Interworking of 802.3av and ITU PON specifications

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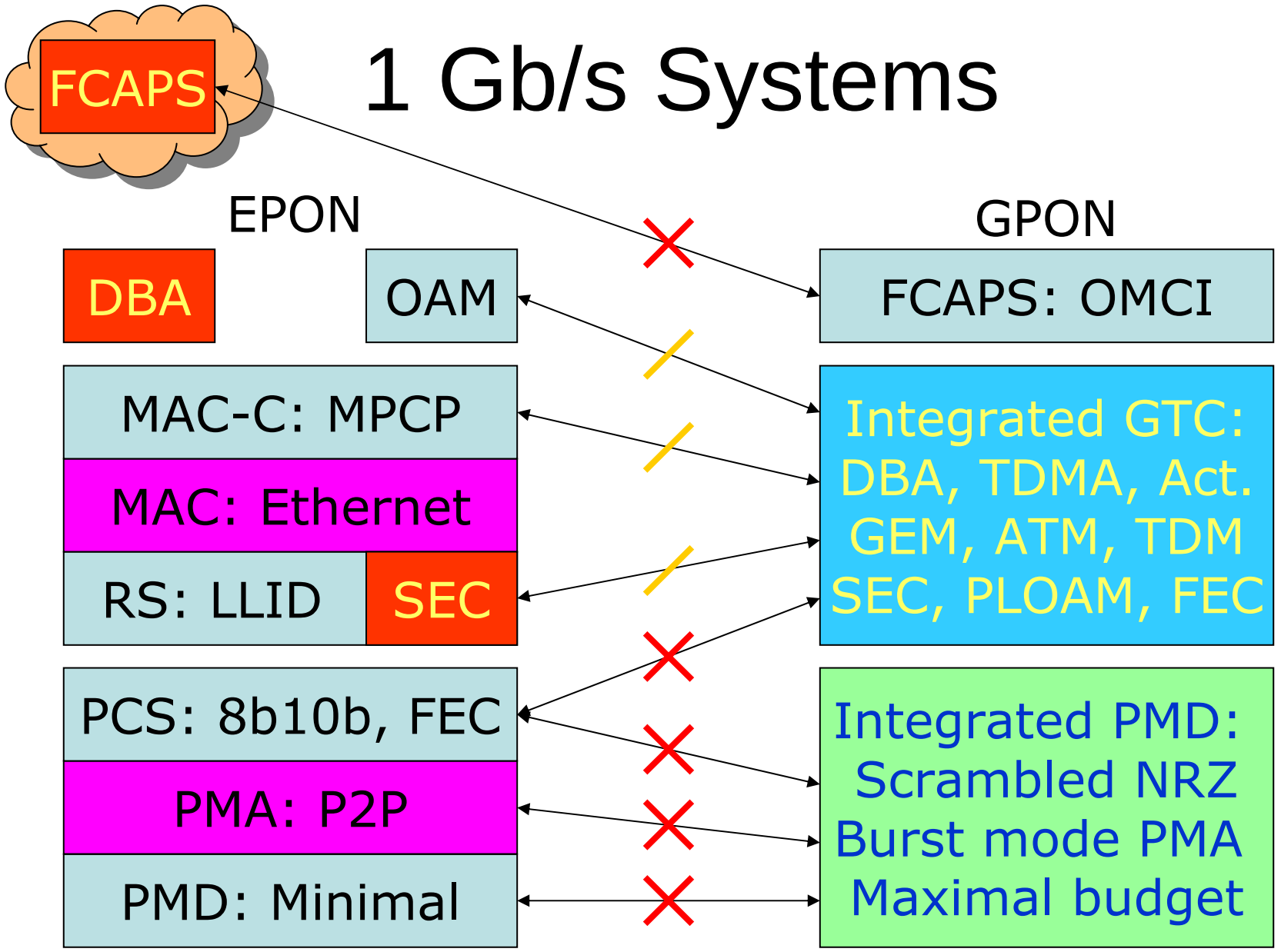
Outline

