ZYXEL
Your Networking Ally

A Smart, Safe Classroom Ideal for Digital Learning

Education
Solution Guide

zyxel**one**network
Redefining network integration

Why Zyxel

From teachers to administrators, students to parents — everyone in education is talking about digital learning. It has become the one of the fastest-growing instructional trends in the world today. Many countries are now channeling funds to help schools make the transformation to smart campuses that offer a more compelling learning experience for the next generation young students. Taiwan's Ministry of Education, for example, now sponsors a four-year E-Learning program* to support digital instruction. The stage has been set with a comprehensive K-12 network infrastructure

upgrade along with the goal of 90% Wi-Fi coverage per school. Meanwhile in the U.S., the E-rate program provides US$3.9 billion in annual discounts to assist K-12 schools and libraries in obtaining affordable Internet access and telecommunications services.
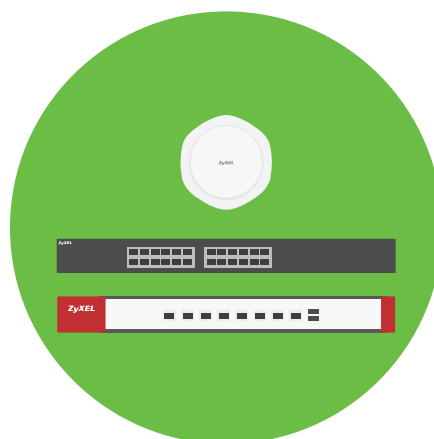
Drawing on its extensive networking background, Zyxel has provided tailor-made educational solutions for grades kindergarten to high school around the world.

* The 4-yr E-Learning program from 2015 to 2019

Zyxel's achievement in global education success cases for 2014-2016

2,100+
Schools

7,200+
Networking Devices

Zyxel assesses the needs of schools and creates tailor-made solutions for their networks. Features of Zyxel's education solutions include:

• Academic networks pioneered the introduction IPv6 globally. Zyxel education solutions support IPv4 and IPv6 transition to help efficiently build academic networks.

• Specialized antenna design helps optimize the digital learning experience in classrooms.

• Zyxel switches feature IP source guard and loop guard to secure school networks from being misused.

• On top of network connectivity, Zyxel also provides security gateway solution to gate keep the content and prevent network misuse.

Challenges Facing Smart Campuses

Educators, parents, and students all desire faster, more stable, and more secure Wi-Fi connectivity for their schools. It's a natural response to the demands of today's digital learning experience with e-textbooks, on-line quizzes, tests, and virtual field trips all becoming the norm.

Another challenge many schools face is that network administrators are either part-time personnel or teachers with no professional IT background. This means that any effective campus network solution must be stable and easy enough to manage that even networking novices can handle the job.

The continuous development of new smart classroom applications as well as the openness and scope of campus networks makes education solutions quite different from typical business networks. The smart campus ideal is often hard to reach due to improper solutions in place.

Zyxel Solutions for Smart Campus

• Complete product portfolio from a single vendor, covering wired to wireless to security gateways.

• Tailor-made features for schools and smart classroom applications.

• Secure and field-proven network connectivity.

Reliable connectivity

In order to deliver access to educational information anytime, anywhere, key campus buildings — common areas, classrooms, and libraries — need more network connectivity to accommodate the increasingly popular "bring your own device" (BYOD) trend affecting both pupils and faculty. As this trend grows, high-speed and high-density data and video streaming from mobile devices threaten to negatively impact Wi-Fi user experiences in campus.

School Wi-Fi Expert

Taking advantage of the latest 802.11ac technology, Zyxel offers an assortment of managed access point series featuring innovative technology, such as smart antenna (WAC6500 series) and dual-optimized antenna (WAC6103D-I). Smart antenna APs provide the best possible performance by shaping their signals to various patterns while also overcoming interference from other APs. Dual-optimized antenna APs can be deployed in a variety of ways with both wall and ceiling mounts, as well as by providing adjustable antenna patterns. All of these managed APs deliver smooth, consistent, and uninterrupted Wi-Fi connectivity for high-density venues like lecture halls and other public areas on campus.

