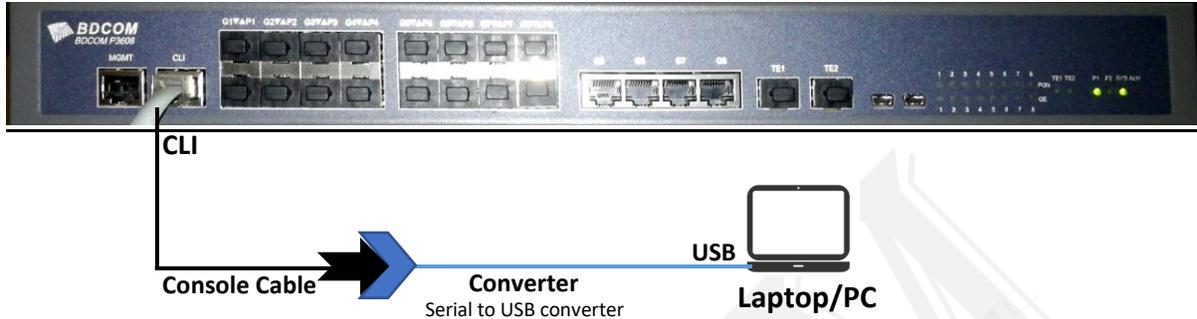
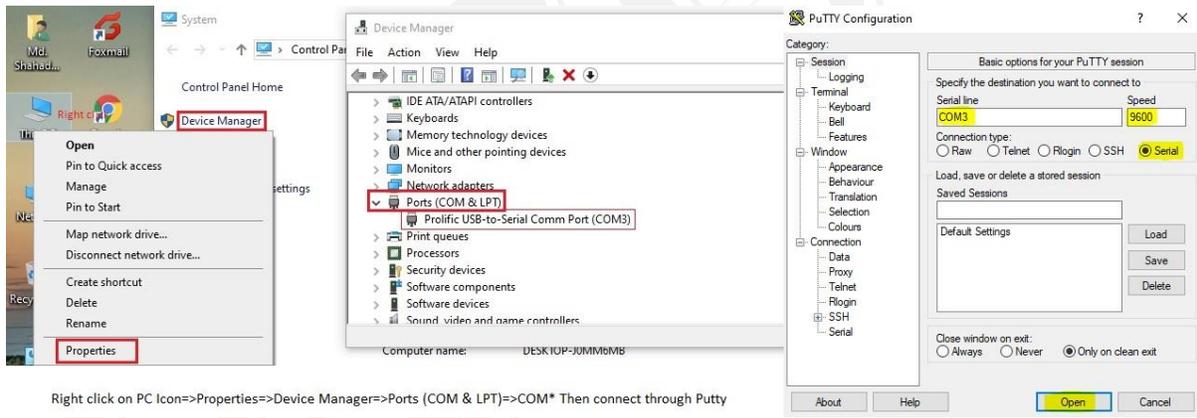


New BDCOM EPON OLT (P3608B/P3616/P3310D) basic configuration through CLI

Provide electrical power to the OLT and connect the serial cable provided with the OLT from OLT CLI port to a PC/Laptop (Use a Serial to USB converter) as like the below picture.



After connection as like the above picture; download and install the **Putty** software in your Laptop. As like the below picture check your Serial Communication port from **Device Manager** => **Ports**. Using that port, select Serial and click Open in putty. For example: Here the USB to Serial Comm. Port is **COM3**; so I used COM3 in putty for login to OLT.



A black window will appear automatically. Press **enter** then provide the Username: **admin** & Password: **admin**. Type **enable** to enter into the privilege mode. Then type **config** to enter into the global configuration mode. Now use the below commands to enable all of your Up-link and PON ports; then save all the configuration using **wr a** command.

```
int range gig 0/1-8
no shut
int range tgig 0/1-2
no shut
int range epon 0/1-8
no shut
exit
wr a
```

P3608B

```
int range gig 0/1-8
no shut
int range tgig 0/1-2
no shut
int range epon 0/1-16
no shut
exit
wr a
```

P3616

```
int range gig 0/1-6
no shut
int range epon 0/1-4
no shut
exit
wr a
```

P3310D

```

User Access Verification
Username: admin
Password: admin

Welcome to BDCOM P3310D EPON OLT

Switch>
Switch>enable
Switch#
Switch#config
Switch_config#

```

```

Switch_config#int range gig 0/1-6
Switch_config_if_range#
Switch_config_if_range#no shut
Switch_config_if_range#
Switch_config_if_range#int range epoN 0/1-4
Switch_config_if_range#
Switch_config_if_range#no shut
Switch_config_if_range#
Switch_config_if_range#exit
Switch_config#
Switch_config#wr a
Saving current configuration...
OK!
Now saving current ifindex to flash memory...
OK!

```

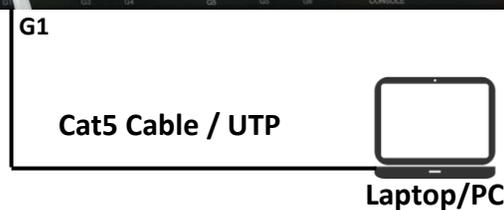
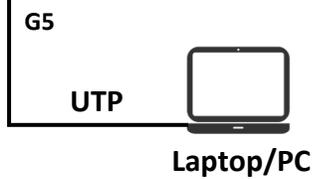
Now your OLT is configured as a plug and play mode. You can input your Bandwidth with services from any of the Up-link ports (TE1/TE2/G1/G2/G3/G4/G5/G6/G7/G8) and can be distributed through downlink PON ports.

