EPON – GROWING YOUR BUSINESS

SCTE – November 20, 2013

COMMERCIAL SERVICES
A HUGE OPPORTUNITY FOR CABLE

$140B

SPEND BY BUSINESSES ON TELECOM SERVICES

$7B

TAKEN BY MSOs, A MERE 5-6% OF TOTAL

$8.5B

MOBILE BACKHAUL SERVICES REVENUE

27M

BUSINESSES IN THE US

66%

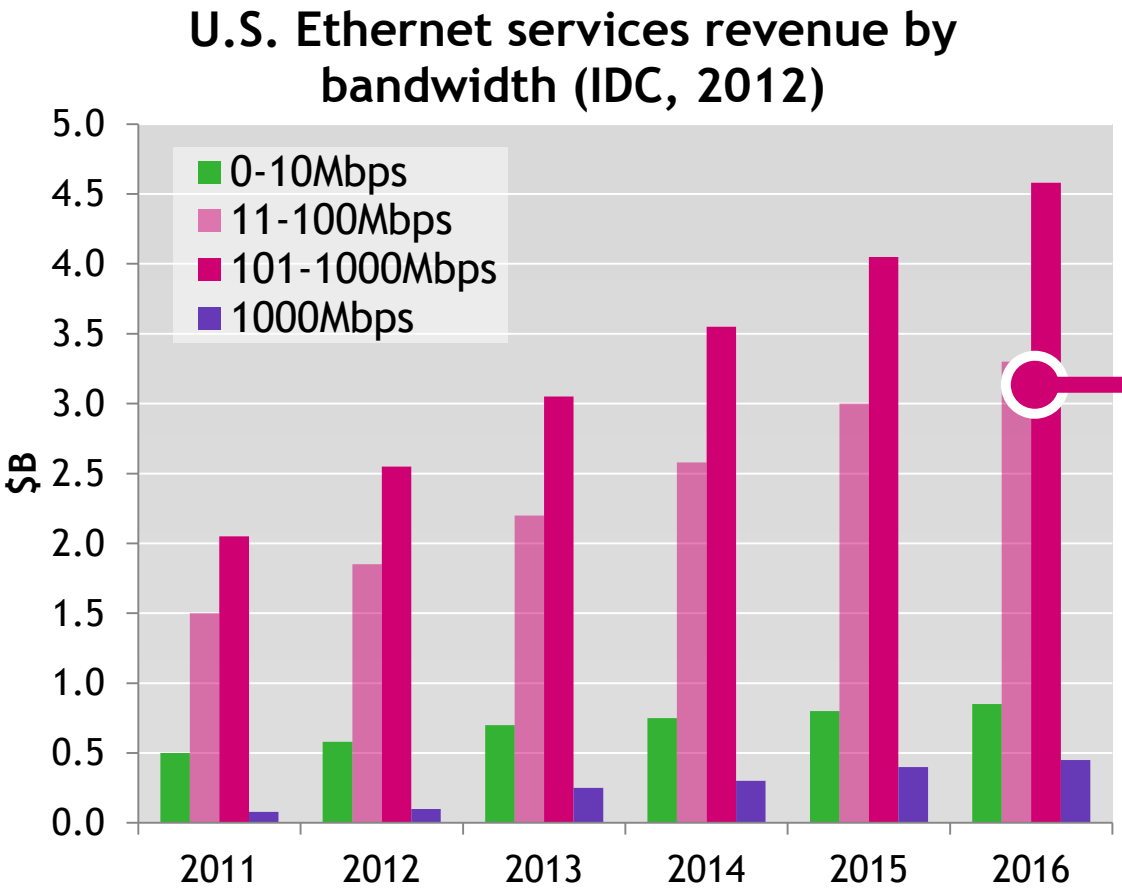
OF WHICH ARE PASSED BY MSOs

$600M

MOBILE BACKHAUL REVENUE GOING TO MSOs

SNL Kagan LIGHT READING INFONETICS RESEARCH

ADDRESSING THE LARGEST & FASTEST GROWING COMMERCIAL SERVICES SEGMENT



IDC

10s of Mbps: DOCSIS

- 100M maximum downstream bandwidth
- Upstream bandwidth limitations
- Re-use of existing HFC network offers cost advantage
- Addresses only the lowest revenue opportunity

