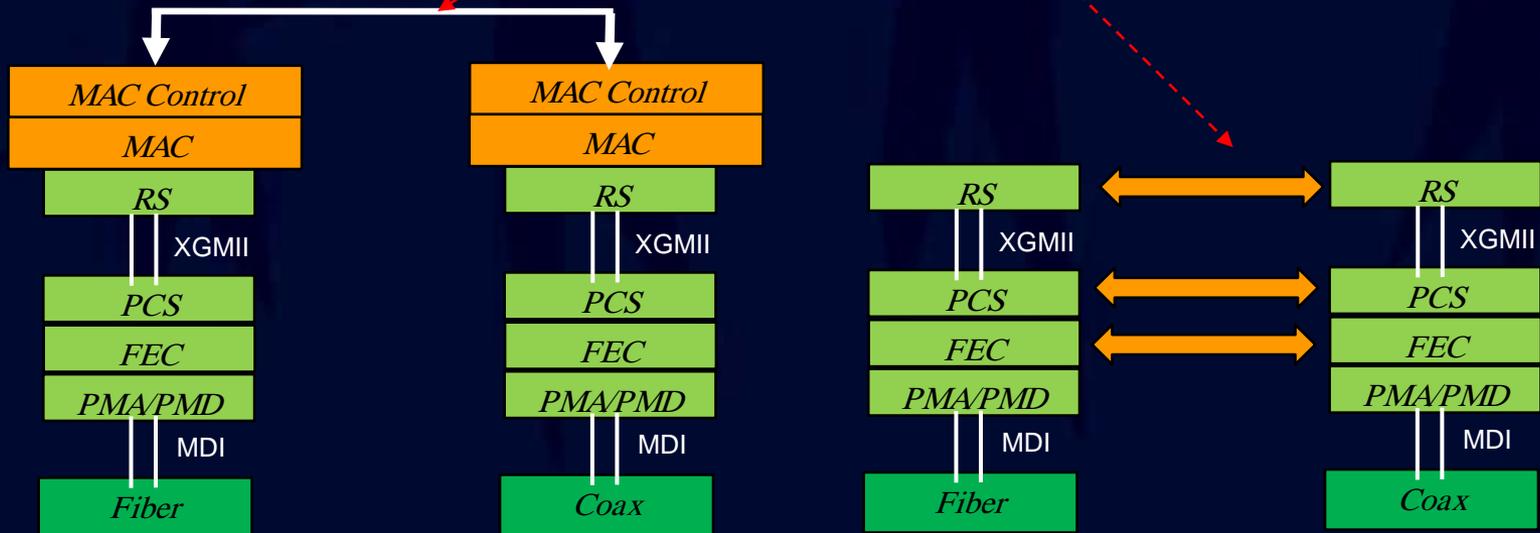
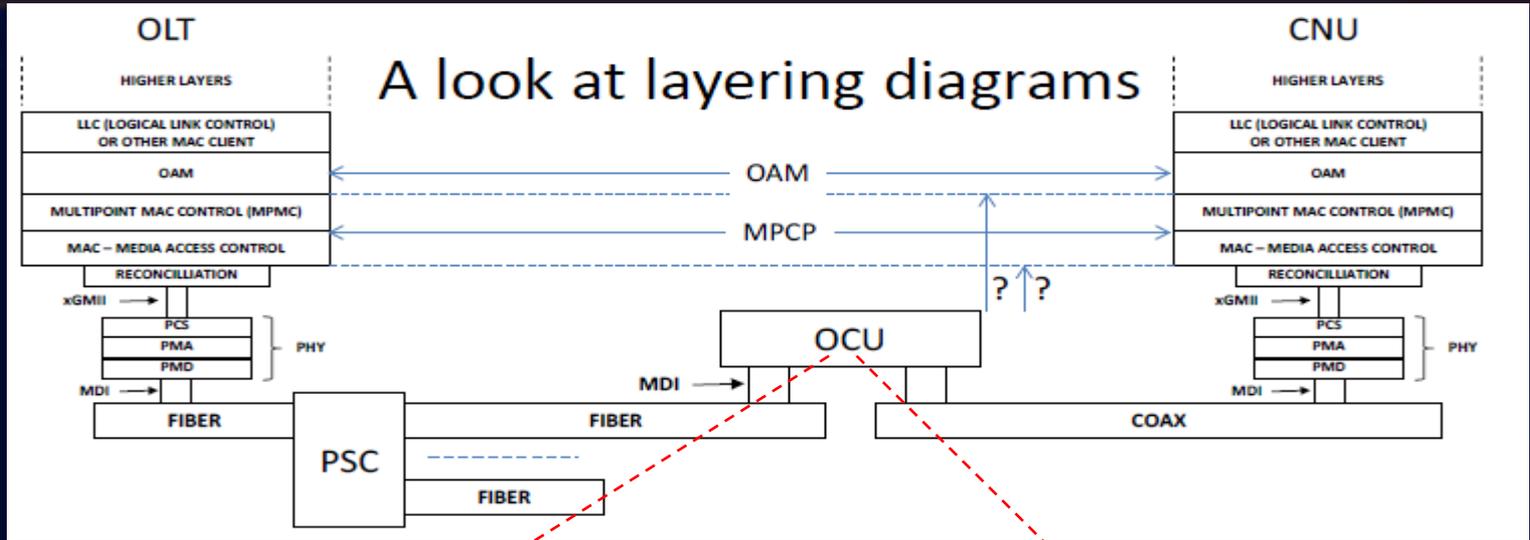