Login Through GUI mode

Connect an UTP/Cat5 cable from OLT G5 port to a PC/Laptop as like the below picture.

OLT Default IP address: **192.168.0.1**

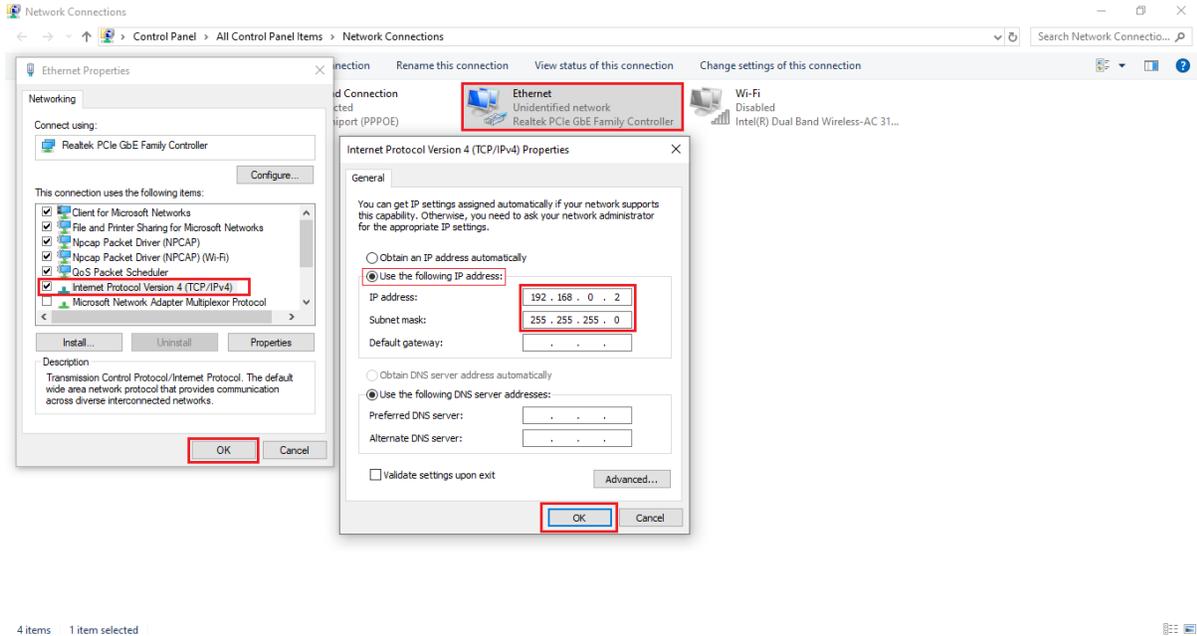
Username: **admin** & Password: **admin**



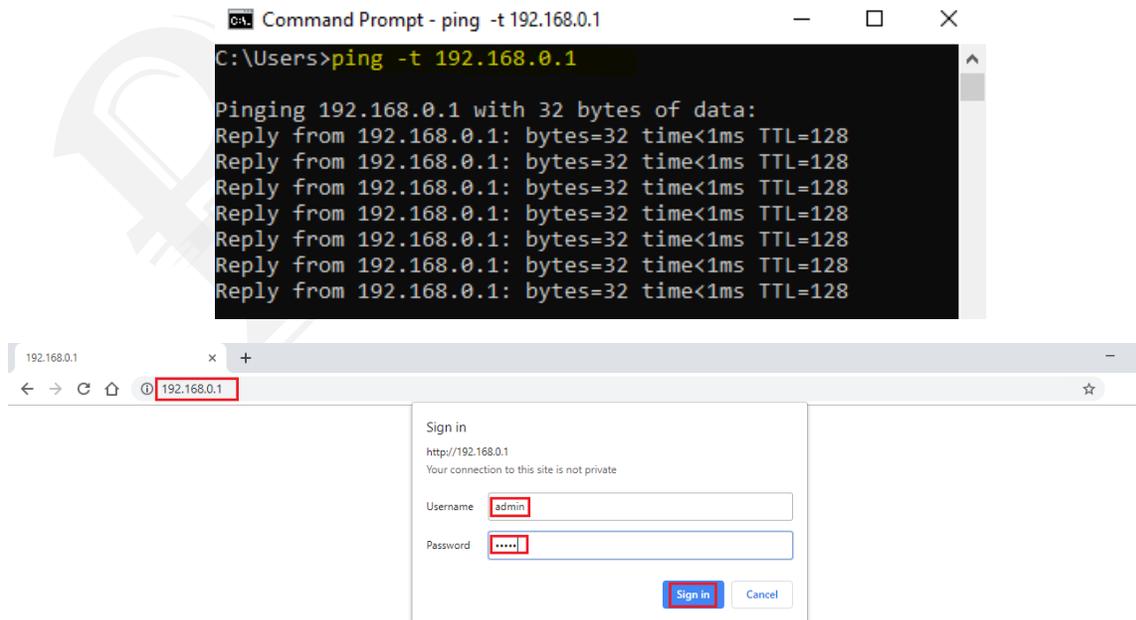
After connected cable with OLT; PC/Laptop's ethernet will show Up. Need to provide an IP address at your PC/Laptop LAN interface as like below:

Open Network & Internet Setting=>Change adapter options=Ethernet=TCP/IPv4=>IP address & Subnet mask=>Ok=>Ok

(IP address: **192.168.0.2** & Subnet mask: **255.255.255.0**)



Now check the ping reachability of your OLT IP: 192.168.0.1 from cmd of PC then open a browser and provide the OLT IP address: **192.168.0.1** (Logging by Username: **admin** / Password: **admin**) and then press **Sign in**.



