



Fibre Optic PTP Broadband Solution (FTTx)



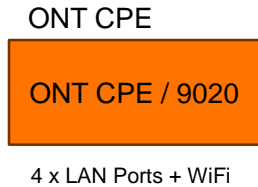
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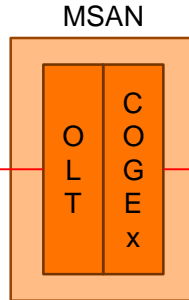


High Level Architecture

IONT terminates customer fibre within integrated FTU and provides local LAN ports (up to GbE) and WiFi (802.11b/g/n). Conventional Private IP address allocation via DHCP and NAT or Bridge Mode can be configured. User can change local DHCP and WiFi parameters via GUI. Remote management via SNMP or CLI.



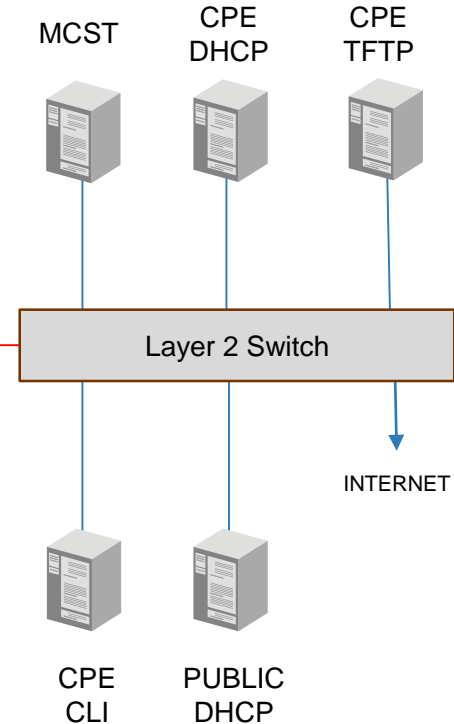
1000BaseBX – Single Fibre



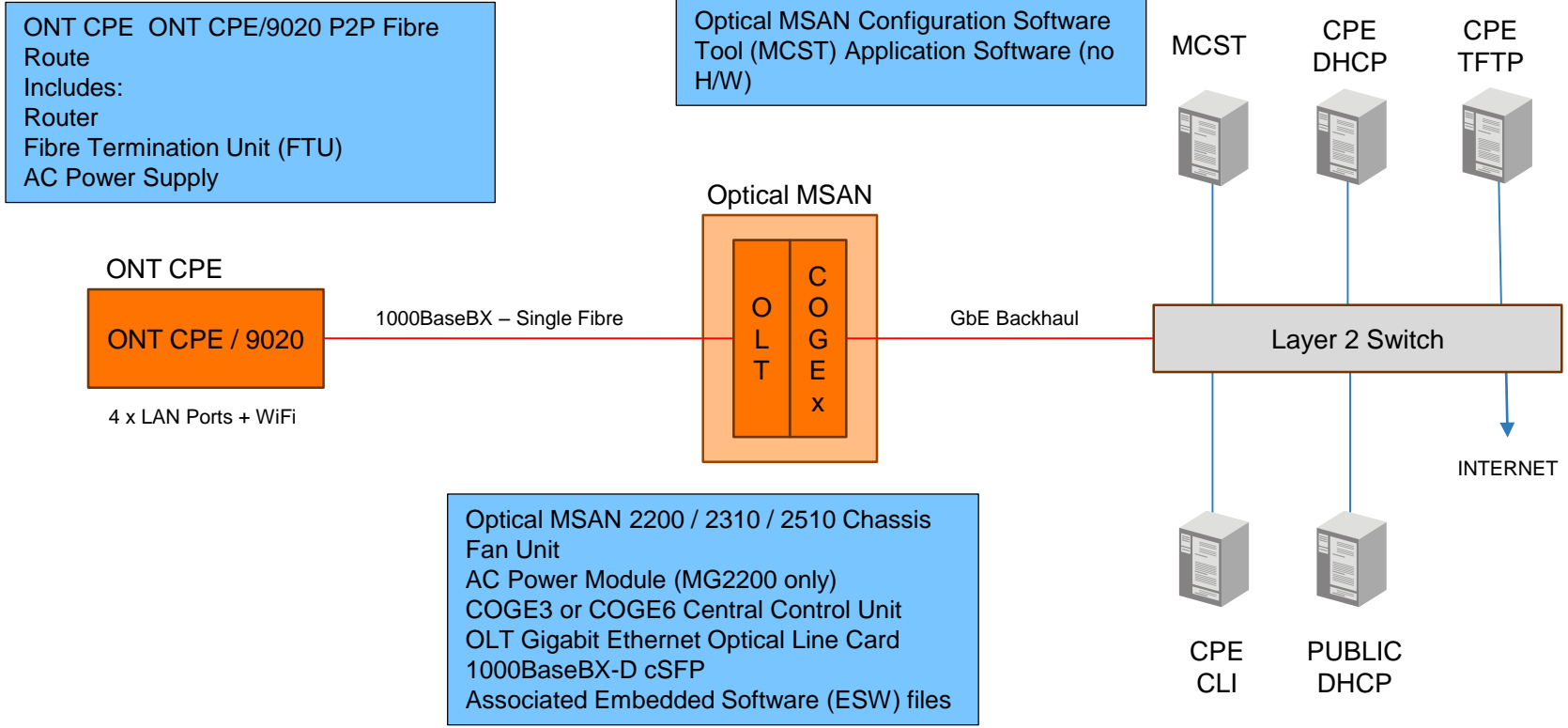
GbE Backhaul

Optical Msan provides fibre interfaces and aggregation to GbE backhaul (optical or electrical). User isolation and protection via various security mechanisms including MAC spoofing, broadcast storm protection and DoS attacks. Fault management and performance monitoring statistics supported.

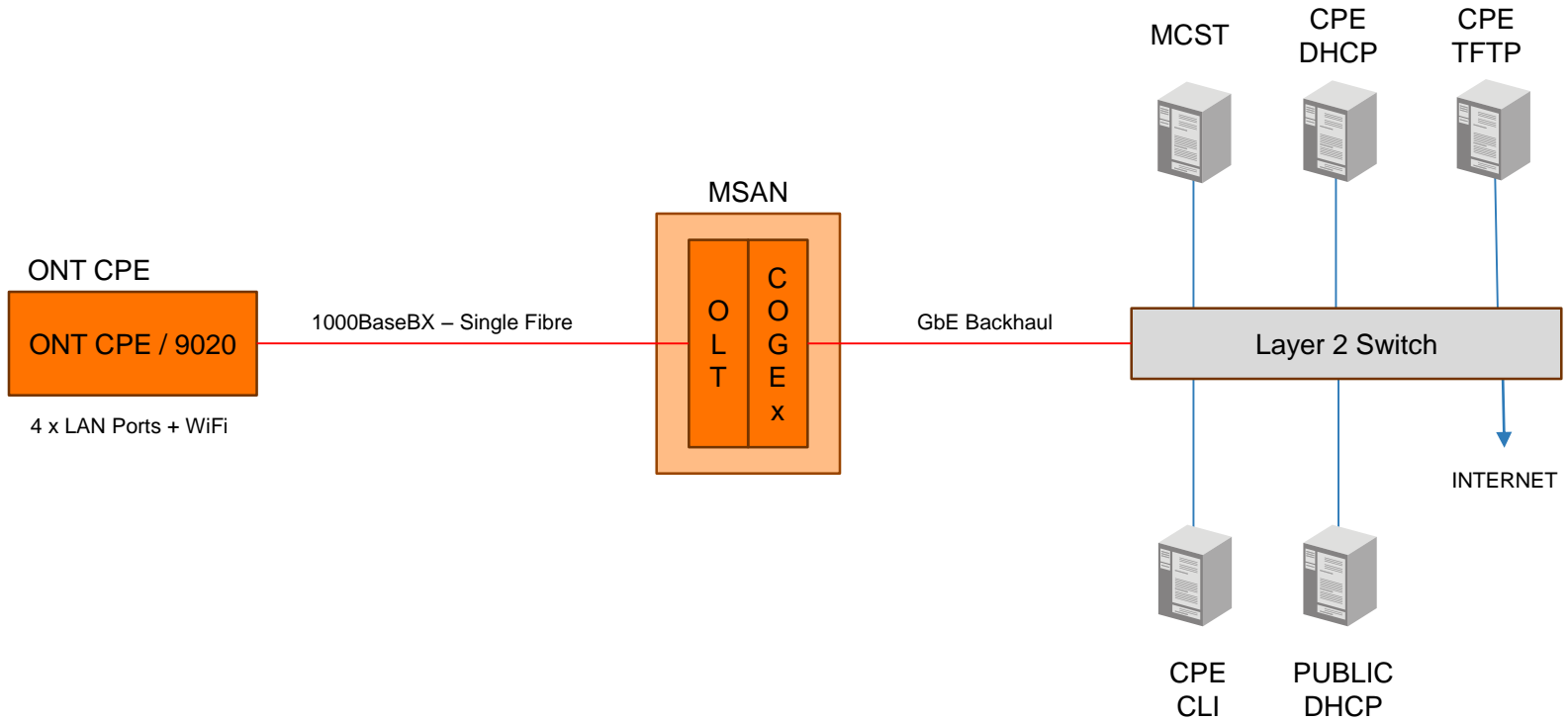
MCST application provides remote (and local) management of Optical MSAN platforms.