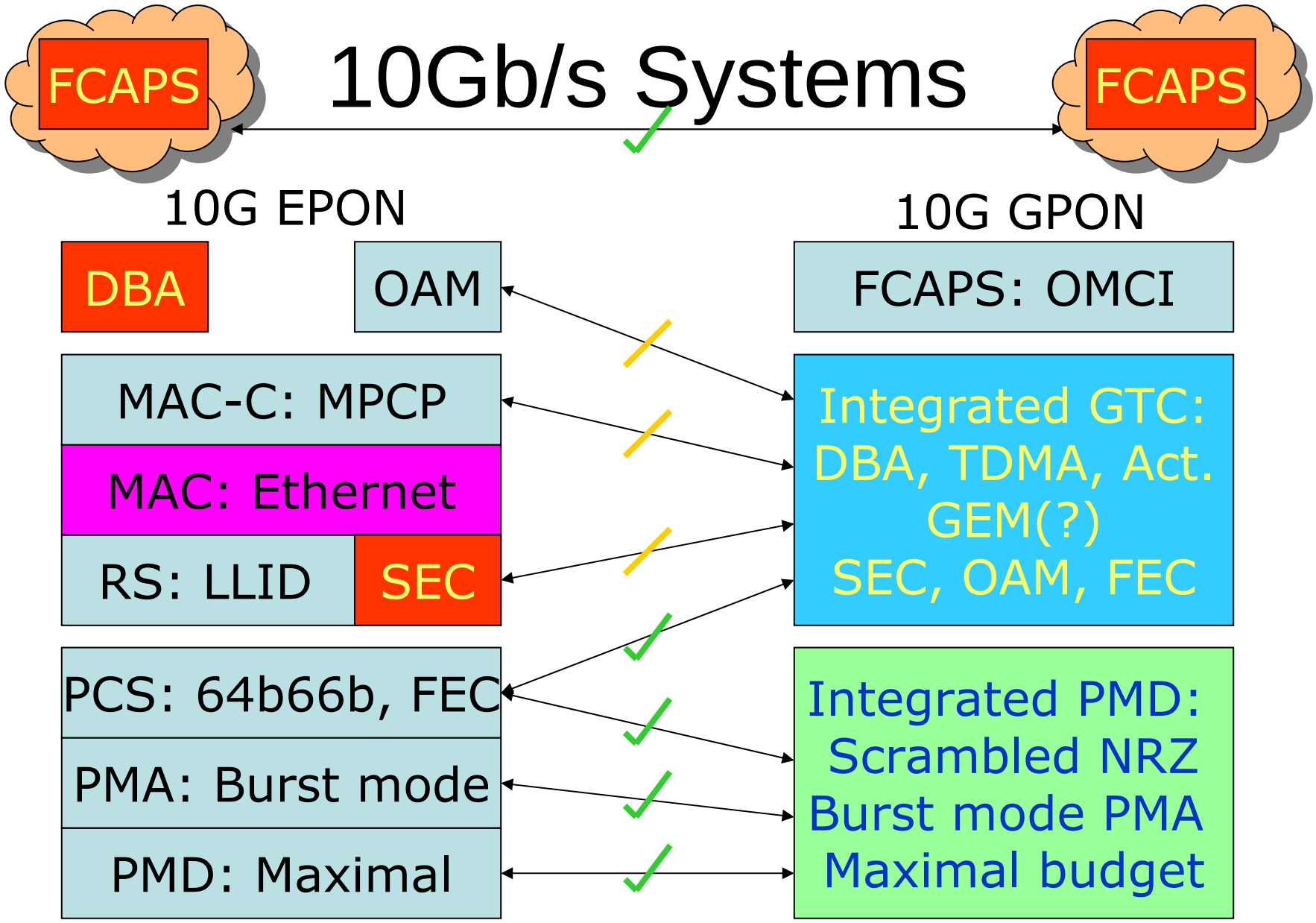
- Background and introduction
- Liaison statement
- Technical comparison

History

- The previous round of PON standardization was characterized by what could be called “Competition”
  - Aiming at the same technology problem
  - A very different constituency base
  - An opposite design approach
- But, time heals all wounds – we hope!
- Many in Q2/15 have realized
  - You shouldn’t ask for every possible feature
  - Industrial/vendor input is important
  - Efficiency/cost tradeoffs should be considered
- Many in 802.3av have learned
  - Leaving important features undefined is dangerous
  - You need to listen to operator requirements

1 Gb/s Systems




FCAPS
10Gb/s Systems
FCAPS
10G EPON
10G GPON
DBA
OAM
FCAPS: OMCI
MAC-C: MPCP
MAC: Ethernet
RS: LLID
SEC
Integrated GTC:
DBA, TDMA, Act.
GEM(?)
SEC, OAM, FEC
PCS: 64b66b, FEC
PMA: Burst mode
PMD: Maximal
Integrated PMD:
Scrambled NRZ
Burst mode PMA
Maximal budget