Basic Configurations (CLI) on BDCOM EPON products (P3616/ P3608B/ P3310D)

1. EPON OLT basic configuration - default (Plug & Play) [Default IP: 192.168.0.1]

```

Username: admin
Password: admin
Switch> enable
config
int VLAN1
    ip address 172.16.0.1 255.255.255.0
    !
int range g 0/1-8
    no shut
int range e 0/1-8 or int range e 0/1-16
    no shut
int range tg 0/1-2
    no shut
    !
exit
    !
ip route default 172.16.0.254
    !
write all

```

Model: P3608B/P3616

```

Username: admin
Password: admin
Switch> enable
config
int VLAN1
    ip address 172.16.0.1 255.255.255.0
    !
int range g 0/1-6
    no shut
int range e 0/1-4
    no shut
    !
exit
    !
ip default-gateway 172.16.0.254
    !
write all

```

Model: P3310D

2. Service Vlan configuration including PON wise

```

Switch_config# vlan 100-800
int Tg0/1
    switchport mode trunk
    switchport trunk vlan-allowed 1,100-800
int epon 0/1
    switchport mode access
    switchport pvid 100
int epon 0/2
    switchport mode trunk
    switchport trunk vlan-allowed 201-264

```

=> Service Vlans: 1,100-800 from Router comes through OLT Tg0/1 port [trunk port]

=> Epon0/1 is access port for vlan 100, in that case all the connected ONUs will provide service through vlan 100

=> Epon0/2 is trunk port with multiple tag vlans 201-264, in that case all ONU needs specific vlan configuration for providing service to clients.

Commands [e.g. int gig 0/1]

switchport mode trunk	[To pass all tag vlans from a configured port]
switchport trunk vlan-allowed add < >	[Add specific vlans from any port]
switchport trunk vlan-allowed remove < >	[Remove specific vlans from any port]
switchport trunk vlan-untagged < >	[Untagged specific vlans for a port]
switchport trunk vlan-untagged none	[Only can be passed tag vlans in a port]
switchport pvid < >	[Declared a native Vlan in a trunk port]

3. ONU Lan port Vlan configuration command **tag/trunk** (Specific ONU)

Switch_config# int epon 0/2:1

epon onu port 1 ctc vlan mode tag 201

=>Single access vlan 201 for ONU Lan port

Switch_config# int epon 0/2:2

epon onu port 1 ctc vlan mode trunk 1 261-263

=>Multiple tag vlans 261-263 from ONU lan port [trunk port]

4. ONU description add command (Specific ONU)

Switch_config# int epon 0/1:1

epon onu description bdc0m-office-test

=>ONU description

Switch_config# int epon 0/1:1

description bdc0m-office-test

=>ONU Interface description

```
epon_config#int epon 0/1:1
epon_config_epon0/1:1#epon onu description bdc0m-office-test
epon_config_epon0/1:1#description bdc0m-office-test
epon_config_epon0/1:1#exi
epon_config#show run int epon 0/1:1
Building configuration...

Current configuration:
!
interface EPON0/1:1
  description bdc0m-office-test
  epon onu description bdc0m-office-test
```

5. ONU Loop detection and notification configuration (Specific ONU/ONUs)

```
epon_config#int epon 0/1:1
epon_config_epon0/1:1#epon onu all-port ctc loopback detect
epon_config_epon0/1:1#epon onu all-port ctc notify loopback
epon_config_epon0/1:1#exit
epon_config#show run int epon 0/1:1
Building configuration...

Current configuration:
!
interface EPON0/1:1
  epon onu port 1 ctc loopback detect
  epon onu port 1 ctc notify loopback
```

```
Switch_config# int epon 0/1:1
  epon onu port 1 ctc loopback detect
  epon onu port 1 ctc notify loopback
```

=>For single Lan port ONU

```
Switch_config# int epon 0/1:2
  epon onu all-port ctc loopback detect
  epon onu all-port ctc notify loopback
```

=> For Multiple Lan port ONU

```
Switch_config# int range epon 0/1:1-64
  epon onu port 1 ctc loopback detect
  epon onu port 1 ctc notify loopback
```

=> For all single port ONUs in a specific PON ports

6. ONU PON port 1G/1000Mb configuration (By default 100Mb)

```
Switch_config# int epon 0/1:1
  epon sla upstream pir 1000000 cir 1000
  epon sla downstream pir 1000000 cir 1000
```

```
epon_config#int epON 0/1:1
epon_config_epon0/1:1#epon sla downstream pir 1000000 cir 1000
epon_config_epon0/1:1#epon sla upstream pir 1000000 cir 1000
epon_config_epon0/1:1#ex
epon_config#show run int epON 0/1:1
Building configuration...

Current configuration:
!
interface EPON0/1:1
  epon sla upstream pir 1000000 cir 1000
  epon sla downstream pir 1000000 cir 1000
```

7. ONU Rx & Tx optical power checking command (Specific PON port)

show epon onu-ctc-optical-transceiver-diagnosis interface epon 0/1

```
Switch#show epon onu-ctc-optical-transceiver-diagnosis interface epon 0/1
IntfName      Temp(degree) Volt(V) Bias(mA) TxPow(dBm) RxPow(dBm)
-----
epon0/1:1     35.0         3.3   16.0   2.2     -16.3
epon0/1:2     43.0         3.3   10.0   2.2     -12.6
epon0/1:3     46.4         3.2   16.3   1.7     -17.9
epon0/1:4     42.2         3.2   13.4   1.6     -15.4
```

