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Multi-Tenancy WiFi Infrastructure with Managed Virtual Access Points

Shopping centers, convention centers, and many other multi-tenant properties create unique challenges for deploying WiFi solutions, but also many opportunities for creating real ROI from WiFi.

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Executive Summary

In an increasingly mobile world, people desire to connect, communicate and consume content everywhere. In retail, a recent survey showed that 85% of consumers with smartphones use it while shopping in-store. In hospitality, free WiFi remains the most sought-after amenity increasingly driving hotel selection. For conventions centers, attendees expect WiFi and exhibitors increasingly rely on WiFi to generate a meaningful ROI from events. Across these verticals, offering robust WiFi to deliver a branded mobile experience to customers and guests is now a strategic imperative that can boost customer experiences, drive loyalty, and improve business performance all around.

Many of these businesses that can benefit from their own branded WiFi are located in multi-tenant environments where the location is operated and managed by a property owner. In addition to leasing the physical space itself, property owners traditionally offer a range of supplemental amenity services. Given the need for branded WiFi by tenant businesses, enabling and offering a WiFi amenity service in these multi-tenant environments creates new opportunities for property owners to create tremendous value within their properties. However, multi-tenant environments pose security and scalability challenges for existing WiFi solutions.

This white paper explores in detail the concept of multi-tenancy WiFi. It looks at the challenges posed by existing WiFi solutions as well as the benefits that Relay2's Managed Virtual Access Point (MVAP) solution provides. It is geared towards multi-tenant property owners in retail (shopping centers & malls), hospitality (convention centers, hotels, etc.), as well as multi-dwelling units (MDU) & multi-tenant units (MTU). The topics covered are also relevant to managed service providers serving these sectors.

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Introduction - What is WiFi Multi-Tenancy?

Multi - Ten·an·cy (ˈməltē - ˈtenənsē) *noun*.
1. Multi-tenancy is an architecture in which a single physical resource serves multiple customers. Each customer is called a tenant.

Multi-tenancy is a fundamental concept to IT that has driven the economics and massive growth of cloud computing. The cloud uses multi-tenancy technologies to cost-effectively share IT resources, such as compute and storage, securely among multiple tenants. Tenants can vary widely by use case, and can range from individual applications and users, to entire business and organizations. Virtualization is a key technology that enables IT multi-tenancy in cloud data centers.

Out in the physical world too, there are many examples multi-tenant environments. These can include:

- Retail malls and shopping centers
- Convention centers and event spaces
- Multi-tenant unit (MTU) office buildings
- Multi-dwelling units (MDU) buildings

In each of these, a property owner controls much of the physical infrastructure for the property and is responsible for providing services with this infrastructure to their tenants. Such properties provide an ideal setting for extending the technology concepts and more importantly benefits of multi-tenancy in the cloud out to the edge of the network to enable secure cost-effective multi-tenancy WiFi. In this context, multi-tenancy WiFi refers to a common physical WiFi infrastructure at a property that can be used by all tenants.

Challenges with Multi-Tenancy WiFi

With existing solutions, several options exist for supporting WiFi in multi-tenant environments, but each have significant challenges.

> Legacy Option 1

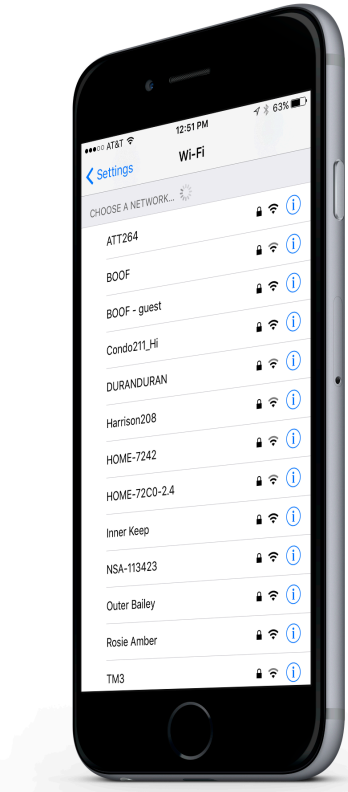
While not strictly multi-tenant, one option is for tenants to build "private WiFi" using their own equipment which can result in an overbuilt AP infrastructure. This Bring-your-own-AP approach to enabling private networks in multi-tenant environments requires little to no involvement from property owners, but has many downsides.

