

ZyXEL

IP Access Network Solution ServiceAware IP Access Network Promise to Rich Media



2006

ZyXEL

Corporate Headquarters
ZyXEL Communications Corp.
Tel: +886-3-578-3942
Fax: +886-3-578-2439
Email: sales@zyxel.com.tw
http://www.zyxel.com
http://www.zyxel.com.tw

ZyXEL France SARL
Tel: +33 (0)4 72 52 97 97
Fax: +33 (0)4 72 52 19 20
Email: info@zyxel.fr
http://www.zyxel.fr

ZyXEL North America
Tel: +1-714-632-0882
Fax: +1-714-632-0858
Email: sales@zyxel.com
http://www.us.zyxel.com

ZyXEL Spain
Tel: +34 902 195 420
Fax: +34 913 005 345
Email: sales@zyxel.es
http://www.zyxel.es

ZyXEL Czech s.r.o.
Tel: +420 241 091 350
Fax: +420 241 091 359
Email: info@zyxel.cz
http://www.zyxel.cz

ZyXEL Germany GmbH.
Tel: +49 (0) 2405-6909 0
Fax: +49 (0) 2405-6909 99
Email: sales@zyxel.de
http://www.zyxel.de

ZyXEL Norway A/S
Tel: +47 22 80 61 80
Fax: +47 22 80 61 81
Email: sales@zyxel.no
http://www.zyxel.no

ZyXEL Sweden A/S
Tel: +46 (0) 31 744 7700
Fax: +46 (0) 31 744 7701
Email: sales@zyxel.se
http://www.zyxel.se

ZyXEL Denmark A/S
Tel: +45 39 55 07 00
Fax: +45 39 55 07 07
Email: sales@zyxel.dk
http://www.zyxel.dk

ZyXEL Hungary
Tel: +36-1-336-1646
Fax: +36-1-325-9100
Email: info@zyxel.hu
http://www.zyxel.hu

ZyXEL Poland
Tel: +48225286603
Fax: +48225206701
Email: info@pl.zyxel.com
http://www.pl.zyxel.com

ZyXEL UK Ltd.
Tel: +44 (0) 1344 303044
Fax: +44 (0) 1344 303034
Email: sales@zyxel.co.uk
http://www.zyxel.co.uk

ZyXEL Finland Oy
Tel: +358-9-4780 8400
Fax: +358-9-4780 8448
Email: sales@zyxel.fi
http://www.zyxel.fi

ZyXEL Kazakhstan
Tel: +7-327-2-590-699
Fax: +7-327-2-590-689
Email: sales@zyxel.kz
http://www.zyxel.kz

ZyXEL Russia
Tel: +7-095 542-8920
Fax: +7-095 542-8925
Email: info@zyxel.ru
http://www.zyxel.ru

ZyXEL Ukraine
Tel: +380 44 494 49 31
Fax: +380 44 494 49 32
Email: sales@ua.zyxel.com
http://www.ua.zyxel.com



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Since Teleco/ISPs focus on wringing out excessive and unsustainable operating expenses as well as seeking revenue growth, access networks play the most critical infrastructural and operational role for fulfilling their needs. Nowadays, Teleco/ISPs are marching forward on the transition to converged packet infrastructure at the access networks. ZyXEL's cost-effective network solutions provide with this packet evolution for Teleco/ISPs to extract the kind of value expected from these packet infrastructure investments.