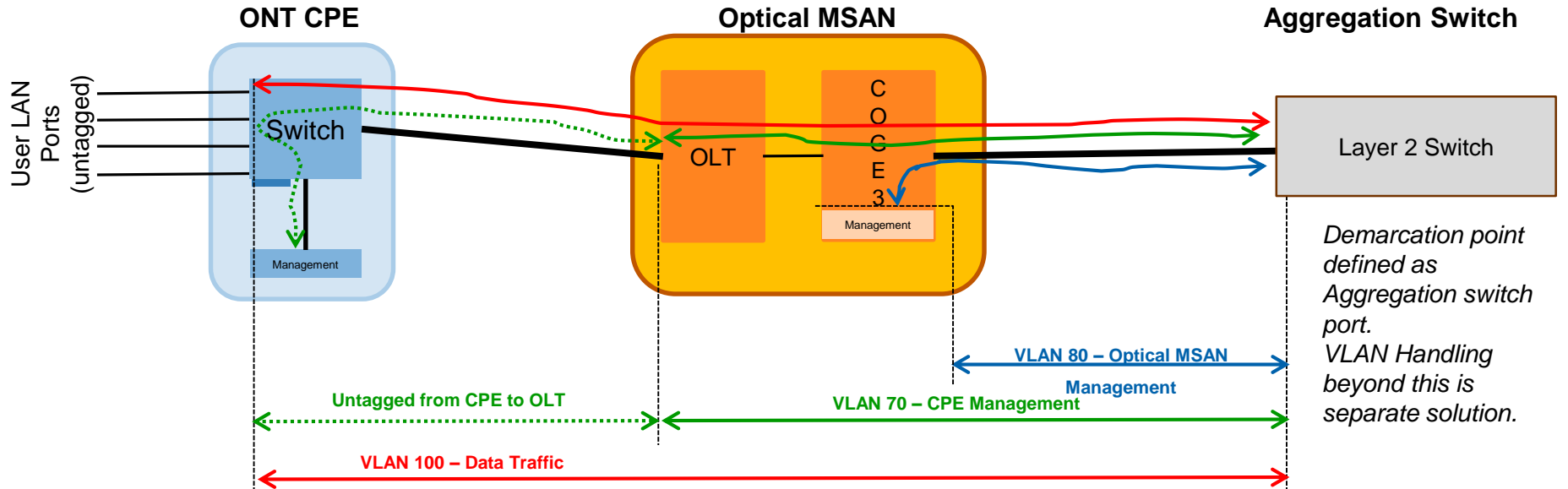
Equipment Being Supplied



High Level Architecture



Access Layer VLAN Usage



■ Proposed Implementation

□ Internet Traffic

- CPE User Data VLAN
- Mapped at MSAN to

C-Tag = 100 (fixed, to facilitate standard CPE config)

S-Tag = 100 (This can be varied for each site needed)

□ CPE Management

- Management VLAN

S-Tag = 70 (fixed, to facilitate standard CPE config)

□ Optical MSAN Management

- Management VLAN

S-Tag = 80 (fixed, to facilitate standard Optical MSAN config)

■ Provisioning Separated into

- Initial network build / capacity expansion
- Per customer provisioning

■ Initial Network Build

- Assume Core MSAN and Aggregation switch configuration etc. already done...