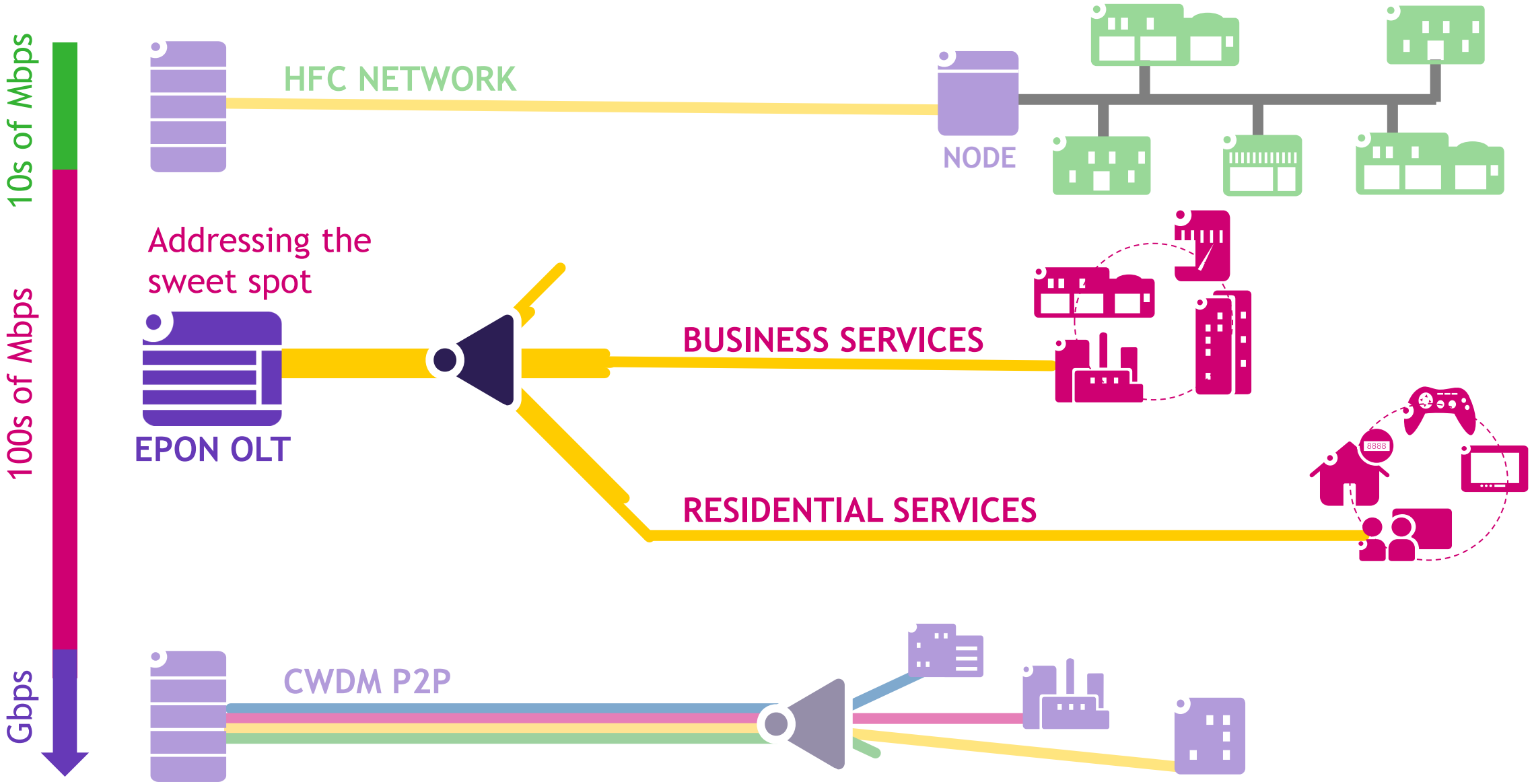
100s of Mbps: EPON

- From 10Mbps symmetrical upwards
- Point-to-multipoint architecture reduces fiber costs
- DPoE for easy integration into existing systems
- Addresses the most lucrative service tiers