Why ZyXEL

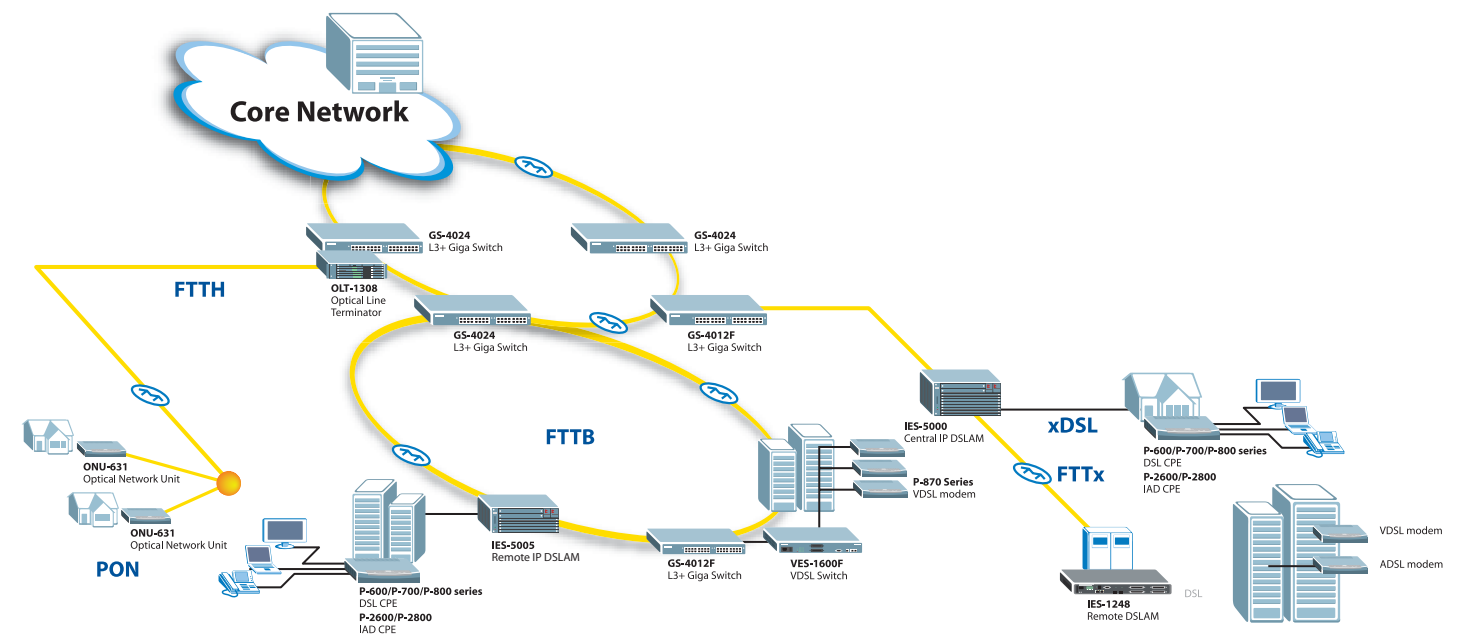
The convergence of video, voice and data services into so-called "Triple Play" is a key business strategy for many service providers. ZyXEL is one of the very few vendors which is capable of offering broadband access equipment for both central office and client users to fulfill their needs. ZyXEL's ZyNOS platform integrates the most advanced broadband technologies, value-added functionality and the ability to build tailor-made implementations for customer requirements. ZyXEL's complete IP network solutions boast the latest, hottest network features such as Triple Play, QoS, Network Security and Network management that not only fit into the IP-based infrastructure deployed by service providers, but also offer the flexibility required for future expansion to reduce initial deployment costs. ZyXEL also provides comprehensive product lineups for customers to choose from: Multi-service IP DSLAM, VDSL switch, L2/L2+/L3+ switch, DSL CPE (ADSL/ADSL2/ADSL2+, SHDSL/SHDSL.bis, VDSL/VDSL2), VoIP and Video/Multimedia CPE(IAD), Multimedia Auto Provisioning Solution, Central Management Software, as well as the Product and Service Platform. This article introduces service aware IP access network solutions driven by Triple Play services and why ZyXEL brand is the premium choice.

Application Scenario - IP Access Network Topology

ZyXEL's L2/L3 Gigabit Ethernet Switch, Multi-service IP DSLAM, GEAPON, and VDSL Switch Series can be used to construct various network infrastructures from metro to access network total solution to satisfy different Telco/ISP operator requirements. The below diagram illustrates ZyXEL's concept of IP access network topology for Triple Play applications.

