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Business-Class Wi-Fi

BUSINESS-CLASS WI-FI FOR ALL

A brief history of Wi-Fi and how Xclaim developed a Business-Class Wi-Fi solution for the price sensitive SMB market

The world of wireless, and particularly Wi-Fi, is advancing and transforming at an incredible pace. According to ABI Research there will have been over 10 billion wi-fi devices sold by the end of 2015. The Wi-Fi Alliance informs us that 42% of all mobile phone traffic was carried by Wi-Fi in 2014 as was over 90% of all tablet traffic. The new and much faster 802.11ac Wi-Fi standard will continue to drive these numbers higher and higher in the years ahead.

But before we look too deeply at the present and future, let's take a quick swing through the past.

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A Brief History of Wi-Fi
It may seem like forever, but in fact it was only in 1997 that the original IEEE 802.11 Wi-Fi standard was ratified. The first widely adopted version – 802.11b – was ratified in 1999. Based exclusively on the 2.4GHz frequency, 802.11b Wi-Fi offered wireless connectivity upto a maximum speed of 11Mbps. Imagine that…..a whole 11Mbps to share with your work colleagues!

Of course, this being Wi-Fi, that 11Mbps was actually only the maximum theoretical or advertised speed as we sometimes call it. As you probably know (and if you don't know you are about to), the maximum advertised speed is not an accurate indication of the average speed an individual user will get. In fact you can typically expect somewhere around one quarter to one half of the maximum advertised speed as the average total throughput that an access point will be able to provide. This then has to be shared with all the connected users. So an 11Mbps 802.11b access point might actually have provided an average throughput of around 3-6Mbps. And then that had to be shared with all your buddies in the office. If there were 10 of you, then you would get maybe 600Kbps each. Given that a good quality video stream is typically going to need a few Mbps, that's not great news. However, it is no longer 1997 so we can in fact expect much greater speeds than this today….pheww!

The Ethernet to Wi-Fi Comparison
Wi-Fi has become to the wireless world, what Ethernet has been to the wired world. In other words, it has developed over time, becoming faster and faster and more sophisticated whilst maintaining ease of use and most importantly - backwards compatibility. Back in 1973 when it was first invented, Ethernet was a "shared" network medium, offering a maximum theoretical throughput of 10Mbps (so not dissimilar to the 11Mbps of shared capacity that 802.11b offered 25 years later!). The term "shared" means that the advertised throughput numbers are the aggregate amount, and have to be "shared" amongst all the users. The sharing is done by only allowing one device at a time to communicate over the medium whilst every other device has to wait for its turn. So whilst a device might theoretically be able to connect at 10 Mbps, in any given second it is actually only able to transmit or receive data for a fraction of that second. The result of course is that the actual throughput of that client is only some fraction of 10Mbps.

Since the early 1970s, Ethernet has morphed from "shared" hubs to switches which dedicate an amount of capacity on each port (actually, each port is still a "shared" port but the switches are designed so that typically only 1 client connects to each port so the client does not need to share the bandwidth with another device).

As stated earlier, backwards compatibility was key to the success of Ethernet. Ethernet has evolved over the years from 10Mbps to 100Mbps and then 1Gbps and today Ethernet can run to speeds of 10Gbps or more which is 1,000x faster than the original specification. Despite these huge speed advancements, you can still plug a 10Mbps client device into a 10Gbps switch port and expect it to work with nothing extra to configure. In fact if you have ever deployed a 10Mbps Ethernet switch, you can pretty much deploy a 10Gbps Ethernet switch and it all just works in the same way. There might be a bunch of additional software features you can configure if you want – but if basic plug and play connectivity is what you need then whether it is 10Mbps Ethernet or 10Gbps Ethernet, it really makes no difference - and therein lies the beauty and the secret of its success.

That ease of use, that backwards compatibility with existing client devices and that comfort feeling within the IT community that says "I already know how this thing works" has been the foundation of Ethernet's success. That success has never been based on it being the "best" from a technical standpoint and there have been challengers along the way. Wired solutions such as Fibre Distributed Data Interface (FDDI) and Asynchronous Transfer Mode (ATM) both came along and threatened to lift the crown from the wired king of connectivity. They were both considered "better" technologies – more efficient with better mechanisms for ensuring quality of service, redundancy, higher bandwidth etc. etc…….but alas, FDDI and ATM were more complicated to understand and thus deploy and critically they were not backwards compatible with existing Ethernet client devices - and therein lies the biggest problem. Physically replacing a 1,000 port switched Ethernet network with a 1,000 port switched ATM network was not particularly hard (pricey, but not hard!)…..but replacing the Ethernet adapters inside 1,000 desktop PCs with 1,000 ATM adapters was both hugely time consuming and very, very expensive. So expensive and time consuming in fact that hardly anyone did it…….and in the meantime Ethernet just evolved…becoming faster and faster, cheaper and cheaper and the rest is history.

