a Hewlett Packard Enterprise company

AP 双线路测试

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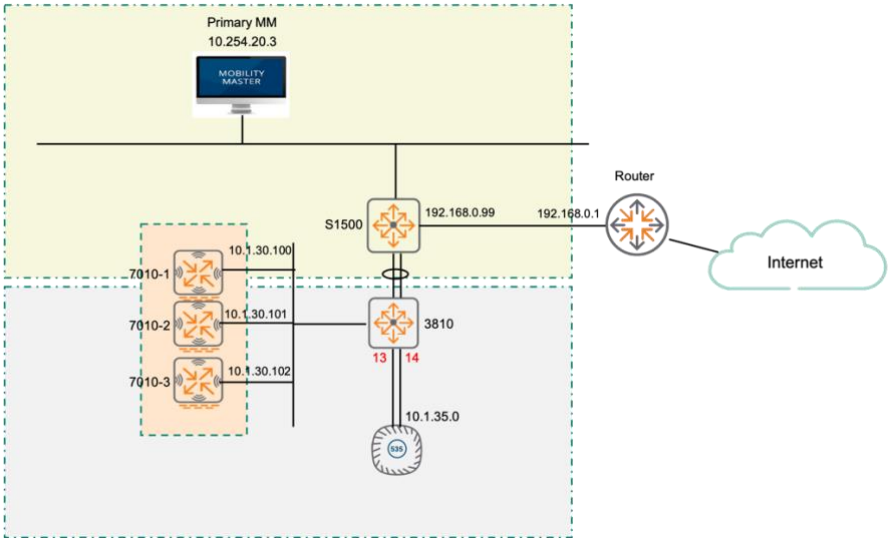
目录

1 测试需求

AP-535/555 只有在 DC 供电或者 802.3bt 供电或者双 802.3at 供电下才能无限制模式工作，由于目前大部分用户 PoE 交换机未升级到 802.3bt，仅能通过双 802.3at 供电，为了简化 PoE 交换机的配置操作，同时为了 AP 施工时不受连接 PoE 交换机接口的限制，用户不希望配置 PoE 交换机部分接口仅提供 PoE 供电不提供网络连接，也不希望配置 LACP，而是希望 AP 能够连接到相同配置的两个独立端口即可正常工作。

2 测试拓扑



测试环境：3*7010（Cluster），AOS 8.6.0.6

AP：AP-535

PoE 交换机：3810M，13、14 口为独立的 access 接口

3 PoE 交换机配置

3.1 3810M 接口配置

1) AP-535 连接 3810M 的 13、14 口

```
3810M(config)# show interfaces brief

 Status and Counters - Port Status

                         | Intrusion                              MDI  Flow Bcast
 Port        Type        | Alert     Enabled Status Mode          Mode Ctrl Limit
 ----------- ----------- + --------- ------- ------ ------------- ---- ---- -----
 1-Trk10     100/1000T   | No        Yes     Up     1000FDx       MDIX off  0
 2-Trk10     100/1000T   | No        Yes     Up     1000FDx       MDI  off  0
 3           100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 4           100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 5           100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 6           100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 7           100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 8           100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 9           100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 10          100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 11          100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 12          100/1000T   | No        No      Down   1000FDx       NA   off  0
 13          100/1000T   | No        Yes     Up     1000FDx       MDIX off  0
 14          100/1000T   | No        Yes     Up     1000FDx       MDIX off  0
 15          100/1000T   | No        Yes     Down   1000FDx       NA   off  0
 16          100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 17          100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 18          100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 19-Trk1     100/1000T   | No        Yes     Up     1000FDx       MDIX off  0
 20-Trk1     100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 21-Trk2     100/1000T   | No        Yes     Up     1000FDx       MDI  off  0
 22-Trk2     100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 23-Trk3     100/1000T   | No        Yes     Up     1000FDx       MDIX off  0
 24-Trk3     100/1000T   | No        Yes     Down   1000FDx       Auto off  0
 A1          10GbE-T     | No        Yes     Down   10GigFD       Auto off  0
 A2          10GbE-T     | No        Yes     Down   10GigFD       Auto off  0
 A3          10GbE-T     | No        Yes     Down   10GigFD       Auto off  0
 A4          10GbE-T     | No        Yes     Down   10GigFD       Auto off  0
```

2) 3810M 13、14 口 VLAN 配置

```
3810M(config)# show vlans ports 13,14 detail

 Status and Counters - VLAN Information - for ports 13

  Port name: to-IAP225
  VLAN ID Name                 | Status     Voice Jumbo Mode
  ------- -------------------- + ---------- ----- ----- ---------
  35      VLAN35               | Port-based No    No    Untagged

 Status and Counters - VLAN Information - for ports 14

  Port name: to-AP535
  VLAN ID Name                 | Status     Voice Jumbo Mode
  ------- -------------------- + ---------- ----- ----- ---------
  35      VLAN35               | Port-based No    No    Untagged
```

3) 未配置 loop-pretect

```
3810M(config)# show loop-protect

 Status and Counters - Loop Protection Information

  Transmit Interval (sec)     : 5
  Port Disable Timer (sec)    : 5
  Loop Detected Trap          : Disabled
  Loop Protect Mode           : Port
  Loop Protect Enabled VLANs  :


        Loop    Loop     Detected  Loop   Time Since  Rx            Port
  Port  Protect Detected on VLAN   Count  Last Loop   Action        Status
  ------ ------- -------- --------- ------ ---------- ------------- ---------
3810M(config)#
```

4) 未开启 spanning-tree

```
3810M(config)# show spanning-tree

 Multiple Spanning Tree (MST) Information

  STP Enabled    : No
```

4 验证

4.1 AP Console 输出

```
 SSDK Init OK!
operation done.

Ethernet port 1 mode: active-standby
[    17.505374] aruba_alloc_config_range freeing 954 reserved pages at:0xffffffc07b046000
set device anul0 mtu to 2000
Starting watchdog process...
Aruba watchdog daemon started [4 thread(s)]
Starting update TZ ...
Done.
Starting DHCP
net.ipv4.conf.all.arp_notify = 1
Getting an IP address...
net.ipv4.conf.all.arp_notify = 0
net.ipv4.conf.br0.arp_notify = 1
10.1.35.254 255.255.255.0 10.1.35.1
Running ADP...Done. Master is 10.1.30.110
[    31.219206] diag: IPC Logging disabled
Initiating cold boot calibration
```

4.2 MD 上 AP 显示状态

1) show ap database，没有显示 r flag（Power Restricted）

```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status      Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------      -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 13m:41s         10.1.30.101  10.1.30.100
```

2) 未开启 IPM。

```
(MC2) #show ap-group default | include system
AP system profile                          default
(MC2) #show ap system-profile default | include IPM
IPM activation                             Disabled
IPM power reduction steps with priorities  N/A
IPM Steps delete all                       No
(MC2) #show ap-name
<profile-name>          Profile name
|                       Output Modifiers
<cr>
```