Flexible and Scalable WLAN Management

As demand for wireless connectivity in education continues to grow, so too will the number of APs on campuses. And with this growth come new and varied management challenges to be faced by administrators. Zyxel's AP Controller (APC) technology allows centralized management of multiple APs for easy deployment and scalable expansion. APC technology features Wi-Fi bandwidth management, user-centric access control, and RF management. It also optimizes WLAN performance and delivers always-on Wi-Fi connectivity. Zyxel not only provides stand-alone NXC WLAN controllers, but also security gateway products that can act as an APC. Now, APCs can be flexibly deployed to meet different network needs, onsite or offsite.
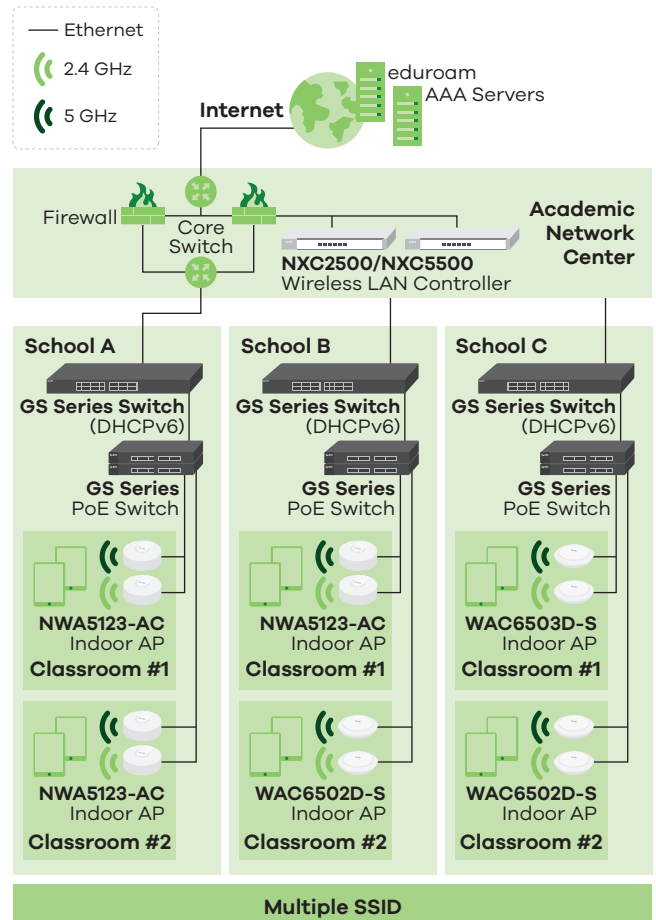
Onsite Controller Model:

• Controller placed in each school.
• APs are managed by onsite controller in each school.
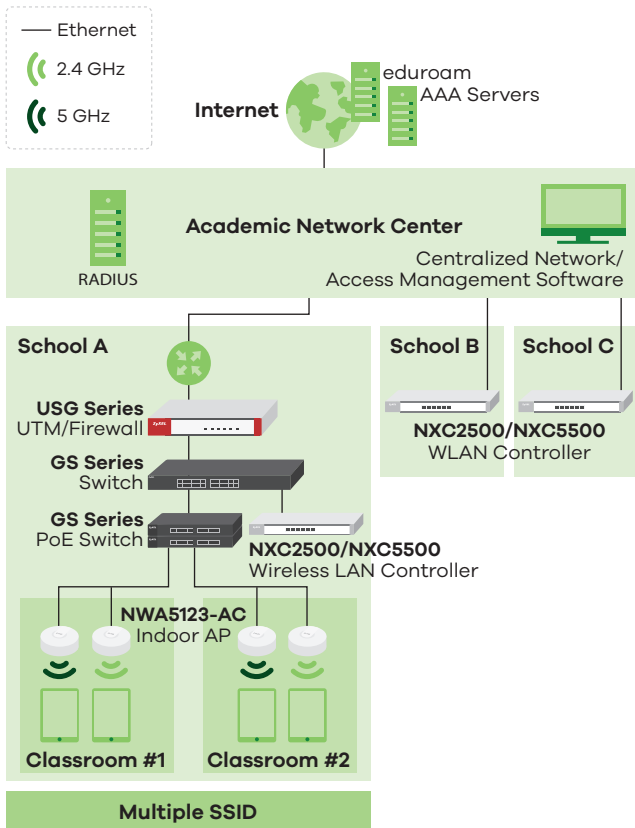
Offsite Model:

• Controller placed in academic network center.
• APs in each school are centrally managed by offsite controller in academic network center.

Efficient PoE Deployment

Zyxel's PoE switches support the IEEE 802.3at standard and are equipped with high power budget to easily accommodate power-hungry devices such as the latest 802.11ac access points. In addition, Zyxel fully managed

PoE switches feature PoE scheduling to supply power to devices only during school hours, saving energy and money while preventing improper use of school network resources.

Tailor-made for smart classrooms

One-to-one (1:1) computing gives every student access to interactive multimedia content and the Internet . This digital learning approach makes content more vivid through the use of multimedia videos that inspires student interest and allows teachers to perform Q&A or pop quizzes to quickly assess understanding and enhance the learning experience.

1:1 computing demands high-density AP deployments. To accommodate this, Zyxel provides specialized designs that can support reliable Wi-Fi for an uninterrupted learning experience.

Challenges Facing 1:1 Computing Environments

- Triple traffic such as video, audio, and multimedia during lectures

- High-density connections for 35-50 students simultaneously in a classroom.

- Low latency is required due to real-time and uninterrupted interaction.

- Less interference is essential because high-density AP deployments within a confined space result increased interference among APs.

Flexible Wi-Fi Deployments

Because tablet PCs generally do not feature Ethernet interfaces, they must rely on Wi-Fi for high-speed data transmission. Featuring compliance with advanced 802.11ac technology, the Zyxel Unified Pro AP series delivers high throughput for heightened performance and a better overall user experience. Unified AP series access points are also designed to support both ceiling and wall-mount installation, and can be adapted to different classrooms to provide seamless connectivity.

Load Balancing

In most digital learning environments, each classroom is equipped with two access points to guarantee uninterrupted connectivity. The biggest challenge in this setting is how distribute connections to several student devices quickly for the best possible performance. In a worst-case load-balancing design scenario, the AP could delay or refuse connection requests from Wi-Fi clients, resulting in un-balanced load sharing or situations in which Wi-Fi clients are pushed to more distant APs.

Zyxel's classroom-optimized load balancing offers the following advantages:

• Two (2) APs per room for rapid load-balancing plus fail-over to ensure always-on wireless access.

• Automatic station to AP assignment.

• Smart technology uses the less congested 5GHz band as first priority for high-speed client devices

• Dynamic handling of student connections so that if an AP station limit is reached, the AP seamlessly passes the request to a nearby AP.

Advanced Dynamic Channel Selection

In extensive Wi-Fi deployments, the dynamic channel selection (DCS) feature can be extremely helpful in saving time that would have been spent configuring access points. However, if such a feature is not carefully designed, the network could face endless channel reselection and changes, negatively impacting network performance.

Zyxel's advanced design provides the following advantages:

• Intelligent scan scheduling to improve Wi-Fi network availability and manage interference.

• Fast scanning and response mechanism to achieve optimal Wi-Fi channel selection.

• Zero impact to normal wireless student connections when performing DCS scan.

• Quick stabilization of DCS results provides stable Wi-Fi performance.

Secure campus network

Because of their accessibility, school networks are often the targets of malicious attacks and intrusions by viruses or botnets. It is therefore essential for network equipment to offer some form of automated security control to mitigate threats and to reduce the work load on faculty. It is also the top priority to provide content filtering of improper websites to ensure academic quality and safety for K-12 education.