- All installed MSAN OLT customer ports configured and operational
- Services defined for each port (ONT management and internet access)
- No further MSAN provisioning steps needed to activate live customer
 - (Unless customer specific text labels to be applied to ports etc for admin purposes)
- Capacity Expansion: Additional OLT cards installed and provisioned as above

■ Per Customer Provisioning

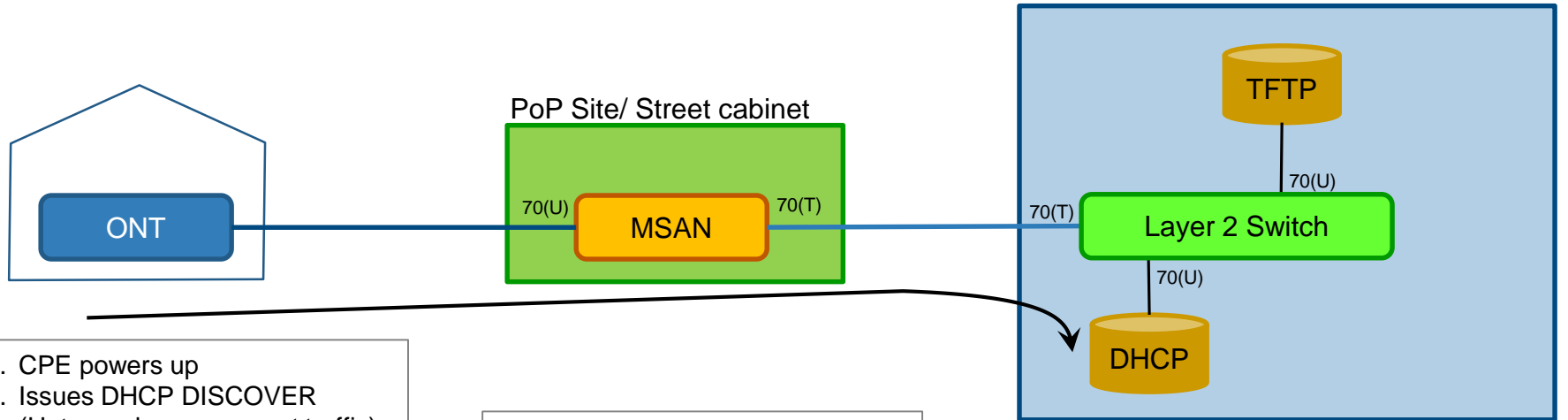
□ CPE Management DHCP Server

- Upon connecting the ONT to the network for the first time, the CPE is issued with a Private IP address
- If this DHCP Server filters based on MAC addresses (and possibly Option 82 as well) then this would need to be pre-provisioned
- Option 66/67 parameters used to identify:
 - a) TFTP Server IP Address
 - b) Filename