Gbps: POINT-TO-POINT FIBER

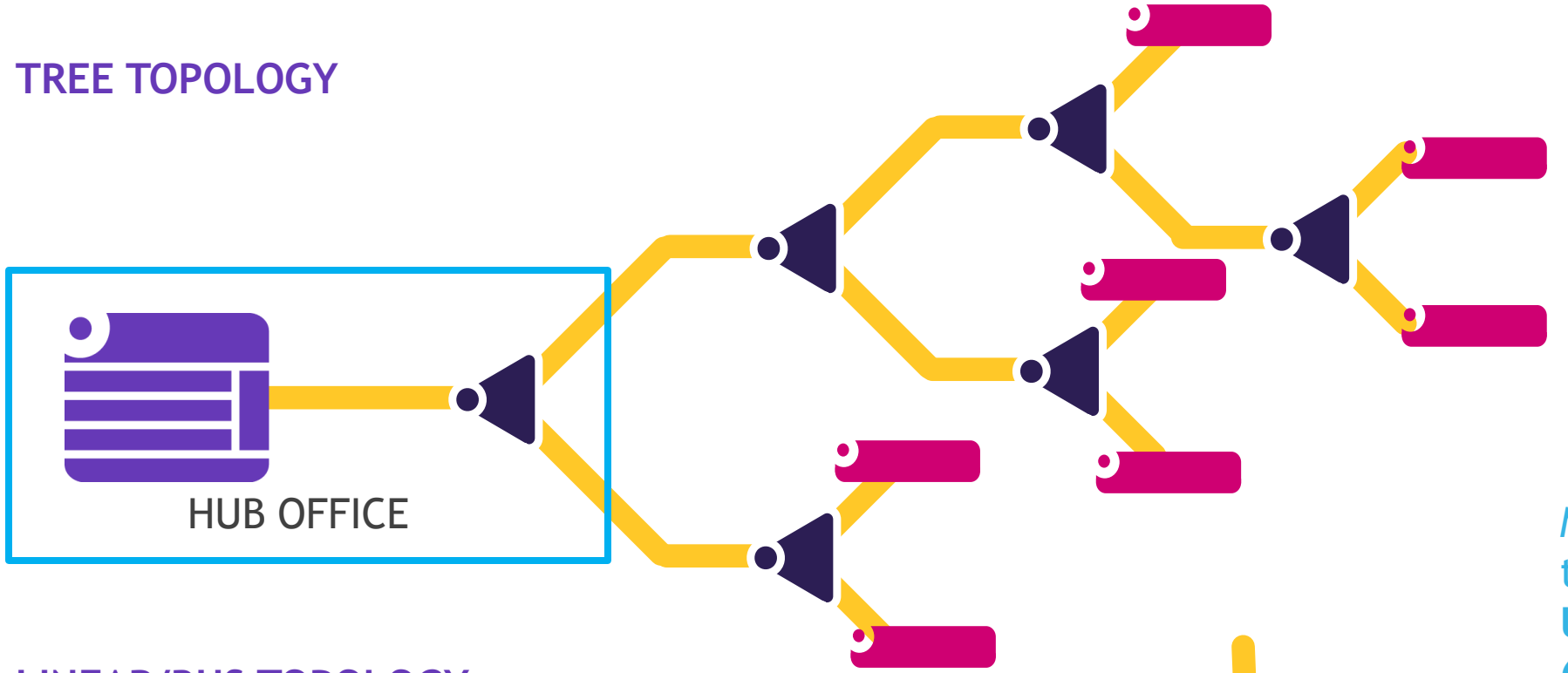
- Good for Gigabit and higher bandwidth
- Costly at below 1Gb/s
- Not ideal for the most lucrative service tiers
- 10G EPON will be an alternative for the Gbps segment