Comments

- Many of the differences are gone
  - 10Gb/s PHY drives the change: Maximal optical budget, scrambled code, burst-mode PMA, and streaming FEC
- At the 10G rate, EPON has come much closer to the ITU design
- What remains?
  - TC-layer “similar concepts”
  - Standardization gaps

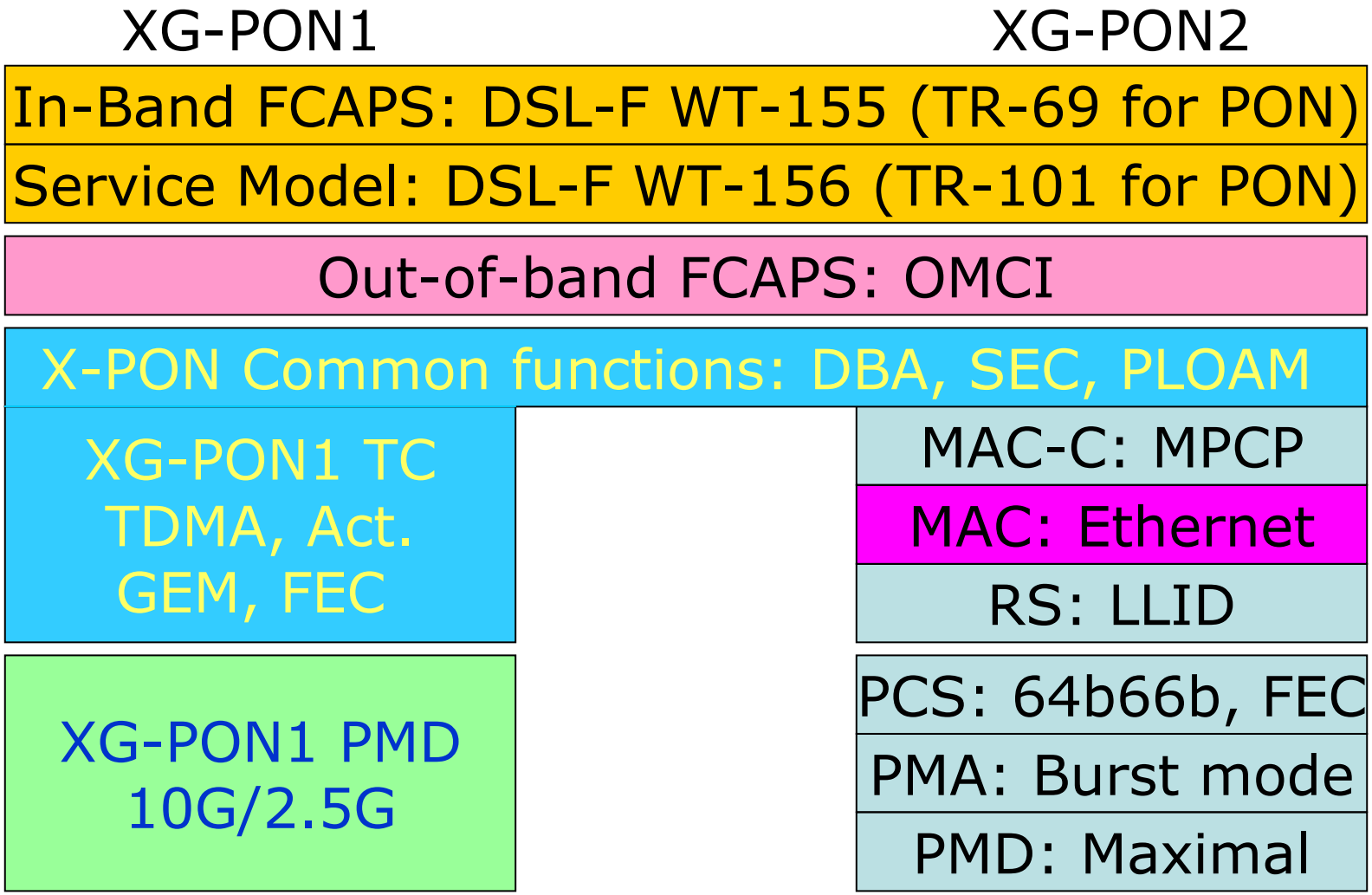
Drivers to commonality

- Service models
  - As the all-IP network (finally) gets off the ground, the “over the top” model is gaining more and more acceptance
  - We would hope it is the dominant model by the time 10G PON is hitting the street
- Technical implications
  - The efficiency gained by fragmenting frames is 10x smaller at 10G upstream
  - It is not worth the complexity cost at this speed
- Technology costs
  - 10G components and systems are difficult to build and tend to carry a cost premium
  - If ever we needed a single market to drive volume up and cost down, 10G PON is it!

