ZYXEL

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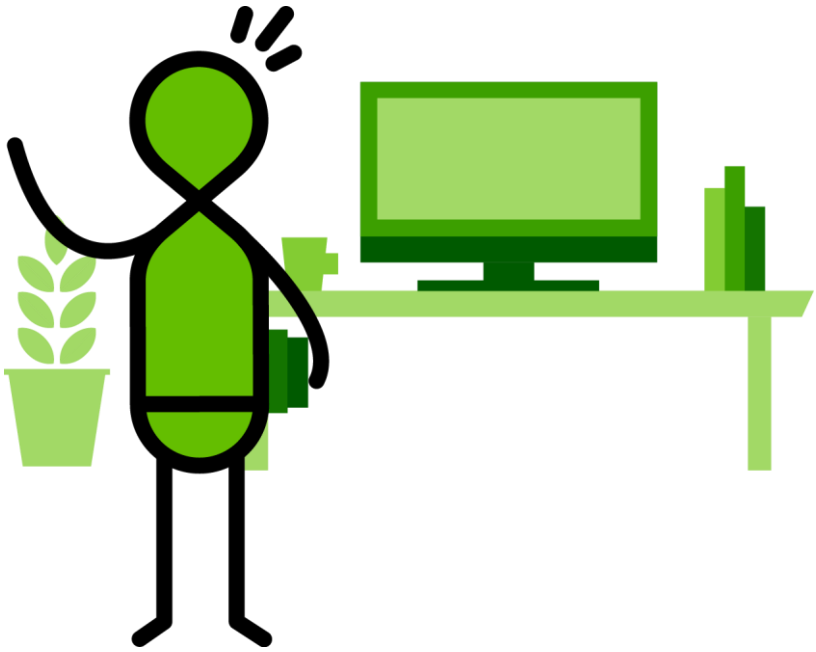
Application Note

Introduction of PoE Enhanced Features for Zyxel PoE Switches

2016 September



Supported Platforms:

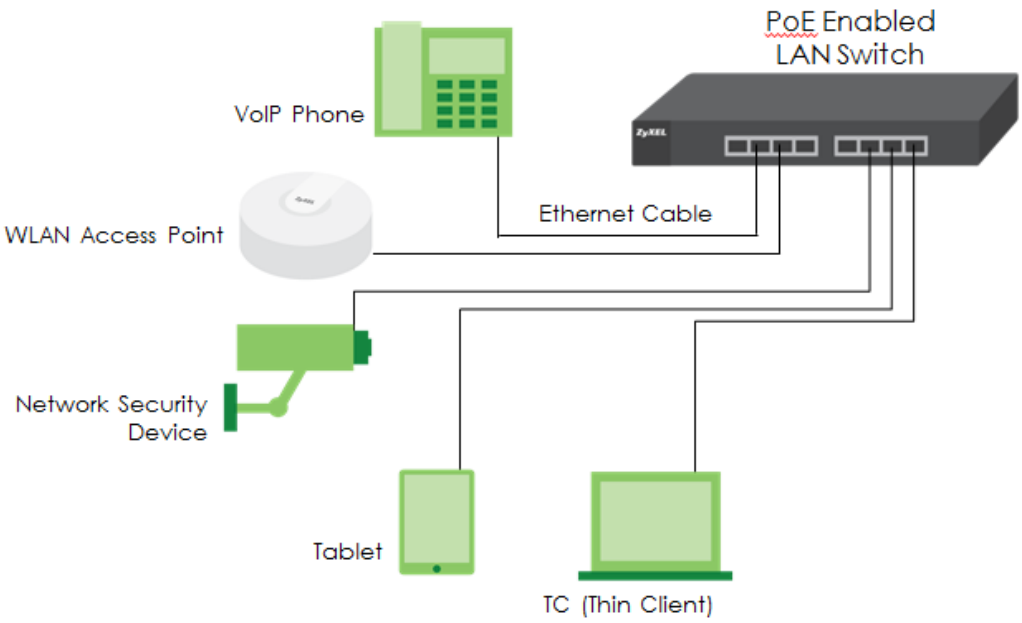
XGS2210-28HP / XGS2210-52HP
Firmware Version 4.30 and above