Solution Highlights

- ▶ Carrier-grade IP access network solution
- ▶ End-to-End QoS empowers data, VoIP and video convergence
- ▶ Leading-edge ADSL2+/SHDSL/VDSL2 technology
- ▶ Tailor-made Element Network Management for small and large networks
- ▶ "High throughput" rather than "high physical speed"
- ▶ Security from the access to the edge against intruders/hackers



Solution Advantages

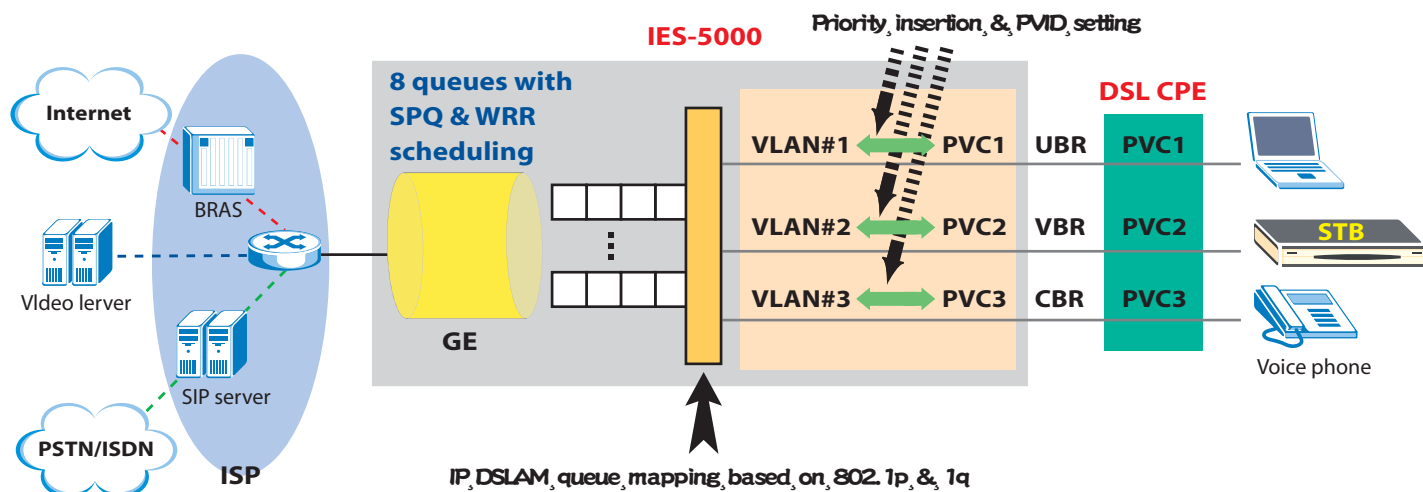
QoS

Enhanced Quality of Service (QoS) has been proven as the enabling technology for the convergence of voice, IP TV/Video and data services. Thus, the IP access network is a key for Triple Play infrastructure design. Typically, the access equipment connect directly to a L2/L3 Ethernet switch or IP router and require efficient switching, bandwidth control management and support to a high QoS to transport traffic from a lower-capacity CPE to a high-capacity metro network.

For these reasons, ZyXEL's access products such as IP DSLAMs terminate and convert ATM traffic directly into an Ethernet environment. Each Permanent Virtual Circuit (PVC) transformed to and from an ATM-based CPE can be configured and mapped to an assigned VLAN with different packet priorities (e.g. ATM QoS to L2 802.1p priority mapping). IP DSLAM aggregates Layer-2 traffics from xDSL users to four Gigabit Ethernet interfaces, which connect to L2/L3 metro network switches. ZyXEL's VDSL switches have the same as key switching QoS features with ZyXEL L2 Ethernet switch, and aggregate traffics from ZyXEL's DMT-based VDSL CPE to support downstream speeds of up to 100 Mbps and upstream speeds of up to 50Mbps while extending Ethernet service distance to as far as 1.5km.