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Wi-Fi is Today's Ethernet:

History Has a Way of Repeating Itself. Wi-Fi is now reliving the continuous rebirth and success that Ethernet has experienced - the same backwards compatibility benefit and the same user familiarity "comfort" factor.

In the box below you can see how the Wi-Fi standard has evolved over the years;

TABLE 1

1997	802.11	2.4GHz	Up to 2Mbps
1999	802.11b	2.4GHz	Up to 11Mbps
1999	802.11a	5GHz	Up to 54Mbps
2003	802.11g	2.4GHz	Up to 54Mbps
2009	802.11n	2.4GHz and/or 5GHz	Up to 600Mbps
2013	802.11ac	5GHz	Up to several Gbps

Just like Ethernet, the great strength of Wi-Fi is the continued speed improvement and its backwards compatibility. A 5GHz device (client or access point) that is advertised as supporting 802.11ac, is actually capable of supporting any 5GHz 802.11a/n/ac device. Likewise, a device that supports 2.4GHz 802.11n is actually able to support 802.11b/g/n (Note: there is no 2.4GHz version of 802.11ac).

So you can see that when a new Wi-Fi network is deployed supporting the latest standards, it always has the ability to support the legacy client devices that are out there, which means no-one gets left behind. On that note, some vendors do actually provide the ability for networks to be configured so that the oldest and slowest client devices *cannot* connect to a new network, as they can slow the network down for everyone (lets face it, a horse and cart might physically work on a freeway, but its presence is not optimal for the other vehicles).

The great news for all of us is that despite its relative maturity, Wi-Fi is still a youngster when compared to Ethernet (see next chart). We can look forward to many, many years of innovative Wi-Fi development ahead of us and a corresponding increase in annual enterprise market size from today's USD $4B-$5B to more like $20B over the course of the next decade.

Ethernet Switch Port Market ($ in billions)

$25B

YESTERDAY

TODAY

$1B

95

Today

Source: DellOro Group

So which Wi-Fi solution should you choose?

Firstly – as of early 2015, you should only be considering 802.11n or 802.11ac access points for a new deployment – and preferably the latter. By the end of 2016, if not sooner, you should only consider 802.11ac.

Legacy Wi-Fi access points supporting only 802.11b/g will prevent you from taking advantage of the speeds that most client devices are capable of today. As well as the speed limitation, there is unlikely to be any sort of price advantage in buying anything which is not 802.11n or 802.11ac based.

Secondly, it is best to buy a dual-radio product. This is an access point that supports both the 2.4GHz frequencies and the 5GHz frequencies at the same time (not to be confused with a single radio access point which can be set at 2.4GHz *or* 5GHz but not both concurrently). Having a dual-radio product will ensure that all client devices can connect at their optimal frequency. Also by having 2 radios instead of just one there is much more bandwidth capacity to share amongst the connected users. If a single-radio solution is deployed it will typically have to be set to 2.4GHz to ensure that all client devices can connect (many client devices, even the more recent ones, only support a 2.4GHz radio and no-one makes 5GHz only client devices). The 2.4GHz band is relatively narrow and is much more prone to interference compared to the 5GHz band as a result of the extensive use that it sees. There may be a small cost benefit in buying a single radio access point, and of course cost can never be ignored, but as explained, the benefits of a dual-radio solution will typically make this seem

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like a false economy over time.

Lastly – because of backwards compatibility and future-proofing, always try and deploy the latest standardized technology you can afford. If you only have 802.11n client devices today, it might appear to make sense on paper to buy lower cost 802.11n access points. Certainly if your budget is limited, then 802.11n will make a fine solution. However, pretty much every vendor of smartphones, tablets and PCs is rapidly moving to, or has already moved to the 802.11ac standard. So whilst you may only have 802.11n clients today, that situation will very rapidly change over the course of the next one or two years. At that point, an 802.11n access point deployment may not deliver the kind of Wi-Fi performance your users will then expect. By contrast, if you deploy a dual-band 802.11ac network today, all of your clients can connect using their current 802.11n standard (on both 2.4GHz & 5GHz) and as they migrate to 802.11ac clients in future, the network will automatically allow them to take advantage of the higher speeds that 11ac provides. Instead of having to replace the network again in a couple of years, the network may be good for 4-5 years or even longer.