3) 查看 AP PoE 供电情况。双 802.3at 供电时，Power Supply 显示为 POE-BT。

```
(MC2) #show ap debug system-status ap-name AP535 | begin "Power Status"
Power Status
------------
Item                          Value
----                          -----
Power Supply                  : POE-BT
LLDP Power                    : Successfully negotiated at 32.1W
Current Operational State     : No restrictions (Overridden by LLDP)
Eth0 HW POE status            : POE AF, LLDP power: 20.9W
Eth1 HW POE status            : POE AT, LLDP power: 20.9W
POE Mode                      : Shared
```

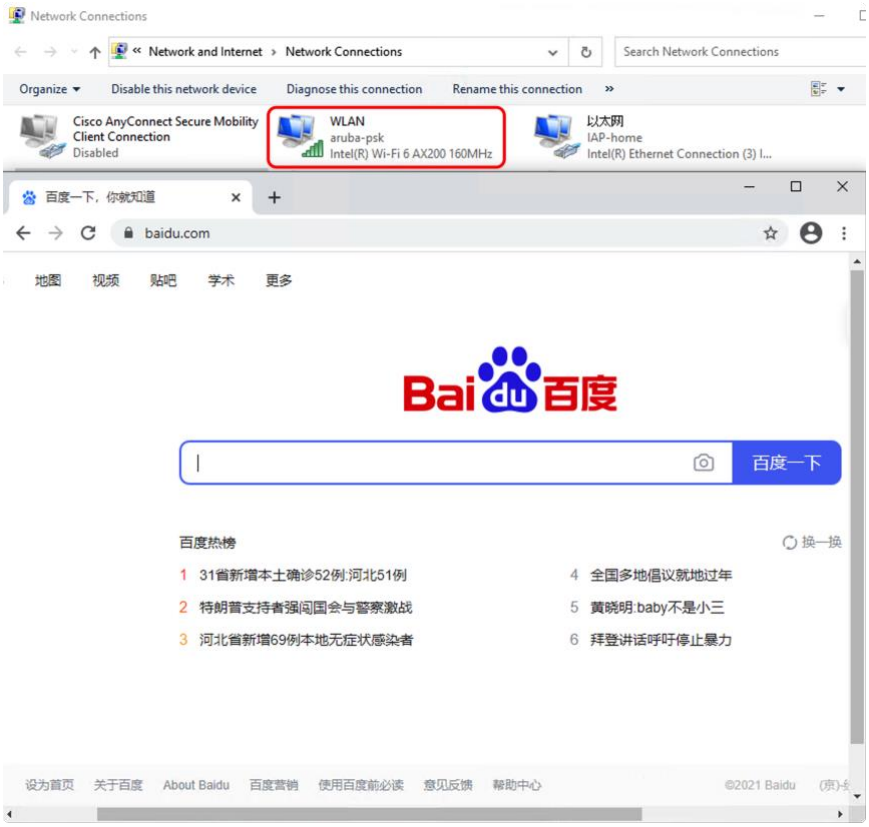
4) AP 未配置 LACP

```
(MC2) #show ap debug lacp ap-name AP535

LACP Not Configured
```

5) show ap debug system-status，可以查看到 eth0 为 ACTIVE，eth1 为 STANDBY

```
(MC2) #show ap debug system-status ap-name AP535 | begin "Slave bonding"
Slave bonding info
------------------
SlaveId  Name  Link  State    #LinkFails
-------  ----  ----  -----    ----------
  0      eth0  UP    ACTIVE   0
  1      eth1  UP    STANDBY  0
```

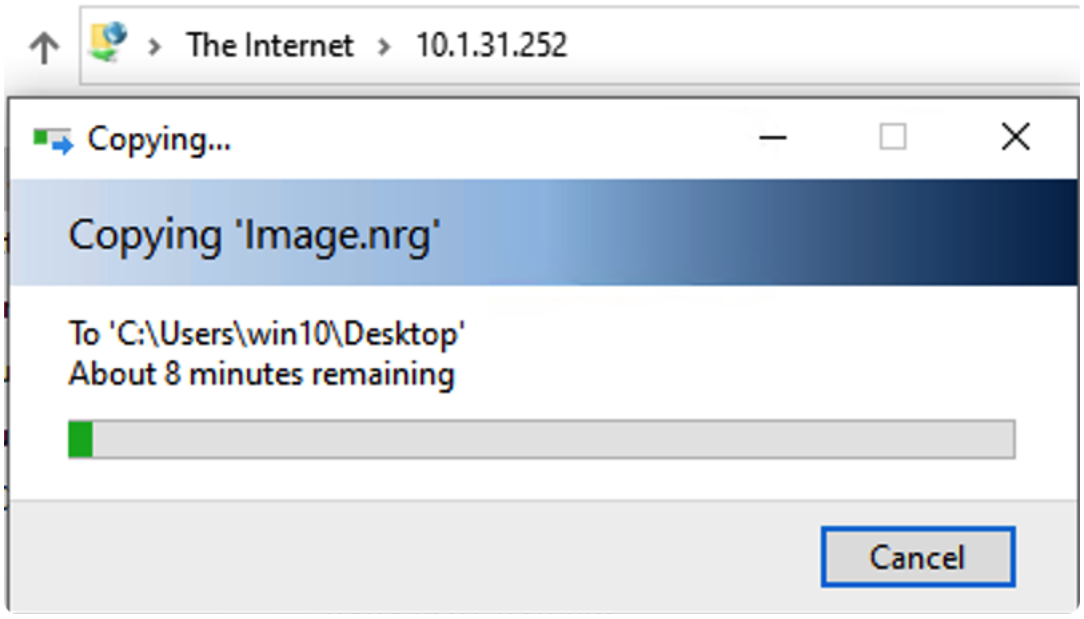
6) 终端连接到 AP-535 释放的 SSID 测试业务，查看 AP 网口数据包增长情况




```
(MC2) #show ap port status ap-name AP535

AP "AP535" Port Status (updated every 60 seconds)
-------------------------------------------------

Port  MAC               Type  Forward Mode  Admin     Oper  Speed   Duplex  802.3az   802.3bz   PoE  STP  Portfast  TX-Packets  TX-Bytes  RX-Packets  RX-Bytes
----  ---               ----  ------------  -----     ----  -----   ------  --------  --------  ---  ---  --------  ----------  --------  ----------  --------
0     f0:5c:19:c9:ed:d4 5G    N/A           enabled   up    1 Gb/s  full    disabled  No        N/A  N/A  N/A       26229       5237826   5786        1716063
1     f0:5c:19:c9:ed:d5 5G    none          enabled   up    1 Gb/s  full    disabled  No        N/A  N/A  N/A       57          10922     169         47634
2     f2:5c:19:c9:ed:d5 USB   none          disabled  down  N/A     N/A     N/A       N/A       N/A  N/A  N/A       0           0         0           0
(MC2) #show ap port status ap-name AP535

AP "AP535" Port Status (updated every 60 seconds)
-------------------------------------------------

Port  MAC               Type  Forward Mode  Admin     Oper  Speed   Duplex  802.3az   802.3bz   PoE  STP  Portfast  TX-Packets  TX-Bytes  RX-Packets  RX-Bytes
----  ---               ----  ------------  -----     ----  -----   ------  --------  --------  ---  ---  --------  ----------  --------  ----------  --------
0     f0:5c:19:c9:ed:d4 5G    N/A           enabled   up    1 Gb/s  full    disabled  No        N/A  N/A  N/A       27788       5698939   6797        2367859
1     f0:5c:19:c9:ed:d5 5G    none          enabled   up    1 Gb/s  full    disabled  No        N/A  N/A  N/A       59          11318     174         49199
2     f2:5c:19:c9:ed:d5 USB   none          disabled  down  N/A     N/A     N/A       N/A       N/A  N/A  N/A       0           0         0           0
```