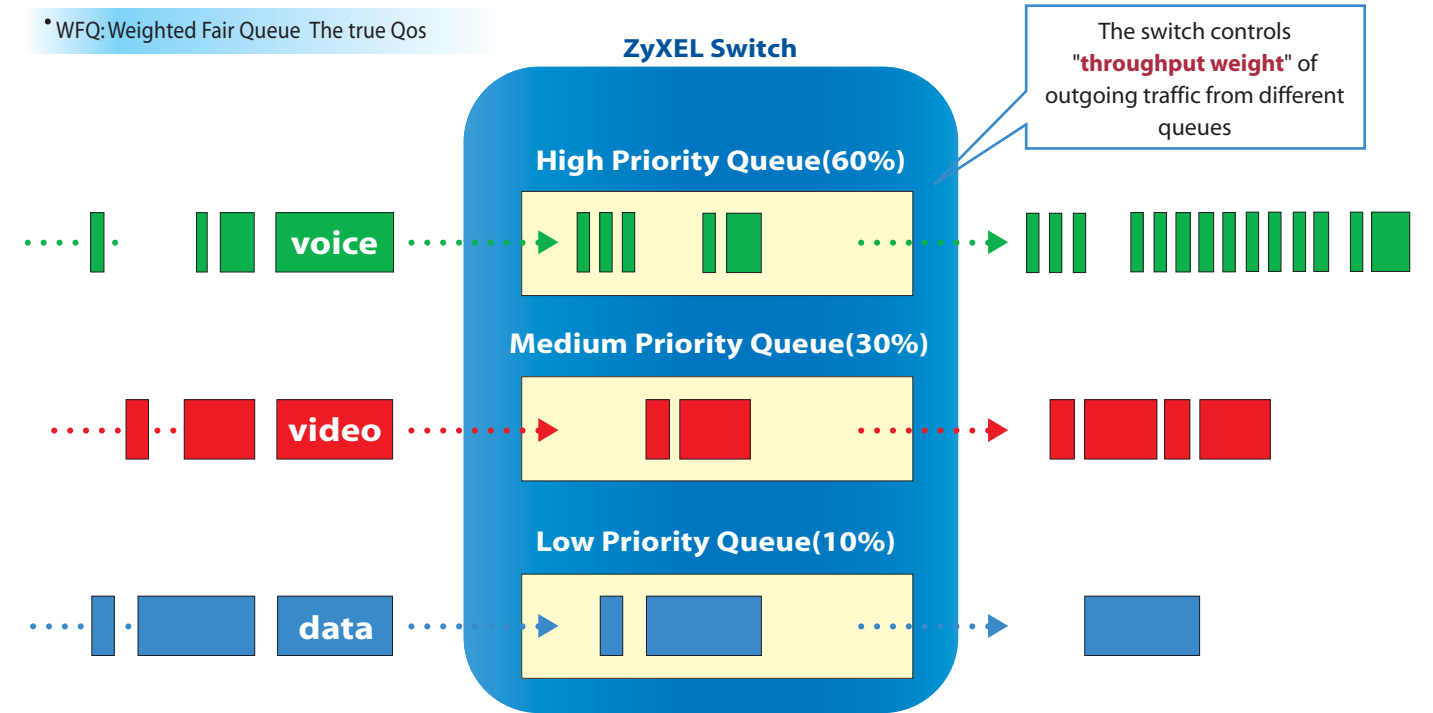
ZyXEL's L2/L3 Gigabit Ethernet switches support essential L2/L3 technologies like 802.1d switching, 802.1q VLANs, broadcast storm control, MAC address filtering, 802.1p traffic prioritization, L3 functions, IGMP snooping; as well as a variety of QoS features like DiffServ and RSVP Layer 3 Gigabit Ethernet Switches are usually employed as edge routers to connect L2 switch, IP DSLAM, VDSL switch or GEAPON to form an all-IP access network. With robust ZyXEL QoS features, service providers can differentiate the service classes for Internet, VoIP and Video broadcasting to meet customer needs.