GS1900-8HP (ver. B) / GS1900-10HP
Firmware Version 2.10 and above

Topic

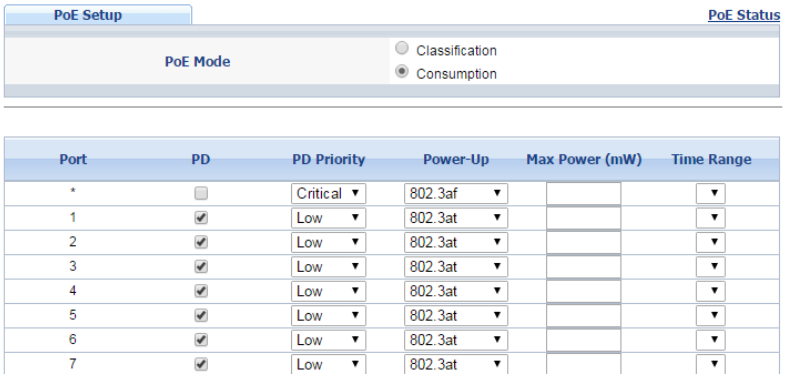
Background

PoE technology allows IP telephones, wireless LAN access points, and other powered devices (PDs) to receive power and transfer data over existing LAN cabling.



Before a Power Sourcing Equipment (PSE) supplies power to PDs, there are some verification procedures for the PoE power delivery process. The following shows PoE function block diagram:

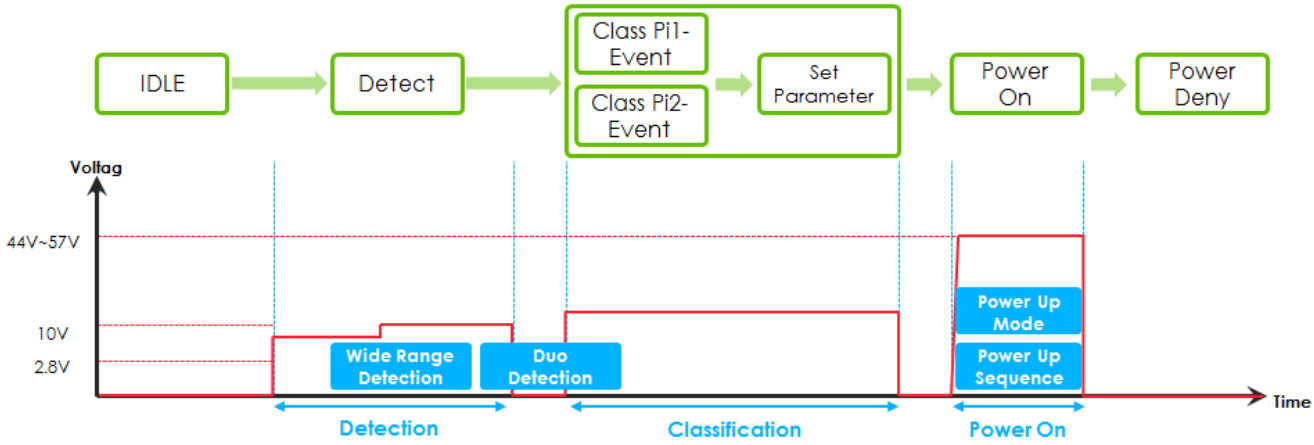
In ZyNOS 4.20, you can only configure PoE mode, Power-Up mode, and PD Priority as the following:



With the demand of wireless applications, the requirements to PSEs also increase. Facing to more and more kinds of PDs, PSEs also have to be enhanced to solve more and more various issues in order to work well with them. Zyxel provides different options for customers to use flexibly.