Result

8. PON SFP Rx & Tx optical power checking command (Specific PON port)

show epon optical-transceiver-diagnosis interface epon 0/1

Switch#show epon optical-transceiver-diagnosis interface epon 0/1				
interface	Temperature (degree)	Voltage (V)	Current (mA)	TxPower (dBm)
epon0/1	69.0	3.2	17.8	7.1

interface	RxPower (dBm)			

epon0/1:1	-24.6			
epon0/1:2	-24.6			
epon0/1:3	-24.8			
epon0/1:4	-24.6			

Result

9. ONU reboot command from OLT (Specific ONU)

Switch# **epon reboot onu int epon 0/1:1**
Are you sure to reboot the ONU(y/n)?y

10. ONU deregister command from OLT (Specific ONU in a PON port)

Switch_config# **int epon 0/1**
no epon bind-onu sequence 1

=>Epon0/1:1 ONU deregister from PON#1

11. ONU blacklist command (Specific ONU in a PON port)

Switch_config# **int epon 0/1**
epon onu-blacklist mac 8479.73fb.3ae3

12. IP address configuration in a specific PON of a ONU on a Vlan (Specific ONU)

Switch_config# **int epon 0/1:1**
epon onu ctc ip address static 172.16.0.20 255.255.255.0 gateway 172.16.0.1 cvlan 100 svlan 0 priority 4

=>ONU IP service is coming through vlan 100

13. ONU LAN port Rate-limit configuration (Specific ONU) [e.g. 10Mbps download & upload]

Switch_config# **int epon 0/1:1**
epon onu port 1 ctc rate-limit 10240 egress
epon onu port 1 ctc rate-limit 10240 ingress

```
epon_config#int epon 0/1:1
epon_config_epon0/1:1#epon onu port 1 ctc rate-limit 10240 egress
epon_config_epon0/1:1#epon onu port 1 ctc rate-limit 10240 ingress
epon_config_epon0/1:1#ex
epon_config#show run int epon 0/1:1
Building configuration...

Current configuration:
!
interface EPON0/1:1
 description bdc0m-office-test
 epon onu description bdc0m-office-test
 epon onu port 1 ctc rate-limit 10240 ingress CBS 10000 EBS 0
 epon onu port 1 ctc rate-limit 10240 egress PIR 10240
```

14. Storm Control configuration in ONU LAN port (Specific ONU)

Switch_config# **int epon 0/1:1**

epon onu port 1 storm-control mode 1 threshold 102400

epon onu port 1 storm-control mode 1 threshold 102400

epon onu port 1 storm-control mode 1 threshold 102400

Mode:1 (Broadcast)

Mode:2 (Multicast)

Mode:3 (Unicast)

15. Deregister/Inactive/Lost/Unknwn ONU delete from a PON Port of OLT (Specific ONU)

Switch_config# **int epon 0/1**

no epon bind-onu sequence 1

16. ONU LAN port shutdown and Up command (Specific ONU)

Switch_config# **int epon 0/1:1**

epon onu port 1 ctc shutdown

no epon onu port 1 ctc shutdown

17. ONU LAN port dynamic Maximum Mac bindings command (Specific ONU)

Switch_config# **int epon 0/1:1**

epon onu port 1 mac address-table dynamic maximum 10

18. One PON to another PON port locally reachability command

Switch_config# **int range epon 0/1-4**

no switchport protected

19. One single port ONU to another ONU in a same PON locally reachability command

Switch_config# **int range epon 0/1-4**

epon inner-onu-switch

20. One 4-port/multi-port ONU; locally ports reachability command

Switch_config# **int epon 0/1:10**

no epon onu port-protect

21. Want to pass dynamic routes (OSPF), IPv6 through ONU need to disable **private-mcst, command (Specific ONU)**

Switch_config# **int epon 0/1:1**

epon onu private-mcst disable

22. ONU basic information checking command (Specific ONU)

show epon interface epon 0/1:1 onu ctc basic-info

23. ONU software version checking command (Specific PON port)

show epon onu-software-version int epon 0/1

24. ONU all configuration checking command (Specific ONU)

show running-config interface epon 0/1:1

25. ONU LAN port status checking command (Specific ONU)

show epon interface epon 0/1:1 onu port 1 state

26. Show all active ONU (specific PON)

show epon active-onu int epon 0/1

27. Show all inactive ONU (specific PON/all inactive in OLT)

**show epon inactive-onu
show epon inactive-onu int epon 0/1**

28. Show all ONU in an OLT

show epon onu-information

29. Show all BDCOM ONU in your OLT (Filter command)

show epon onu-information | include BDCM

30. Show all connected MACs/Clients from ONU/PON (Specific ONU/PON)

show mac address-table dynamic interface epon 0/1:1

show mac address-table dynamic interface epon 0/1

31. Pre-configuration template for ONUs; automatically Loop-detection & PON as Gig (For example)

```
Switch_config# epon onu-config-template onu-auto
  cmd-sequence 001 epon onu all-port ctc loopback detect
  cmd-sequence 002 epon onu all-port ctc notify loopback
  cmd-sequence 003 epon sla upstream pir 1000000 cir 1000
  cmd-sequence 004 epon sla downstream pir 1000000 cir 1000
!
int range epon 0/1-8
  epon pre-config-template onu-auto binded-onu-llid 1-64
```