In addition, ZyXEL provides the integration solution of service aware IP access network combined with L2/L3 Ethernet metro network, IP DSLAM, FTTH, and CPE total solutions; as well as a set of advanced QoS mechanisms to assure service availability and smooth operation via a series of QoS processes that prevent customer networks from congestion impacts. With intelligent multilayer capability, ZyXEL provides carriergrade availability, resilient and redundant architecture with OSPF, VRRP, RSTP, wire-speed flow control, 802.1p class of service (CoS) and WFF/WFQ/SPQ queue algorithm. Besides, traffic classification and reclassification can be based on criteria as specific as rule-based IP, MAC address, VLAN ID and TCP/UDP port number for bandwidth management, allowing administrators to set rule-based rate limiting to take full advantage of limited network resources and to guarantee the desirable performance.



WFQ Guarantee Bandwidth

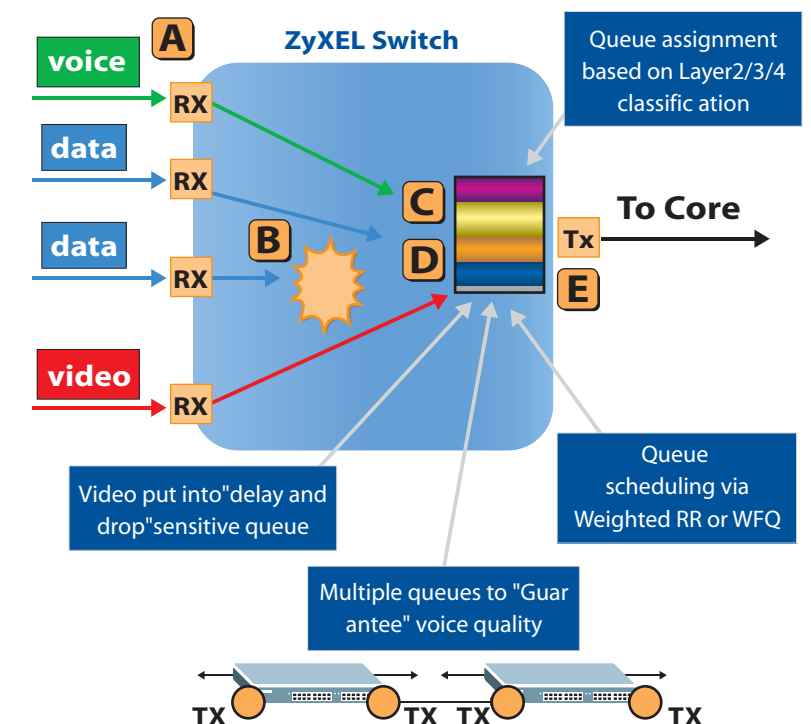
* WFQ: Weighted Fair Queue The true QoS



Intelligent Traffic Policing

- A** Classification(L2-L4)
- B** Policing(Rate Limit)
- C** Prioritization
- D** Re-prioritization
- E** Scheduling & Shaping

- Improves Network Performance
- Protection of Mission-critical applications
- Enable VoIP, video services



Bandwidth

Bandwidth is one of the key factors for networks to carry a large amount of traffic. Simply put Gigabit to the Desktop is bringing Gigabit Ethernet connectivity from the network backbone all the way to the edge of the network, access network and even individual desktops.

ZyXEL's products such as IP DSLAM, L2/L3 Gigabit Ethernet switch, VDSL switch and GEPON can be integrated to a complete IP access network by deploying optical Gigabit Ethernet connectivity among equipments. Gigabit Ethernet provides more bandwidth than both conventional SDH STM-1/STM-4 (155Mbps/622Mbps) and ATM OC-3c/OC-12c (155Mbps/622Mbps), and Gigabit Ethernet trunking can be deployed point-to-point to the CO or in a ring (e.g. Resilient Packet Ring) configuration.