4.3 测试数据端口切换对业务的影响

1) 无线终端通过 FTP 单线程下载大文件，并同时测试长 ping




```
C:\Users\win10>ping 10.254.5.1 -t

Pinging 10.254.5.1 with 32 bytes of data:
Reply from 10.254.5.1: bytes=32 time=3ms TTL=64
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Reply from 10.254.5.1: bytes=32 time=24ms TTL=64
```

2) 保持双网口 at 供电状态，仅关闭 eth0 口数据通信，即 3810M 上 disable 13 口，但是 13 口的 power-over-ethernet 仍然为 enable

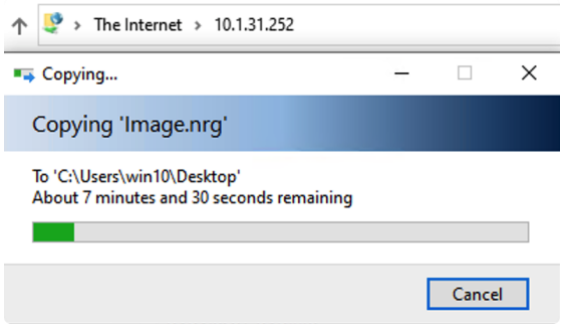
```
3810M(config)# interface 13 disable
3810M(config)# show interfaces brief

 Status and Counters - Port Status

                    | Intrusion                          MDI  Flow Bcast
 Port       Type    | Alert     Enabled Status Mode      Mode Ctrl Limit
 ---------- ------- + --------- ------- ------ --------- ---- ---- -----
 1-Trk10    100/1000T | No        Yes     Up     1000FDx   MDIX off  0
 2-Trk10    100/1000T | No        Yes     Up     1000FDx   MDI  off  0
 3          100/1000T | No        Yes     Down   1000FDx   Auto off  0
 4          100/1000T | No        Yes     Down   1000FDx   Auto off  0
 5          100/1000T | No        Yes     Down   1000FDx   Auto off  0
 6          100/1000T | No        Yes     Down   1000FDx   Auto off  0
 7          100/1000T | No        Yes     Down   1000FDx   Auto off  0
 8          100/1000T | No        Yes     Down   1000FDx   Auto off  0
 9          100/1000T | No        Yes     Down   1000FDx   Auto off  0
 10         100/1000T | No        Yes     Down   1000FDx   Auto off  0
 11         100/1000T | No        Yes     Down   1000FDx   Auto off  0
 12         100/1000T | No        No      Down   1000FDx   NA   off  0
 13         100/1000T | No        No      Down   1000FDx   NA   off  0
 14         100/1000T | No        Yes     Up     1000FDx   MDIX off  0
 15         100/1000T | No        Yes     Down   1000FDx   NA   off  0
 16         100/1000T | No        Yes     Down   1000FDx   Auto off  0
 17         100/1000T | No        Yes     Down   1000FDx   Auto off  0
 18         100/1000T | No        Yes     Down   1000FDx   Auto off  0
 19-Trk1    100/1000T | No        Yes     Up     1000FDx   MDIX off  0
 20-Trk1    100/1000T | No        Yes     Down   1000FDx   Auto off  0
 21-Trk2    100/1000T | No        Yes     Up     1000FDx   MDI  off  0
 22-Trk2    100/1000T | No        Yes     Down   1000FDx   Auto off  0
 23-Trk3    100/1000T | No        Yes     Up     1000FDx   MDIX off  0
 24-Trk3    100/1000T | No        Yes     Down   1000FDx   Auto off  0
 A1         10GbE-T   | No        Yes     Down   10GigFD   Auto off  0
 A2         10GbE-T   | No        Yes     Down   10GigFD   Auto off  0
 A3         10GbE-T   | No        Yes     Down   10GigFD   Auto off  0
 A4         10GbE-T   | No        Yes     Down   10GigFD   Auto off  0
```

```
3810M(config)# show power-over-ethernet brief

 Status and Configuration Information

  System Power Status          : No redundancy
  PoE Power Status             : No redundancy
  Operational Power Status     : No redundancy


  Available: 370 W  Used: 12 W  Remaining: 358 W

 PoE    Pwr  Pwr      Pre-std Alloc Alloc  PSE Pwr PD Pwr  PoE Port     PLC PLC
 Port   Enab Priority Detect  Cfg   Actual Rsrvd   Draw    Status       Cls Type
 ------ ---- -------- ------- ----- ------ ------- ------- ------------ --- ----
 1      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 2      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 3      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 4      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 5      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 6      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 7      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 8      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 9      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 10     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 11     No   low      on      usage usage  0.0 W   0.0 W   Disabled      0   -
 12     No   low      on      usage usage  0.0 W   0.0 W   Disabled      0   -
 13     Yes  low      on      usage lldp   4.9 W   4.7 W   Delivering    4   2
 14     Yes  low      on      usage lldp   6.6 W   6.3 W   Delivering    4   2
 15     No   low      on      usage usage  0.0 W   0.0 W   Disabled      0   -
 16     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 17     No   low      on      usage usage  0.0 W   0.0 W   Disabled      0   -
 18     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 19     No   low      on      usage usage  0.0 W   0.0 W   Disabled      0   -
 20     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 21     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 22     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 23     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 24     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 A1     Yes  low      on      class class  0.0 W   0.0 W   Searching     0   -
 A2     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 A3     Yes  low      on      class class  0.0 W   0.0 W   Searching     0   -
 A4     Yes  low      on      class class  0.0 W   0.0 W   Searching     0   -
```

3) 查看 AP 状态，确定 AP eth0 口已经 DOWN，eth1 变成 ACTIVE，AP 供电状态仍然为 POE-BT

```
(MC2) #show ap debug system-status ap-name AP535 | begin "Slave bonding"
Slave bonding info
------------------
SlaveId  Name  Link  State    #LinkFails
-------  ----  ----  -----    ----------
  0      eth0  DOWN  STANDBY  3
  1      eth1  UP    ACTIVE   0

(MC2) #show ap debug system-status ap-name AP535 | begin "Power Status"
Power Status
------------
Item                        Value
----                        -----
Power Supply                : POE-BT
LLDP Power                  : Successfully negotiated at 32.1W
Current Operational State   : No restrictions (Overridden by LLDP)
Eth0 HW POE status          : POE AF, LLDP power: 20.9W
Eth1 HW POE status          : POE AT, LLDP power: 20.9W
POE Mode                    : Shared
```