32. ONU software/firmware upgrade from OLT (All same type ONU in a specific PON)

Switch# **epon update onu image img.tar interface epon 0/1 1,2,5-7**

33. ONU software commit command (All ONU/Specific ONU in a PON)

Switch# **epon commit-onu-image-update interface epon 0/1:1**

34. ONU authentication MAC/Manual configuration

```
Switch_config# int epon 0/1
    epon onu-authen-method manual
!
int epon 0/1
    epon conform-onu interface epon 0/1:1
```

```
Switch_config# int epon 0/1
    epon onu-authen-method mac
!
int epon 0/1
    epon bind-onu mac 8479.73b2.13bf 10
```

35. Rejected ONU check command from OLT

show epon rejected-onu

36. Serving multicast traffic through OLT and ONU on a specific VLAN/IP configuration

```
Switch_config# vlan 100
!
ip mcst enable
ip mcst timer router-age 150
ip mcst querier enable
ip mcst mrouter interface GigaEthernet0/1
ip mcst mc-vlan 1000 range 239.10.10.1
!
interface GigaEthernet0/1
switchport pvid 100
!
interface EPON0/1
    switchport mode trunk
!
interface EPON0/1:1
    epon onu port 1 ctc mcst tag-stripe enable
    epon onu port 1 ctc mcst mc-vlan add 100
```

For example:

Multicast Vlan: 100
Multicast IP: 239.10.10.1

Up-link is connected from gig0/1
Client is connected from ONU 0/1:1

37. Protect Illegal DHCP from ONU (default vlan: 1)

```
Switch_config# ip dhcp-relay snooping
ip dhcp-relay snooping vlan 1
!
int gigaEthernet 0/1
    dhcp snooping trust
!
int range epon 0/1-8
    dhcp snooping deny
```

Note: Here G1 port is up-link port and you have to apply command "dhcp snooping trust" to your uplink port connected from Router.

38. Delete the configuration from ONU (Specific configuration from specific ONU)

Switch_config# int epon 0/1:1

Go to ONU interface and use "no" before the basic configuration commands

39. Set ONU lost time command at OLT (by default it is 30 days/ 2592000 seconds)

Switch_config# epon onu-lost-time 2592000

40. Clear all the lost ONU from OLT

Switch# clear epon lost-onu

41. Automatically clear all the lost ONU from OLT

Switch_config# epon auto-clear-lost-onu enable

42. All ONUs configuration change/move from one PON to another PON (e.g. PON#1 to PON#2)

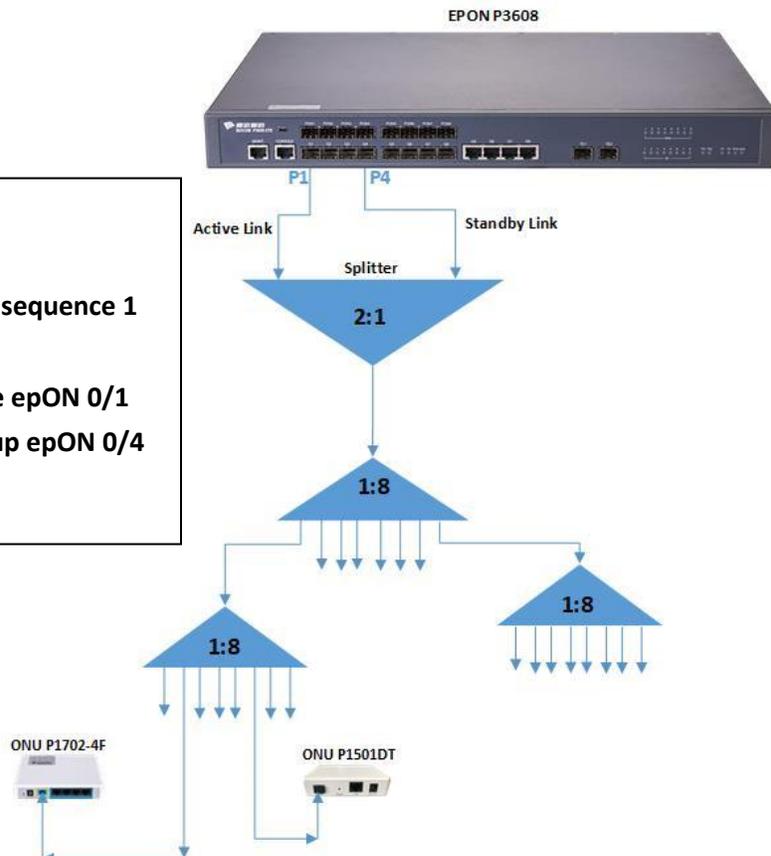
Switch# epon configuration move from epon 0/1 to epon 0/2

43. EPON PSG configuration topology with commands

BPSG- Basic Passive-Protection Switching Group

P3608 Configuration

```
Switch_config# epon b-psg sequence 1
interface psG 0/1
  epon psg member active epON 0/1
  epon psg member backup epON 0/4
  no shutdown
```



44. All down/up reasons as per ONU status

ONU Status	Reasons
Auto-configured	ONU is successfully activated in OLT with all serving mode
Authenticated	Optical power of that ONU is not stable / Onu is not compatible with PON module or OLT
Registered	If PON port is in authentication mode; ONU is connected with OLT; need the permission of OLT admin for activation
Wire down	Optical power is cut-off/Fiber down/High dB loss
Power-off	ONU power is off due to electricity failure
LLID-admin-down	ONU is administratively down from OLT due to some bad behavior of ONU like (false optical power, always laser on issue, incompatible ONU etc)
Linkfault/SFI	Due to problematic splitter or fiber dB loss issue
Lost	ONU is deregistered for long time (more than 30 days)
Unknwn	ONU was down before the OLT gets rebooted