□ TFTP Server

- The CPE then requests a config file from the TFTP Server whose IP address it was given in the DHCP Offer
- Filename provided in DHCP Offer is requested filename – can be unique or universal

ONT Provisioning 1/3

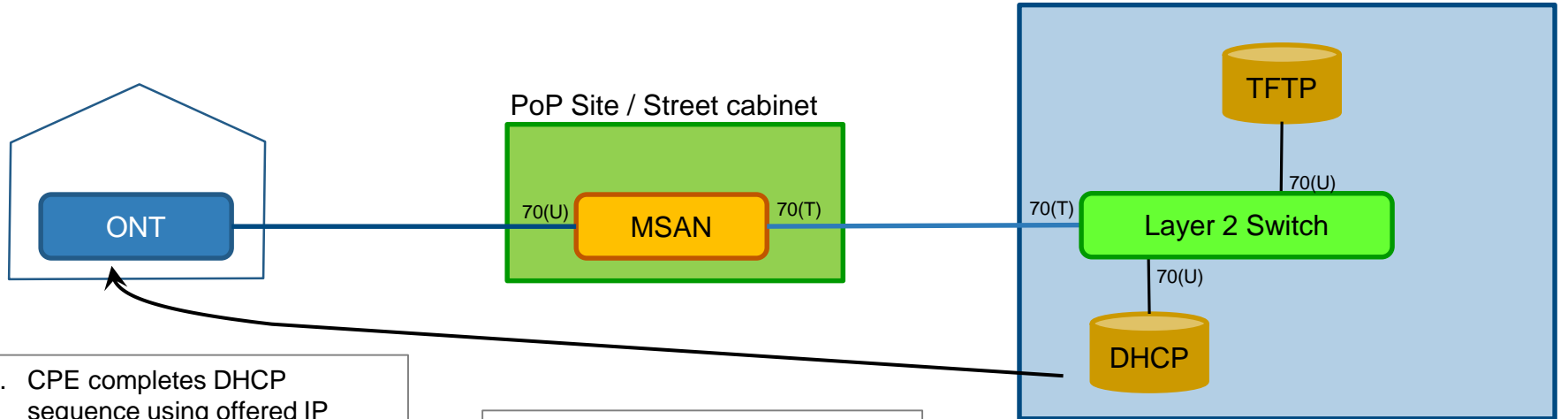


1. CPE powers up
2. Issues DHCP DISCOVER (Untagged management traffic)

3. MSAN service configured with untagged interface being the CPE Management VLAN
- VLAN ID = 70, CoS = 7

5. Layer 2 switch forwards frame to DHCP Server
6. Server allocates IP address with Option 66/67 data:
 - DHCP server location (IP Address)
 - File Name for Config File