# *To bridge or to repeat in an EPOX Network*

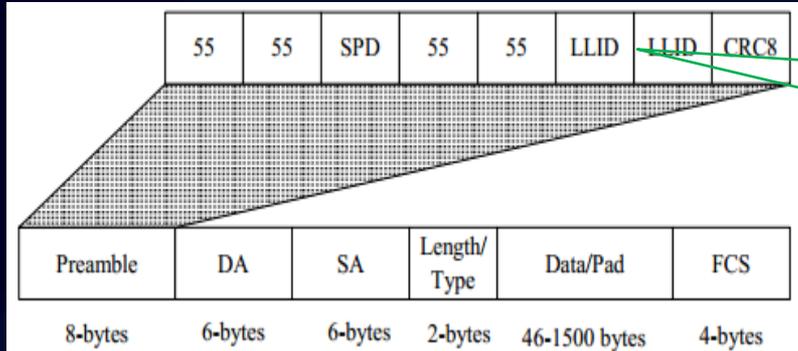
*IEEE 802.3 EPOC Study Group  
May 15-16, 2012  
Minneapolis, MN*

*Rick Li  
Cortina Systems*

# Bridge Vs. Repeater in EPOX Network\*



\* hajduczenia\_2\_0312



*Bridge mode – maintain a EPON LLID to EPOC LLID mapping on OCU*

*Repeater mode – transparent*

Fields	Octets
DA	6
SA	6
Length/Type	2
Opcode	2
Timestamp	4
Opcode-specific field/pad	40
FCS	4

*EPON MPCP frames are limited to 64B*

- Adding additional fields into existing MPCP messages may not be possible*
- new MPCP messages to be defined for EPOC (new Opcode)*
- However, this will impact existing EPON OLT*

# Downstream Packet Buffering @OCU



- 1) 1Gbps EPON feeding into 1Gbps EPOC link
- 2) 10Gbps EPON feeding into 1Gbps EPOC link
- 3) Packet buffering will be needed on the OCU for link rate mismatch
- 4) Impact
  - 1) RTT calculation accuracy
  - 2) OCU thus needs QOS functions – outside the scope for a repeater

# RTT measurement

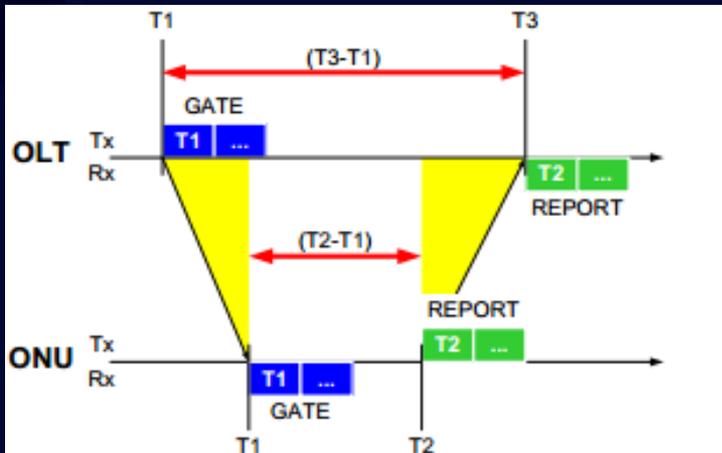


Figure 10: Calculation of Round Trip Time Measurement

The bottom line is that:

