



white paper

CUSTOMER ACCOLADES: REDUCING EQUIPMENT COSTS

[Pacific Ridge School](#) only needed eight APs as opposed to the nearest Ruckus competitor which required 20, thus reducing the capital cost 60 percent relative to competitive solutions

At [Players Club](#), a student housing facility, Scott Casey, VP of IT, replaced 70 legacy APs with 35 ZoneFlex Ruckus APs which provided them with better coverage, reliability, and connectivity over other competitors that were evaluated.

[Lyons Township School District](#) in Illinois wanted to replace their legacy WLAN network to offer more coverage in their education and general purpose spaces. They replaced the existing 100 APs that offered coverage to 30 percent of the education space with 100 Ruckus APs that covered 95 percent of the education space and the general purpose spaces at a cost 40 percent less than that of the next comparable enterprise class system.

Supercharged TCO and ROI

GETTING THE MOST OUT OF YOUR WLAN

Wi-Fi networks have moved beyond nice to have toys. They're a critical part of the IT infrastructure. But that doesn't mean they have to break the bank when it comes to cost.

Initial capital acquisition costs (capex) and ongoing operating costs (opex) can be minimized with some shrewd intelligence. This document points the way towards maximizing Return on Investment (ROI) while keeping Total Cost of Ownership (TCO) low.

Where Does the Money Go?

TCO for a WLAN implementation includes upfront and ongoing costs. This is real money that hits the bottom line for capex and opex.

Upfront costs include site surveys, cabling and POE switches. That's before adding in access points and controllers. So how do you save money? Everything listed here is absolutely required. The answer is performance.

AP performance — throughput, coverage capacity and reliability — directly impacts the amount of equipment needed. Fewer APs and controllers means less upfront money for WLAN hardware, software and licensing. It also means fewer AP cabling runs and Ethernet/POE switches. Performance is key to the lowest possible TCO.

Ruckus Wireless's award-winning WLAN solutions breaks down TCO barriers with unequalled performance. Ruckus customers consistently report an average of 50% less hardware over other enterprise WLAN vendors. Software and hardware combined typically results in an 80% upfront reduction in capex.

Lower TCO also impacts ROI with much faster and greater returns on investment. The following quantifiable analysis explores major cost drivers; ongoing costs and pitfalls to avoid.

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BeamFlex: The Key to Outrageous Performance

BeamFlex is a key technology unique to Ruckus Wireless solutions. It combines the best of beamforming with a smart antennas and software that optimizes performance for every client, everywhere.

Unlike omni-directional antennas that radiate signals in all directions, BeamFlex directs transmit energy towards the best path to the receiving device. Overall signal gains of up to 10 dBi gives performance that is at least double and often triple that of competing solutions. BeamFlex combines the best of omni-directional coverage with directional antenna performance. BeamFlex dynamically configures its “beam” on a per-station, per-packet basis, to achieve omni-directional coverage.

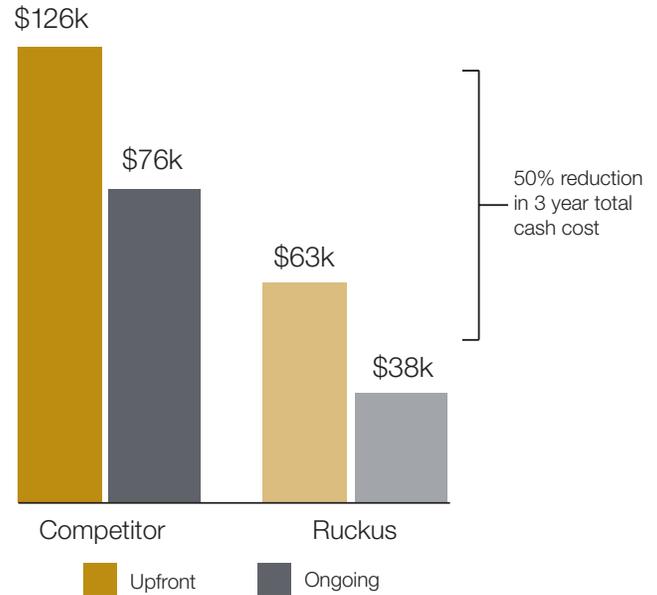
Outstanding performance equals less WLAN hardware and software. That means less money.