Loop Guard

One of the most common problems inhibiting network performance in schools is the network loop. A loop occurs when inexperienced network administrators like teachers, other faculty, and even students mismanage connected devices. The loop guard feature on Zyxel switches can proactively detect when and where a loop occurs and respond with an alert, intelligently preventing it from hampering network performance.

Access Privilege Management

The foundation of a secure school network is making sure that all school resources are only accessible by authorized clients. Whether via wired or wireless connections, clients accessing the network should be identified and authorized with specific access privileges through Ethernet switches or wireless devices. Zyxel switches and WLAN APs can work with RADIUS servers to enforce authorized access.

IP Source Guard

The ability to manage and control of network usage is never more critical than in education. In network world, each IP address represents an individual. That's why ensuring proper use of IP addresses is critical to network security. IP source guard (IPSG) provides that assurance by enabling Zyxel switches to prevent IP spoofing. Whenever it becomes necessary to locate and identify improper use of a network, IPSG helps you find the right one.

Content Filter

Security threats and attacks are continually increasing in complexity, number, and type. Students, teachers, and administrators who access malicious sites inadvertently through public Wi-Fi may infect their devices with malware, which can then spread to school networks when their devices connect. The Zyxel USG Series features Content Filtering 2.0, which leverages a cloud database to continuously analyze and track URLs. This real-time detection provides school networks with the highest level of security protection. To extend filtering coverage, Content Filtering 2.0 blocks inappropriate content, images, and videos efficiently by supporting SafeSearch, which is a service offered by search engines such as Yahoo, Google, Bing, and Yandex.

SSL Inspection

Secure Sockets Layer (SSL) encryption is widely used by almost every website. Popular websites on campus such as Facebook, Gmail, and Dropbox are examples of sites which utilize SSL encryption. However, SSL encrypted connections can also create potential security blind spots as attacks, intrusions, or malware can hide in SSL-encrypted connections to avoid inspection and influence network performance and efficiency. Zyxel Content Filtering 2.0 supports deeper policy enforcement, inspecting traffic in SSL-encrypted connections while blocking threats.

Application Intelligence

When it comes to bringing malicious software onto campus, new network applications are often the primary culprit. This unwanted software — particularly instant messaging (IM) and peer-to-peer (P2P) applications — can consume excessive bandwidth or even cause system damage. With application patrol and bandwidth management features, IT administrators have full control over traffic inspection and rate limit settings. Popular IM and P2P applications can be controlled to restrict client access within the predefined time frame. The table below illustrates typical applications whose control is critical in the school environment.
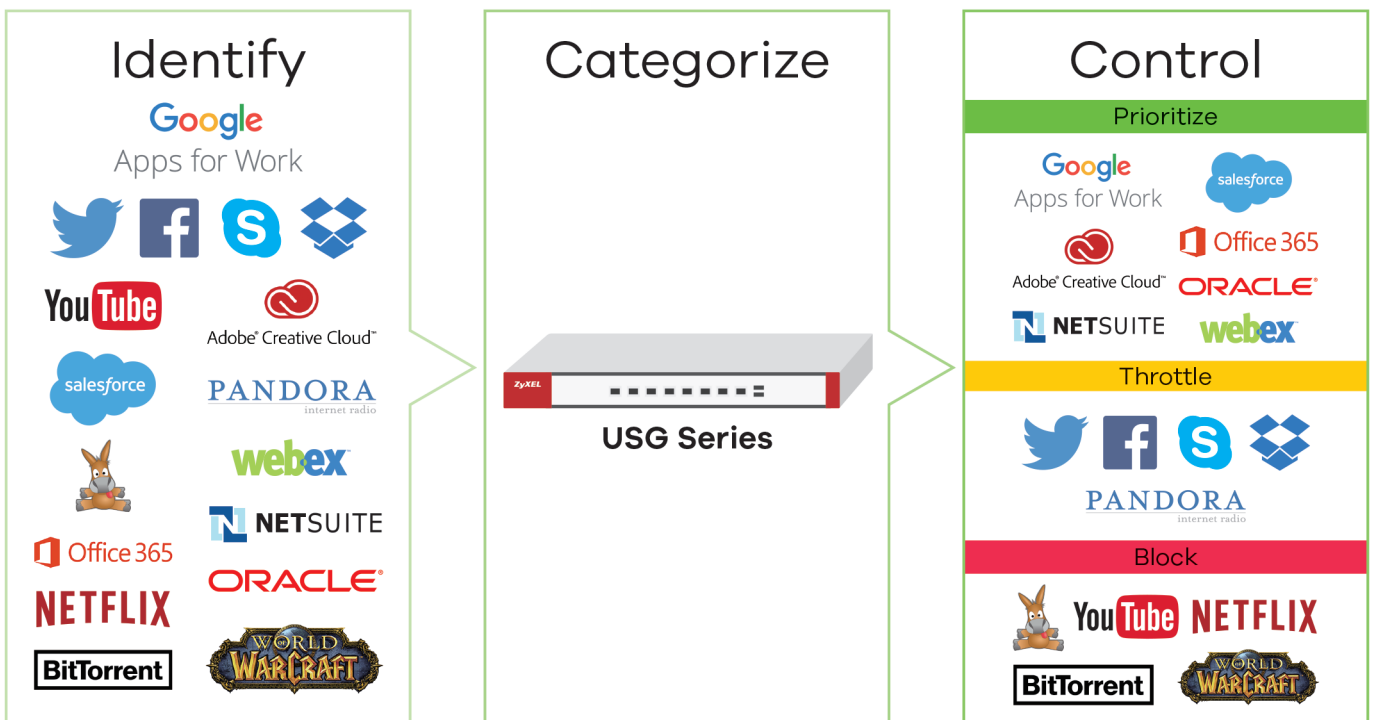
Products at a glance