Challenges:

First, property owners miss out on offering a desirable amenity service to their tenants. Not only are owners foregoing additional service revenue and opportunities to set their properties apart, but the lack of a reliable WiFi offering can translate into tenant complains and general dissatisfaction with amenties and the property.

For tenants, their access to the WiFi infrastructure is restricted to indoors and near their office locations, keeping them from roaming to common areas of the property.

Most importantly, uncoordinated APs can create massive interference with neighboring APs transmitting on the same or adjacent channels. Furthermore, the lack of coordination creates opportunities for rogue APs that can be leveraged for malicious purposes. Even authorized APs in such a scenario tend to be consumer-grade, which limits performance and security capabilities.



> Legacy Option 2

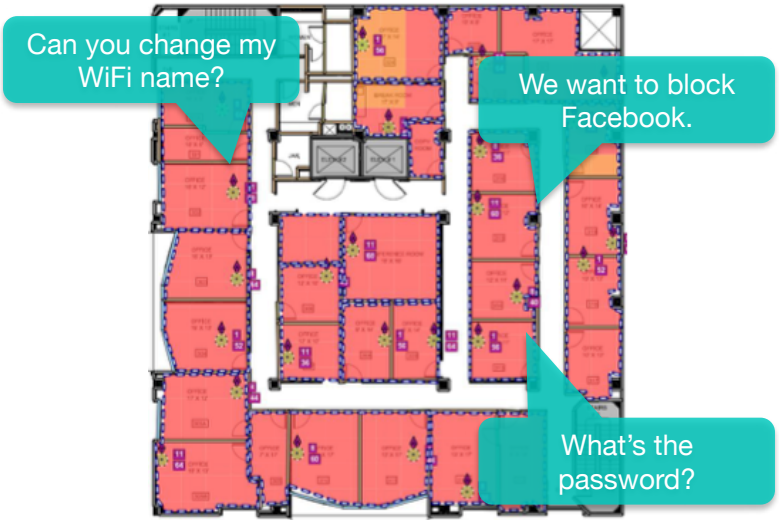
A multi-tenant option for property owners is to provide open service through a single monolithic physical infrastructure. With this option, service providers would give all tenants shared management access to the network.

Challenges:
This shared management approach completely compromises the security and privacy of both the underlying infrastructure and individual private networks making it an unworkable option for any environment with independent tenants.

> Legacy Option 3

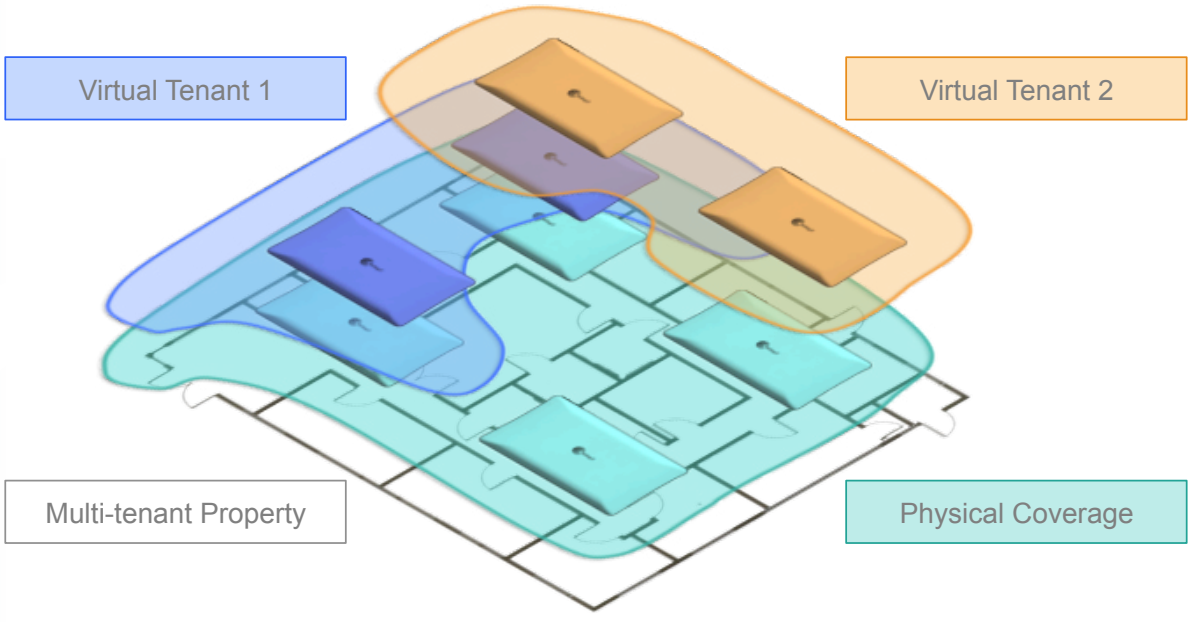
The last historic option is for property owners to provide WiFi services by completely managing individual tenant networks.

