Cloud vs On-Prem Controllers, Tunneling, and VLAN Strategies: Making the Right Wireless Architecture Choices



https://www.linkedin.com/pulse/cloud-vs-on-prem-controllers-tunneling-vlan-making-jarryd-de-oliveira-muboe

When designing enterprise Wi-Fi, one of the most common questions is **where to anchor control and how to handle traffic**.

Should you adopt a **cloud-based controller** for simplicity, or deploy an **on-premises controller** for maximum control? Do you need GRE tunnels, proxy modes, or dynamic VLAN assignments? And in large or complex sites, when does it make sense to consider VXLAN?

These choices matter because they shape how your network scales, how traffic flows, and ultimately, the user experience.

Cloud Controllers – When They Fit Best

Cloud-managed controllers are appealing for their simplicity, central management and reduced onsite infrastructure.

They shine in:

- **Distributed retail chains** - centralized management across many small sites.
- **Hospitality** - easy rollout of guest policies, captive portals, and SSIDs.
- **Education with multiple campuses** - reduced IT overhead across distributed environments.

Pros:

- Lower CAPEX, predictable subscription costs
- Centralized management, rapid feature adoption
- Ideal for multi-site or global operations

Cons:

- Dependency on internet connectivity for management
- Limited control over advanced RF and tunneling features
- May not suit environments with strict data residency requirements

On-Prem Controllers - Where They Still Matter

On-prem controllers remain vital where reliability and local traffic control are critical.

- **Logistics & Warehousing** – AGVs, scanners, and IoT require sub-second roaming.
- **Colleges & Universities** – dynamic VLANs, advanced authentication, and policy enforcement.
- **Enterprises with compliance obligations** – traffic remains onsite for regulatory reasons.

Pros:

- Greater traffic control and advanced feature sets

- Resilience against WAN outages
- Ideal for ultra-low latency and high mobility

Cons:

- Higher CAPEX and operational overhead
- Requires skilled staff for maintenance
- Less agile than cloud for rolling out new features

Proxy vs Non-Proxy Modes

Controllers can operate in **proxy (tunneled)** or **non-proxy (local breakout)** modes.

- **Proxy / Tunneling Mode** – centralizes traffic, great for guest Wi-Fi or compliance.
- **Non-Proxy / Local Breakout** – traffic exits locally, reducing latency.

GRE Tunnels and Dynamic VLANs

- **GRE Tunnels** – useful for centralizing guest or service traffic into a data center.
- **Dynamic VLANs** – assign roles and policies without multiple SSIDs.

Use cases:

- Hospitality – staff, guest, IoT separation on a single SSID.
- Colleges – students, staff, and contractors segmented via RADIUS attributes.
- Warehouses – scanners isolated in dedicated VLANs, laptops in secure VLANs.

VXLAN – When to Consider It

VLANs max out at 4096 IDs. VXLAN expands segmentation by encapsulating L2 into L3, offering millions of IDs.

Where VXLAN helps:

- **Large logistics** – extend tenant isolation across warehouses and data centers.
- **Hospitality chains** – maintain isolated guest networks without VLAN sprawl.
- **Higher education** – scale segmentation for thousands of devices and research networks.

VXLAN isn’t needed everywhere but is invaluable in **very large or multi-tenant networks**.

Final Thoughts

Choosing between cloud and on-prem controllers isn’t about which is “better,” but which aligns with the environment.

- **Logistics** – often need on-prem resilience and ultra-low latency roaming.
- **Retail** – benefits from cloud agility and centralized management.

- **Hospitality** – blends both; cloud for guest Wi-Fi, on-prem for staff traffic.
- **Education** – uses tunneling, VLANs, and even VXLAN for scale and policy control.

By understanding these options - **cloud vs on-prem, proxy vs non-proxy, GRE tunnels, dynamic VLANs, and VXLAN** - you can design networks that work today and scale gracefully into tomorrow.

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