$$RTT = (T3-T1) - (T2-T1) = T3-T2$$

Bridge mode:

- Separate RTT measurement for EPOC
- Use of same RTT calculation mechanism as in EPON

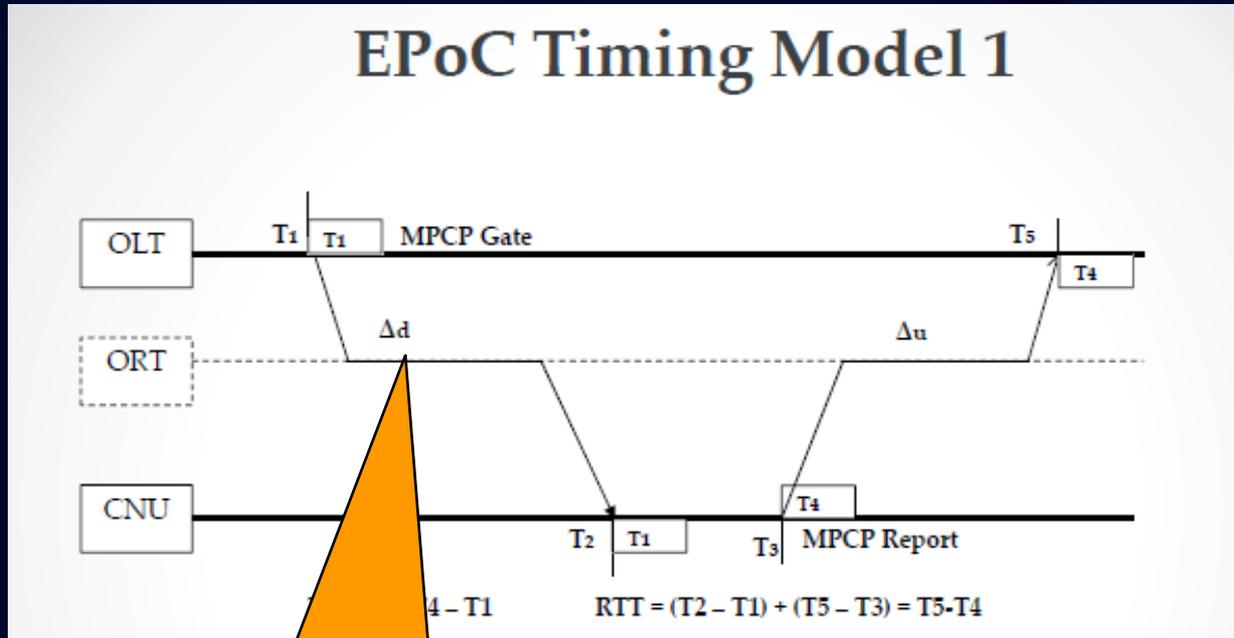
Repeater mode:

- packet buffer introduced downstream latency (variable)
- bit stream processing introduced downstream and upstream latency (consistent)
- adaptive rate change on EPOC link affects calculated RTT

- ❑ Due to OCU, the above RTT formula is not longer valid
- ❑ A residency time,  $T_{ocu-up}$  and  $T_{ocu-dn}$  may need to be introduced
- ❑  $RTT = (T3-T2) + (T_{ocu-up} + T_{ocu-dn})$