UPGRADE YOUR NETWORK WITH EPON



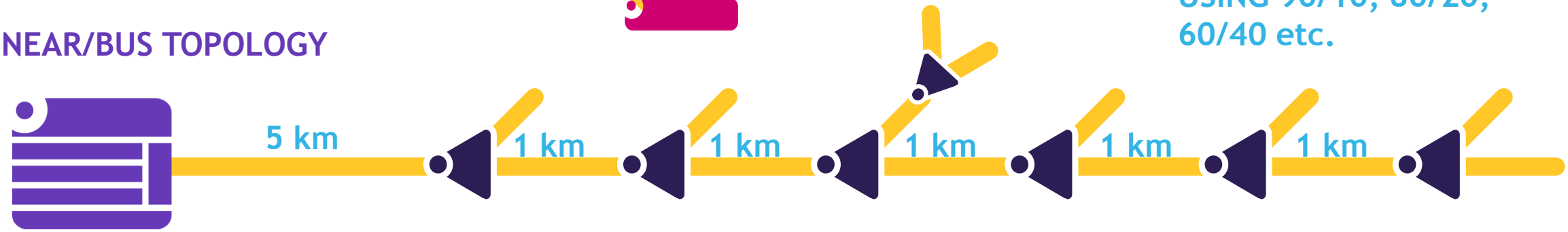
TYPICAL NETWORK TOPOLOGIES FOR COMMERCIAL SERVICES

TREE TOPOLOGY



USING 50/50 SPLITTERS – UP TO 5 SPLITTERS IN A PATH

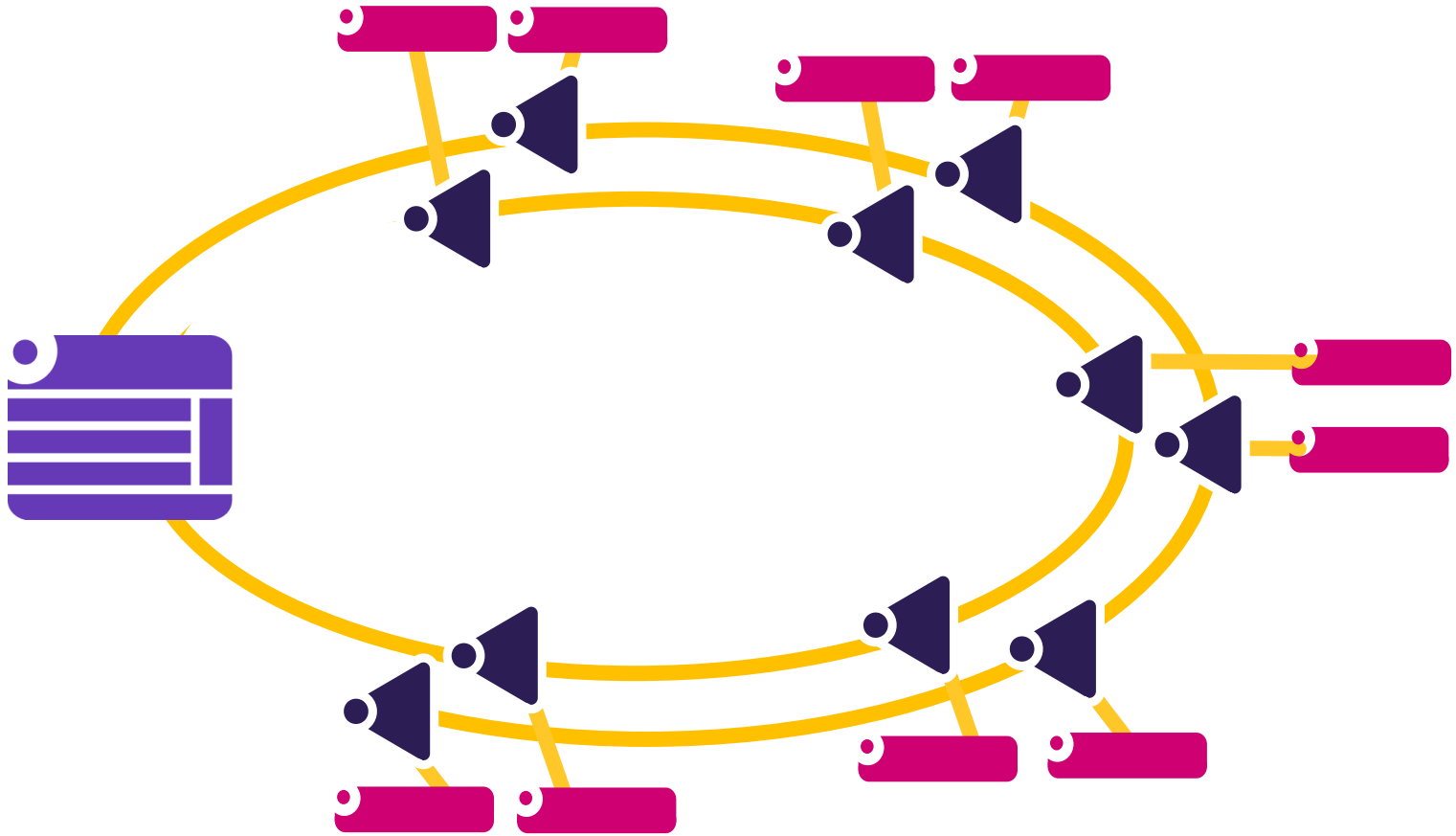
LINEAR/BUS TOPOLOGY



MAXIMUM 20 KM, typically 16 SPLITTERS **USING 90/10, 80/20, 60/40 etc.**

TYPICAL NETWORK TOPOLOGIES FOR COMMERCIAL SERVICES

RING TOPOLOGY



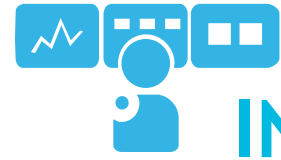
GROWING YOUR BUSINESS WITH EPON
A COST-EFFECTIVE SOLUTION FOR THE UP-MARKET SEGMENT

RIGHT BANDWIDTH

- 1G symmetrical with10Gbps coming soon
- Addresses the up-market segments of 10+Mbps
- Dynamically allocated bandwidth up to 1Gbps peak.

RIGHT PRICE

- Scalable and flexible solution
- Re-use of existing customer premises equipment with the EPON SFP ONU
- Point-to-Multipoint architecture reduces fiber cost
- Typically up to 16 customers per fiber, 3x more than CWDM-P2P
- CAPEX Fully loaded PON system 2/3 cost of fully loaded p2p router system – without consideration of fiber savings



