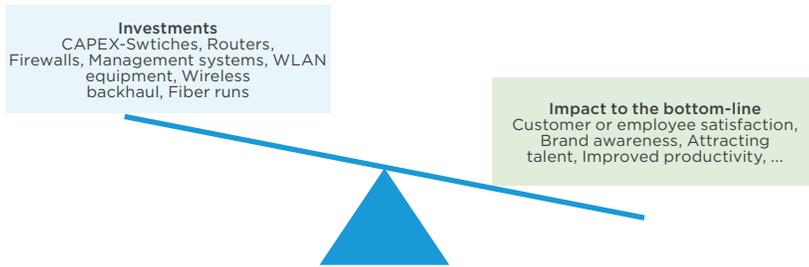


**The three most
important letters
in WiFi - ROI**

WiFi is today an essential need across industries – be it for Internet service providers (ISPs), cellular carriers, hotels, restaurants, coffee shops, the city municipality or remotely located oil drilling pads.



Positive ROI = Net positive effect on the bottom line

But one question common to all industries is:
What is the return on investment (ROI), on my WiFi¹ network?

A positive ROI ensues when the return to a business' bottom line revenues are net positive, when balanced against one time initial investments (capex) and ongoing investments (opex) needed to run a WiFi network

In assessing the bottom line impact, both quantitative factors (direct revenue contribution) and qualitative factors (hard to quantify soft factors like branding gains or savings from deferred expenses) need to be considered. The actual costs and numbers will vary for each deployment but the factors that drive those costs and the return on investment can be identified and discussed. Further, the factors to consider vary by the nature of the businesses and may not be always obvious. For Example, for:

- Service Providers and ISPs, the answer may not necessarily lie in charging separately for WiFi service, but in considering how WiFi increases customer satisfaction, promotes brand awareness, reduces customer churn and the cost of customer acquisition and retention.
- Schools and universities, the answer could depend on evidence that good WiFi in dorms and classrooms is a positive factor in attracting a talented student population and ensuring smooth operations by giving teachers and administrators secure access on the same WiFi network.
- Hospitality, the answer may lie in increased customer satisfaction and attracting repeat business from the well-heeled business travelers likely to spend on other high margin amenities.
- Remote oil pad installations or mining operations, our customers tell us that on-site WiFi access increases operations efficiency and helps attract tech savvy human talent that values being connected, no matter how remote the location.

On the capex and opex side, no matter the industry, there are a few constants that always need to be kept in mind to ensure appropriate selection of a WiFi solution.

These essential factors include:

- End user expectations and end user application – is it voice, video or machine data traffic, or do end users bring their own devices (BYOD)? And it is important to balance expectations and requirements on security against regulations and ease of service
- Site terrain (buildings and local landscape factors) which dictates the choice of not only on the investment on the WiFi network but also the investment needed on the backhaul to carry all that user traffic
- The lifespan that the network needs to be operational, providing optimal performance, and require support before the inevitable next refresh

¹ More appropriately called a WLAN; but we'll use the term WiFi when it comes to the service offered in this paper

So, what are the key cost factors in selecting a WiFi solution?

Upfront costs include the cost of site surveys, the cost of switches, routers and firewalls, the wired and wireless backhaul needed to carry the user traffic and finally the WLAN Access Points (APs) needed for access. On the WLAN side, rather than starting with the feature bells and whistles vendors throw in (including us), consider your real world needs based on user application and equipment location. Getting this right is a critical positive contributor to your ROI.

Today's WLAN networks cater to rapidly evolving user demands, going beyond standard data services such as web browsing or email access. The uptick in video usage along with a voice first approach has resulted in higher than before expectations on WLAN networks and can impact your bottom-line. In such cases projecting for growth in usage, it may make sense to invest in an 802.11ac solution such as Cambium's *cnPilot*[™] dual band R201 or the E400. The answer may not always be 11ac. The correct answer depends on balancing your budget and your needs. Where upfront capital costs are an issue or where the power of a 11ac solution is not needed, consider deploying an economical single band 11n based solutions such as the *cnPilot* R200 or the powerful yet economical ePMP[™] 1000 Hotspot with ability to serve more than a 100 users.

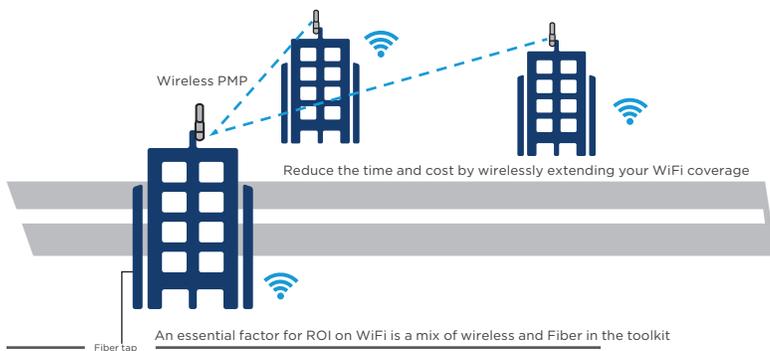


Figure 2: Fiber and Wireless Backhaul Deployment

Of the various location criteria, the ability to physically locate WLAN APs closest to where users are is the number one criteria for good end user experience; and directly affects the overall WLAN AP capex. A key part of locating the APs where the end users are is the ability to employ WLAN APs that support both Fiber and wireless backhaul, (Figure 2) giving service providers and enterprise IT the flexibility in deploying WiFi optimally. Where Fiber is present, savvy WLAN installers will often tap into the fiber and use a combination of Point-to-Point (PTP) and Point-to-Multipoint (PMP) wireless backhaul to

extend the reach of the WiFi network rapidly, yet economically, while yet not sacrificing reliability and performance.

