SAN FRANCISCO UNIFIED SCHOOL DISTRICT
Smart Wi-Fi Transforms Learning Experience

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OVERVIEW

The San Francisco Unified School District, also functioning as the County Office of Education, is the seventh largest school district in California. Operating more than 130 schools throughout the district, SFUSD covers Pre-K through adult education as well as junenile, county and court schools with over 55,000 students and 9,000 teachers and staff.

WHAT THEY NEEDED

- A unified, indoor/outdoor wireless LAN that could be easily and centrally managed

- Ubiquitous Wi-Fi coverage and strong signalstrength to deliver high data rates to thousands of current clients

- The ability for the WLAN to automatically adapt Wi-Fi signals within buildings constructed of "RF unfriendly" materials

- Seamless WLAN integration with existing Active Directory authentication domain

- Higher capacity client support per AP

- Simple to administer guest access

- Stronger BYOD support with automatic device provisioning and policy enforcement

WHAT THEY DID

- Deployed 1,500 dual-band Ruckus ZoneFlex Smart Wi-Fi 802.11n and 802.11ac access points

- Centralized WLAN management with Redundant, high capacity ZoneDirector 5000 controllers in the SFUSD data center

- Simplified BYOD device provisioning and automated the enforcement of user policies

- Increased Wi-Fi coverage, tripled client throughput and improved signal strength and wireless reliability

SMARTER WIRELESS THAT "JUST WORKS" TRANSFORMS THE EDUCATIONAL PROCESS IN OVER 130 SCHOOLS WITH TENS OF THOUSANDS OF WI-FI USERS

The San Francisco Unified School District (SFUSD) had a BIG problem. With 9,000 employees and 55,000 students in more than 130 K-12 schools, SFUSD's legacy wireless network, initially installed to provide basic administrative access, just wasn't delivering the performance and reliability needed to run an efficient school district chartered with delivering a 21st century education.

Wi-Fi signal coverage was spotty, performance was inconsistent, WLAN management was complex and cumbersome and the network just couldn't keep up with the concurrent client capacities driven by an ever-increasing population of wireless devices.

Moreover, most of the schools within the district, built in the 1930s and 40s were constructed with "RF unfriendly" materials such as cinder block concrete, lathe and plaster and security glass with metal meshing. This made delivering a fast, pervasive and stable wireless experience a daunting task. "With a networking staff of five, we didn't really know how we were going to be able to deploy such a massive wireless infrastructure in an efficient and cost-effective manner given the time, resource and financial constraints we faced," said Erik Heinrich, Director of Technology for SFUSD. "But today, because digital content is essential to the educational process, we didn't really have a choice."

SFUSD had a myriad of Wi-Fi requirements. Most important, they needed a fast, reliable Wi-Fi infrastructure that could adapt to the many different types of buildings, devices and applications that had to be supported. The network needed to be easily deployed and centrally managed without having to constantly tweak a lot of "nerd knobs." Comprehensive support for BYOD, simple device provisioning, robust guest networking and support for Apple's Bonjour protocol were non-negotiable needs.

A concern for SFUSD was simplifying the management of its vast Wi-Fi infrastructure. Due to controller capacity issues of its legacy system, SFUSD had been forced to deploy six different WLAN controllers to manage APs across all of its schools. This led to having to install an orchestration agent to manage all the different controllers causing complexity to quickly grow out of hand.

According to SFUSD, Wi-Fi access was required for a variety of different user groups and applications. Some of the primary use cases for wireless included supporting laptop and Chromebook carts, extending wireless outdoors to locations where no Ethernet cabling was in place, providing guest access,

supporting SBAC testing and allowing teachers to be able to access and display content in classrooms or take attendance and performance evaluations using wireless tablets.

Another important requirement was simplifying the provisioning of both IT-sanctioned and non-sanctioned wireless devices needing access to the network. For SFUSD, the Wi-Fi network needed to be smart enough to automatically enforce policies based on the user's role or the user's device type. To do this, seamless interoperation with SFUSD's existing Active Directory domain server was necessary. Additionally, SFUSD wanted to be able to provide local breakout of traffic at the AP but still tunnel guest traffic to its data center where other services, such as rate limiting and content filtering, could be centrally performed.

After an extensive evaluation of different Wi-Fi technology, SFUSD selected and standardized on the Ruckus ZoneFlex system due to its simplicity, cost and coverage as well as its

ability to adapt to the ever-changing RF environments across the district. Over 1,400 dual-band 802.11n indoor and outdoor access points as well as new 802.11ac APs have now been installed across the district and are managed through fully redundant ZoneDirector 5000 WLAN controllers centralized within SFUSD's data center.

Access points, mounted dome-down on ceilings or on walls using custom brackets, are powered using SFUSD's existing 802.3af power over Ethernet switching infrastructure. According to SFUSD, Ruckus APs now deliver two to three times as many concurrent connections without any degradation in service. "We are seeing much higher levels of throughput, reliability and client capacity with the Ruckus system," said Heinrich. To ensure optimal and consistent performace across the network, SFUSD is taking advantage of advanced features within the ZoneFlex system such as client load balancing, airtime fairness, rate limiting, band balancing and client isolation.

Concurrent client use across the network now routinely exceeds 10,000 connections. To simplify BYOD, SFUSD seamlessly integrated the Ruckus ZoneDirector through RADIUS with its existing Active Directory authentication domain. Students and teachers are provided with an AD account and can login and authenticate with their personal mobile devices using SFUSD's 802.1X SSID. Upon successful authentication, policies can then be enforced at the AP based on the user's role.

"Out of the box, Ruckus just works without a lot of tedious configuration," said SFUSD Network Manager Dave Burns. "The APs automatically figure out how to deliver the fastest Wi-Fi performance possible with much broader coverage and stronger signals at a significantly lower cost than any alternatives we could find. It was that simple."

Since deploying the Smart Wi-Fi infrastructure, SFUSD has eliminated Wi-Fi coverage holes, tripled client throughput, increased concurrent client capacities per AP as well as aggregate Wi-Fi capacity across the district. It has also cut in half the time required to manage the wireless infrastructure compared to its legacy environment. "We now commonly see 100+ concurrent clients on any given AP with no calls complaining about Wi-Fi performance. In an environment as large as ours, this is simply unprecedented," concluded Heinrich.

> "The Ruckus system just works without of a lot of kludgy configuration. The hardware configures itself, giving us insanely better coverage at a much lower total cost of ownership, compared to other suppliers. It's that simple."

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