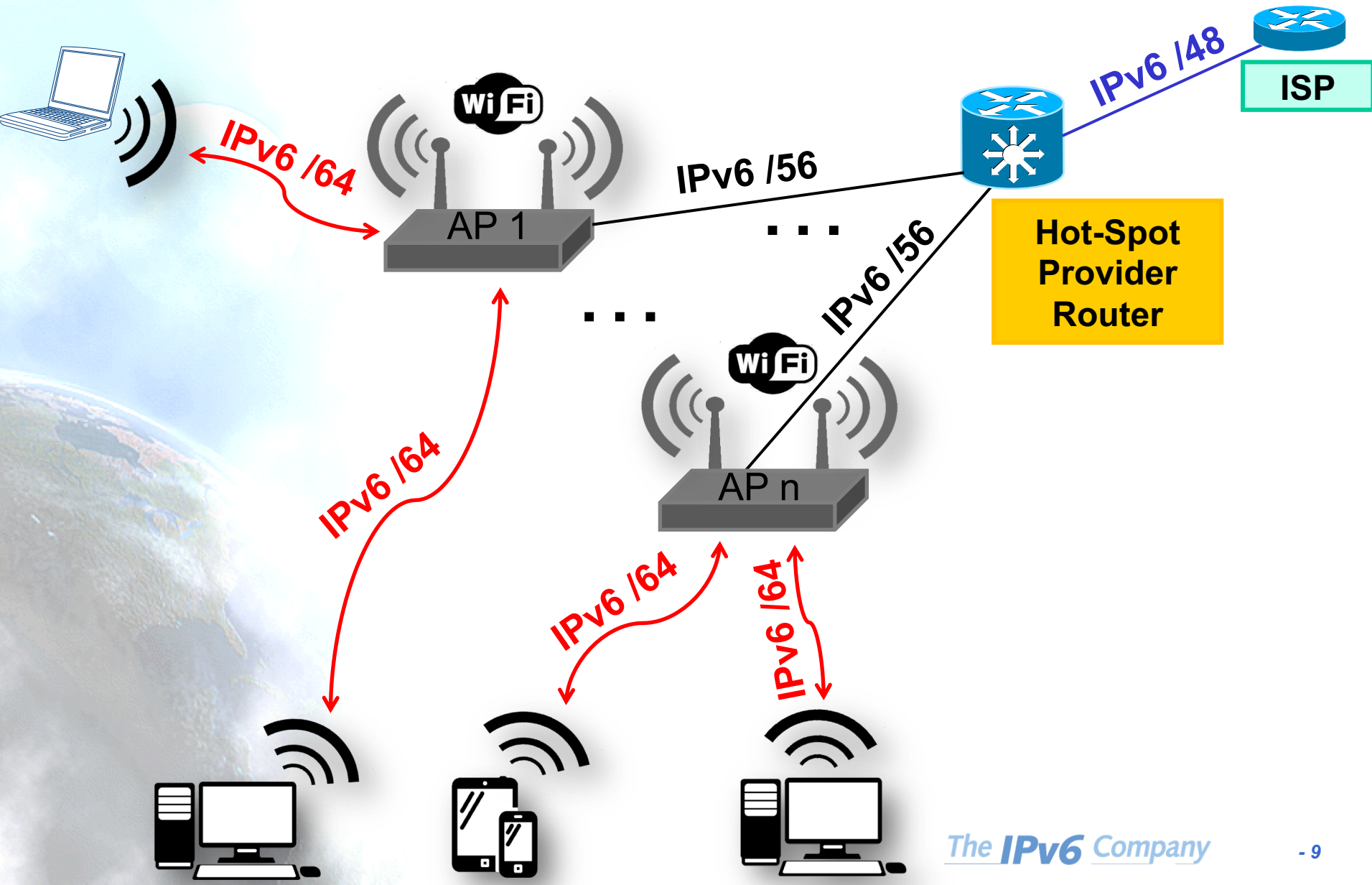
Hot-Spot Example



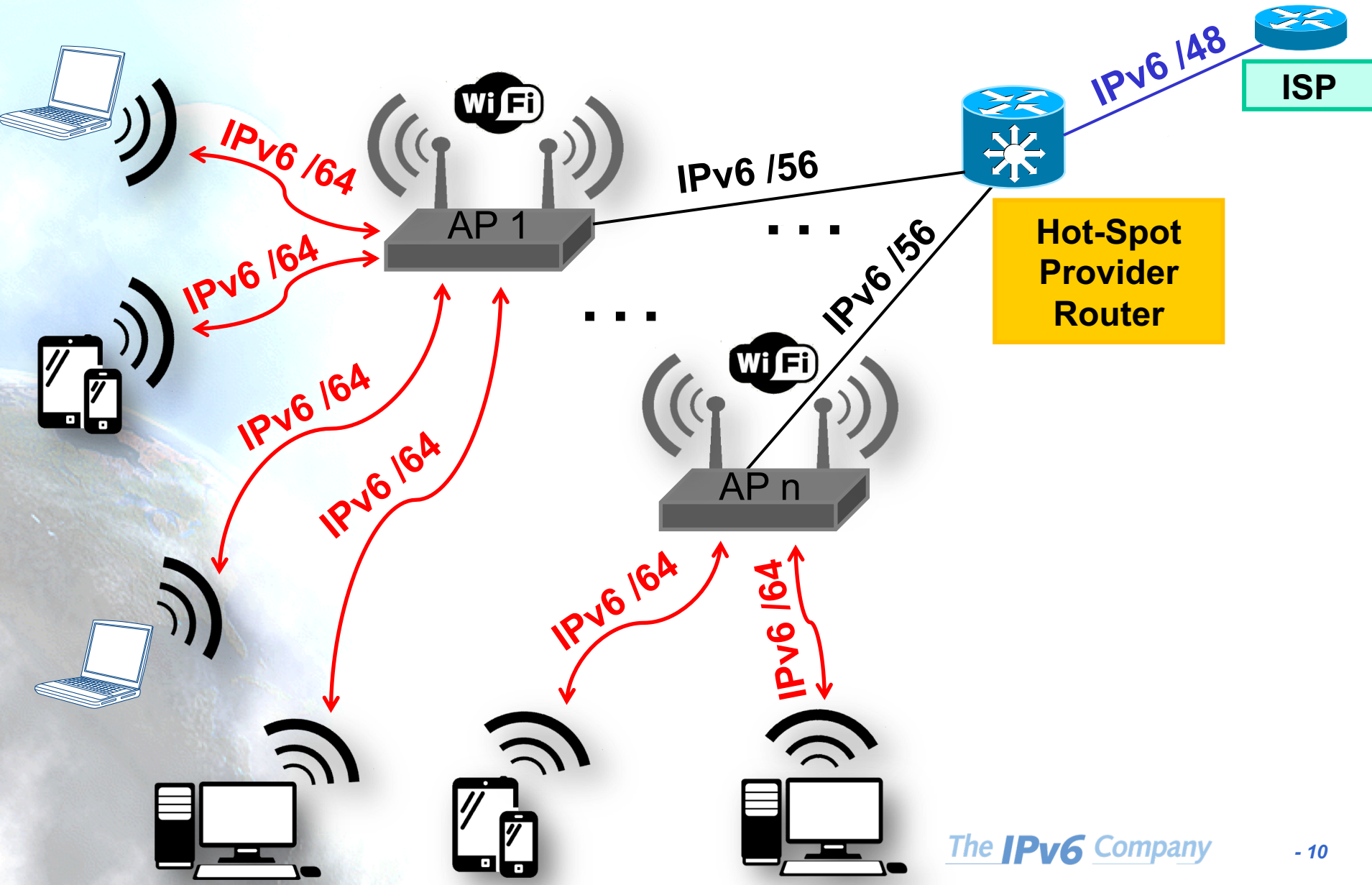
Hot-Spot Example



Hot-Spot Example



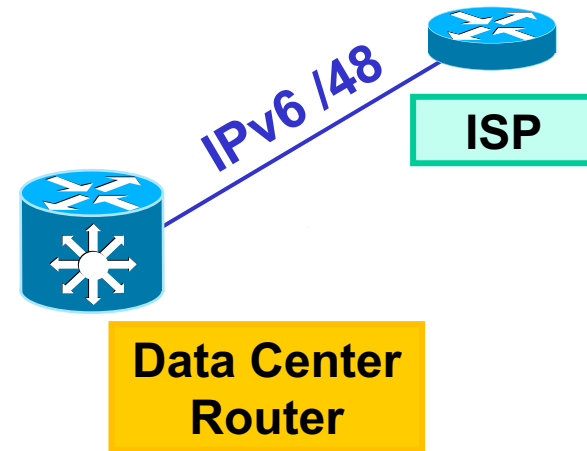
Hot-Spot Example



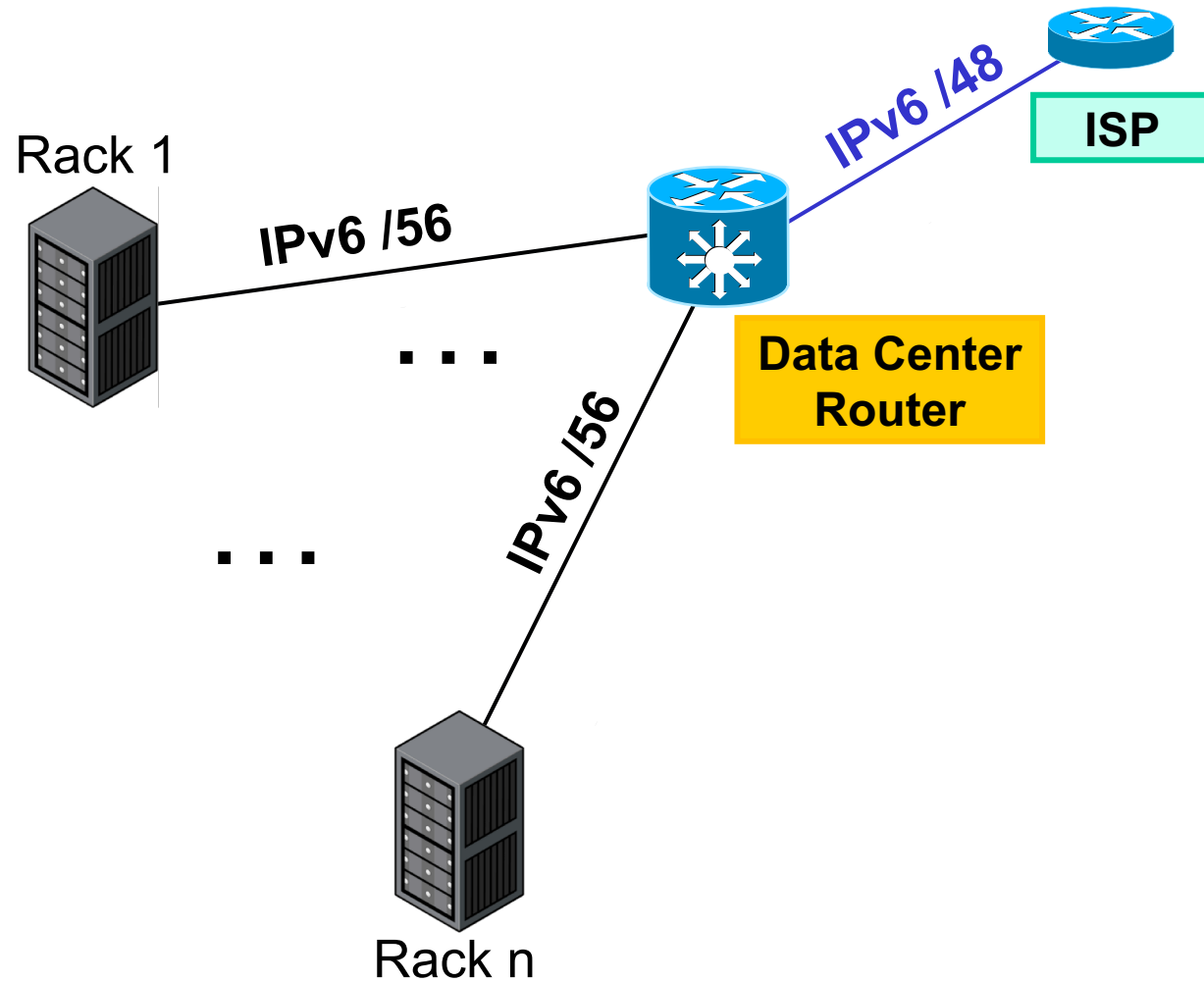
Data Centre Usage

- “How to” same as for the Hot-Spot case
- The UE “server” may need multiple addresses from the same unique IPv6 prefix (VMs, containers), so just need to configure them
- The first-hop router must be able to handle the presence and use of those