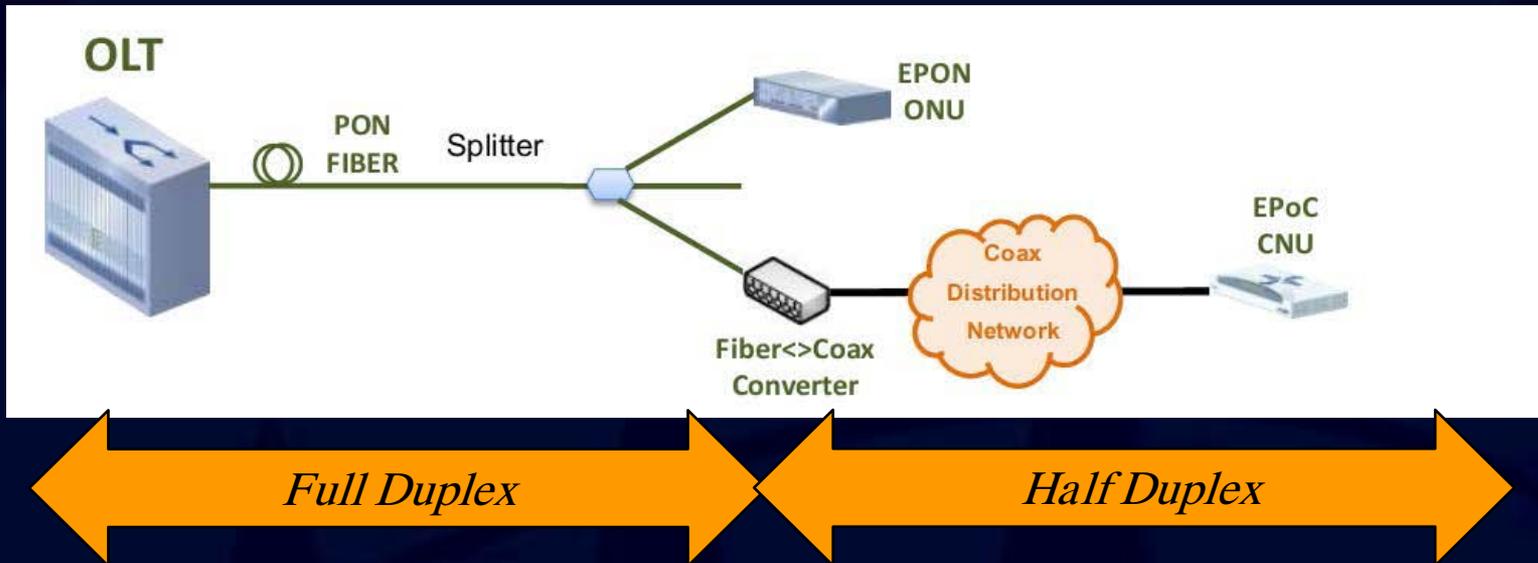
\* From MEF EPON Tutorial

# RTT Measurement



*Due to EPOC/EPOC link rate mismatch, possible TDD mode in EPOC segment, or adaptive rate on EPOC segment, this latency may vary on per packet basis – instead of a consistent constant value*

# TDD Impacts



- 1) EPON segment is continuous SCB
- 2) With Half Duplex mode in TDD coax segment, the OCU needs to buffer downstream
- 3) Existing EPON OLT DBA needs to be adjusted for downstream transmission



# TDD Impacts

Fields	Octets
DA	6
SA	6
Length/Type	2
Opcode = 00-02	2
TS (Time Stamp)	4
# of grants/flags	1
Grant #1 start time (TQ)	4
Grant #1 length (TQ)	2
Grant #2 start time (TQ)	4
Grant #2 length (TQ)	2
.....	