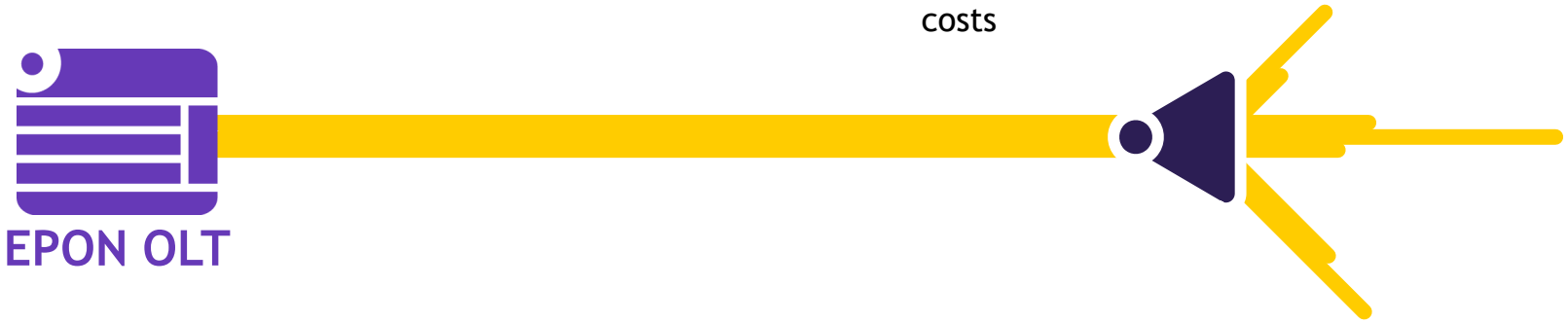
EASY INTEGRATION

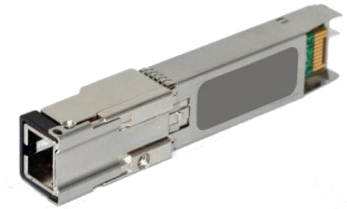
- DPoE allows EPON to be easily integrated into the existing OSS management system
- Management system of the EPON network is the same as the legacy DOCSIS network
- Compatible with CWDM-P2P

EPON COMMERCIAL SERVICES AT A GLANCE

REDUCED OPEX

- Passive EPON network, no active equipment in the field
- Reduced power consumption
- High density results in smaller footprint
- DPoE reduces provisioning costs





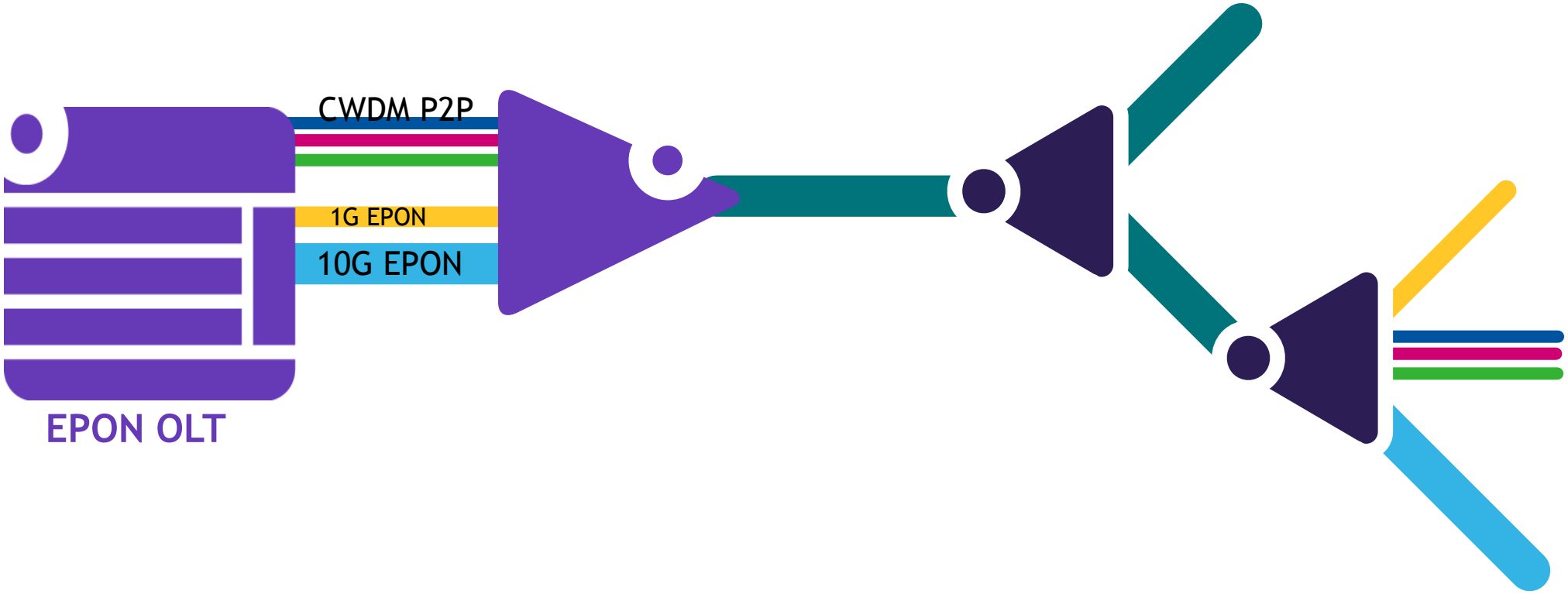
RE-USE OF EXISTING EQUIPMENT

- “Plug-in” EPON SFP ONU to existing NIDs
- Preserve your previous investment
- Upgrade your existing business CPEs to an EPON ONT
- Compatible with CWDM-P2P

