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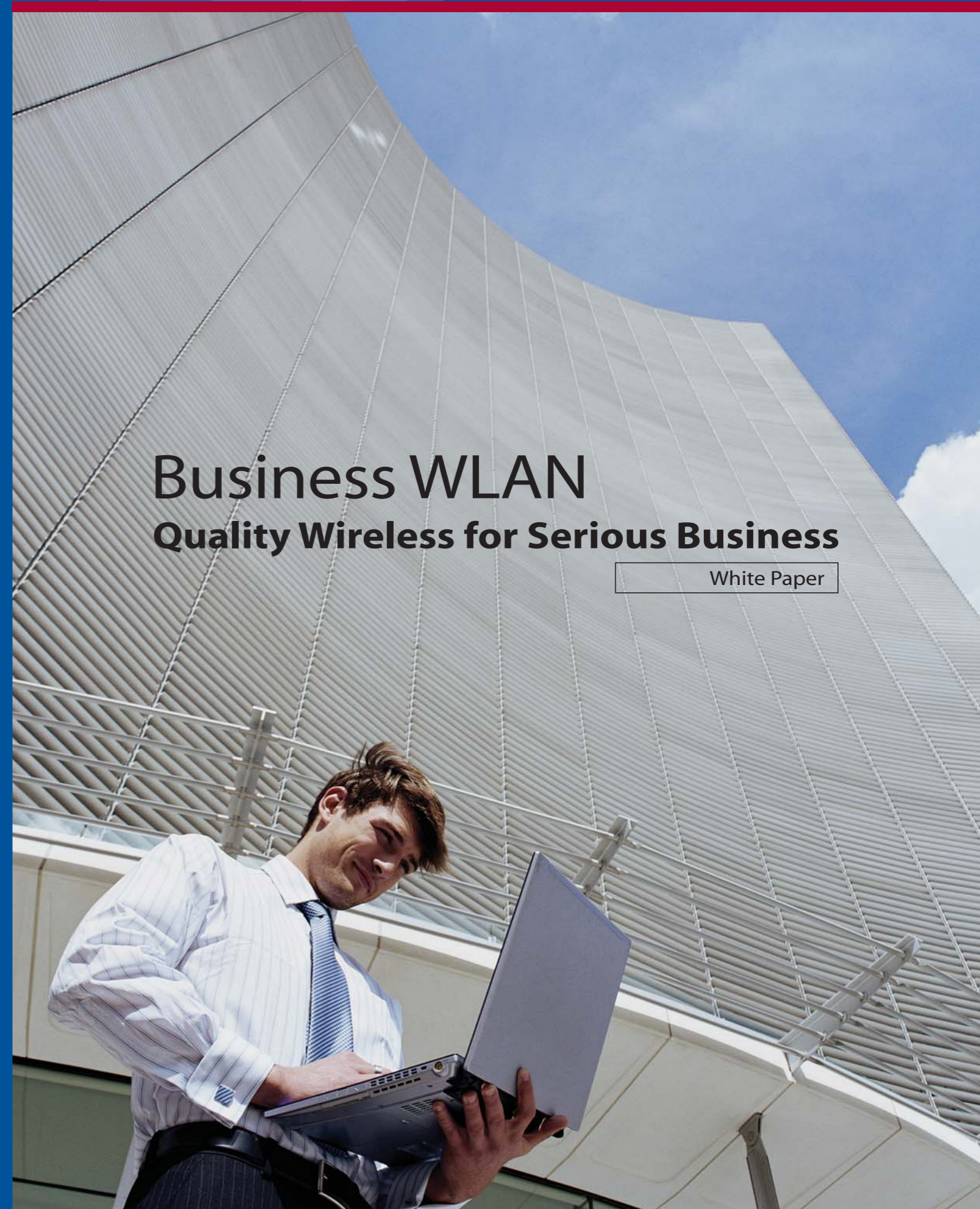
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Business WLAN Quality Wireless for Serious Business

White Paper



The Goal of Implementing Business WLAN

It is no doubt that implementing WLAN in business environments tremendously improves productivity and efficiency. As voice and video applications such as VoWLAN and video streaming begin to appear today, deploying WLAN is more than about convergence or connectivity. The goals of business WLAN deployment for the future should include the capability to carry on multiple Wi-Fi services with reliable, secure connectivity and easy installation and maintenance. To meet the demand of different deployment scenarios, ZyXEL Business WLAN provides smart AP solutions and centralized WLAN controller systems for small- to medium-size businesses to cost effectively deliver secure and reliable converged Wi-Fi services with great future-proof extensibility.