Cambium's *cnPilot* enterprise class APs including the ePMP 1000 hotspot, come with Gigabit Ethernet ports and the ability to rapidly deploy with Cambium's proven ePMP and the PMP 450, offering much needed flexibility. Flexibility combined with reliability that has proven its worth in many real world deployments around the world - more so than the commonly touted all-in-one WLAN mesh networks which reuse the radio and end up being neither good for WiFi access nor for the backhaul traffic!

Moving beyond access requirements, consider the often hidden key components that contribute to much of the ROI costs: the reliability of the equipment, the cost of network management, the ability to support the installation with expertise and the vendor's ability to adapt to new changes in technology. For any sizeable network beyond a handful of APs, the configuring and on-going monitoring of the network requires a good management system often called the Element Management system (EMS) or the Network Management System (NMS).

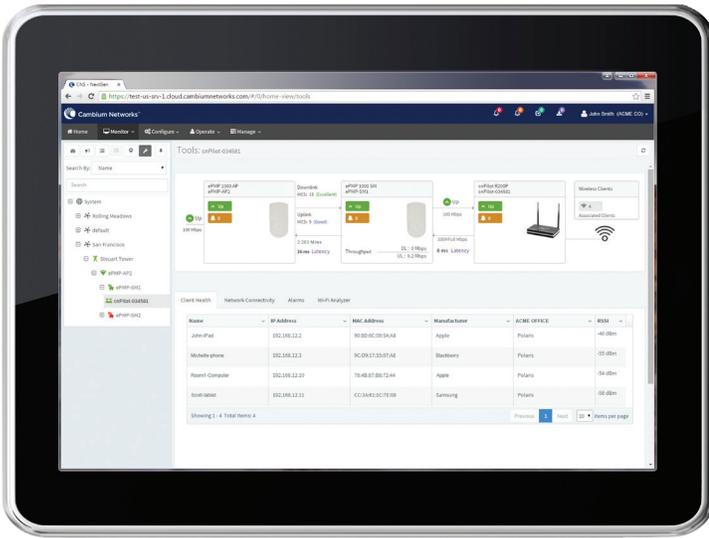


Figure 3: cnMaestro

When it comes to wireless equipment, a wireless management system from a vendor that lives and breathes wireless is essential to keeping tabs on the network and knowing what's going on with ease and comfort. Good management systems not only provide visibility but also support a rich set of APIs to enable integration of the vendor's management, enabling integration with 3rd party billing or marketing CRM engines. And most importantly consider a modern management system that packs its punch without necessarily requiring large upfront capex spending.

Cambium's *cnMaestro*TM (Figure 3) management system is an end-to-end wireless management system that manages both the WLAN and the wireless backhaul from Cambium. By providing deep visibility into daily network operations, it pays for itself in reduced site visits, providing proactive reporting and alarming when issues occur and in faster time to pin point and root cause issues.

Offered as a cloud deployed management system with a Restful API interface, it is designed to support the full lifecycle for Cambium's wireless network equipment from onboarding to inventory management to daily performance and health monitoring and managing software upgrades.

An industry first - it manages both the ePMP and PMP 450 PTP and PMP wireless backhaul and the *cnPilot* WLAN APs, enabling a *single-piece-of-glass* integrated experience across both the wireless backhaul and the WLAN access equipment; making network management in minutes, a reality.

Cambium's intelligent client classification engine, built into the management system, provides meaningful client and device fingerprint data offering insight into user behavior and device usage trends - a valuable tool to help WiFi providers optimize their network today and plan for the tomorrow's network evolution. All of which add up to saved expenses that otherwise would be incurred in understanding daily performance and managing for user equipment (UE) evolution.

And last but not the least, good technology products need reliable support and the backing of a talented R&D team to keep your investments protected. Cambium's reliable *cnPilot* WLAN products are backed by the same R&D team that has built lasting wireless products across multiple industries; products that have stood the test of time over decades of service in tough conditions ranging from Alaska to the deserts of Arabia. *cnPilot* WLAN APs are backed by a rich support offering that includes not only do-it-yourself self-support forums supported by our community of users but also the traditional Tier1/2/3 support backed by field engineers to come on-site when needed.

All of this simply adds to up to: peace of mind and an insurance on your investment knowing that the best in technology is backed by great R&D and hands on customer support - another important factor when considering the soundness of your investment in WLAN products today.

Win the WiFi ROI challenge by firstly picking the right mix of wireless technology that meets your operational needs, keeps your costs in line and has the ability to evolve and support you, as your users grow and your network needs change over time. The business bottom line will thank you for it.



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