100s OF MBPS SYMMETRICAL

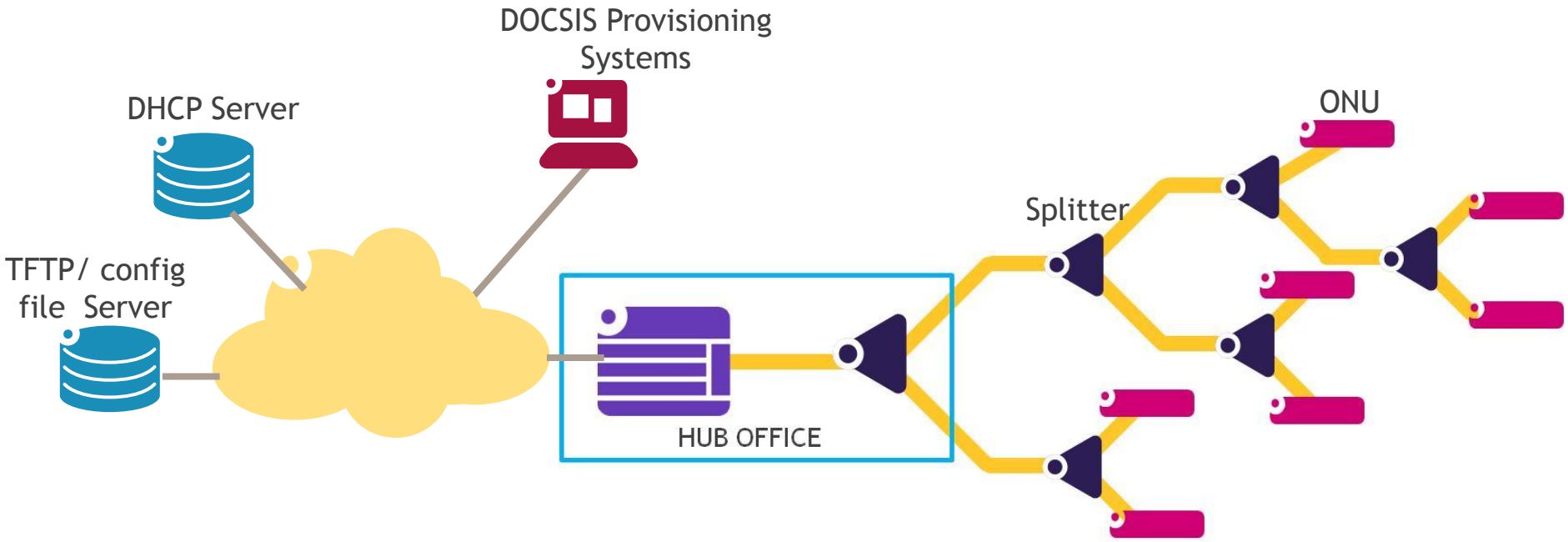
- Symmetrical EPON technology provides up to 1G upstream and 1G downstream
- Covers upstream bandwidth needs for commercial services