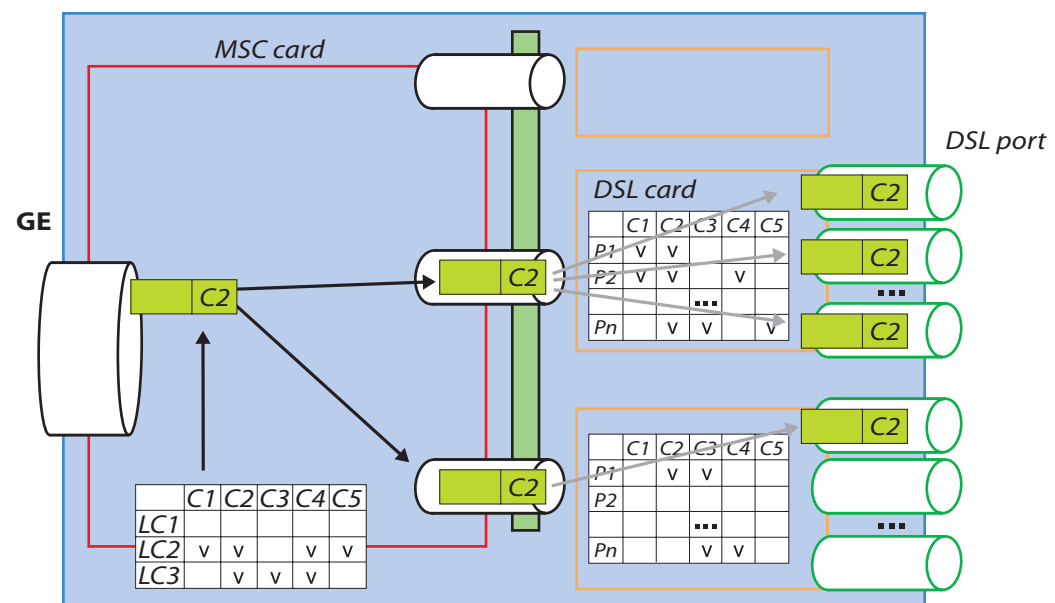
As part of the foundation for broadband services, ZyXEL's sophisticated IP DSLAM (Copper + ADSL2/ADSL2+, SHDSL, VDSL2) and FTTx (Fiber + GPON + ADSL2+/VDSL2) with L2/L3 Ethernet Switches are solid complements to the next generation IP access network architecture.

Multicast

A technique for distributing bandwidth-intensive data across a WAN, IP multicast is an ideal alternative to IP broadcast and unicast transmission for such applications. IP multicasting sends the same information only once and only to the intended recipients. The resulting bandwidth savings and scalability inherent in multicasting provide a major benefit to network operators.

ZyXEL's access series products support IGMP v1, v2 protocol, and at least 256 multicast groups are supported for IPTV or MOD services distribution. Additionally, ZyXEL offers the IGMP v1//v2 snooping feature that forwards traffic only to subscribers that request multicast traffic. This prevents unnecessary forwarding of multicast traffic to all subscribers, thus optimizes bandwidth utilization for heavy bandwidth-consuming applications such as broadcast video. The following diagram shows an example of the multicasting feature of IES-5000 IP DSLAM.

IES-5000 IP DSLAM two-level multicasting



Security

ZyXEL's "Security from Access to Edge" consists of two features: MAC management with specific MAC forwarding, port security/filtering, and per-port MAC count; 802.1x port-based security with a radius management scheme for centralized authentication and authorization to prevent unauthorized client access to the network.

Additionally, ZyXEL's multilayer ACLs suite of sophisticated rule-based control mechanisms can be easily deployed in network environments via Web or command-line interface to prevent abnormal and illegal access. The rules can be defined to deny packets based on source and destination MAC addresses, IP addresses or TCP/UDP ports. ZyXEL also provides VLAN Stacking (QinQ) for network-based or campus VPN.

Intelligent 4-Tier Security

A Prevention

1. MAC freeze
 2. Intrusion Lock
 3. 802.1x & Limit MAC no. per port
 4. Specific MAC forwarding
- TO prevent network sniffing

B Action

- MAC Management
1. MAC filtering & lock
 2. Port Lock
- TO stop internal outbreak

C Policy

- Policy Management
1. L2 to L4 ACL applicable by MAC, VLAN, IP, TCP/UDP
- TO protect network in advance