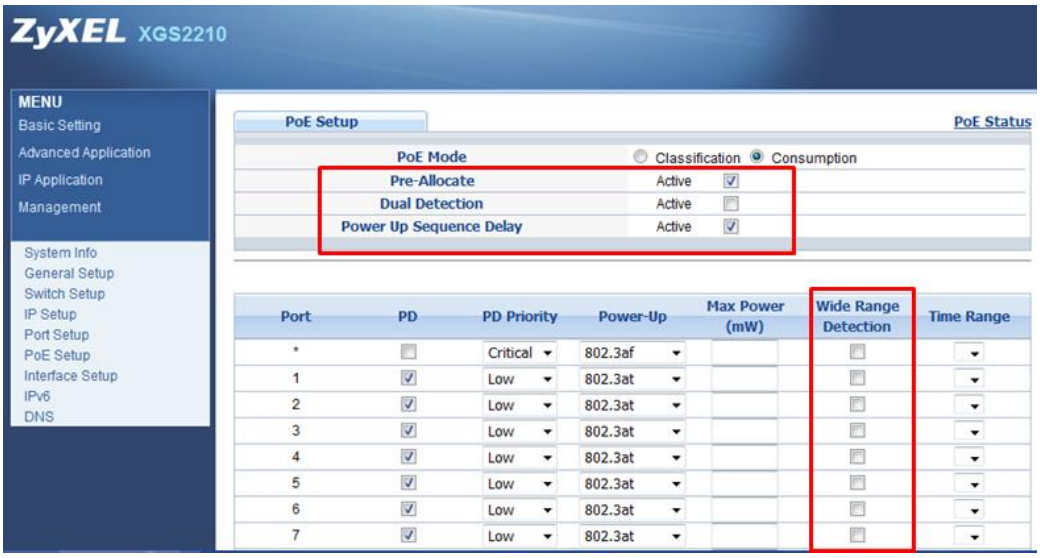
Enhanced Features

The following diagram is the voltage change flow when PSE power on a PD.



A current problem exists between the detection and start-up phases. Zyxel designs extended commands for user setting:

- Wide range detection
- Dual detection
- Pre-allocate
- Power-up sequence delay



- Wide range detection
  - ➢ Theory

    When you connect the device to a PSE, the PSE uses some power to detect the device. The feedback of the device has to be under the defined range so the PSE knows it is a PD.
  - ➢ Enhance

    The enhanced feature can raise the detection tolerance range in PD detection stage. It help identify the device as a PD successfully.
  - ➢ Default setting

    Per port setting, as "disable".
  - ➢ Usage time

    The possible reasons are listed as the following when the PD cannot be powered up:
    - ✓ The power budget is still enough
    - ✓ The PSE supports the corresponding PD class and type
    - ✓ The type of the Ethernet cable in used is correct
    - ✓ The PD's Power indicator might flash occasionally
- Dual detection
  - ➢ Enhance

    In detection phase, it should process detection twice before the PSE delivers power.