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ZyXEL Technologies Delivering Multiple Wi-Fi Services



The ZyXEL Business WLAN AP solution provides two different WLAN architectures, Smart AP and WLAN Controller System, for different deployment scales range from 1-3 access points to dozens or even hundreds. Regardless of the scale, converged Wi-Fi voice, data and video services are all needed for today's network applications, so you can use VoIP, instant messaging or video conference to communicate efficiently. Here we will introduce the technologies working behind the scene while you enjoy the benefit of multiple Wi-Fi services from ZyXEL gears.

Smart AP

(1) Roaming Improvements

ZyXEL Business Smart AP provides Pre-Authentication, PMK Cache and IAPP enhancements to speed up the roaming operations between APs. With these improvements, you can enjoy the convenience and lower cost of new VoWLAN technologies such as text message, voice and video conference features of instant messengers without suffering from lagging voices or videos. As security threats become another Wi-Fi concern, the Pre-Authentication and PMK Cache is specifically designed to guarantee the isolation of your important voice or video sessions from eavesdropping with rock-solid WPA2 protections.

Illustration of Pre-Authentication

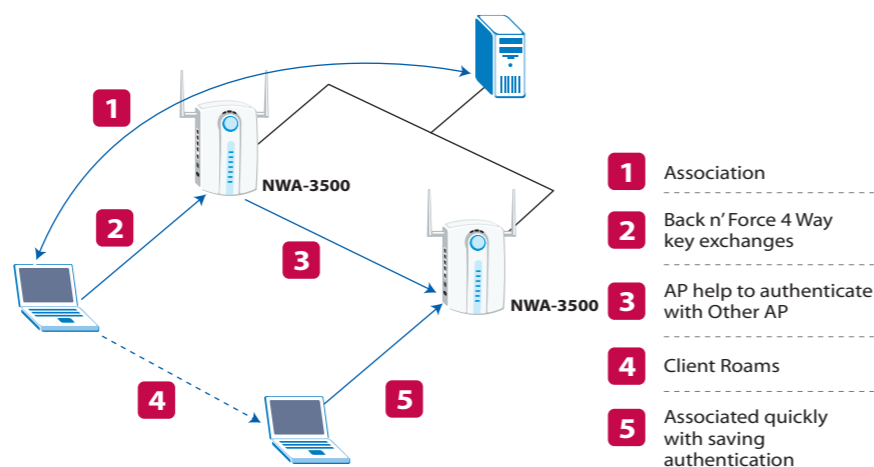
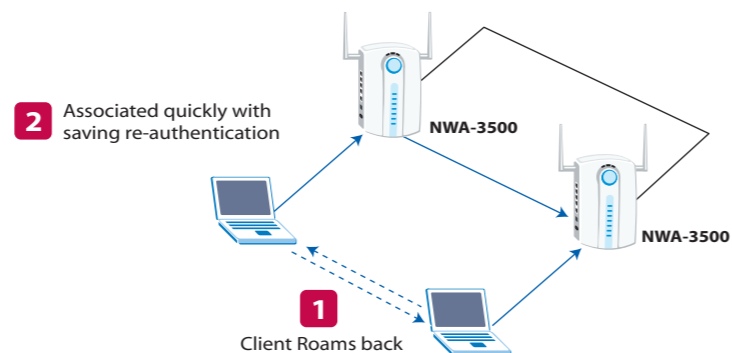
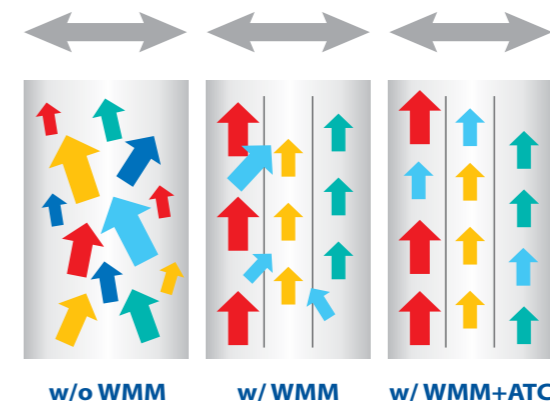