COMBINING DIFFERENT TECHNOLOGIES ON THE SAME FIBER



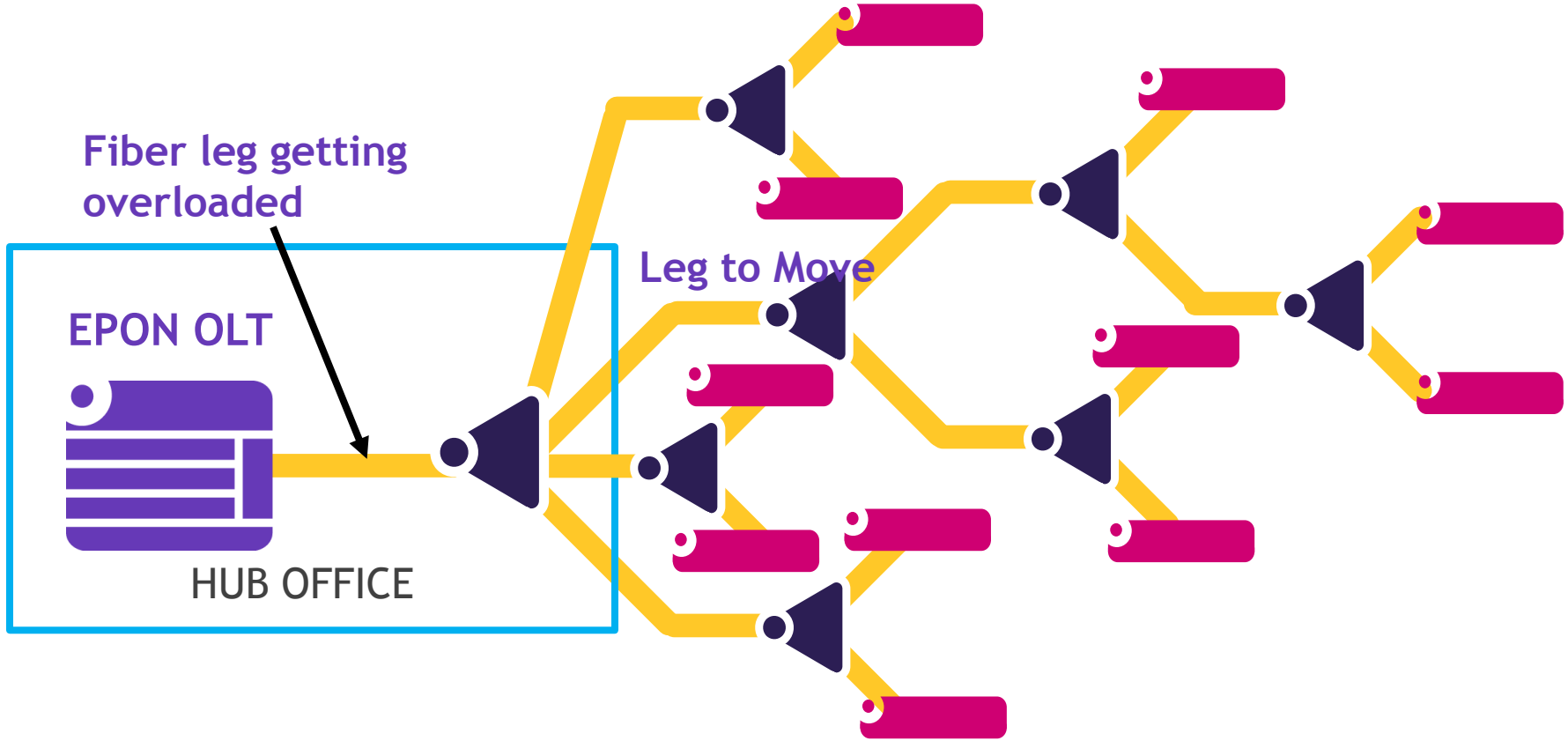
Customers Preparing for 1G EPON, 10G EPON and CWDM P2P on the Same Fiber

Transactionalizing the Commercial Service



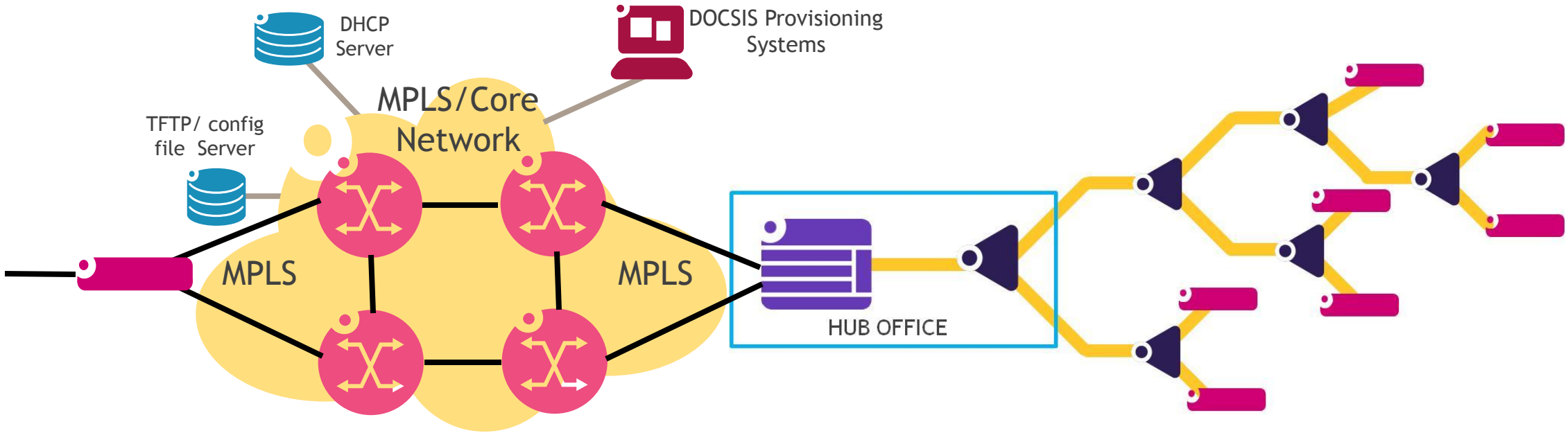
- Allowing the existing CMTS provisioning systems to provision EPON
- Virtualizing the cable modem
  - The virtual cable modem gets a config file that is very similar to a regular cable modem
- DPoE EPON system processes the config file and programs the PON MAC, ONU and other items in the system
- Proactive fiber builds in