Adaptive Antennas — The Ruckus Approach To Beamforming

Although some vendors claim to have some form of beamforming technology, don't be confused. The real benefits are derived from software algorithms, along with other optimization and adaptation criteria that focus radio frequency energy in the direction of the client, and refocus the energy in milliseconds toward each client transmitting the RF signal. This extremely fast and versatile adaptive approach toward beamforming is unique to Ruckus and reduces signal to noise ratios and interference, which in turn decreases the need for extensive site surveys and equipment, as well as diminishes the costs for troubleshooting and maintenance. Enhanced quality of service, reliability, throughput, and capacity are the result.

For a brief video on adaptive antennas, [click here](#). For a more detailed webinar, [click here](#).

FIGURE 1: Midwest Surgical Case Study



For 80 employees at the 40,000 square foot hospital:

- ZoneFlex 7942 single-band 802.11n APs
- ZoneFlex 7962 dual-band 802.11n APs
- ZoneDirector Smart WLAN controllers
- FlexMaster remote Wi-Fi management

Ruckus Upfront Costs: \$63,358

Competitive Upfront Cost: \$126,277

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One of the biggest benefits we've seen is outrageous coverage from a relatively few number of access points. And we really didn't have to worry about where to place the APs or perform extensive RF site surveys. The system basically takes care of all this for you by automatically determining the best signal path to every client and altering that signal path on-the-fly as problems are encountered”

— **Spencer Williamson**, Network Admin
[Midwest Surgical](#)

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The Other Guys: Can They Deliver on TCO?

Of course there are plenty of WLAN vendors who will tell you they have a great TCO as well. If a reliable, high performance wireless network is the best way to control upfront costs, this is worth looking into.

Single Channel

Some vendors tout single channel architecture as the key to performance. The idea is to put multiple APs on the same channel.

This mitigates RF interference since all APs act like one big, coordinated AP. The idea is to reduce co-channel RF interference and increase AP density. Greater density is equated with higher performance.

But this means every client and every AP that hears another AP/ client conversation will wait. They won't transmit until the other devices are done because they're all on the same channel. Contrast this to a multi-channel architecture where adjacent APs operate on non-conflicting channels. A single room with 3 APs can support all three APs transmitting and receiving at the same time. A single channel architecture with three APs in the same room? One.

Shrinking Cells

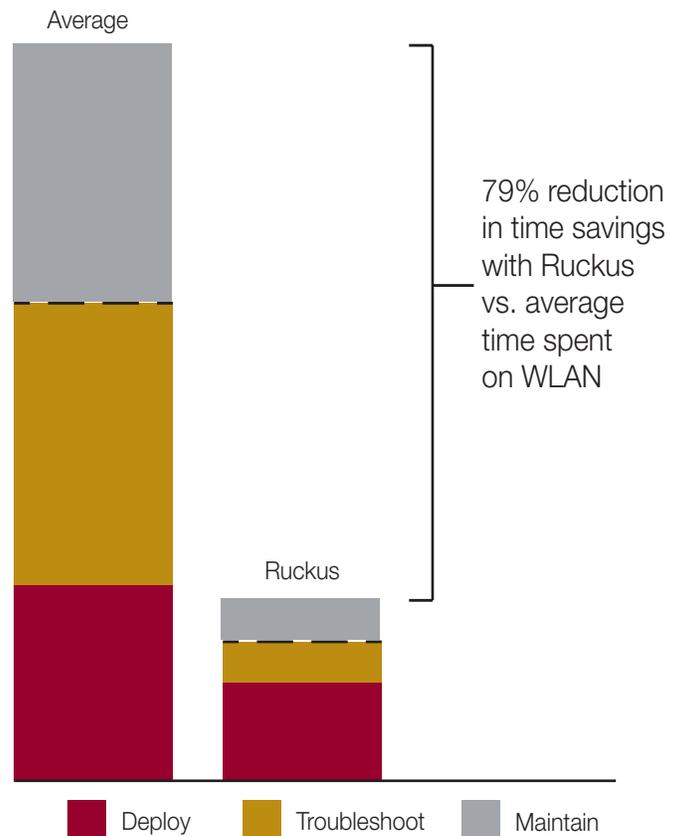
Other vendors take a different approach. They agree co-channel interference is a key limiting factor for WLAN performance. However their solution advocates reducing transmit power on the APs; otherwise known as pico cells. This approach does reduce RF interference while taking advantage of multiple channels. But, reducing AP power means more APs are required to cover a given area.