45. IP Management & Vlan interface configuration command

```
Switch_config# int VLAN 100
    ip address 172.16.0.1 255.255.255.0
!
ip route default 172.16.0.254
```

46. Configuration command for saving all the running configuration

```
Switch_config# write all
```

47. Enable SSH

```
Switch_config# ip sshd enable
    ip sshd version 2
    no ip sshd disable-aes
```

48. Enable & configuration of SNMP community service

```
Switch_config# snmp-server community 0 bdcop-test rw
    snmp-server host 172.16.0.100 version v2c bdcop-test authentication configure snmp
```

49. VLAN

```

Switch_config# vlan 100-200
!
int GigaEthernet 0/1
    switchport mode access
    switchport pvid 100
!
int GigaEthernet 0/2
    switchport mode trunk
    switchport trunk vlan-allowed 100-200
!
int epon 0/1
    switchport mode trunk
    switchport trunk vlan-allowed 100-200

```

=>Access Vlan in a port

=>Trunk port for passing multiple tag Vlans

50. Loop detection and protection for Up-link Ports

```

Switch_config# loopback-detection
!
no error-disable-recovery
!
int range gig 0/1-8
    loopback-detection enable
    loopback-detection control shutdown

```

51. Port security command

```

Switch_config# interface g 0/1
    switchport port-security static mac-address H.H.H
    switchport port-security dynamic maximum 2048

```

52. Storm control command

```

Switch_config# interface tg 0/1
    storm-control broadcast threshold 500
    storm-control unicast threshold 500
    storm-control multicast threshold 500

```

53. Port isolation command

```

Switch_config# interface g 0/1
    switchport protected 1

```

54. DOS attack prevention command

```

Switch_config# dos enable ip
                dos enable icmp

```

55. Rate-limit configuration

```
Switch_config# interface gigaEthernet 0/1
    switchport rate-limit 16383 ingress
    switchport rate-limit 16383 egress
```

56. QOS for BW manage/bind on a specific Vlan

```
Switch_config# policy-map BW-10MB
    classify vlan 100
    action bandwidth 160
!
Interface gigaEthernet 0/1
    qos policy BW-10MB ingress
```

57. LACP (Port-Aggregation & Port-Channel)



Switch Configuration

```
interface Port-aggregator 8
    switchport mode trunk
    switchport trunk vlan-allowed 1-4094
!
interface range tg 0/1,4
    aggregator-group 8 mode lacp
    switchport mode trunk
    switchport trunk vlan-allowed 1-4094
```

EPON OLT Configuration

```
interface Port-aggregator 8
    switchport mode trunk
    switchport trunk vlan-allowed 1-4094
!
interface range tg 0/1-2
    aggregator-group 8 mode lacp
    switchport mode trunk
    switchport trunk vlan-allowed 1-4094
```

58. Jumbo Frame (MTU)

```
Switch_config# system mtu 9216
```

59. NTP server configuration for clock management

```
Switch_config# time-zone tz 6 0  
ntp server 183.177.72.201
```

60. Logging buffer size configuration

```
Switch_config# logging on  
logging buffered 409400
```

61. SFP optical power check command (DDM)

```
Switch_config# ddm enable
```

62. LLDP configuration commands

```
Switch_config# lldp run
```

63. Create and change the Username and Password

```
Switch_config# username bdc com password bdc com  
username admin password admin321
```

64. Create a Limited or Read user

```
Switch_config# localauthor limited  
exec privilege default 8  
!  
username bdc com password 0 bdc com author-group limited
```

65. Change HTTP and Telnet port

```
Switch_config# ip http port 9090  
ip telnet listen-port 3030
```

66. Change Telnet default (Port: 23) port and assign a new one

```
Switch_config# ip access-list extended telnet
```

```
deny tcp any any eq telnet
permit ip any any
permit tcp any any
```

!

interface VLAN 1

```
ip access-group telnet in
```

!

```
ip telnet listen-port 3030
```

67. DHCP server over vlan-100

```
Switch_config# interface VLAN 100
```

```
ip address 172.31.100.1 255.255.255.0
```

!

```
ip dhcpd pool test
```

```
network 172.31.100.0 255.255.255.0
```

```
range 172.31.100.2 172.31.100.20
```