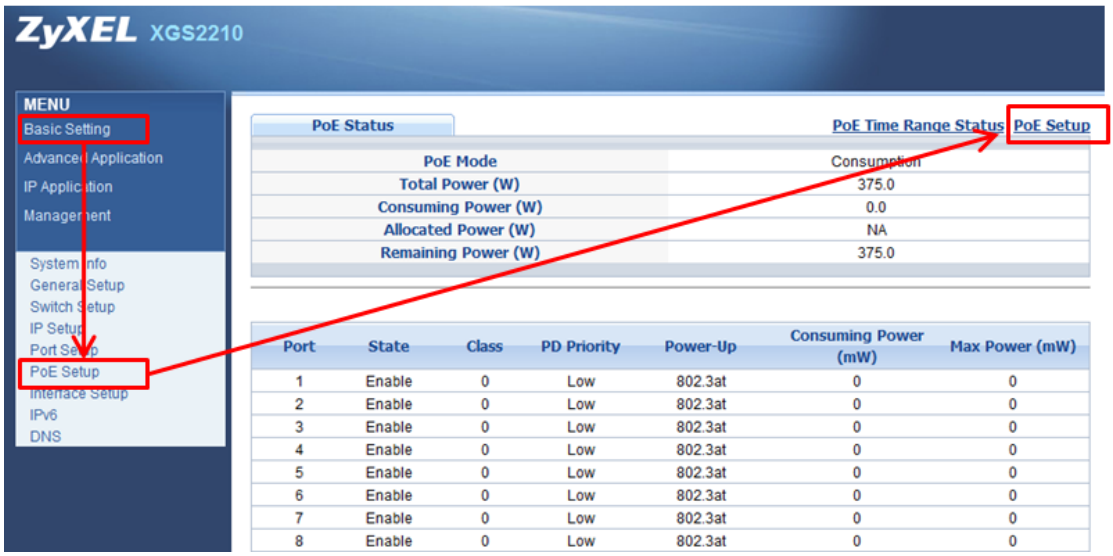
  - ➢ Default setting

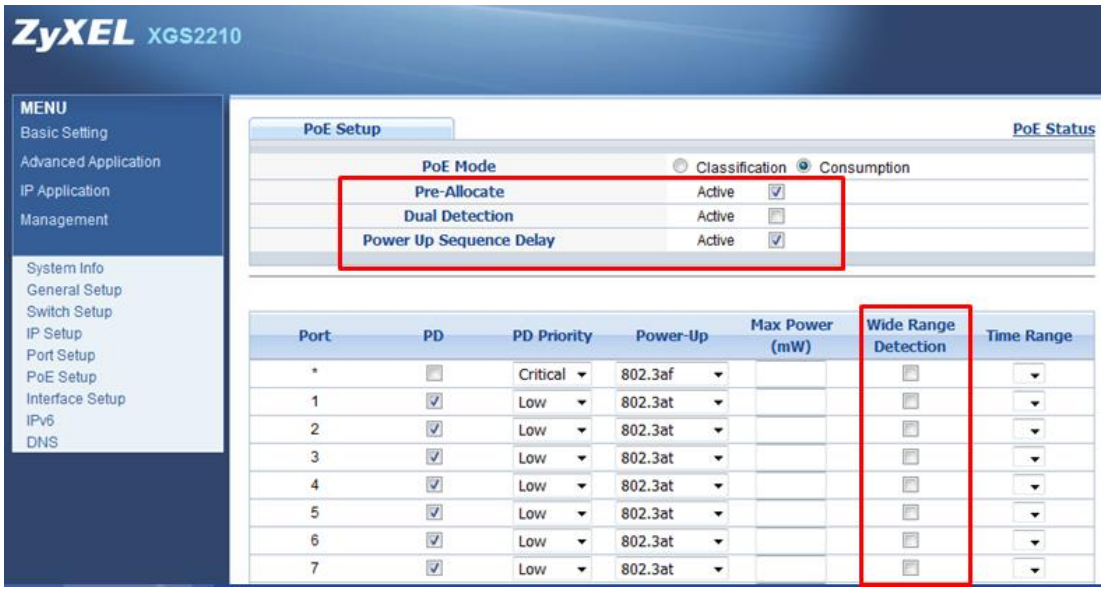
    Per system setting, as "disable".

- Pre-allocate
  - Enhance
    When you connect a PD to a PSE, the PSE preparatory reserve enough power for power budget before the PD is powered up.
  - Default setting
    Per system setting, as "enable".
- Power-up sequence delay
  - Enhance
    It decides whether each PD needs to wait for a period of time before the PSE supplies power.
  - Default setting
    Per system setting, as "enable".
  - Usage time
    More than one PDs are connected to PSE at the same time.

Configuration

Basic Setting > PoE Setup > PoE Setup





Use the "show pwr" command to check the current setting of the PoE.

```
XGS2210# show pwr

 PoE Mode : Consumption mode
 Pre-Allocate : enable
 Dual Detection : disable
 Power Up Sequence Delay : enable
 Total Power:375.0(W)
 Consuming Power:0.0(W)
 Allocated Power:NA
 Remaining Power:375.0(W)

 Averaged Junction Temperature: 14 (c), 57 (f).

 Port   State   PD  Class  Priority  Power-Up  Wide Range  Consumption (mW)  MaxPower(mW)
 ----  ------  ---  -----  --------  --------  ----------  ----------------  ------------
    1  Enable  Off      0       Low   802.3at     Disable                 0             0
    2  Enable  Off      0       Low   802.3at     Disable                 0             0
    3  Enable  Off      0       Low   802.3at     Disable                 0             0
    4  Enable  Off      0       Low   802.3at     Disable                 0             0
    5  Enable  Off      0       Low   802.3at     Disable                 0             0
    6  Enable  Off      0       Low   802.3at     Disable                 0             0
```