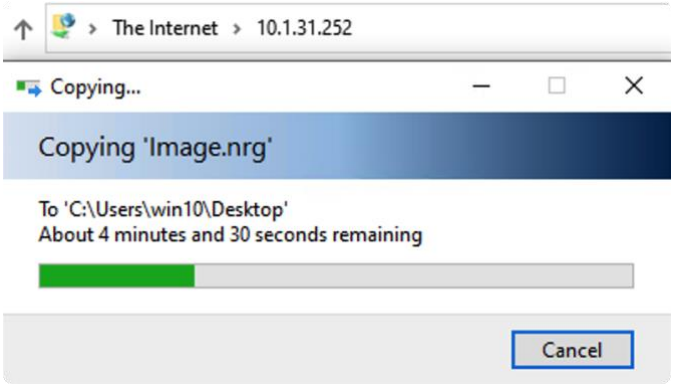
4) 确认 FTP 下载是否发生中断，测试结果未发生中断，ping 有一个丢包




```
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Reply from 10.254.5.1: bytes=32 time=3ms TTL=64
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Request timed out.
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Reply from 10.254.5.1: bytes=32 time=3ms TTL=64
```

5) 开启 13 口，再次查看 AP 网口转发状态，ACTIVE 又切回 eth0，FTP 下载仍然未中断，此时 ping 无丢包

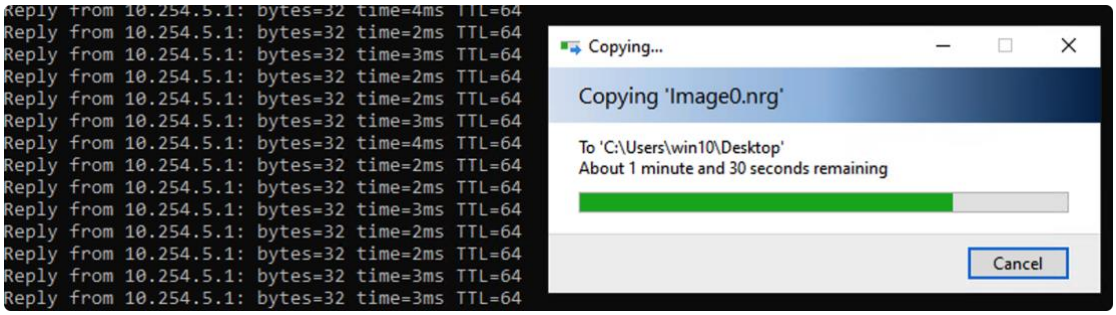
```
(MC2) #show ap debug system-status ap-name AP535 | begin "Slave bonding"
Slave bonding info
------------------
SlaveId  Name  Link  State    #LinkFails
-------  ----  ----  -----    ----------
  0      eth0  UP    ACTIVE   3
  1      eth1  UP    STANDBY  0
```



```
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Reply from 10.254.5.1: bytes=32 time=3ms TTL=64
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Reply from 10.254.5.1: bytes=32 time=3ms TTL=64
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Reply from 10.254.5.1: bytes=32 time=1ms TTL=64
Reply from 10.254.5.1: bytes=32 time=3ms TTL=64
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Reply from 10.254.5.1: bytes=32 time=4ms TTL=64
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Reply from 10.254.5.1: bytes=32 time=2ms TTL=64
Reply from 10.254.5.1: bytes=32 time=3ms TTL=64
Reply from 10.254.5.1: bytes=32 time=4ms TTL=64
```

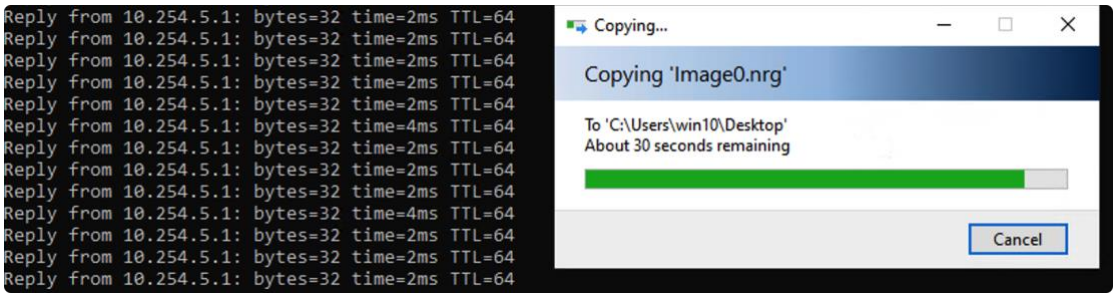
6) 关闭 14 口，查看 AP 状态，查看 FTP 下载状态和 ping 状态，FTP 无中断，ping 无丢包

```
(MC2) #show ap debug system-status ap-name AP535 | begin "Slave bonding"
Slave bonding info
------------------
SlaveId  Name  Link  State    #LinkFails
-------  ----  ----  -----    ----------
  0      eth0  UP    ACTIVE   9
  1      eth1  DOWN  STANDBY  2
```



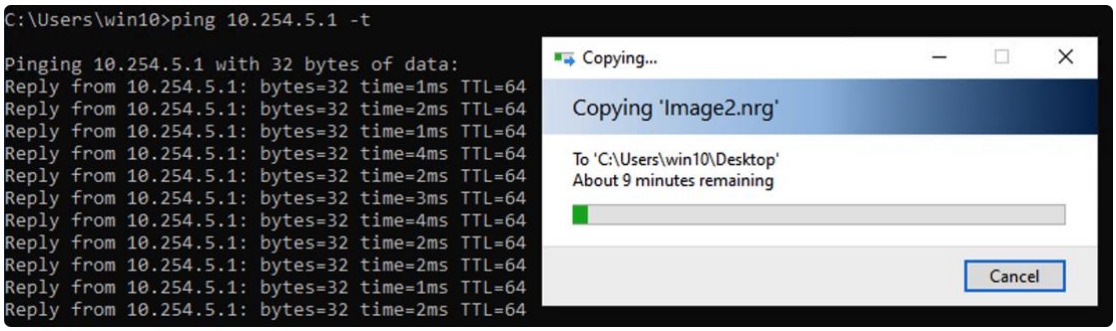
7) 开启 14 口，再次查看 AP 状态，查看 FTP 下载状态和 ping 状态，FTP 未中断， ping 无丢包

```
(MC2) #show ap debug system-status ap-name AP535 | begin "Slave bonding"
Slave bonding info
------------------
SlaveId  Name  Link  State    #LinkFails
-------  ----  ----  -----    ----------
  0      eth0  UP    ACTIVE   9
  1      eth1  UP    STANDBY  2
```