Network Overlays

Another argument for TCO reduction focuses on issues that are not performance related. For example, much can be made about the cost of re-architecting a wired network to support wireless LANs. The solution, in this case, is to avoid touching the wired network and simply run wireless as a service overlay. This can be a compelling argument if viewed within the narrow context of man-hours spent on wired infrastructure work. But it avoids the follow up questions: if all Wi-Fi traffic is tunneled to a central device, it would need to handle multiple tens or even hundreds of gigabits of network traffic. That kind of performance is not cheap. Scaling such a network mandates recurring capital costs to upgrade existing central controllers or purchase new ones.

Contrast this to a distributed data forwarding architecture. This solution avoids central traffic bottlenecks in favor of dropping off WLAN traffic at the AP port. Most wired networks are already

FIGURE 2: IT Manager Time Savings with Ruckus



Based on customer input n40.

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configured to handle local traffic at a local switch. Adding WLAN traffic to the mix doesn't really change the overall architecture much. However, even if it did, the real cost comparison should be one time cost of man-hours for wired network configuration vs. higher hardware costs — much, much higher costs.

(See more detail in the troubleshooting and maintenance section).

More Ways to Save Money: Opex

With an operational lifetime of 3 to 5 years, the ongoing cost of maintaining, managing and troubleshooting a wireless network is substantial.

Unreliable wireless networks are worse than useless for IT managers and end users alike. Users are frustrated, less productive and dissatisfied. Endless troubleshooting drains IT resources and decreases IT's productivity and ability to handle other projects. and critical tasks.

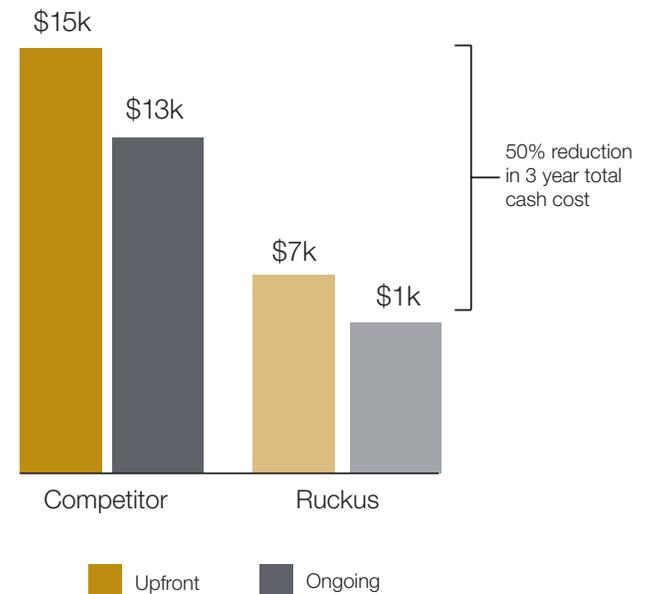
It can be difficult to look down the road several years from today and make predictions, but there are key factors that arise time and again.

Scalability: All new Wi-Fi deployments incorporate 802.11ac technology with wire line speeds. Only a handful of APs could generate 3 Gbps of traffic. Scale that up to hundreds or thousands of APs and its obvious this much traffic would swamp even the largest WLAN controllers that depend on tunneling traffic to a central location. The only way to plan for future scalability and expansion is to avoid these kinds of bottlenecks that choke WLAN performance.

Restricted bandwidth not only reduces overall WLAN capacity it can lead to overloaded networks, dropped connections and their associated help desk calls and complaints.