Challenges:
This approach requires that property owners micro-manage every WLAN & SSID and handle all tenant WiFi requests including questions and changes to various network and security settings for the tenants. This is both inefficient and restrictive.



Solution for Managed Multi-Tenancy WiFi: Virtualized WiFi Infrastructure

The solution for offering high performance multi-tenancy WiFi is to completely virtualize a single shared physical WiFi infrastructure. Beyond just the multi-SSID support of legacy "virtual-AP' offerings, true virtualization separates and segments network access, control, and management. True multi-tenancy WiFi enables property owners to control the air-space in their buildings to deliver high-performance "WiFi-as-a-Service" to their tenants while allowing the tenants to apply their own wireless policies, configurations, and security settings. Multiple tenants are able to share one access point with complete security and segregation of networking resources.



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Multi-Tenancy WiFi Infrastructure

Relay2 Managed Virtual Access Points

Relay2's patent-pending Managed Virtual Access Point (MVAP) enables such a virtualized WiFi infrastructure by allowing a physical AP to be virtualized into as many as 8 virtual instances. MVAP tenants are freed from maintaining a physical device, while enjoying enterprise-class features and performance, as well as gaining security and segregation of networking and application resources.

MVAP allows venue and property owners to fully leverage their wireless infrastructure by selling each AP to multiple tenant groups. MVAP enables the provisioning of completely separate, isolated, and individually managed virtual AP instances unlike multiple WLAN profiles common to existing Wi-Fi solutions.

MVAP is ideal for providing hassle-free, secure WiFi services to tenant stores in a multi-tenant shopping centers, office parks, and residential complexes. Temporary event WiFi amenities can quickly and easily be configured from a single deployed WiFi infrastructure for show organizers and exhibitors at convention centers or other event spaces. Alternatively, MVAP can enable property owners to offer an open neutral host solution to carriers and hotspot operators for public or community access WiFi. In all scenarios, MVAP customers are freed from maintaining a physical device, while enjoying enterprise-class features and performance.

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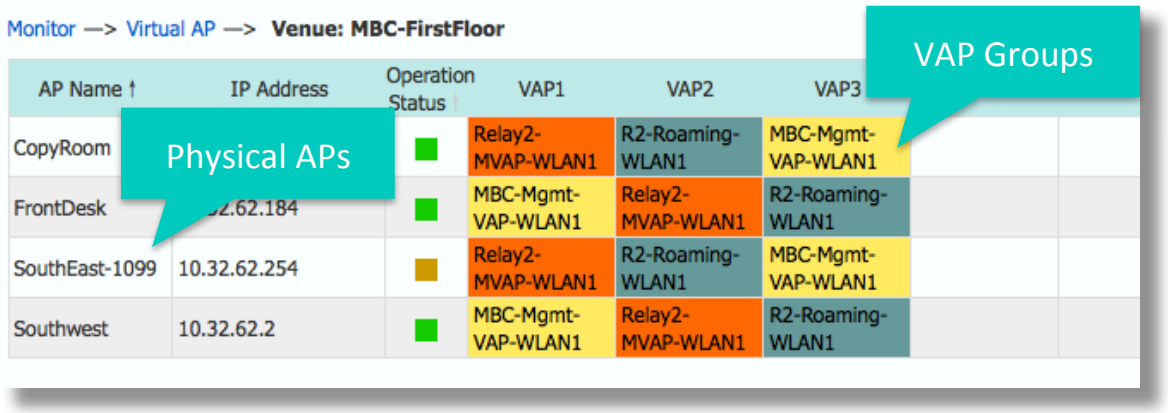
Both property owners and and tenant customers are provided with intuitive management interfaces via the Relay2 platform.