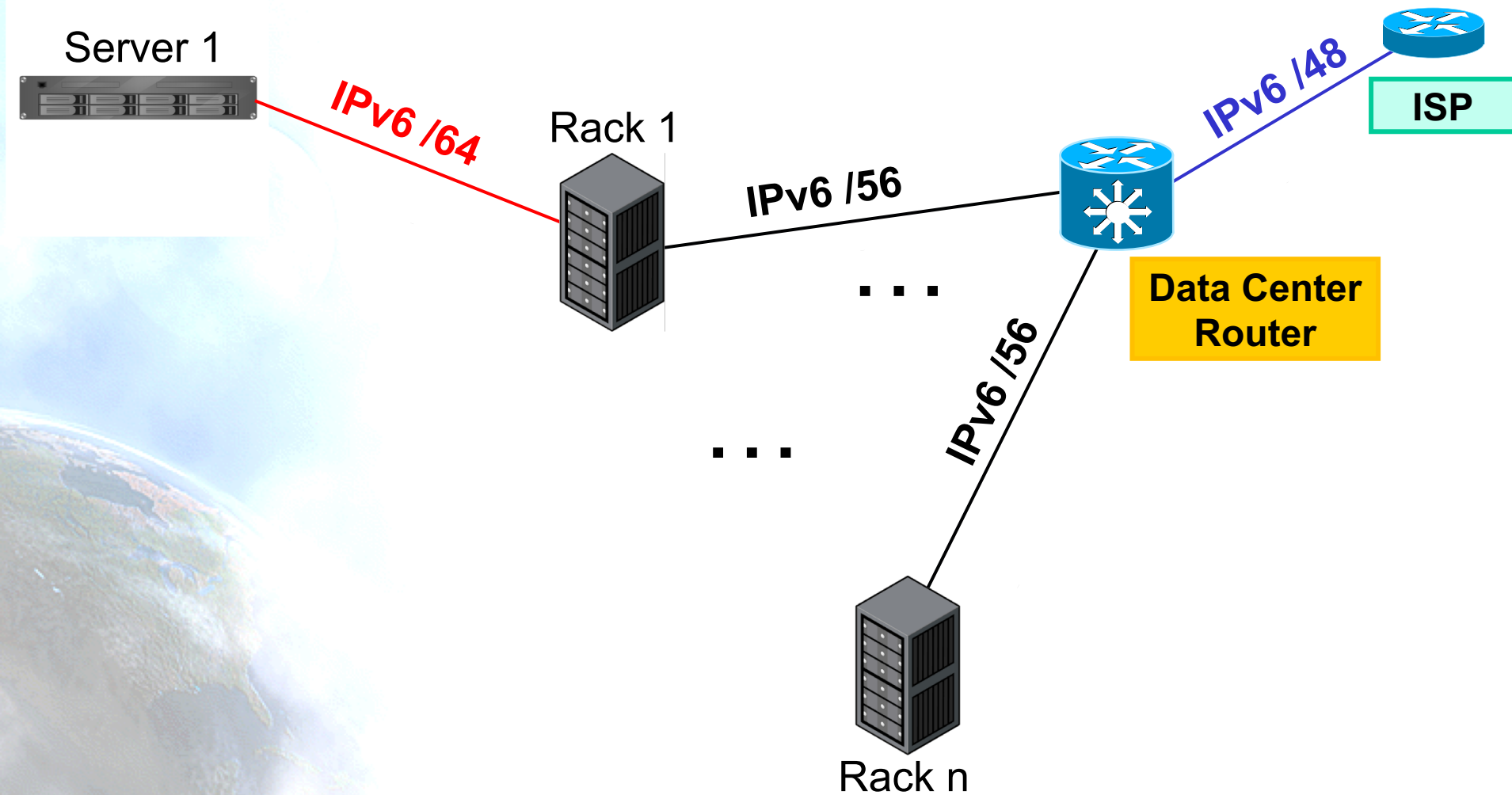
Data Center Example



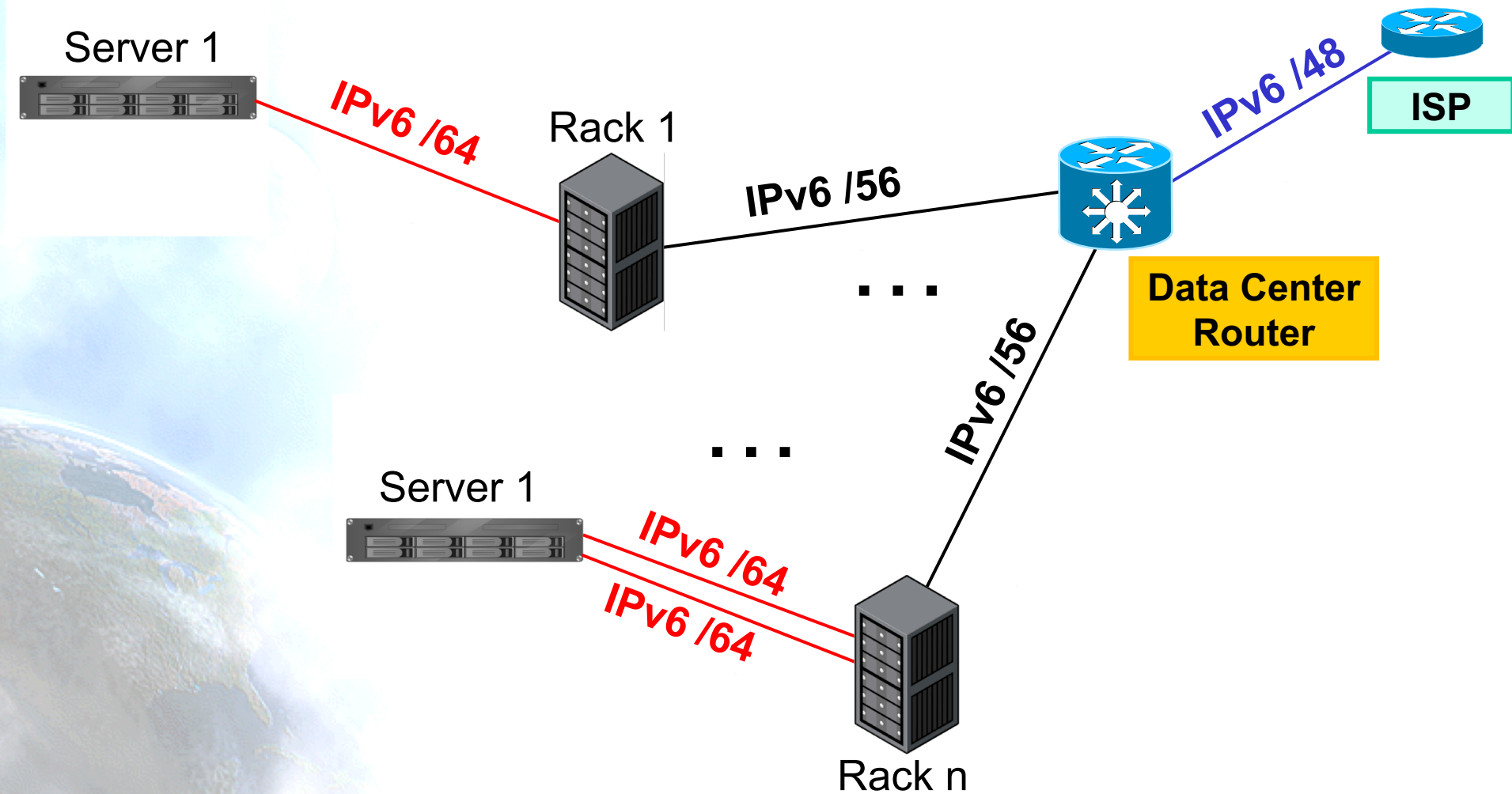
Data Center Example



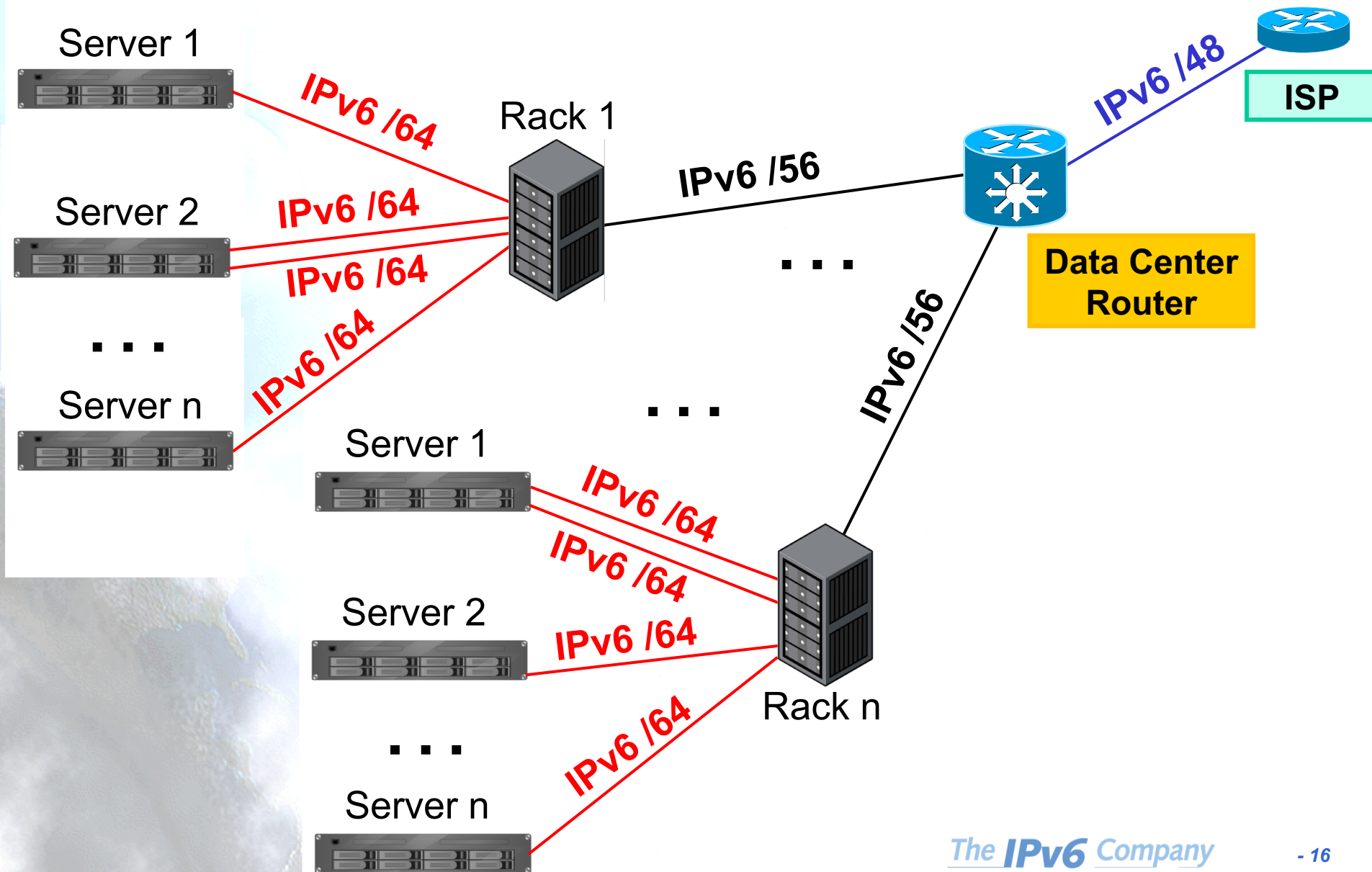