You can also view the settings of the PoE by using the "show running-config" command.

```
XGS2210# show run
  Building configuration...

  Current configuration:

no pwr pre-allocate
no pwr sequence-delay
vlan 1
  name 1
  normal ""
  fixed 1-28
  forbidden ""
  untagged 1-28
  ip address 192.168.1.1 255.255.255.0
exit
interface route-domain 192.168.1.1/24
exit
pwr interface 1 wide-range
pwr interface 2 wide-range
pwr interface 3 wide-range
pwr dual-detection
```

Verification

Here are some symptoms you might easily encounter:

1. PD cannot be powered on.
   a. Detect failures.
   ➔ Enable "Wide Range Detection" and "Dual Detection".
   b. Classification fails.
   ➔ Change to "Power on mode".
   c. The issue only happens on some PDs when more than one PDs are connected to a PSE at the same time.
   ➔ Enable "Power up sequence delay".

2. PD power goes off after working for a while.
   The consuming power is over than the PSE setting or defined IEEE range.
   ➔ Change to "PoE mode".
3. An AT device can only obtain AF power.
   a. Cabling issue.
   ➔ Enable "Wide Range Detection" and "Dual Detection".
   b. Classification fails.
   ➔ Change to "Power on mode".

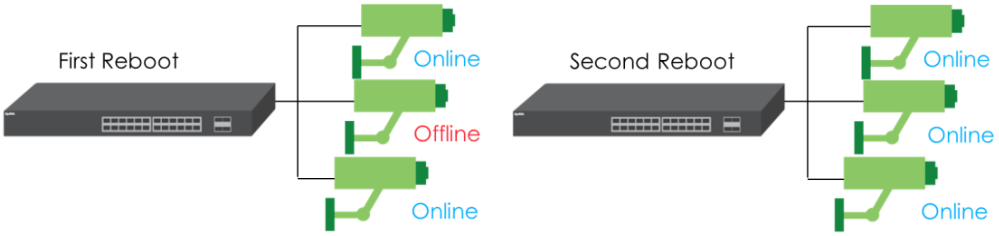
Application

1. An old PD has been used in operation for a long time. The original PoE switches have always been able to power-on this old PD model. After replacing the older PoE switch with a newer model, the old PD is no longer able to power-on.

Looking at the PoE page verifies that the new model did not exceed the PoE budget. The old PD will always work on the old PoE switch but fails when connected to the newer model.

If the newer switch model is a Zyxel PoE switch that supports "**Wide Range Detection**", enable the feature on the port connected to the old PD. The old PD should now be able to power-on.

2. A network administrator has had experience dealing with PDs that malfunctions. There are chances that these PDs would not be able to power-on after a successful switch reboot or after reconnecting the Ethernet cables.



In order to enforce a stricter product quality control for the administrator's network, enable "**Dual Detection**" on ports connected to PDs. With Dual Detection enabled, the chances of malfunctioning PDs to power-on is lower. This allows the network administrator to easily locate, isolate, or replace the malfunctioning PDs.

Note

1. The total power available varies by Switch. Use the "show pwr" command to check the total power available on your Switch. The formula to calculate the number of ports that can be powered by PoE is: (total power available) / (maximum power available per port).
   - In Consumption mode

   The power available per port ranges from 1 to 33 watts. Configure the maximum power available per port in the **Max Power (mW)** field in **Basic Setting > PoE Status > PoE Setup**.
   - In Classification mode

   The power available per port ranges from 1 to 30 watts. The maximum power available per port depends on the power classification of the connected PD. See the **Class** field in **Basic Setting > PoE Status > PoE Setup**.

2. Power-on mode is a feature which originally existed in system before ZyNOS 4.30. The differences between them are listed as the following:
   - 802.3AF

   A port is powered in IEEE 802.3af mode
   - Legacy

   A port is powered using high-inrush current, which is used by legacy PDs with a power requirement greater than 15W at power-up.
   - Pre-802.3AT

   A port is powered in IEEE 802.3af mode initially and switched to the high-power IEEE 802.3at mode before 75 msec. Use this mode if the PD is not performing layer 2 classification, or if the switch is performing two-event layer 1 classification
   - 802.3AT

   A port is powered in IEEE 802.3af mode. If the PD class detected by the switch is not Class 4(type 2), although the port will still supply power to the PD, only Class 4 PDs can be powered up in IEEE 802.3at mode