!

```
ip dhcpd enable
```

68. Firmware Upgradation of an OLT (EPON) through GUI (Web) mode

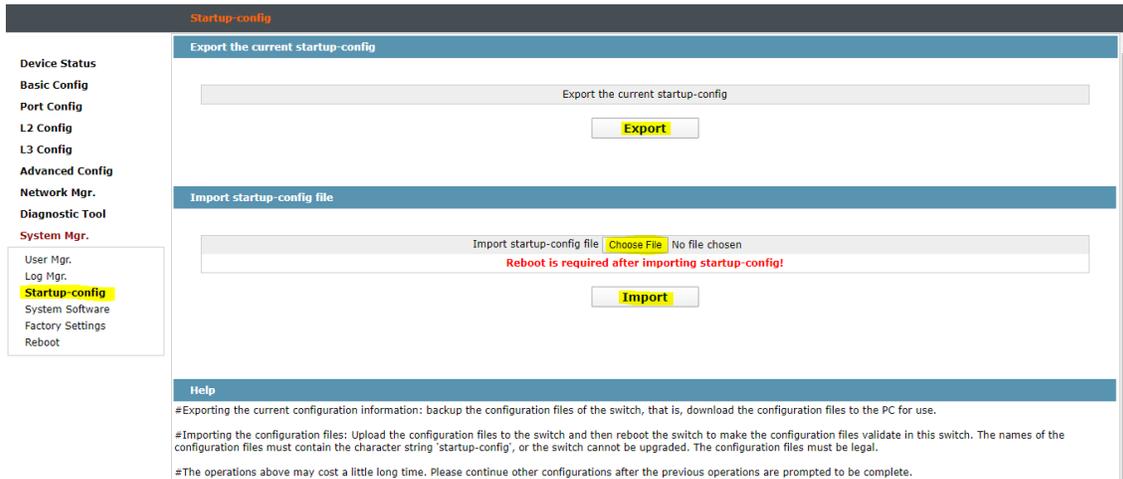
The screenshot shows the BDCOM web interface for managing IOS software. The left sidebar contains a navigation menu with the following items: Device Status, Basic Config, EPON Interface Config, ONU Interface Config, Advanced Config, Remote Monitor, System Mgr (1), User Mgr, Log Mgr, Diagnostic, Startup-config, IOS Software (2), Factory Settings, Reboot, and About. The main content area is titled "IOS Software" and contains two sections: "Backup IOS" and "Update IOS".

The "Backup IOS" section displays the current software version: "Switch.bin, 10.1.0F Build 69083 Build 69083, 2019-11-27 18:57:48 by SYS". Below this, there is a text input field for "File name on the server" containing "Switch.bin" and a "Backup IOS" button.

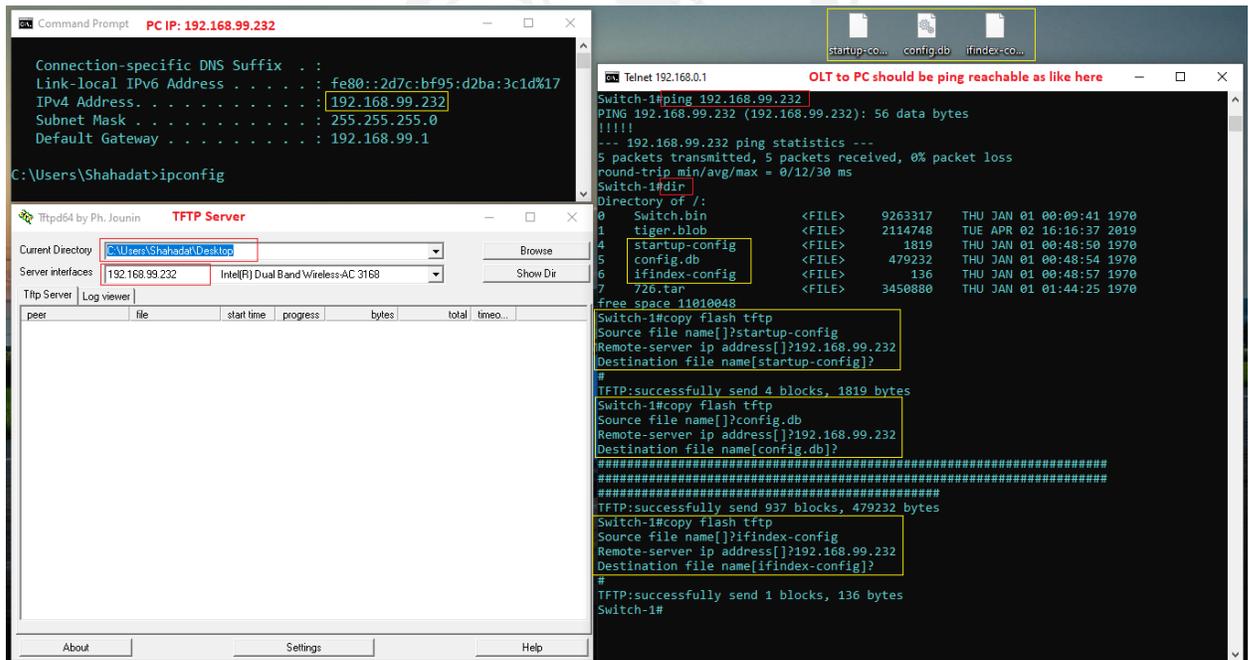
The "Update IOS" section features a red warning message: "Reboot is required after the update of IOS software!". Below the warning, there is a checkbox for "Reboot the device automatically after update". A text input field for "File name on the server" contains "Switch.bin". Below this, there is a "Choose File" button and a text input field for "Update IOS" containing "BD_3310D_10...F_69083.bin". At the bottom of the section is an "Upgrade" button.

Wait until the below POP-Up has come "IOS Software Upgraded Successfully". After, just reboot the OLT and the OLT will be updated with the provided firmware.