How to work together

- IEEE standard defines the “transport”
  - PHY and much of the TC layer
- ITU and DSL-F defines the “system”
  - DBA
  - Security
  - FCAPS management
  - Service model

Converged 10Gb/s PONs



Liaison Statement from Q2

- The members of Q2 considered and approved a liaison statement that proposes converged 10G PON [see document]
- The liaison suggests that interfaces be added to 802.3av systems that will facilitate the tie-in of ITU standards
  - PLOAM extension, OMCI provision, etc.
- We need to consider
  - What all the ‘interfaces’ (or other things) are
  - How might they be standardized

Technical Comparison

G-PON TC	EPON
• ONU Serial Number	• MAC address
• ONU ID = first Alloc-ID	• No counterpart
• Alloc-ID	• LLID
• GEM Port-ID	• LLID
• PLOAM channel	• MPCP channel
• OMCI channel	• No counterpart

PLOAM / MPCP comparison

Downstream PLOAM messages

1. Upstream_Overhead : Register
2. Assign_ONU-ID : Register
3. Ranging_Time : Register
4. Deactivate_ONU-ID : Register
5. Disable_serial_number : Register
6. Encrypted_Port-ID : User data privacy
7. Request_password : Authentication / Service binding
8. Assign_Alloc-ID : Register
9. No message : Not needed in Ethernet
10. POPUP : Fiber protection
11. Request_Key : User data privacy
12. Configure Port-ID : OMCI connection set-up
13. PEE – Physical Equipment Error : Fault
14. Change-Power-Level : PHY configuration
15. PST message: Fiber protection
16. BER interval : Performance Monitoring
17. Key switching Time : User data privacy
18. Extended_Burst_Length : PHY configuration

Upstream PLOAM messages

1. Serial_number_ONU : Register_Req
2. Password : Authentication / Service binding
3. Dying_Gasp : Fault
4. No message : Not needed in Ethernet
5. Encryption Key : User data privacy
6. Physical Equipment Error (PEE) : Fault
7. PST message : Fiber protection
8. Remote Error Indication (REI) : Performance Monitoring
9. Acknowledge : Register_Ack

Downstream MPCP messages

1. Gate
2. Register

Upstream MPCP messages

1. Report
2. Register_Req
3. Register_Ack

MPCP extension

- There are many PLOAM functions that are not captured in the basic MPCP messages
  - User data privacy
  - Authentication / Service binding
  - OMCI connection set-up
  - Fiber protection
  - PM and Fault
- While we may not need to support all of these, certainly some are a good idea
- We should think about extending MPCP (that is, MAC control) to support this sort of thing

What can we do?

- Procedurally, we must decide if adding an extension to MPCP is in our scope
- This is a judgment call:
  - We have already modified some of the existing MPCP messages, but
  - The extension is not strictly needed to accomplish our objectives and criteria, except
  - Facilitating interworking will increase the market size and promote earlier feasibility

Possible way forward

- All we need is an open extensible interface to the MAC control channel
- Interface should be simple and briefly described
- It should be extensible to any organization that has a need to use it
- It does not need to go into the detailed usages that we see on the horizon

Proposed concept

- Define a new MAC control frame:
  - Organization specific extension
  - Opcode #7
  - Message contents consists of one or more Type-Length-Value triplets
  - The “Type” is the defining OUID (3 bytes)
  - The “Length” is the length of the triplet (1 byte)
  - The “Value” is defined by the organization

Frame Format

	Octets
Destination Address	6
Source Address	6
Length/Type = 88-08	2
Opcode = 00-07	2
Timestamp	4
OUID	3
Length	1
Value	L_1

OUID	3
Length	1
Value	Ln
Pad	$40-\Sigma[4+Li]$
FCS	4

How to proceed

- Option 1: We propose this material is within our scope, and we add it into our draft
  - Somewhat risky to our schedule
  - Is the quickest and easiest way
- Option 2: We treat this as out of scope, and introduce it as a maintenance request
  - Unclear if this type of thing is really “maintenance”
  - Not too much more work, but not as fast
- Option 3: We gather this and all the other OAN liaison issues into a new Call-for-Interest – SG – TF – etc…
  - Lots of procedural overhead
  - Slower (but maybe that is not so bad)
  - Certainly the widest latitude to handle all issues