4.4 测试插拔网线对业务的影响

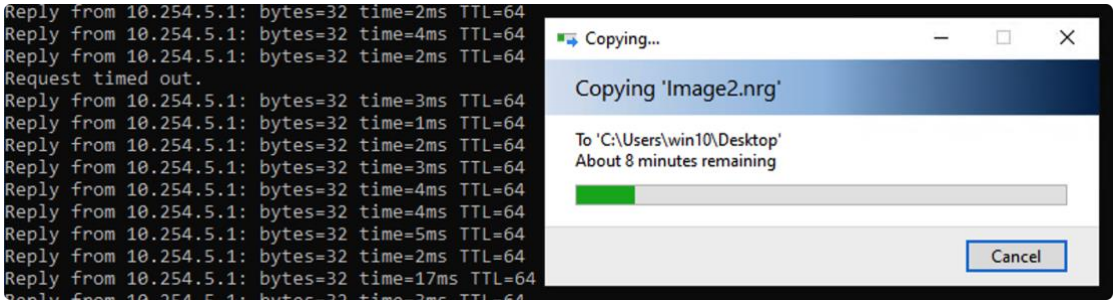
1) 仍然进行 FTP 单线程下载大文件，同时进行长 ping



2) 拔掉 eth0 口网线，观察 AP 状态及 FTP 下载状态及 ping 状态，FTP 未中断，ping 丢一个包，eth1 切换成 ACTIVE

```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status        Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------        -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 3h:7m:30s  r      10.1.30.101  10.1.30.100

(MC2) #show ap debug system-status ap-name AP535 | begin "Slave bonding"
Slave bonding info
------------------
SlaveId  Name  Link  State    #LinkFails
-------  ----  ----  -----    ----------
  0      eth0  DOWN  STANDBY  10
  1      eth1  UP    ACTIVE   2
```

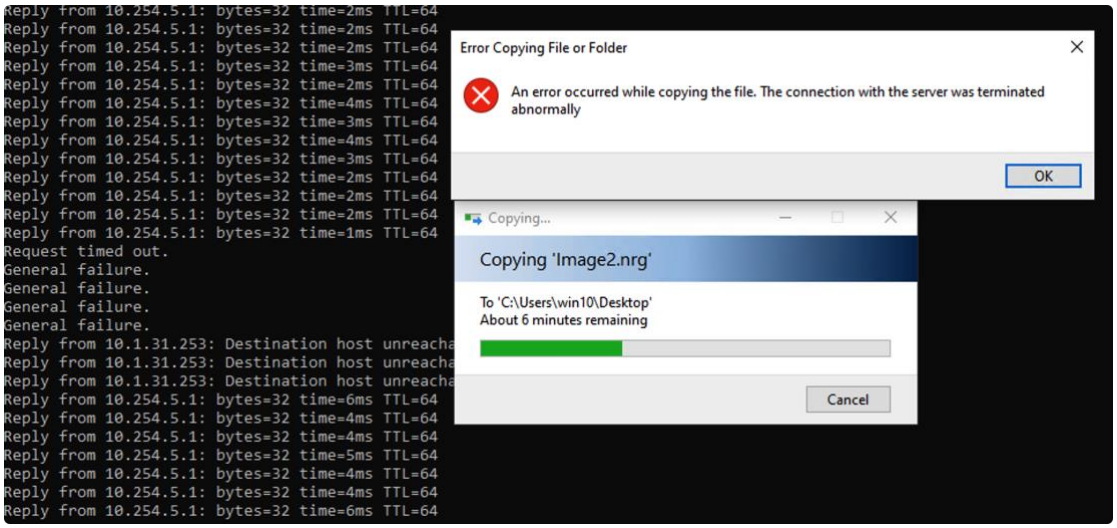
```
(MC2) #show ap debug system-status ap-name AP535 | begin "Power Status"
Power Status
------------
Item                          Value
----                          -----
Power Supply                  : POE-AT
LLDP Power                    : Successfully negotiated at 23.3W
Current Operational State     : 1 ETH port disabled; USB power disabled;  (Overridden by LLDP)
Eth0 HW POE status            : NONE, LLDP power: 0.0W
Eth1 HW POE status            : POE AT, LLDP power: 23.3W
POE Mode                      : Shared
```



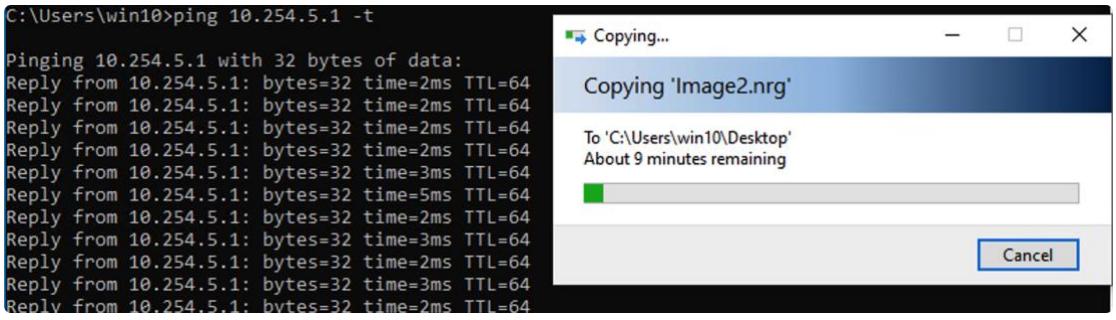
3) 插回 eth0 口网线，观察 AP 状态及 FTP 下载状态，AP 从 flag r 变成 flag rl 然后再变成 flag D，然后恢复正常，FTP 下载中断

```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status        Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------        -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 2h:46m:8s  r      10.1.30.101  10.1.30.100

(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status         Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------         -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 2h:46m:12s  rI     10.1.30.101  10.1.30.100

(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status         Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------         -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 2h:46m:20s  D      10.1.30.101  10.1.30.100

(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status         Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------         -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 2h:46m:27s         10.1.30.101  10.1.30.100
```

```
(MC2) #show ap debug system-status ap-name AP535 | begin "Power Status"
Power Status
------------
Item                          Value
----                          -----
Power Supply                  : POE-BT
LLDP Power                    : Successfully negotiated at 32.1W
Current Operational State     : No restrictions (Overridden by LLDP)
Eth0 HW POE status            : POE AF, LLDP power: 20.9W
Eth1 HW POE status            : POE AT, LLDP power: 20.9W
POE Mode                      : Shared

(MC2) #show ap debug system-status ap-name AP535 | begin "Slave bonding"
Slave bonding info
------------------
SlaveId  Name  Link  State    #LinkFails
-------  ----  ----  -----    ----------
  0      eth0  UP    ACTIVE   10
  1      eth1  UP    STANDBY  2
```



