



White Paper

Ten factors to consider before deploying WLAN 802.11n

Introduction:

The introduction of WLAN 802.11n represents an exciting event for customers due to its greatly enhanced capabilities over the existing 802.11 a/b/g standards in terms of capacity, range and reliability. However, before installing any new technology, particularly one based on a draft standard, it is crucial to first consider all of the implications and create an approach that meets the needs and business goals of your organization. Deploying 802.11n involves much more than just an exchange of hardware and software. A wide range of issues need to be carefully considered.

This white paper provides a 'top ten' list of factors that will help you develop a successful strategy for how and when to migrate to this breakthrough next-generation technology.

Making an informed decision: Ten things to consider about 802.11n

1. What are your applications requirements?

What are your primary drivers? Do you need to increase bandwidth or support 802.11n client devices? The first step in making an informed decision about moving to 802.11n is to map out your applications requirements for the next three years and assess where and when the enhanced capabilities of 802.11n will be required.

2. Determine your comfort level with risk

Installing any new technology, particularly one based on a standard that has not yet been ratified, involves a modicum of risk. Although it is highly likely that the current 802.11n draft standard will be compatible with the final 802.11n standard, there are no guarantees. Additionally, many expanded capabilities, which will be implemented over time, are included in the new standard. Capabilities such as three spatial streams (with up to



50 percent higher throughputs) will be added as the radio technologies mature.

Before making a decision as to when to migrate to 802.11n, it is important to understand the level of risk your company is comfortable with in light of the 802.11n standard maturity.

3. Develop a support strategy for clients

When it comes to the adoption of new technology, devices for vertical industry applications often lag behind PCs, which are driven by consumer applications. In the case of 802.11n, several factors — including higher power consumption, more complex antenna design and support for both 2.4 GHz and 5.x GHz operation — have led to a lag in the availability of small form factor, 802.11n-based clients for Voice over Wireless Local Area Networks (VoWLANs) and other specialized requirements such as personal digital assistants (PDAs), barcode readers and RFID tags.

A mixed mode of operation will have to be part of the strategy for most customers until all clients are able to support the 802.11n standard.

A complete migration strategy must take into account that an extended period of time in a mixed mode of operation might be necessary. Note that this means you will not get the full promise of 11n throughput (some say as high as five-fold) until the full migration is completed. A business case for investing in 11n today should factor in this limitation.

4. What controller processing will you need?

Today's WLAN controllers are designed and scaled to handle centralized processing of a fixed number of a/b/g access points operating at up to 54 Mbps. It is unreasonable to expect the same controllers to handle the traffic of 802.11n access points operating at three or more times the throughput. The net impact of this is that a controller designed to handle 100 a/b/g access points can only be expected to support about 33 802.11n access points without being severely oversubscribed. To scale controller processing, you will have to either add a substantial number of controllers, replace existing controllers with new higher capacity controllers, or alter the traffic forwarding strategy and deal with the potential tunneling/security impacts.

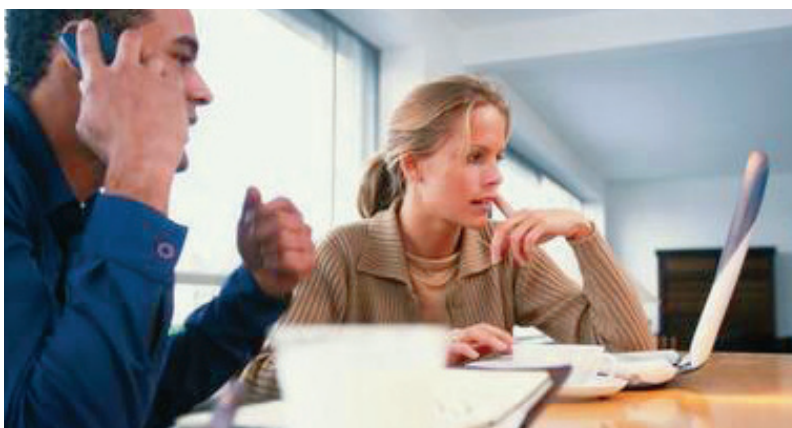
A comprehensive strategy must account for the expected traffic increases, the additional controllers and/or a new product architecture to ensure controller capacity can scale along with access point capacity.

5. How will you power your access points?

Access points with multiple 802.11n radios will most likely require more power than today's 802.3af-based Power-Over-Ethernet (PoE) sources can provide (especially when the advanced features are implemented). A new PoE standard, 802.3at, which will provide the higher power levels required by 802.11n, is still under development and scheduled to be available in the same timeframe as the 802.11n standard.

Until the new PoE standard is widely available, a powering strategy for 802.11n access points could be complicated and might entail using external power injectors, dual Ethernet runs and limitations on full functionality — all of which translate to a higher cost of ownership.

When considering when to deploy 802.11n, you should examine what capabilities you might be giving up to use standard PoE, and you should also consider whether to wait for 802.3at-based PoE switches before moving to 802.11n on a large scale.