Property Owner's View

Property owners, or their managed service providers, deploy and manage the physical AP including radio settings. The physical AP is then configured to host tenant Virtual APs.

From an MVAP service provider account, property owners are able to:

- Configure AP radio settings.
- Create customer virtual tenant accounts.
- Support monitoring or setup of virtual network configurations if required.
- Manage OTT service distributions.

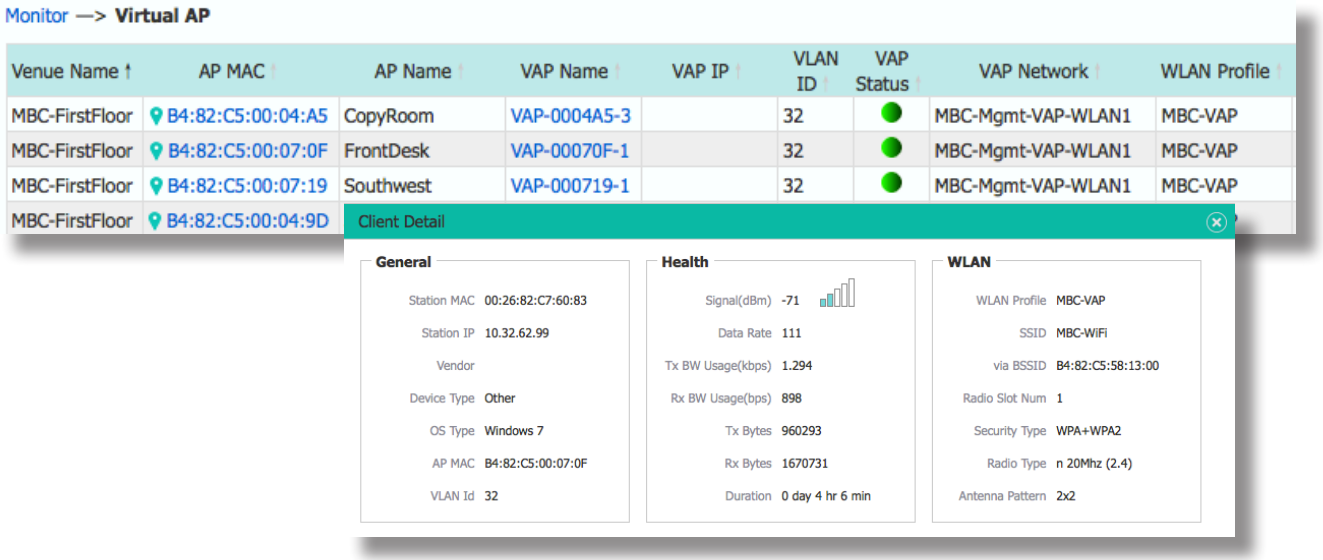


Virtual Tenant View

More than just a WLAN profile, Virtual AP give tenants a dedicated management login account to provide complete administrative control and visibility over their own WLAN and associated SSIDs.

From their account, tenants are able to:

- Configure WLAN (internal & guest): ACL, security, RADIUS, and other policies.
- Monitor and manage clients and client traffic (including generating client reports).
- Set-up unique-to-Relay2 integrated applications & services such as analytics, advertising, and much more.



Benefits of Multi-Tenancy WiFI

MVAP-enabled multi-tenancy WiFi offers numerous benefits to both property owners and tenant customers for enabling property-wide WiFi.