4) 拔掉 eth1 口网线，观察 AP 状态及 FTP 下载状态，FTP 下载中断，AP 从 rI->rD->r，然后恢复正常



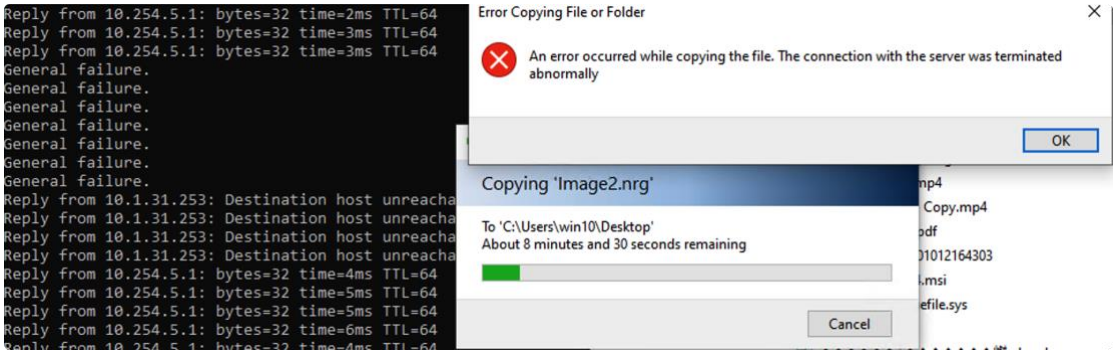
```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status        Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------        -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 3h:12m:3s  rI     10.1.30.101  10.1.30.100
```

```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status         Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------         -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 3h:12m:14s  rD     10.1.30.101  10.1.30.100
```

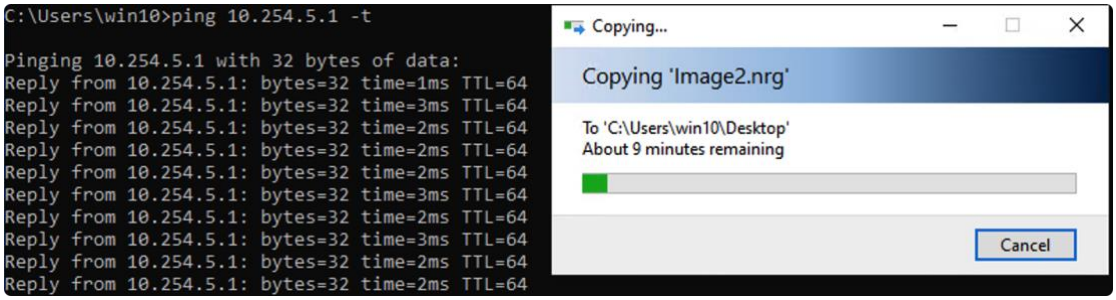
```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status         Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------         -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 3h:12m:24s  r      10.1.30.101  10.1.30.100
```

```
(MC2) #show ap debug system-status ap-name AP535 | begin "Slave bonding"
Slave bonding info
------------------
SlaveId  Name  Link  State    #LinkFails
-------  ----  ----  -----    ----------
  0      eth0  UP    ACTIVE   10
  1      eth1  UP    STANDBY  2
```

```
(MC2) #show ap debug system-status ap-name AP535 | begin "Power Status"
Power Status
------------
Item                        Value
----                        -----
Power Supply                : POE-AT
LLDP Power                  : Successfully negotiated at 23.3W
Current Operational State   : 1 ETH port disabled; USB power disabled;  (Overridden by LLDP)
Eth0 HW POE status          : POE AF, LLDP power: 23.3W
Eth1 HW POE status          : NONE, LLDP power: 0.0W
POE Mode                    : Shared
```



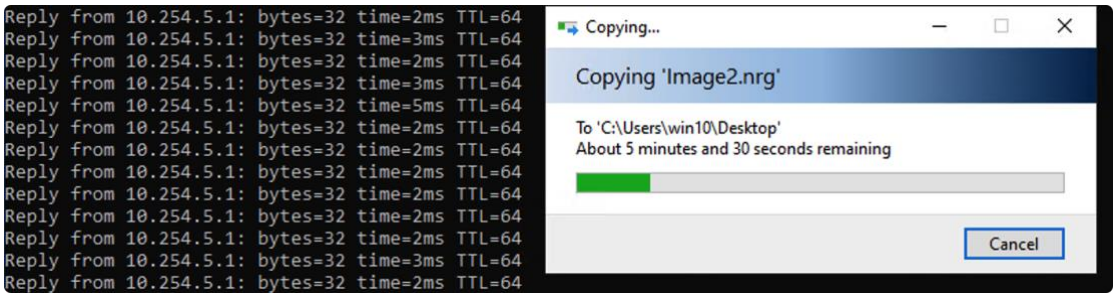
5) 插回 eth1 口网线，观察 AP 状态及 FTP 下载状态，FTP 无中断，ping 无丢包




```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status          Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------          -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 3h:16m:35s          10.1.30.101  10.1.30.100
```

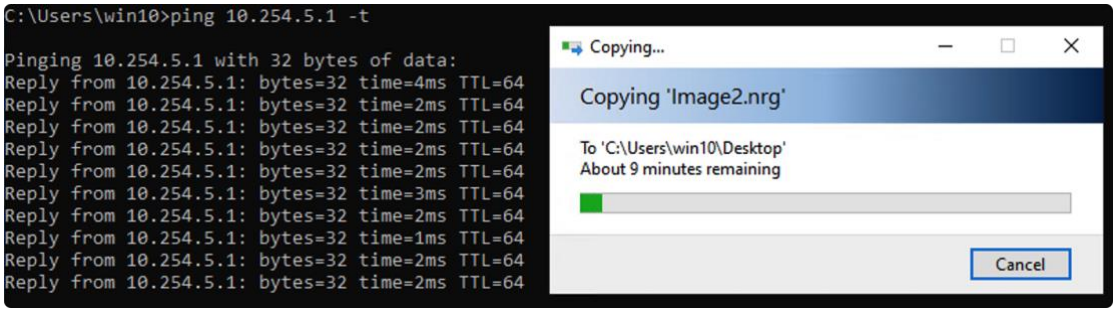
```
(MC2) #show ap debug system-status ap-name AP535 | begin "Slave bonding"
Slave bonding info
------------------
SlaveId  Name  Link  State    #LinkFails
-------  ----  ----  -----    ----------
  0      eth0  UP    ACTIVE   10
  1      eth1  UP    STANDBY  2
```

```
(MC2) #show ap debug system-status ap-name AP535 | begin "Power Status"
Power Status
------------
Item                          Value
----                          -----
Power Supply                  : POE-BT
LLDP Power                    : Successfully negotiated at 32.1W
Current Operational State     : No restrictions (Overridden by LLDP)
Eth0 HW POE status            : POE AF, LLDP power: 20.9W
Eth1 HW POE status            : POE AT, LLDP power: 20.9W
POE Mode                      : Shared
```