6. Map to your LAN considerations

WLAN 802.11n potentially delivers a three-fold increase in data throughput from each access point in the network, possibly more. Many of today's current edge switches, which operate at only up to 100 Mbps, will create bandwidth limitations for the new access points. Any deployment strategy should consider whether these bandwidth limitations will justify an upgrade to GigE edge switches at the same time as the 802.11n implementation. Refresh cycles for edge switches and the upcoming PoE standard should also be carefully thought through.

7. Plan your deployment

When planning implementation of 802.11n, a number of complex deployment issues should be taken into consideration, including:

- › **Radio Frequency (RF) planning**
WLAN 802.11n introduces many new Radio Frequency (RF) planning challenges, such as 20 versus 40 MHz channels and 2.4 GHz versus 5 GHz. These are not trivial challenges and need to be carefully thought through prior to implementation.
- › **Greenfield, legacy and mixed-mode considerations**
For many enterprises, a mixed-mode environment will be a reality, which will add complexity from a planning perspective. Some of the early 802.11n devices are limited to 2.4 GHz and will complicate this strategy.

8. Consider your budget

Cost is obviously a major factor when considering any technological investment. It is important that any strategy takes into account all costs associated with any implementation,

and not just the cost of the new 802.11n equipment. Other costs might include:

- › Improving the LAN infrastructure, buying new power equipment and upgrading clients
- › Enhancing the network design because of increased complexity over the current a/b/g system
- › Increased operational expenditures associated with the introduction of new technology
- › Additional future upgrades, such as new client devices, which could be necessary to conform to the final, ratified standard

You might also need to factor an 'early adopter' price premium into your strategy. List prices for new draft 802.11n access points currently range from 70 to 100 percent higher than the 802.11a/b/g equivalents. As the technology matures and moves into full adoption, prices will decline.

9. When is the right time?

Although all of the above points should be carefully thought through, the decision about when to deploy WLAN 802.11n should ultimately be driven by application need. The first-generation solutions, which will hit the market this year, will have bandwidth that is limited to 300 Mbps, with the full 802.11n bandwidth and range likely not being available until 2009 or 2010. It is important to understand what will be available and when, to ensure any 802.11n implementation truly meets your organization's needs.

Many enterprises will be able to address their current wireless applications with today's 802.11a/b/g technology while they wait for the new technology and ecosystem to mature. For instance, coordinating

the 802.11n upgrade with a planned edge switch refresh will provide both the powering and GigE interfaces needed to realize the full benefits of the new technology.

10. Which vendor is right for your organization?

So, you've determined the time is right to move ahead with an 802.11n implementation, but which vendor will you choose? This can be as complex a consideration for your deployment strategy as any discussed in previous sections. This can also prove to be the most critical of your decisions. There are a wealth of solutions to choose from — all with their own individual strengths and promises to solve every 802.11n challenge. Assessing the technical merits of the various offerings to ensure they will meet your needs is certainly a key step but, given the critical role this network will play in your business, a comprehensive evaluation of the end-to-end capabilities each vendor can deliver is warranted. A solid approach is to visualize what your next-generation wireless enterprise will look like three to five years from now, and then determine who the best vendor is to take you there.

For example, perhaps you visualize your next-generation wireless as being able to ensure your employees are always connected and able to access applications seamlessly, even as they move from location to location. Imagine the scenario: it's 2011 and one of your employees arrives in the parking lot of your building. As the employee walks into the building, your 802.11n network detects that he is talking on his dual-mode phone. The call, which happens to be with the account prime of an important potential customer, is transferred seamlessly

from the cellular network onto the corporate WLAN network, providing significant savings in cellular charges while addressing any in-building coverage issues. The customer is asking for additional information about a specific product before closing the deal they've been working on. The employee uses the presence feature on his phone's multimedia conferencing client to ascertain which product managers are available to provide the information the client needs. He uses the phone's conference feature to bring the product manager into the call with the customer and provide the needed information. A few minutes later, the deal is closed.

Why Nortel?

First and foremost: experience. At Nortel, we have a century of experience in voice and data solutions and in bringing full end-to-end solutions to our customers. Consider the key

requirements for future enterprise wireless networks: seamless mobility, mobile unified communications and carrier-grade RF. Which vendor is best positioned to take you there? The answer is Nortel.

Who better to deliver seamless mobility than a vendor whose equipment is used by some of the largest cellular and enterprise networks in the world? Who better to deliver mobile unified communications than a vendor who is **already** an industry leader in both unified communications and mobility? Who better to deliver carrier-grade RF than a vendor who is a major technical contributor to the emerging OFDM- and MIMO-based standards, and has had reliability in its DNA since the beginning?

Unlike many 802.11n product vendors in the marketplace today, Nortel is committed to, and has the capability to bring to customers, the full ecosystem needed for next-generation wireless networks.

Conclusion

Next-generation wireless is about much more than 802.11n. While 802.11n is a crucial enabler, the real value will come from what you do with the enhanced capabilities, the new applications you can run, and how the network can enhance productivity and reduce costs.

The move to 802.11n will likely be the largest wireless investment you make in the next three to five years, so developing a comprehensive strategic plan that spans clients, infrastructure and applications is crucial. Nortel can help you develop a plan for success.

For more information

To find out more about Nortel WLAN solutions, please visit www.nortel.com/wlan.

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