Illustration of PMK Cache



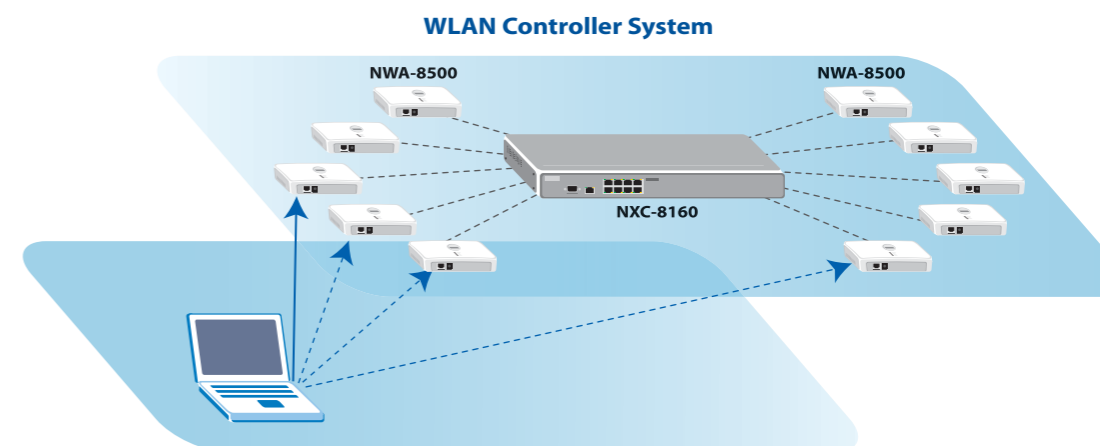
(2) WMM and ATC Technology

Furthermore, ZyXEL's unique ATC (Auto traffic Classifier) technology takes care of non-WMM compliant traffics, despite that most current Wi-Fi phones and voice/video applications are not yet WMM compliant. NWA-3100/3500 supports WMM to prioritize wireless voice, video and data packets even for your legacy non-WMM Wi-Fi phones.



WLAN Controller System

The advanced ZyXEL WLAN controller system brings you the groundbreaking channel blanket architecture. This new architecture provides the "Zero-Delay" roaming and "guaranteed throughput" for the entire WLAN.



Client is associated with the Controller. APs are considered as Radio port of the system. No roaming really occurred while client is moving. The controller has the intelligence to select the best route by packet-by-packet basis.

Deployment Guidelines

ZyXEL's Smart AP and WLAN controller system are all designed for business environments; users may choose Smart AP, or WLAN controller systems to fulfill different scenarios and applications needs. Here we've summarized several guidelines and factors for you to evaluate what fits the best.

802.11 Facts

Understanding the facts of 802.11 will help decide better solutions to fulfill your requirements.

- 2.4 GHz frequencies are constrained.
- Only 3 non-overlapping channels are available for 802.11b/g (2.4 GHz). You must choose 11a/g or utilize the frequencies better.
- The protocols were designed for portability, not mobility.
- Roaming decision is up to the client, not the infrastructure.
- 11b/11g coexistence degrades the capacity, and low-data rate clients degrade the capacity even more. Bandwidth condition cannot be predicted in such a complicated environment.

Cell Planning Deployment Guidelines

Therefore, the cell planning deployment guidelines for smart AP deployments are as follows.

Illustration of "Cell Planning" Deployment



- Each Access Point (AP) is assigned a channel
- APs distributed to minimize interference between any two APs operating on the same channel

(1) Be aware of the cell planning to get optimized performance.

(2) Suitable for lower-density deployments

The constraints we just mentioned in "802.11 facts" will not affect the WLAN performance so much if the density is low. For example, the cell planning will be obviously easier for 10 to 20 Wi-Fi users than 50 to 100 users in a geographical area of the same size.

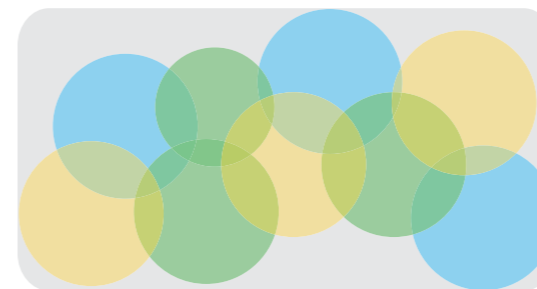
(3) Suitable for low- to medium-level mobility users

With the latest improvements, now the smart AP can provide better roaming support and voice/data convergence for VoWLAN handsets.

Channel Blanket Deployment Guidelines

ZyXEL not only offers the cell planning product, but also provides the "Channel Blanket" alternative.

Illustration of "Channel Blanket" Alternative



- Radio channels are a scarce resource - use them wisely
- Make each channel's bandwidth available everywhere

(1) Sufficient thin AP density for best system performance

ZyXEL's unique WLAN controller system can eliminate co-channel interference; higher AP density provides better throughput, better mobility and better coverage without interfering each other at the same time.