4.5 测试关闭一个 PoE 对业务的影响

1) 仍然进行 FTP 单线程下载大文件，同时进行长 ping



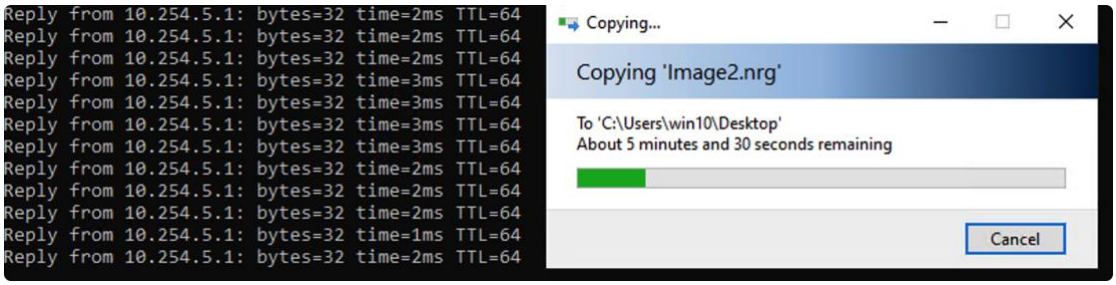
2) 关闭 13 口的 power-over-ethernet 功能，此时网口数据转发仍然为 UP，观察 AP 状态和 FTP 下载状态，FTP 未中断，ping 无丢包

```
3810M(config)# no interface 13 power-over-ethernet
3810M(config)# show power-over-ethernet brief

 Status and Configuration Information

  System Power Status          : No redundancy
  PoE Power Status             : No redundancy
  Operational Power Status     : No redundancy


  Available: 370 W  Used: 12 W  Remaining: 358 W

 PoE    Pwr  Pwr      Pre-std Alloc Alloc  PSE Pwr PD Pwr  PoE Port     PLC PLC
 Port   Enab Priority Detect  Cfg   Actual Rsrvd   Draw    Status       Cls Type
 ------ ---- -------- ------- ----- ------ ------- ------- ------------ --- ----
 1      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 2      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 3      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 4      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 5      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 6      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 7      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 8      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 9      Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 10     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 11     No   low      on      usage usage  0.0 W   0.0 W   Disabled      0   -
 12     No   low      on      usage usage  0.0 W   0.0 W   Disabled      0   -
 13     No   low      on      usage usage  0.0 W   0.0 W   Disabled      0   -
 14     Yes  low      on      usage lldp   11.6 W  10.5 W  Delivering    4   2
 15     No   low      on      usage usage  0.0 W   0.0 W   Disabled      0   -
 16     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 17     No   low      on      usage usage  0.0 W   0.0 W   Disabled      0   -
 18     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 19     No   low      on      usage usage  0.0 W   0.0 W   Disabled      0   -
 20     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 21     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 22     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 23     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 24     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 A1     Yes  low      on      class class  0.0 W   0.0 W   Searching     0   -
 A2     Yes  low      on      usage usage  0.0 W   0.0 W   Searching     0   -
 A3     Yes  low      on      class class  0.0 W   0.0 W   Searching     0   -
 A4     Yes  low      on      class class  0.0 W   0.0 W   Searching     0   -
```

```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status         Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------         -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 3h:33m:30s  r      10.1.30.101  10.1.30.100
```

```
(MC2) #show ap debug system-status ap-name AP535 | begin "Power Status"
Power Status
------------
Item                          Value
----                          -----
Power Supply                  : POE-AT
LLDP Power                    : Successfully negotiated at 20.9W
Current Operational State     : 1 ETH port disabled; USB power disabled;
Eth0 HW POE status            : NONE, LLDP power: 0.0W
Eth1 HW POE status            : POE AT, LLDP power: 20.9W
POE Mode                      : Shared
```

```
(MC2) #show ap debug system-status ap-name AP535 | begin "Slave bonding"
Slave bonding info
------------------
SlaveId  Name  Link  State    #LinkFails
-------  ----  ----  -----    ----------
  0      eth0  UP    ACTIVE   11
  1      eth1  DOWN  STANDBY  4
```

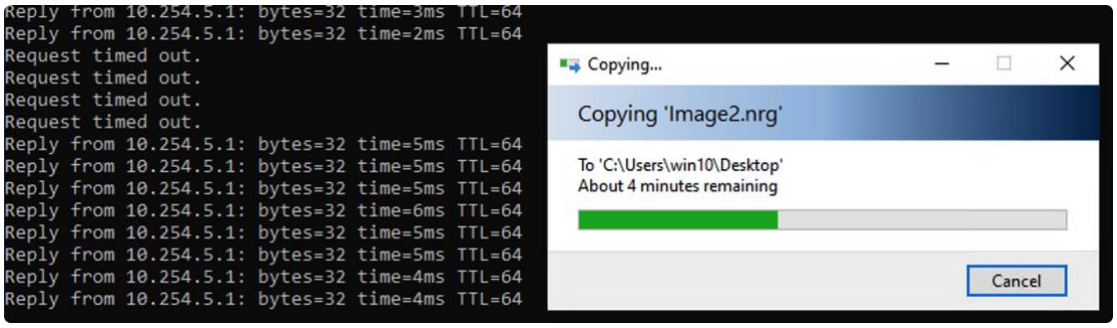


3) 开启 13 口的 power-over-ethernet 功能，观察 AP 状态和 FTP 下载状态，FTP 中断，AP 从 r->rI->D->no flag

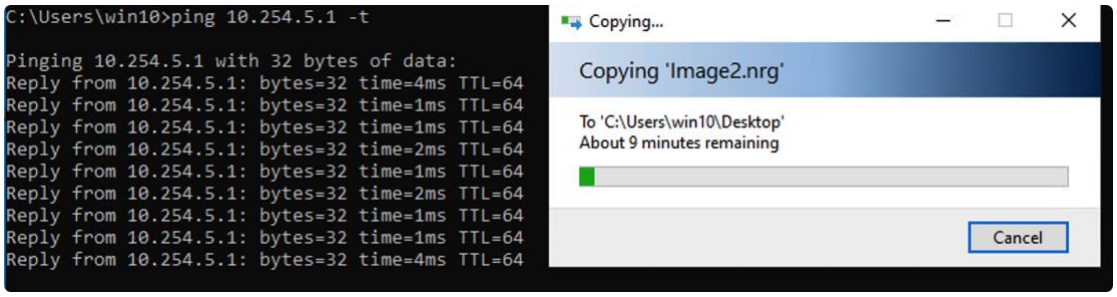
```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status         Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------         -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 3h:36m:17s  rI     10.1.30.101  10.1.30.100
```

```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status         Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------         -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 3h:36m:26s  D      10.1.30.101  10.1.30.100
```

```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status         Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------         -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 3h:36m:34s         10.1.30.101  10.1.30.100
```