Ease of Use: Any new system must be incorporated into the existing infrastructure. That includes training IT staff to a level whereby they are knowledgeable enough to configure, monitor and manage the WLAN with proficiency. The easier a system is to understand and use, the more effective IT can be right from the start. A WLAN solution with a highly complex interface can take months or years to learn. That can be reflected in training time costs. Not only do the training courses themselves incur a real cost, there is also lost productivity while the engineer is off-site and unavailable.

FIGURE 3: Pacific Seafood Case Study



- 1 ZoneDirector 1025
 - 16 ZoneFlex 7942 APs
 - ZoneDirector Smart WLAN controllers
 - FlexMaster Remote Wi-Fi management
- Ruckus Upfront Costs: \$7,350
Competitive Upfront Cost: \$15,090

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We cobbled together our existing wireless network over time with Cisco, Linksys and SonicWall products. The system wasn't ideal and with the increasing number of dropped connections, especially during certain times of the day, we had to figure it out and fix it. The cost was a bit of a surprise, fixing it using even fewer access points at half the price was totally unexpected” for the 30 remote sites.”

— **Nathan Wiegand**, Network Manager
[Pacific Seafood](#)

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Redundant Overlays: Most organizations buy and install wireless LANs to improve productivity and support new applications or services. If a WLAN infrastructure already exists, it's typically decommissioned as part of the new deployment. But sometimes a wireless solution is sold as more than just wireless and that raises some thorny problems.

Some WLAN systems offer, and sometimes require, additional services as part of their WLAN deployment. A common example of this is wireless firewalls. Some vendors have extensive firewall capabilities that are touted as a requirement for truly secure wireless LANs. But most organizations today already have enterprise-class firewalls with equivalent or better features. Why buy a second firewall that must be separately monitored, maintained and paid for when you already have one?

This is a case of redundant overlay services — unlike a pre-existing WLAN solution, services such as firewalls are typically not replaced as part of a new WLAN implementation. This is simply another cost that really isn't required to deploy superior Wi-Fi performance and reliability.

Subjective Benefits

Aside from the hard benefits of deploying a reliable WLAN, there are many ancillary benefits are not as easy to quantify such as:

- Users can now maintain more frequent contact with customers and co-workers
- Users can make decisions faster
- Users have the flexibility to work anywhere anytime
- A reliable wireless LAN can accommodate a temporary workforce and allow partner access on site
- Ubiquitous network access aids user productivity.

Ease of Use?

Most vendors say that their solutions are easier to use because it is difficult to quantify until after you buy and deploy any one vendor's solution. Ruckus' solution IS easier to manage and maintain. In order to learn everything you need to know for all of the Ruckus enterprise products, there is only one two-day course. Additionally, the user guide is up to 75% FEWER pages than the nearest competitor. The other top competitors in the WLAN market have thousand page user guides and over 30 days of classroom time to learn their product.

Ruckus' solutions are simply easier to set up and maintain. Why? Ruckus employs a fundamentally different approach to the user interface than most vendors. Knowing that 95 percent of users utilize similar configuration sets, Ruckus' interface is built to leverage this. More granular feature and functionality is still available, but from a deployment standpoint, our users have consistently lauded time to set up versus other vendors.

Case Study: [Pioneer](#), which is a Triple Play broadband IPTV provider, noted cost savings. Scott Ulsaker, Video Products Manager, found that by using Ruckus they eliminated one truckroll per consumer and cut the installation time from 3.5 hours to less than 45 minutes per subscriber. This tripled the number of subscribers brought online each day.

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Summary

As you can see, all of the key considerations in this framework directly relate to the quality of the WLAN implemented, which is inextricably tied to the overall cost of the set-up, implementation, and other ongoing costs. Further, incorporating these considerations into your wireless network implementation will lead to much better quality for the end user also impacting IT management activity costs resulting in an overall higher ROI and lower TCO.

The 802.11ac standard has laid the foundation for better reliability, throughput, and capacity. However, the antenna type deployed along with the software algorithms managing the AP to client interactions greatly differentiates one vendor solution from another. The best antenna technology allows for the greatest economic advantage in all arenas — upfront costs, cost of deployment, equipment, troubleshooting, maintenance, and ultimately quality of service for end users.

Ruckus' patented smart antenna technology has consistently resulted in better performance, range, and reliability. To view our many customer testimonials validating this, view our case studies [here](#).