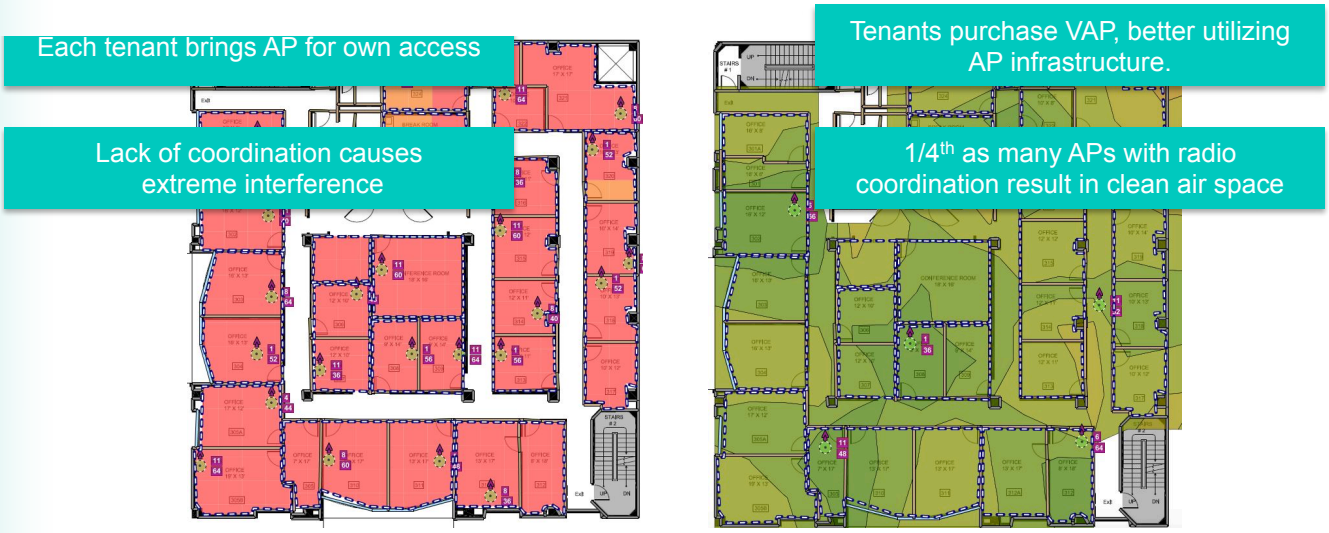
> Benefits to Property Owners:

New Revenue Opportunities

Both in multi-tenant environments, such as malls and convention centers, as well as non-multi-tenant environments, such as standalone restaurants and stores, MVAP enables the WiFi network owner to engage any businesses and organizations that may have interest in having a digital presence on the property. This can include tenant businesses looking to take advantage of high performance WiFi to boost customer satisfication. However, much like neutral host DAS solutions being rolled out in venues and large indoor properties globally, MVAP enables neutral host WiFi to be offered to entities beyond physical tenants. Possible uses of MVAP in this context could be to engage:

- Mobile network operators looking to expand their WiFi footprint as a means of carrier offloading from their cellular networks.
- Cable operators looking to expand their WiFi footprint as part of their community WiFi model.
- Online-only and ecommerce businesses looking to establish physical footprints to engage mobile users.
- Neighboring businesses. For standalone businesses, valuable cross-selling partnerships can be created by allowing neighboring businesses to lease their own branded private network at your location.

Each of these presents new revenue-generating opportunities for property owners to maximize the ROI of their WiFi deployment.



Without MVAP

With MVAP

Clean Radio Environment

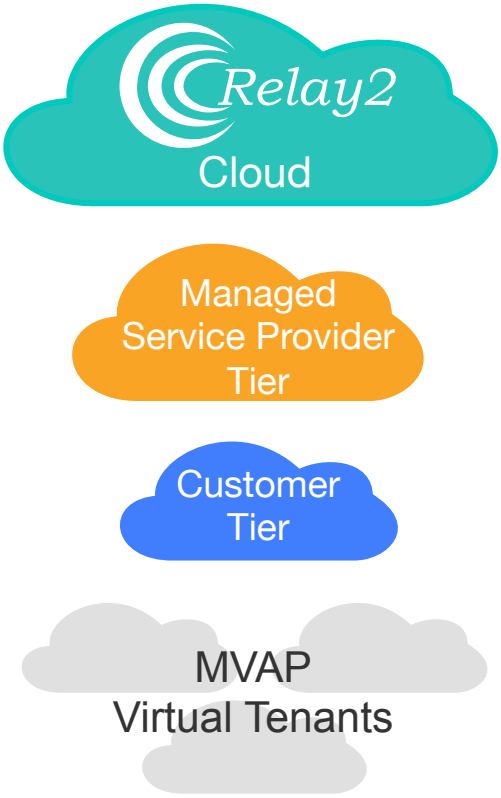
Comparing radio spectrum conditions between a multi-tenant deployment with MVAP and one without MVAP highlights the signficant reduction in co-channel interference resulting in cleaner spectrum and improved performance.