Data Center Example



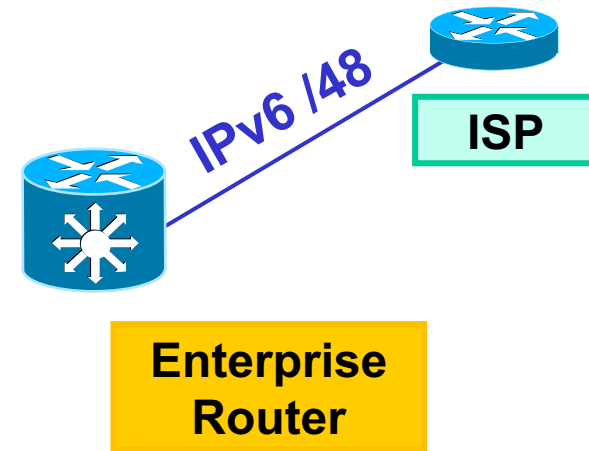
Data Center Example



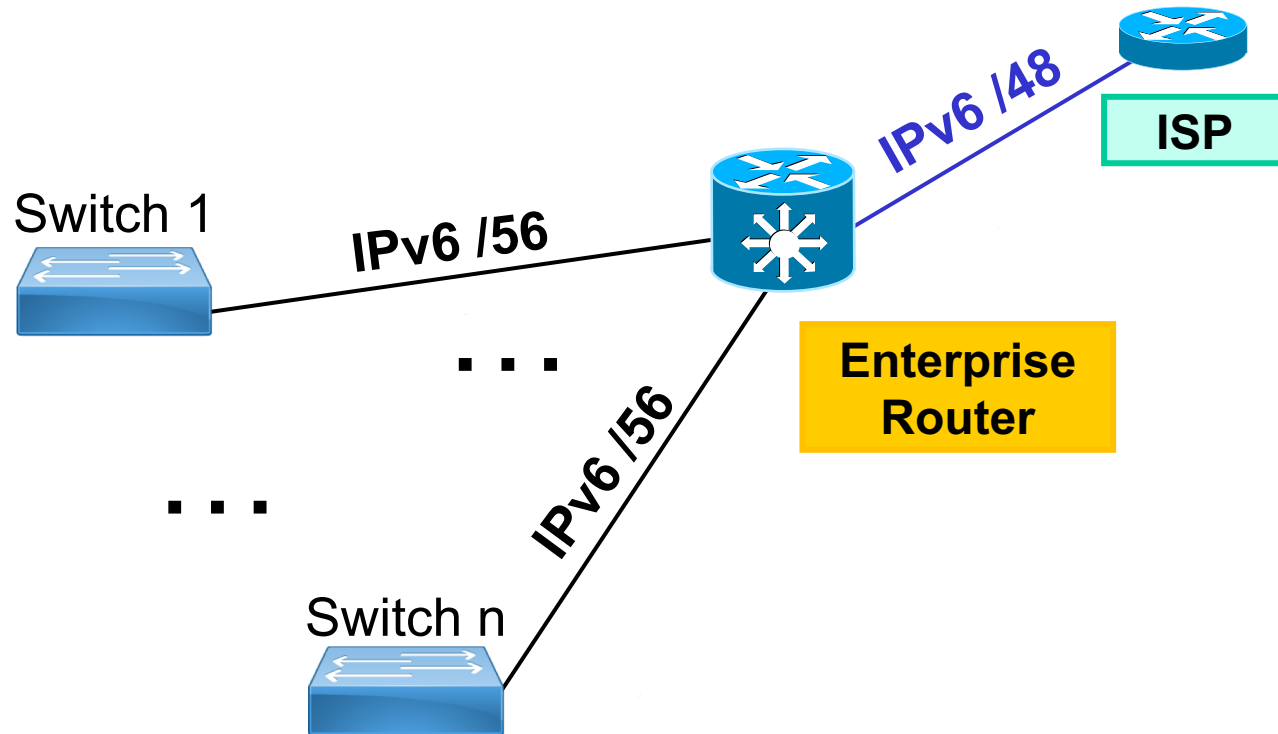
Data Center Example



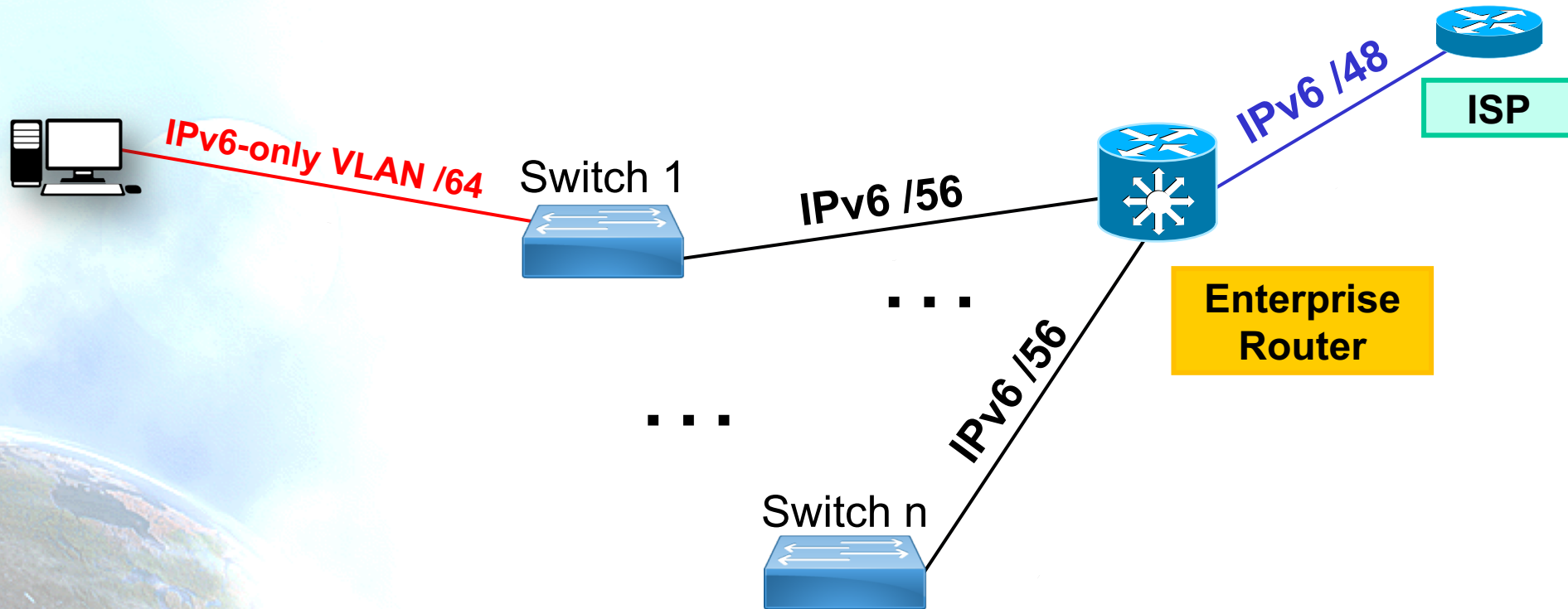