- 1) **More consistent client performance** at longer ranges through the use of unique and patented smart antenna arrays and best path Wi-Fi signal selection.
- 2) **More stable client connectivity** through a uniquely adaptive Wi-Fi system that constantly optimizes client performance based on real-time feedback and antenna diversity
- 3) **Much faster return on investment and lower cost of ownership** through WLAN system inherently designed to reliably support multimedia applications along with our ability to cover more area with fewer access points that don't all require fixed Ethernet connections.
- 4) A robust WLAN system that is demonstrably **simpler to configure, deploy and manage** based on system software that automates many manual tasks of competing systems.

Wire EVERYTHING?

Wiring drops are expensive whether it is for the stand alone wired LAN or for wiring the access points. As employees are moved within the enterprise and as workforces become more mobile, mixing a network with the appropriate balance of wired and wireless for users saves money. See some of the case studies listed below:

In Philadelphia, [Kimpton Hotels](#) wanted to outfit IPTVs at new locations in each renovated room but didn't want to rewire each room. Ruckus implemented a wireless solution that saved nearly \$60K in wiring expenses that would have been required to wire the rooms.

In many deployments where cabling is difficult, such as in warehousing, large outdoor arenas, or other open areas, Ruckus' smart antenna technology shines through in the effectiveness of its meshing capabilities. In fact, customers have not only taken notice, so have the analysts. Ruckus has the largest deployment of outdoor mesh equipment in the industry. See the press release [here](#).

In a 300 unit community, [Veracity Networks](#) chose to deploy Ruckus' wireless gear in lieu of a wired broadband network when they realized that the Ruckus solution could provide connectivity and reliability to all homes throughout the half mile complex. They calculated that it was one tenth the cost to deploy the Ruckus solution versus wiring each unit. Each unit would have cost \$50 to \$70 per home in physical costs to wire whereas delivering the Ruckus wireless solution cost \$22 per unit.

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Consideration Framework for Implementing a Robust, Reliable and Cost-Effective WLAN

UPFRONT COSTS		ON-GOING COSTS
Site Surveys/Deployment	Hardware — Access Points/ Controllers/Antennas	Troubleshooting & Maintenance
Required to streamline equipment list and coverage with respect to capacity to ensure reliability	Consider a scalable solution where traffic is not funneled through the controller	Consider a wireless vendor whose core competency is wireless, not complicated and unnecessary user interfaces with ancillary redundant features to the WLAN
Consider ways to decrease site survey and deployment costs.	Consider the best solution for coverage & reliability with the least number of APs necessary.	Consider the easiest solution to set-up and deploy.
Consider smart antenna technology which leverages adaptive antennas by directing energy to the client and steering through, while rejecting interference	Consider the best solution for interference mitigation	Consider the most reliable vendor with the best connectivity and throughput
Case Studies Highlighting Site Surveys/Deployment: <ul style="list-style-type: none"> AirMedia Central Utah Clinic Delta School District Douglas County School District Georgia World Congress Center Groupe Frontenac Grove Hill Medical Center Harborlink Holiday Inn Express and Comfort Suites Holland Christian Schools Intercontinental Maurice Midwest Surgical Hospital Pioneer Players Club Satilla Medical Seamar University of Georgia Veracity Networks Womad 	Case Studies Highlighting Hardware: <ul style="list-style-type: none"> AirMedia Central Utah Clinic Douglas County School District Emmanuel College Georgia World Congress Center Hamilton 400 HSV Maurice Midwest Surgical Hospital Pacific Ridge School Pacific Seafood Players Club Queen Mary RCM London Satilla Medical Sistema Universitario Thai Fi 	Case Studies Highlighting Troubleshooting & Maintenance: <ul style="list-style-type: none"> Access Networks AirMedia Belgacom TV Central Utah Clinic Emmanuel College Grove Hill Medical Center Holland Christian Schools Intercontinental Lodgian Maurice Pacific Seafood Players Club University of Georgia
Goal: Least number of APs while achieving reliability and connectivity.	Goal: Optimize number of APs and controllers while achieving reliability and connectivity. A lower number of APs decreases ongoing maintenance costs.	Ease of use and reliability will decrease costs over time.