Which vendor should I choose?

That's obviously a loaded question in this Xclaim Whitepaper, but listen to the argument anyway! Over the years since Wi-Fi first became available, the market has polarized into the consumer side and the enterprise side with various well-known brands that are associated with either side.

Consumer products of course are very popular for home use to compliment the often very poor Wi-Fi provided by the home cable or DSL router. These consumer products typically have a couple of major benefits. Firstly they are low cost which is often the key feature. Secondly they are usually reasonably straightforward to set up which is important given the relative lack of IT knowledge of your average consumer home owner.

Cost and ease of use is certainly good – which is why consumer brand products have also historically been very successful inside small businesses too. But there are many downsides to consumer products. They typically do not have any business-class features such as secure guest access capabilities, bandwidth throttling tools and the ability to support high client densities without falling over. They are typically never designed to be managed as a network if you need to deploy more than one unit. Lastly, nine times out of ten a

software update is done once every 3-4 years….and that is when you go out and buy a new one to replace the old one!

In recent years, when Wi-Fi merely acted as an overlay for the "primary" wired Ethernet network for a business, suffering from the weaknesses of consumer brand access points was something businesses would be prepared to live with given the cost and complexity benefits. Today that has changed. For many businesses, perhaps even for most, Wi-Fi has become the primary network access technology. Many small businesses today do not even have a wired network as they rely solely on their smartphones, tablets and ultra-book PCs to go about their daily activities. None of these devices offer a physical wired RJ45 Ethernet port these days. So with Wi-Fi now the primary on-ramp to the network, more and more businesses are today looking to enterprise grade solutions to solve their wireless connectivity needs.

If we look to the traditional enterprise Wi-Fi vendors, we see many "opposites" relative to the consumer brands. Products from these enterprise vendors tend to be feature rich and come with regular software updates. They are designed to scale and are mostly robust solutions that deliver significant value if the extensive feature sets can be harnessed successfully (policy-based network access anyone?). But that extra "value" comes with a cost - both a financial cost and a complexity cost.

An enterprise access point can cost 2-4x that of a consumer brand access point with the same number and standard of radios (i.e. when comparing a dual band 11ac consumer AP to a similar enterprise AP). In addition, and for all the right reasons, enterprise solutions almost always require some kind of central management system. This may be a Wireless LAN (WLAN) Controller or Management Appliance, or maybe a Cloud based controller/management service with a mandatory subscription model. Any required local WLAN controller or management appliance will typically add several thousand dollars to a network at minimum (even if you just have to supply the PC platform to run "free" software) and these solutions can run to many tens of thousands of dollars. Cloud subscription services will typically run to around $50 to $100 *per AP per year* which will soon accumulate to a hefty annualized operational cost as you deploy more and more access points. In fact most cloud subscription models will generate more

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revenue for the vendor over the lifetime of the subscription than the capital cost of the hardware in the first place.

On the complexity side, most recognized leading enterprise Wi-Fi solutions have been developed with an expectation that there is going to be some reasonably high level of IT sophistication and competence at the customer end, both during deployment and then operationally thereafter. In the SMB space this is often not the case and even where there is a reasonably proficient IT staff, very often the enhanced feature sets of enterprise solutions are simply not needed by many businesses.

So – Consumer brand or Enterprise Brand?

There are one or two Wi-Fi vendors who have tried to bridge the gap between the consumer and enterprise markets. These are mostly vendors with no enterprise background who are leveraging up consumer-centric access point designs.

Xclaim is in the unique position of being part of Ruckus Wireless. Having been the fastest growing Wi-Fi vendor year

over year for the last 5 years, Ruckus is now the third largest supplier of enterprise Wi-Fi technology by revenue in the world. It is also the #1 supplier of Wi-Fi infrastructure to the global Service Provider community. Recognized for building very high quality, high performing products with leading edge features and the most reliable RF technology in the industry, Ruckus is also renowned for being very easy to do business with and for standing behind its solution from a support perspective.

In Xclaim, Ruckus has brought to market the first solution to successfully bridge the gap between the currently polarized consumer and enterprise vendor solutions. Xclaim delivers the ease of use and price points of consumer brand solutions – including a totally subscription free Cloud service - with the required enterprise capabilities that will still make a small businesses or a price sensitive enterprise of any size successful.

For more information on Xclaim please visit our web site at www.xclaimwireless.com.

350 West Java Drive
Sunnyvale, CA 94089 USA
(650) 265-4200 Ph \ (408) 738-2065 Fx

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