(2) Suitable for High density deployment

The groundbreaking "Zero Delay" roaming and "No cell planning" help you deploy a high-density WLAN with excellent service quality in all respects, regardless of connection quality, security, mobility and voice or even video support.

(3) Suitable for high-mobility environments

ZyXEL's unique WLAN controller system turns the roaming behaviors from client-centric to AP-centric, since the controller determines roaming behaviors and all the clients are guaranteed to connect to the AP of the best service quality. WLAN system performance in such architecture will not be affected by roaming clients.

These two different architectures have different planning, deploying and maintaining attributes as well as their respective benefits and advantages. The decision you have to make is to evaluate your application, decide the major problem to resolve, and identify the goals of WLAN implementation. Once the goals, scale and IT resources needed are identified, you can then choose the best solution for your environment; it can be the smart AP solution, the WLAN controller system, or a mixture of both.

Deployment Guidelines

ZyXEL's Business WLAN Solution with Lower Total Cost of Ownership

No matter you choose cell planning or channel blanket deployment, ZyXEL can provide you a solution with the best total cost of ownership (TCO). Here are the guidelines to evaluate the TCO of a system:

(1) Total Cost of Ownership Evaluation Guidelines

To calculate and compare TCO between different technologies, we must determine the elements that need to be quantified. There are four main cost categories to evaluate TCO.

A) People: In the start-up stage, skill sets are required for the WLAN Project. For example, RF engineers specialized in signal propagation, interference analysis and signal shaping with antenna and were trained on "air analyzers" and voice quality assessment.

B) Tools: Required by the people in charge of executing the WLAN project. These tools include RF propagation prediction, air analyzer, network throughput meter and site survey apparatus.

C) Equipment: In addition to the WLAN devices, other network devices such as PoE injector and extra layer 2 or layer 3 switches, etc. will be used as well.

D) Per Project Costs: The costs required by different stages of the project, such as design, deploy, validate and adjustment.

(2) Cost Allocation of WLAN Deployment

The results of the TCO analysis will be pretty much depending on the goals of implementation and scale of deployment. The cost allocation of a common WLAN deployment is like:

■ WLAN Infrastructure	42%	} 50% of Project!
■ Site Survey/Design	12%	
■ Management	15%	
■ Cabling & Install	14%	
■ Maintenance	9%	
■ Other	8%	

(3) TCO Comparison Matrix

Now let's take a look at how ZyXEL smart AP or WLAN controller system can provide the best WLAN service quality with lower TCO:

Smart AP

Cost	ZyXEL	Competitor	Reason
WLAN Infrastructure	Lower	Higher	The ZyXEL AP is highly integrated with features such as cost-saving embedded RADIUS server.
Site Survey	Same	Same	
Management	Lower	Higher	The ZyXEL AP is equipped with unique features like Auto Configuration and Centralized Administrator Account that save time and effort involved in massive deployment and maintenance.
Cabling and Installation	Lower or Similar	Higher or Similar	The ZyXEL NWA-3000 Series has PoE support for easy deployment and WDS for the case when cabling is not applicable.
Maintenance	Lower	Higher	Features such as centralized administrator account and embedded RADIUS server simplify management.








WLAN Controller System

Cost	ZyXEL	Competitor	Reason
WLAN Infrastructure	Lower or Similar	Higher or Similar	Integrated PoE ports save the extra cost of PoE injectors or PoE switches for deployment.
Site Survey	Not Required	Higher	"No cell" planning saves site survey efforts, and is easy to change channels
Management	Lower	Higher	Do not need a complicated RF analysis or monitoring tool to manage the WLAN
Cabling and Installation	Lower or Similar	Higher or Similar	Controller and AP has PoE built-in.
Maintenance	Lower	Higher	No RF expertise needed to maintain the system, and has much better flexibility to change channels, etc.

Business WLAN Product Matrix



Business WLAN Product Matrix

Product	G-1000 v2	G-3000	G-3000H	NWA-3100	NWA-3500	NXC-8160 (Wireless Switch) & NWA-8500 (Supporting AP)	G-4100 v2
Graphic							
Product Category	Entry Level Smart AP	Smart AP	Smart AP	Smart AP	Smart AP	WLAN Controller System	Wireless Security Gateway
Wireless Technology	802.11g	802.11g	802.11g	Super A/G	Super A/G	802.11a and g*	802.11g
PoE		x	x	x	x	x	x
WMM (Wi-Fi certified)				x	x		
WPA (Wi-Fi certified)	x	x	x	x	x	x	x
WPA2 (Wi-Fi certified)	x	Compatible	x	x	x	Compatible	x

* Function/Features provided by NWA-8500.