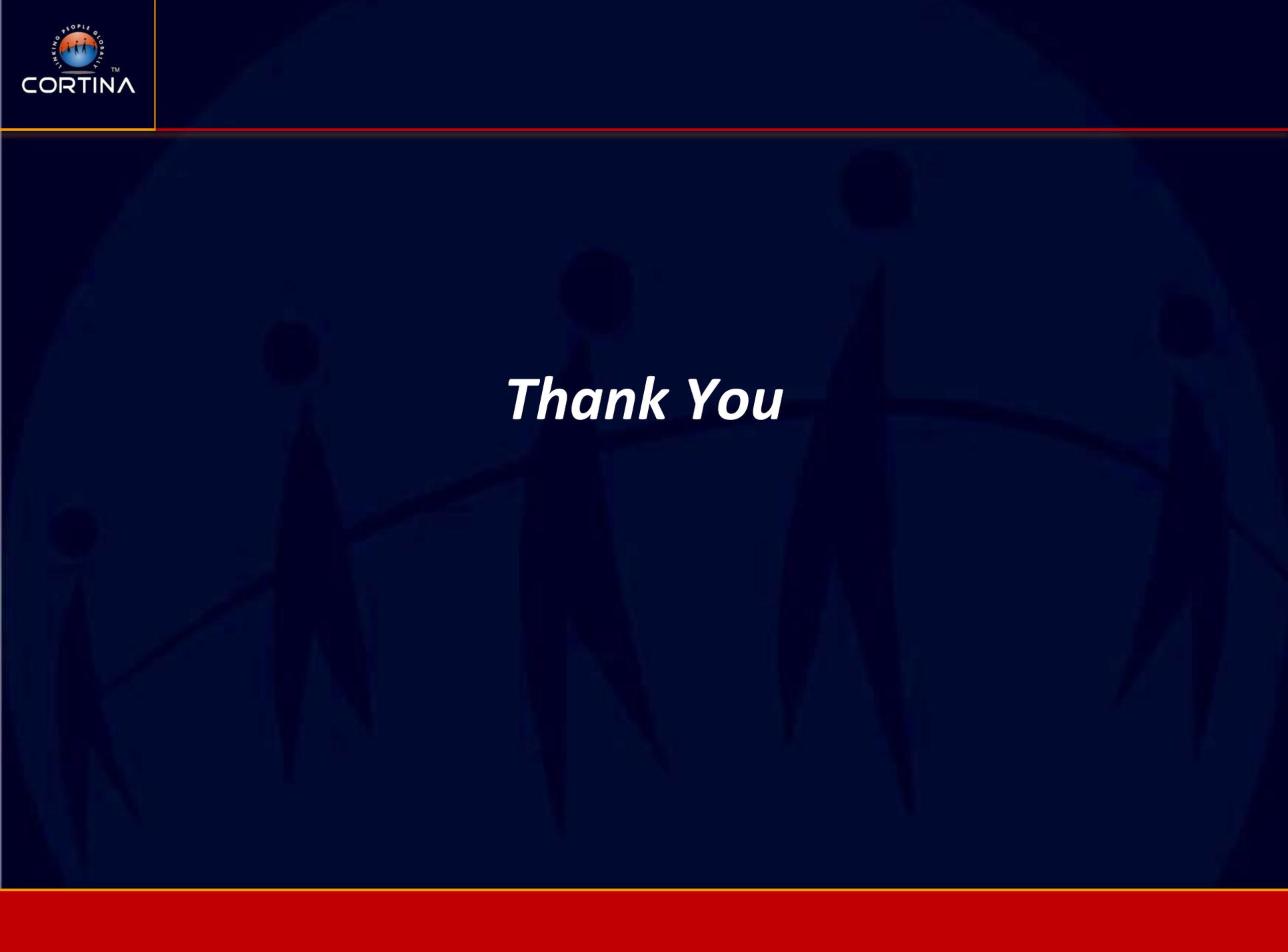
Fields	Octets
DA	6
SA	6
Length/Type	2
<b>Opcode = TBD</b>	<b>2</b>
TS (Time Stamp)	4
# of grants/flags	1
<b>Grant #1 start time TX (TQ)</b>	<b>4</b>
<b>Grant #1 TX length (TQ)</b>	<b>2</b>
<b>Grant #1 start time RX (TQ)</b>	<b>4</b>
<b>Grant #1 RX length (TQ)</b>	<b>2</b>
.....	

A normal EPON GATE to an EPON ONU

A normal EPON GATE to an EPOC CNU

Such changes, if necessary to support half duplex, may break 802.3ah/av MPCP state machine

- Bridge or Repeater mode of the OCU has significant impacts to existing EPON operation
- Half duplex mode on EPOC link may require hardware changes on existing OLT EPON hardware
- The spirit of EPOC CFI and success call for the leverage of existing EPON eco-system on chipsets and deployed OLTs, not limited reuse of selective functions from EPON



***Thank You***