Because tenants can utilize a single common infrastructure with MVAP to configure their own private network, the need to overbuild wireless infrastructure to accommodate “private WiFi” requests is elimianted. Multiple tenants can use the same physical APs to build out up to eight private networks per physical AP to eliminate overlapping unecessary overlapping AP coverage. Furthermore, APs deployed by the property owner can be centrally configured to ensure coordination with respect to channel planning and radio power settings to ensure an optimized network plan. As such, fewer APs with coordinated settings offer a much cleaner radio environment resulting in improved over-the-air performance, which provides connected clients with a much better user experience and property owners with improved tenant satisfaction.

Service-Provider Friendly

Many properties outsource the deployment and operation of IT services to managed service providers. These service-providers require visibility and control across a disparate customer base.

MVAP is architected to operate in a tiered multi-tenancy environment extending from top-level service provider down to individual virtual tenant accounts. The Relay2 platform gives service providers visibility and control across multiple customers, locations, physical AP, and virtual AP. Lower tiers have access to only their networks and devices. Finally, virtual tenants can only manage the WLAN and associated services to which they have access. The solution is fully scalable to support service providers with a few customers to thousands of customers.



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> Benefits for MVAP Tenants:

WiFi-everywhere

With the old approach of "Bring-your-own-AP", businesses would be limited to WiFi coverage in or near their physical location whether that be a store, office, or trade-show booth. For retailers, the ability to extend their WiFi coverage to common areas such as mall entrances or food courts, offers opportunities to engage and analyze customer behavior during their entire shopping journey from the time they enter to the time they leave. For offices, employees and guests can stay connected whether at their desk, from the lobby, or in the lounge. For convention centers, exhibitors can extend their presence to provide sponsored access in key areas such as during keynotes or social events.

Lower CAPEX

Because physical APs are shared between different customers, the effective CAPEX per customer is much lower. Viewed from the tenant customer perspective, WiFi can be implemented purely as a service, as needed, and on-demand thereby eliminating CAPEX investment.

Lower OPEX

Because customers do not need to build WLAN competence for physical deployments and daily maintenance, OPEX resulting from staffing and services are eliminated.