ONT CPE Provisioning 2/3

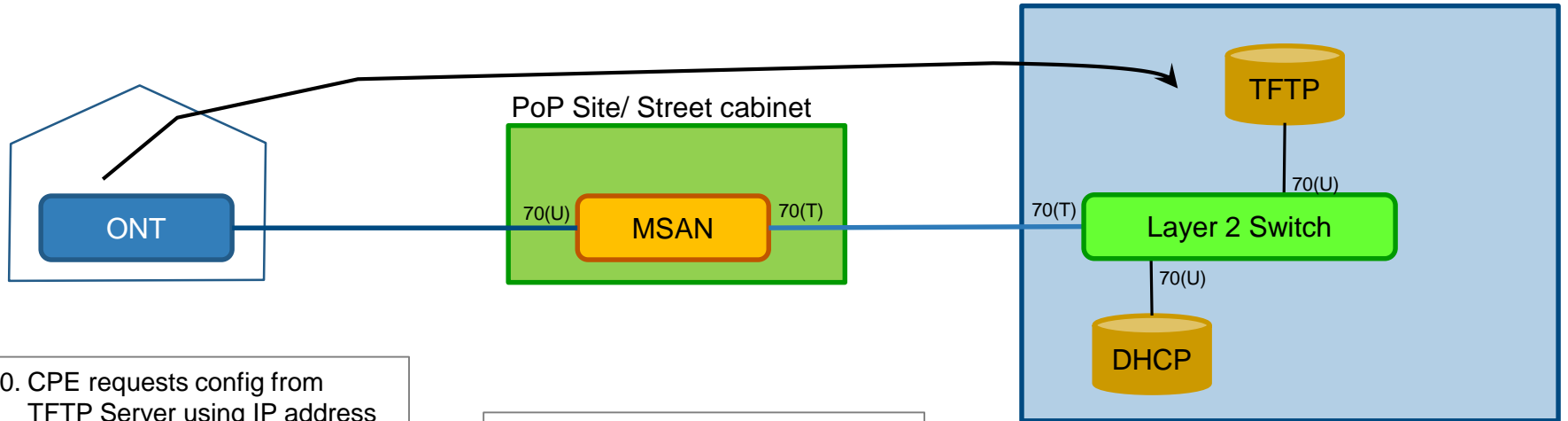


9. CPE completes DHCP sequence using offered IP address
DHCP REQUEST
DHCP ACK

8. MSAN forwards DHCP Offer (removing Option 82 data) on untagged interface

7. DHCP Server sends DHCP OFFER with Option 66/67 information

ONT Provisioning 3/3



10. CPE requests config from TFTP Server using IP address given in Option 66
Uses given FileName

13. CPE uses given config and configuration is complete
CPE then reboots to activate

11. Transparent traffic to MSAN

12. TFTP Server sends default config based on File Name requested

- All management traffic will be in-band carried in dedicated VLANs
- Optical MSAN
 - MCST Application Server located at NOC (tbc)
 - Each MSAN is given a fixed IPv4 IP address
 - Access passwords, Fixed IP address, Management VLAN, Trunk Port Enabling
 - Dedicated VLAN for Optical MSAN management traffic
 - MCST GUI used to configure and interrogate each MSAN (CLI also possible)
 - Standard configurations and profiles downloaded from MCST
 - Fault analysis, performance monitoring and configuration changes
 - Same GUI on laptop for local access for commissioning / local fault finding etc..
- ONT
 - No dedicated management platform
 - CLI via SSH proposed solution
 - SNMP option possible

- MSAN Node Management IP Address
 - Fixed, Private Address, IPv4
- ONT Management IP Address
 - Dynamic (allocated via DHCP), Private Address, IPv4
- ONT Public IP Address
 - Dynamic (allocated via DHCP), Public Address, IPv4 (may also be static with config change)
 - Future can be Public IPv6 address
- ONT Private Network IP Address
 - Dynamic (allocated via DHCP), Private Addresses, IPv4 (default 192.168.x.x)
 - Future can be IPv6 address

- The following security features are implemented on the Optical MSAN OLT
 - Broadcast Filtering
 - Broadcast filtering can be enabled or disabled. With the enabled filter, broadcast frames are filtered in upstream and downstream direction on the whole unit
 - Multicast Filtering
 - Multicast traffic can be blocked in upstream direction. This prevents customers from feeding multicast traffic into the network. This feature can be configured per unit
 - Prevention of L2 peer to peer ("hair-pin") forwarding
 - OLT support a mechanism to prevent direct communication (with Unicast direction) between two user ports
 - Prevention of source MAC spoofing (N:1 VLAN)
 - OLT prevents learning the MAC address from switch port X if the same MAC address appears in the MAC learning table pointing to switch Y. It also prevents BRAS MAC address spoofing, i.e. it filters and discards frames received on bridged ports with the BRAS MAC address as source address.
 - Prevention of source MAC flooding
 - OLT supports the limitation of the number of source MAC addresses learnt from a bridged port. This limitation can be set per port.