HOW DPoE PROVISIONING REDUCES MOVES AND CHANGES OPEX



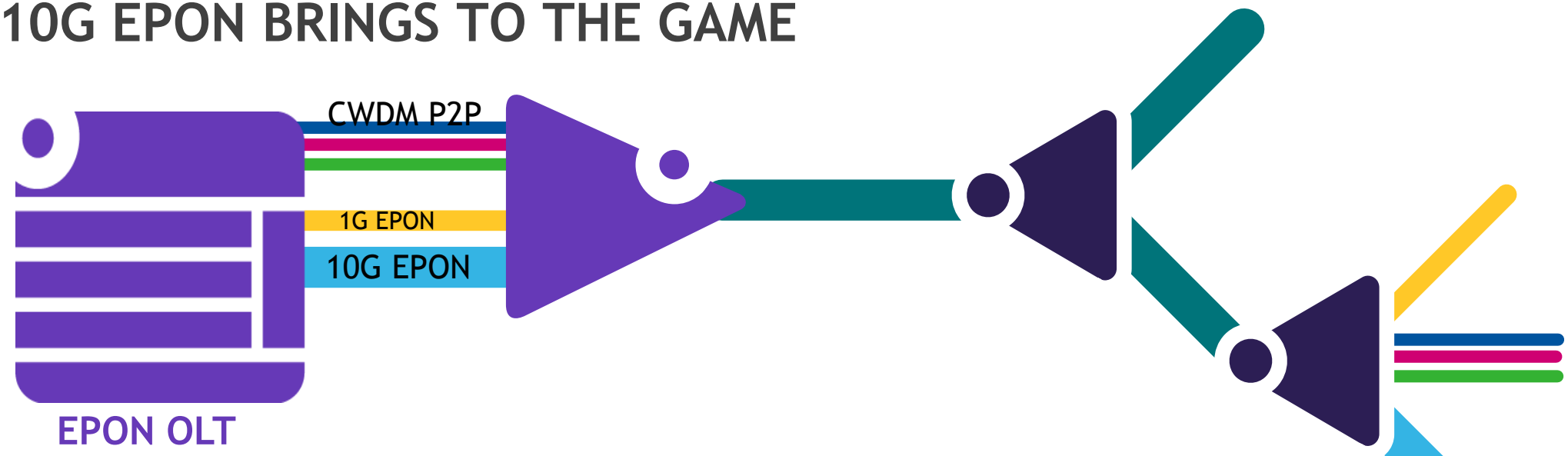
- Moving a leg to another EPON port requires un-provisioning and re-provisioning of each ONU
- Assuming each one takes 5 minutes of typing CLI commands then moving say 10 customers to another port would take 50 minutes – and hope you make no mistakes typing
- With DPoE you just unplug the fiber from the splitter and connect it to its own EPON port. The ONUs automatically reboot and are automatically re-provisioned. All up and working in under 5 minutes – no typing

HOW DPOE V2.0 MAKES COMMERCIAL SERVICES EASILY PROVISIOINED END-TO-END



- OLT connected to upstream routers with MPLS LDP and L3 BGP-AD
- When config file is loaded to virtual cable modem the vCM tells the switch in the OLT to establish a VPLS using MPLS or BGP signaling.
- MPLS LDP communicates to the other routers and switches to establish a path to the far end automatically with the proper QoS requirements (MPLS Forwarding Equivalency Class (FEC) etc.).
- Just typing in the Service order in the DOCSIS OSS allowed the circuit to be established on its own.

WHAT 10G EPON BRINGS TO THE GAME



- 10G Overlay onto 1G
- More customers on a fiber
  - EPON yields eight to Nine 100Mb/s customers on a fiber
  - 10G EPON bandwidth allows Eighteen 500 Mb/s customers on a fiber
- Allows 1G service via PON without using a dedicated wavelength
- Allows use of available P2P wavelengths for 10G services

WHAT DOES THE EPON OUTLOOK LOOK LIKE?

2013

TODAY — COMMERCIAL SERVICES WITH 1G EPON

2014

1H — RESIDENTIAL SERVICES TRIALS WITH 1G EPON

Voice provisioning under discussion

2H — COMMERCIAL SERVICES WITH 10G EPON

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