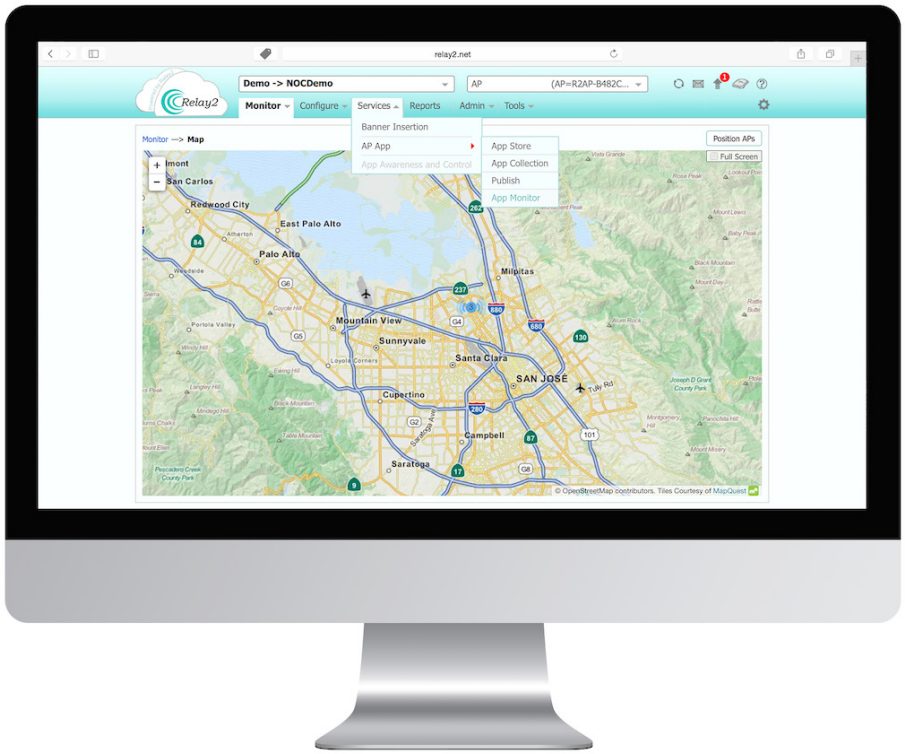
Network Separation

Separation of network functions means each tenant or service provider can provision its own discrete wide area connections for their WiFi network and select their own broadband provider.

Remote Access

In multi-tenant environments, the on-site IT team can be minimal or non-existent. For retail chains operating in shopping malls, IT is often centralized at corporate headquarters. IT teams may be sent out for new store openings, but little to no IT expertise stays on site during regular operations. At conventions or tradeshows, while the property owner may have an on-site IT support staff, exhibitors are usually limited to non-technical event teams. Multi-tenant WiFi needs to fit such limited IT operational models.

Plug-n-play access points and cloud-based management, means that provisioning and management of WiFi can be handed off to the property manager to manage the physical infrastructure while centralized IT teams at headquarters can provide remote configuration and management via the cloud for virtual AP settings.



Beyond Multi-Tenancy WiFI with MVAP

Beyond just providing high performance WiFi, the intelligent MVAP-enabled Relay2 Service-Ready Access Points support advanced value-added services including HTML insertion, web caching, and deep packet inspection (DPI). These built-in services enable advanced engagement and analytics capabilities to be implemented directly from the AP. As with network settings, MVAP entirely separates and segments service configuration too.

HTML Insertion

With HTML insertion, businesses can turn their private network into a customer engagement tool. HTML Insertion provides a universal means of communicating with connected users via their device's web-browser. Inserting HTML ranging from simple static banners to interactive overlays, provides an effective user engagement tool regardless of a user's device or operating system and without needing mobile applications to be downloaded and installed.

Caching

Using the onboard solid-state storage of the Relay2 Service-Ready-AP, web caching can be configured to cache media and domains to reduce network bandwidth costs and improve high demand online material. Pre-caching ensures that key content is a blink away from your users. Retailers can ensure seamless access to their online ecommerce site as part of a broader omni-channel experience. Exhibitors at conventions can cache collateral and corporate videos to share with event attendees.

Deep Packet Inspection

Each Relay2 SR-AP comes equipped with a powerful network processor that allows line rate inspection of all traffic flows across the wireless network. Deep Packet Inspection (DPI) provides visibility well beyond just the IP quintuple and up into the application layer, which enables insights into user behavior, applications, and content.

Conclusion

Multi-tenant environments present unique opportunities and challenges for providing reliable high performance WiFi.

With Relay2's Managed Virtual Access Point (MVAP) capability, property owners of shopping malls, convention centers, office parks and much more are able to cost-effectively and securely implement a managed WiFi service to tenant busineses. Leveraging virtualization at the AP level, a single shared WiFi infrastructure can be securely and flexibily shared amongst businesses in a multi-tenant environment. MVAP provides the ideal solution for deploying business WiFi in multi-tenant environments.

About Relay2

Relay2 helps service providers transform legacy managed services into complete ROI-generating business solutions tailored for SMB and IoT markets. Relay2's pioneering Service-Ready Access Point enables cloud-managed applications and content to be hosted at the network edge, as close as possible to mobile customers, guests, and employees. The open Relay2 platform makes it both simple and affordable to leverage a foundation of high-performance WiFi to build, deploy, and manage innovative edge applications that deliver rich and relevant connected experiences. Relay2 was founded in 2011 and is a privately funded company led by an experienced team of wireless and networking industry veterans.

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