Wireless Connectivity

NXC2500/NXC5500
Wireless LAN Controller

- Centralized WLAN management and auto provisioning
- Adaptive and resilient Wi-Fi deployments with Zyxel ZyMesh technology
- Client Steering optimizes efficiency of wireless spectrum utilization
- Auto Healing maximizes Wi-Fi service availability
- Comprehensive guest network management features

WAC6500 Series
802.11ac Dual-Radio Unified Pro Access Point

- Zyxel smart antenna provides enhanced performance anywhere (WAC6503D-S, WAC6502D-S)
- Advanced IEEE 802.11ac delivers up to 1.75 Gbps combined data rates
- Industry-leading receive sensitivity as low as -102 dBm
- AP Flex^{TM}, DCS and tool-less bracket design streamline deployment
- Client steering utilizes functions of band select and client signal threshold to match every Wi-Fi client to the best radio of the best AP

WAC6103D-I

802.11ac Dual-Radio Dual-Optimized Antenna 3x3 Access Point

- Enterprise class 3x3 802.11ac AP supports combined data rates of up to 1.75 Gbps
- "Dual-optimized antenna" allows pattern optimization adapting to wall- or ceiling-mount installations
- Dynamic Channel Selection, Load Balancing and Smart Client Steering ensure optimal wireless experience
- Stylish, ultra-slim ID design as the 32 mm height blends perfectly into modern interior decorations
- APFlex^{TM} and Zyxel One Network utilities make deployment simple and fast

NWA5120 Series

802.11ac/n Unified Access Point

- Ceiling and wall mountable
- 2-in-1 standalone/managed AP design
- Plenum rated housing
- CAPWAP management supported
- APFlex^{TM} and Zyxel One Network utilities make deployment simple and fast

Switch

GS1920 Series
Advanced Smart Managed Switch

- Smart managed switch with essential L2 features
- Complies with IEEE 802.3af PoE and 802.3at PoE Plus and supports Intelligent PoE technology
- Reliable network availability with Loop Guard, IPSG and CPU protection
- RADIUS, static MAC forwarding and 802.1x authentication enhance network access management