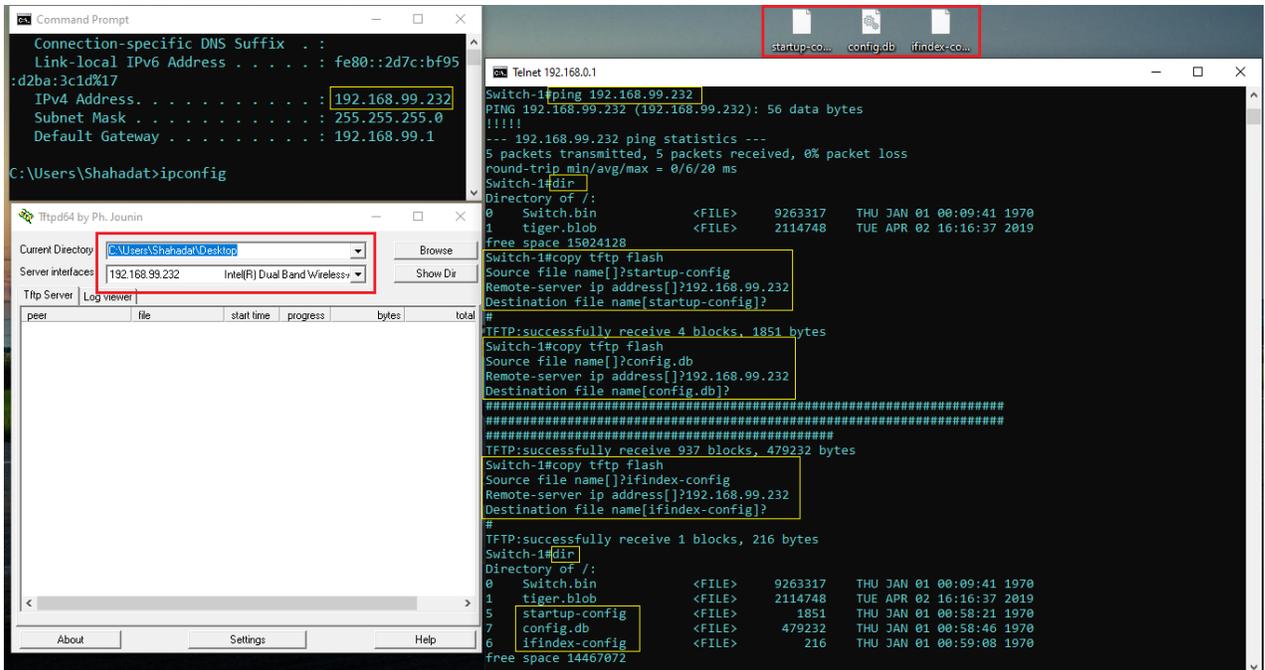
69. Configuration Backup (Export & Import) from GUI [Note: Only the startup-config excluding the ONU configurations]



70. How to take full configurations backup from OLT including ONU configurations [Export configurations from OLT via TFTP]



71. How to import previously backup configuration to OLT [Import configurations to OLT via TFTP; should be same model OLT]



72. How to Reset a Switch or OLT [Delete the below mentioned files without Switch.bin & tiger.blob for EPON]

After completed the deletion just reboot the Switch or OLT and your device will be successfully reset.

Note: If any one forgot the login password, one can reset the device from **monitor** mode using the same way. Press **[control + P]** continuously while device is booting to go to monitor mode.

```
Switch#dir
Directory of /:
0  Switch.bin          <FILE>    8654006  SAT DEC 21 13:36:42 2019
1  startup-config      <FILE>    2048    MON JAN 05 17:51:47 1970
2  config.db           <FILE>    507904  MON JAN 05 17:51:51 1970
3  ifindex-config      <FILE>    272     MON JAN 05 17:51:55 1970
free space 17235968
Switch#
Switch#delete startup-config
this file will be erased,are you sure?(y/n)y
Switch#
Switch#delete config.db
this file will be erased,are you sure?(y/n)y
Switch#
Switch#delete ifindex-config
this file will be erased,are you sure?(y/n)y
Switch#
Switch#
Switch#reboot
reboot rename resume
Switch#reboot
Do you want to reboot the Switch(y/n)?
```

73. Basic switching monitoring commands

- show interface brief
- show running-config

- show configuration
- show interface g0/1
- show mac address-table dynamic interface g0/1
- show mac address-table dynamic vlan 1
- show vlan
- show vlan id 1
- show run int g0/1
- show cpu
- show task
- show spanning-tree
- show version
- show version all
- show system mtu
- show lldp
- show telnet
- show run int vlan 1
- show ip int brief
- show arp
- show ip route
- show ip route all

74. ping and trace from OLT

Switch# **ping** *.*.*.*

..*.* valid and reachable IP address

Switch# **traceroute** *.*.*.*

More basic information regarding Splitting ratio and Power budget

Some splitting combinations for single PON port of EPON are (Reverse/Reshuffle of combinations can be applicable also):

Combinations of Splitting	Approximate dB losses Of different splitters	
1:8 <=> 1:8	1:2 => 4.5dB loss	➔ ONU Rx optical power sensitivity is from -6dBm to -27dBm (range), RX Wavelength = 1490nm
1:4 <=> 1:16	1:4 => 7.5dB loss	➔ PON Module Rx optical power sensitivity is -32dBm
1:2 <=> 1:32	1:8 => 10.5dB loss	➔ PON Module Tx optical power For PX20++ is 6~7dBm For PX20+++ is 7~8dBm
1:2 <=> 1:4 <=> 1:8	1:16 => 13.5dB loss	➔ ONU Tx optical power is 0~3dBm
1:2 <=> 1:8 <=> 1:4	1:32 => 16.5dB loss	
1:2 <=> 1:2 <=> 1:16	1:64 => 19.5dB loss	
1:4 <=> 1:4 <=> 1:4		
1:8 <=> 1:2 <=> 1:4		
1:2 => 1:2 => 1:2 => 1:8		
1:4 => 1:2 => 1:2 => 1:4		

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