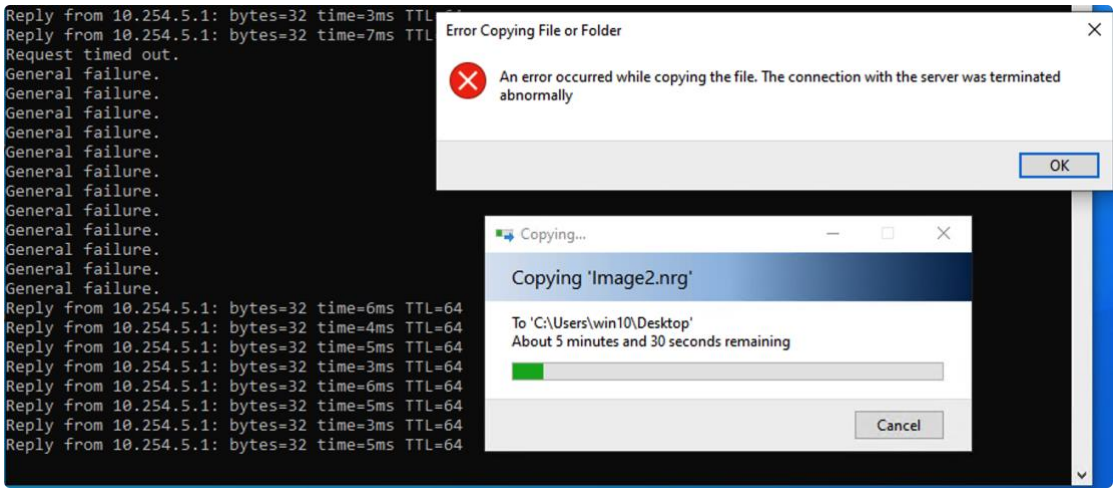
4) 关闭 14 口的 power-over-ethernet 功能，此时网口数据转发仍然为 UP，观察 AP 状态和 FTP 下载状态，FTP 中断，AP 从 no flag->rI->rD->r



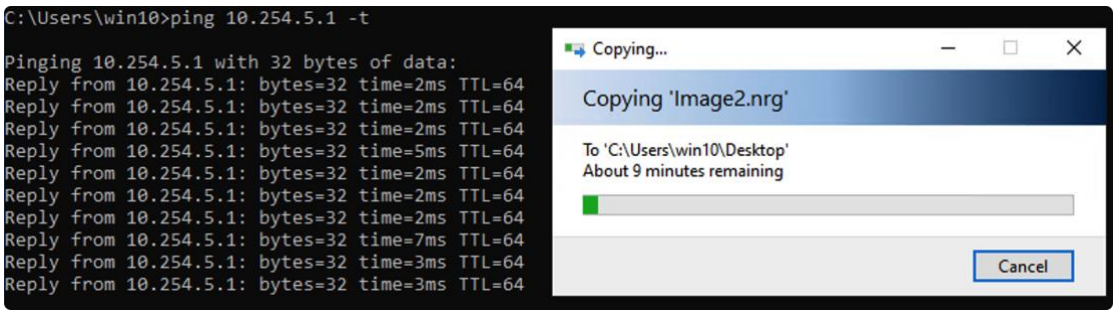

```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status         Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------         -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 3h:41m:55s  rI     10.1.30.101  10.1.30.100
```

```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status         Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------         -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 3h:41m:57s  rD     10.1.30.101  10.1.30.100
```

```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status        Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------        -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 3h:42m:6s  r      10.1.30.101  10.1.30.100

(MC2) #show ap debug system-status ap-name AP535 | begin "Slave bonding"
Slave bonding info
------------------
SlaveId  Name  Link  State    #LinkFails
-------  ----  ----  -----    ----------
  0      eth0  UP    ACTIVE   11
  1      eth1  DOWN  STANDBY  5
```

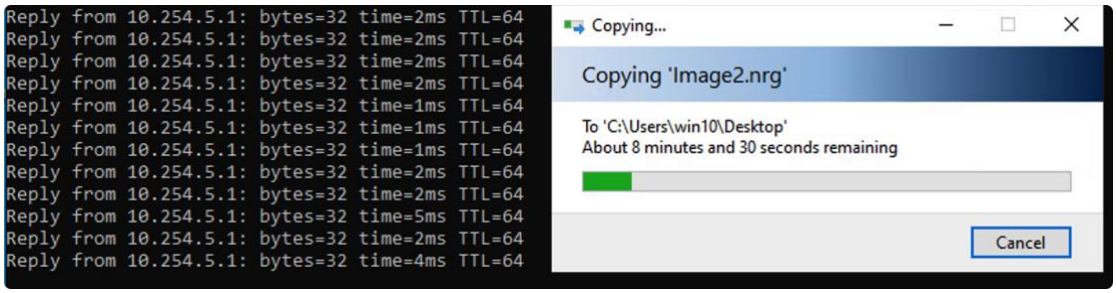


5) 开启 14 口的 power-over-ethernet 功能，观察 AP 状态和 FTP 下载状态，FTP 未中断，ping 无丢包




```
(MC2) #show ap database

AP Database
-----------
Name   Group    AP Type  IP Address   Status        Flags  Switch IP    Standby IP
----   -----    -------  ----------   ------        -----  ---------    ----------
AP535  default  535      10.1.35.254  Up 3h:45m:17s        10.1.30.101  10.1.30.100
```

```
(MC2) #show ap debug system-status ap-name AP535 | begin "Slave bonding"
Slave bonding info
------------------
SlaveId  Name  Link  State    #LinkFails
-------  ----  ----  -----    ----------
  0      eth0  UP    ACTIVE   11
  1      eth1  UP    STANDBY  5
```



5 结论

1) AP-535 双网口连接到 PoE 交换机的两个独立接口（配置一样，都是 access vlan <ap 管理 vlan>），AP 和 PoE 交换机都未配置 lacp，不需要配置 spanning-tree 和 loop protect，AP 可以正常工作，不会形成环路，双 at 供电时 AP 可以工作在无限制模式（show ap debug system-status 显示 Power Supply 为 POE-POE-BT），eth0 和 eth1 为主备模式，双网口工作时总是 eth0 为 ACTIVE，eth1 为 STANDBY；
2) AP-535 保持双 at 供电不变的情况下，shutdown eth0 网络连接，会自动切换到 eth1 通信，切换不影响业务，FTP 下载无中断，ping 丢一个包；恢复 eth0 网络连接，业务会自动切回 eth0，eth1 作为备份，不影响业务，FTP 无中断，ping 无丢包；shutdown 和恢复 eth1 网络连接不影响业务，因为供电状态和 ACTIVE 网卡都未发生变化，FTP 无中断，ping 无丢包；

3) 拔掉 AP-535 的 eth0 网线时，业务不影响，FTP 无中断，ping 丢一个包；恢复 eth0 网线连接，会出现业务中断的情况（FTP 下载中断，ping 连续丢包 8-10 个），AP 然后再恢复正常；拔掉 AP-535 的 eth1 网线时，会出现业务中断的情况（FTP 下载中断，ping 连续丢包 8-10 个），AP 然后再恢复正常；恢复 eth1 网线连接，业务不影响，FTP 无中断，ping 无丢包；
4) 关闭 AP-535 的 eth0 口 PoE 供电（网络通信正常），业务不影响，FTP 无中断，ping 无丢包；恢复 eth0 口 PoE 供电，会出现业务中断的情况（FTP 下载中断，ping 连续丢包 4 个），AP 然后再恢复正常；关闭 eth1 口 PoE 供电，会出现业务中断的情况（FTP 下载中断，ping 连续丢包 8-10 个），AP 然后再恢复正常；恢复 eth1 口 PoE 供电，业务不影响，FTP 无中断，ping 无丢包