Enterprise Example



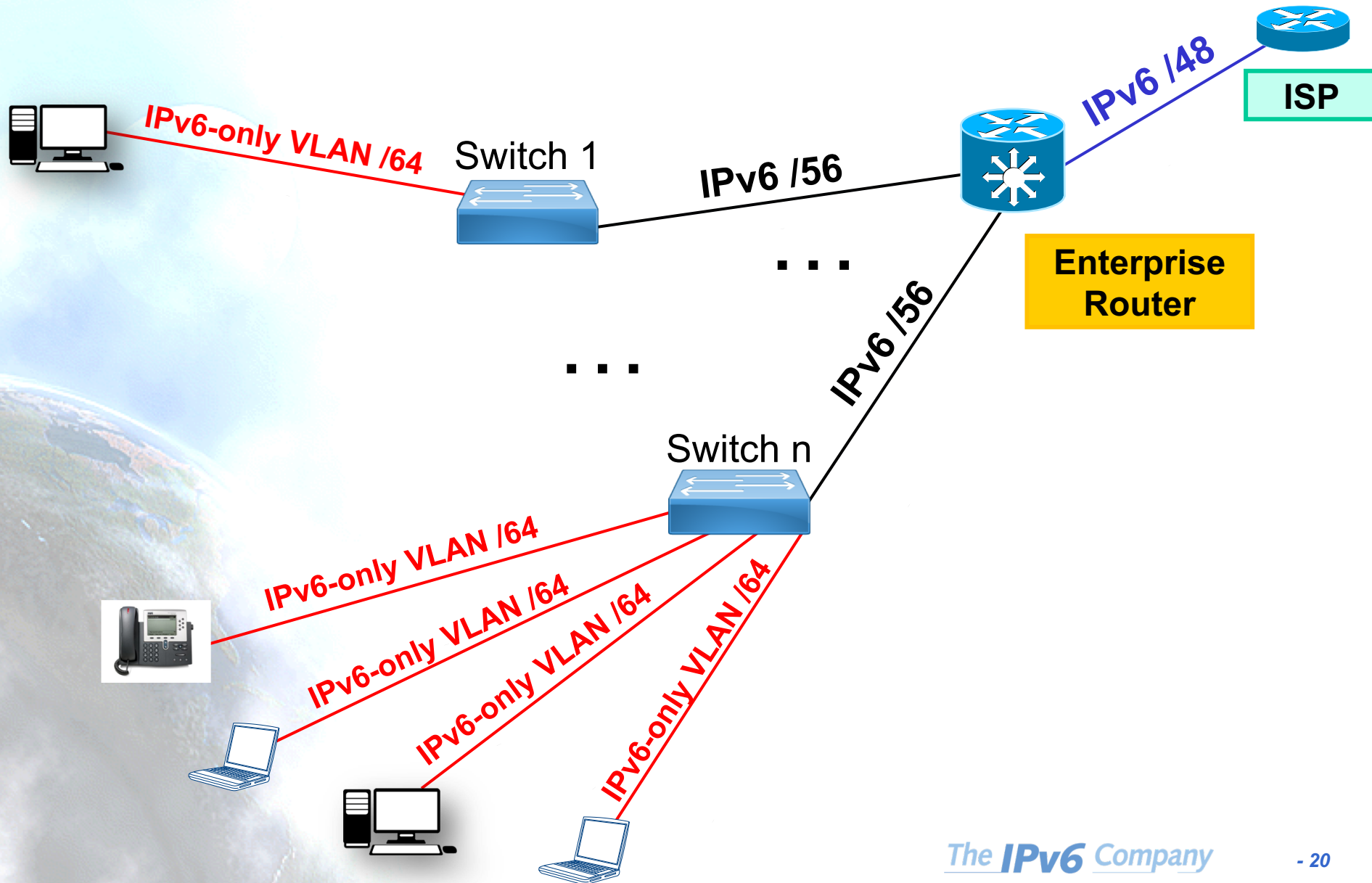
Enterprise Example



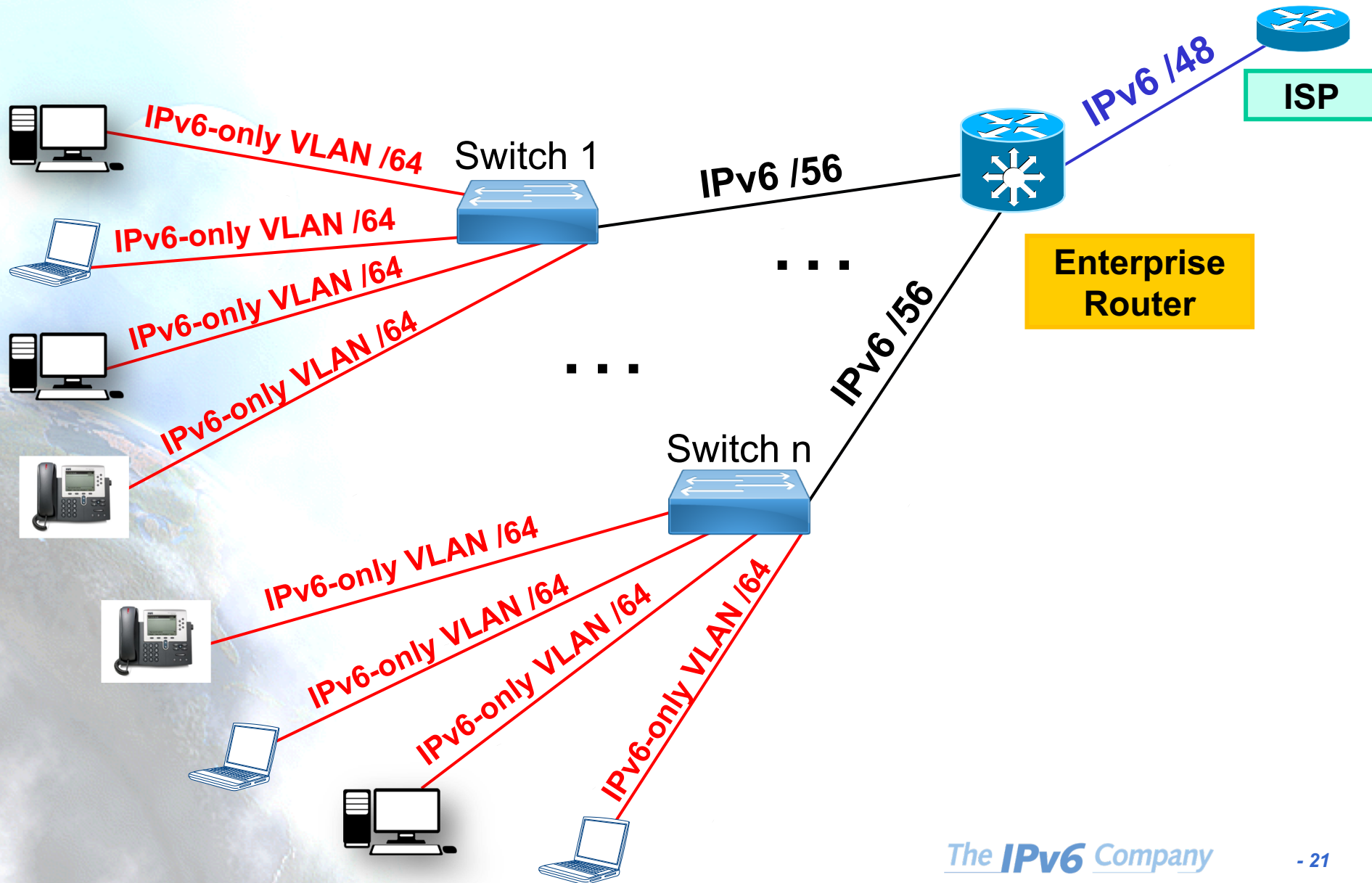
Enterprise Example



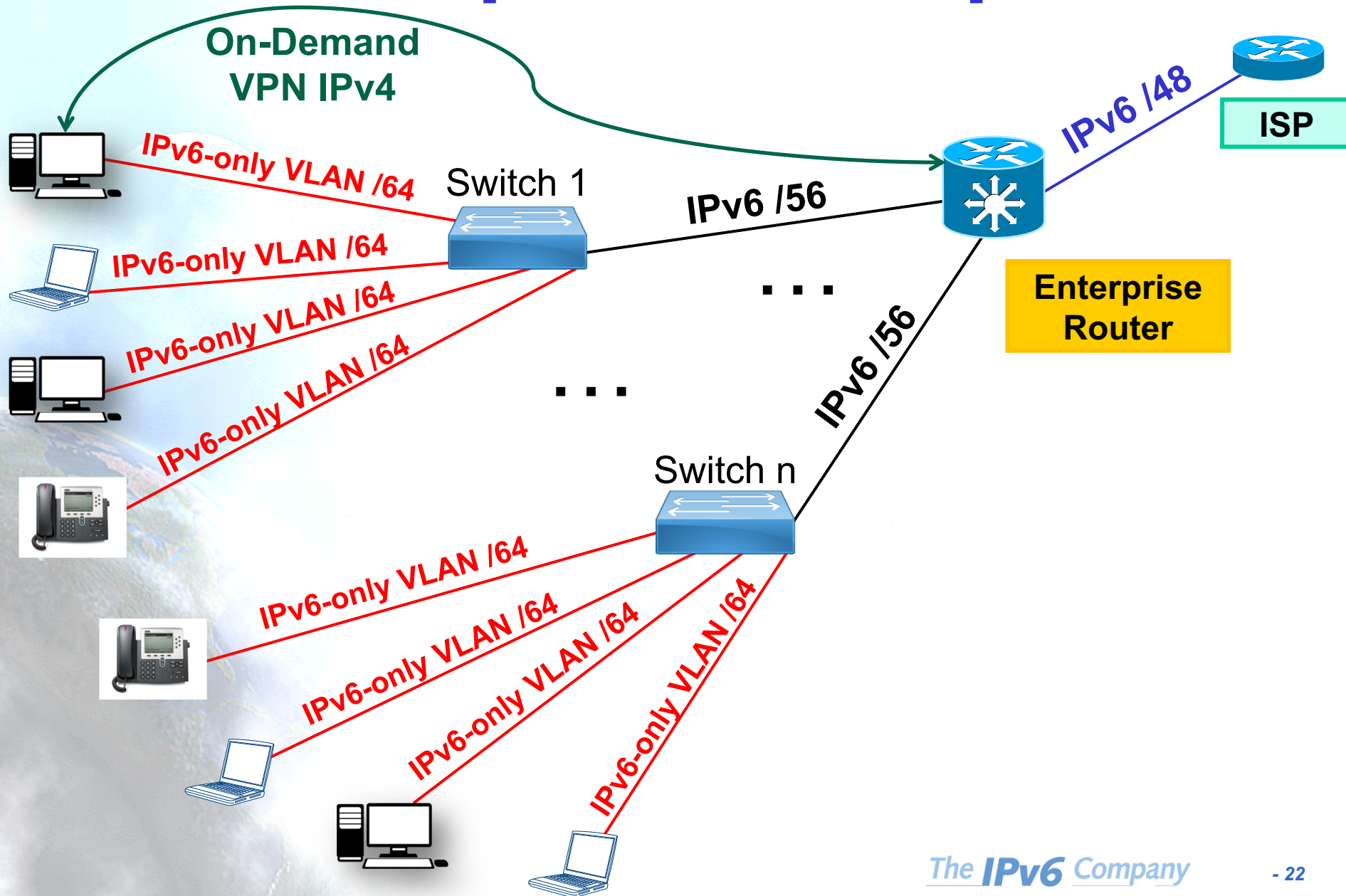
Enterprise Example



Enterprise Example



Enterprise Example



Conclusions RFC8273

- Stable and secure IPv6-only experience
- No performance impact
- Secure host-to-host communication managed by first-hop router
- Each unique IPv6 prefix can function as a control-plane anchor point to ensure that each device receives expected subscriber policy and service levels
 - Throughput
 - QoS
 - Security
 - Parental control
 - Other value-added-services ...



Thanks!

Contact:

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