XGS2210/GS2210 Series
Layer 2 Managed Switch

- Fully managed Layer 2 switching solution
- Complies with IEEE 802.3af PoE and 802.3at PoE Plus
- L2 multicast, IGMP snooping, and MVR for convergence
- Enhanced network protection with IP source guard, DHCP snooping, ARP inspection, CPU protection
- L2, L3 and L4 filtering, MAC freeze, port isolation, guest VLAN for improved isolation and access control
- XGS2210 series supports physical stacking up to 2 units

XGS3700/GS3700 Series
Layer 2+ Managed Switch
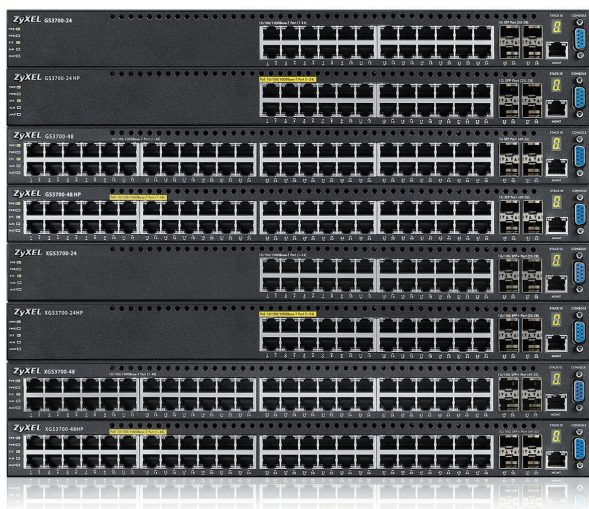
- Full Layer 2+ feature set with Layer 3 features including static routing, policy-based routing, VRRP and ECMP support

- Internal redundant power supply design

- 24 or 48 ports with or without PoE providing optimized gigabit Ethernet connectivity

- Provides up to 30 W per port with IEEE 802.3at PoE Plus compliance

- XGS3700 series supports physical stacking up to 8 units

XS3700-24
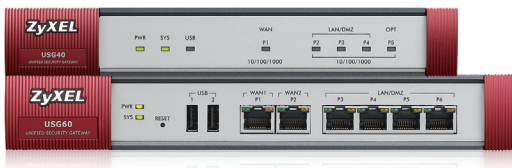Layer 2+ Managed Switch

- Flexible 10GbE connectivity with 12 SFP+ ports, 8 10G BASE-T ports and 4 SFP+ combo ports

- Layer-2 plus (L2+) feature set equipped with static, policy route and VRRP

- No single-point of failure hardware and software design

- Comprehensive security features to ensure network availability
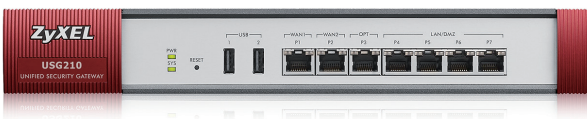
Security

USG40/USG60
Unified Security Gateway

- All-in-one Next Generation Firewall (NGFW) for small businesses
- Complete network protection with firewall, anti-virus, anti-spam, content filtering, IDP, and next-generation application intelligence
- Robust SSL, IPSec and L2TP over IPSec VPN connectivity
- Built-in WLAN controller for centralized management and effortless WLAN scalability

USG210
Unified Security Gateway

- High performance, high value Next Generation Firewall (NGFW) for small and medium-sized businesses
- Complete network protection with firewall, anti-virus, anti-spam, content filtering, IDP, and next-generation application intelligence
- Robust SSL, IPSec and L2TP over IPSec VPN connectivity and VPN High Availability (HA)
- Enhanced clean Web connections with newly Content Filtering 2.0
- Built-in WLAN controller for centralized management and effortless WLAN scalability

ZyWALL 110
VPN Firewall

- Robust hybrid VPN (IPSec/SSL/L2TP over IPSec)

- High-performance SPI firewall

- Bandwidth management

- More secure VPN connections with SHA-2 cryptographic

- Auto-provisioned client-to-site IPSec setup with Easy VPN

- Cloud helper provides the friendly firmware upgrade to ensure its authenticity and reliability

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