Addressing Issues of Provider Backbone Bridges

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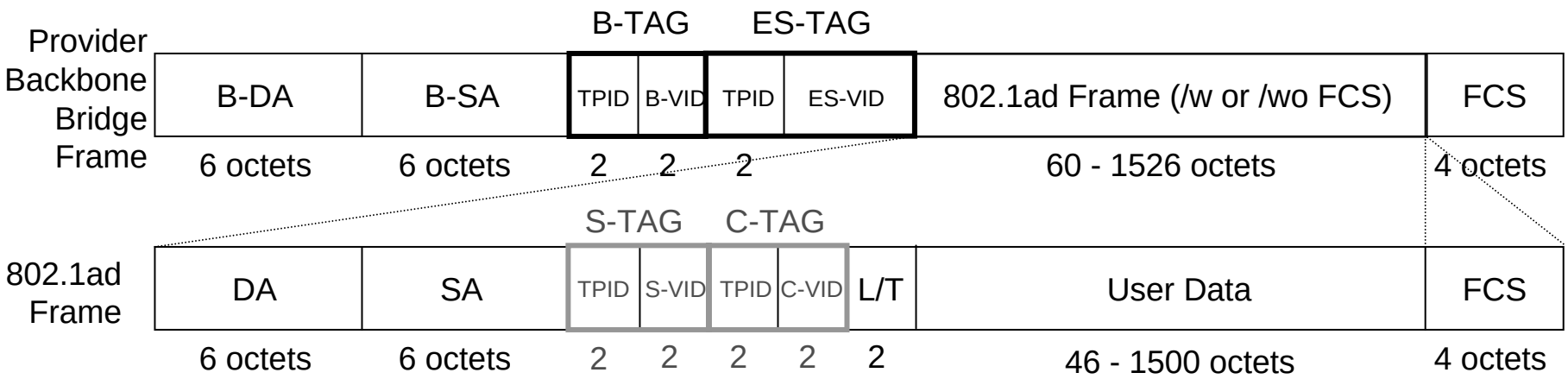
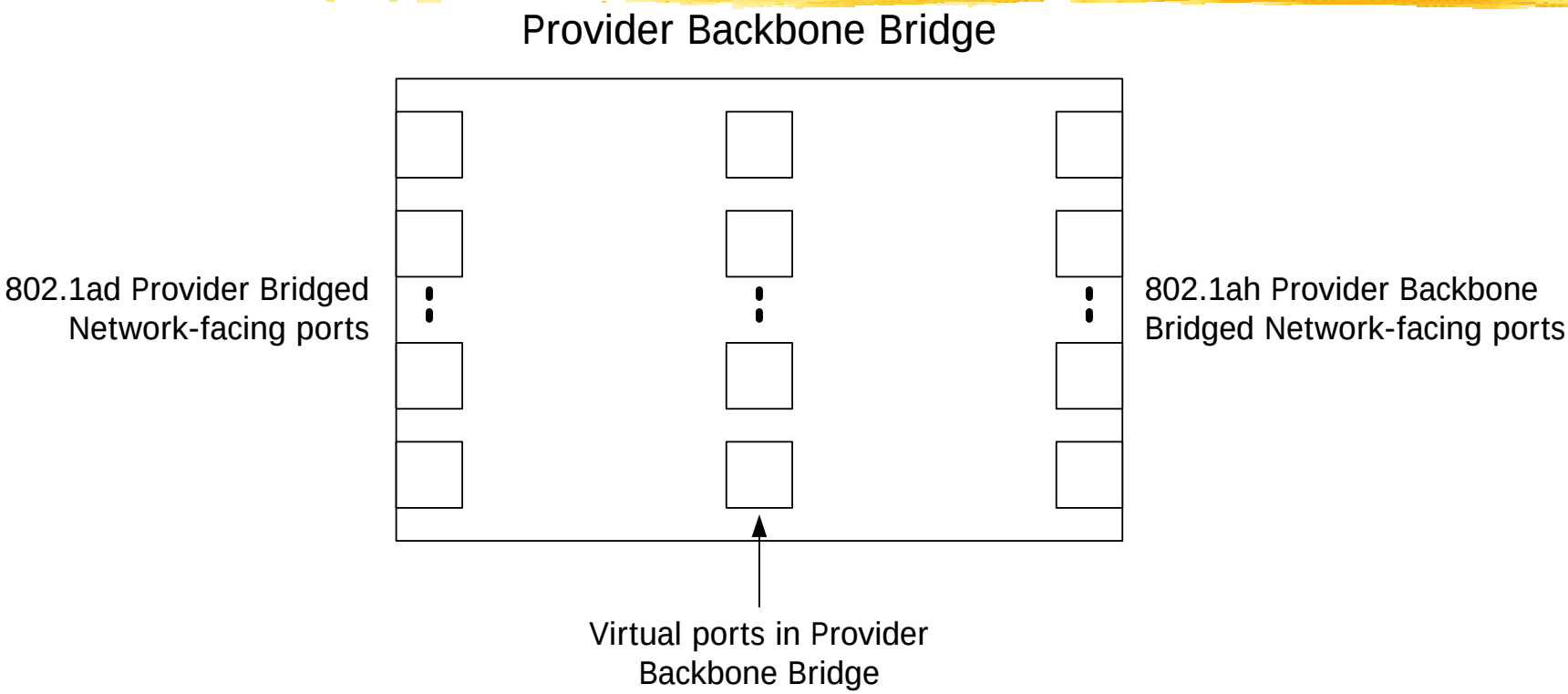
B-DA/B-SA Issues of Provider Backbone Bridge Frame



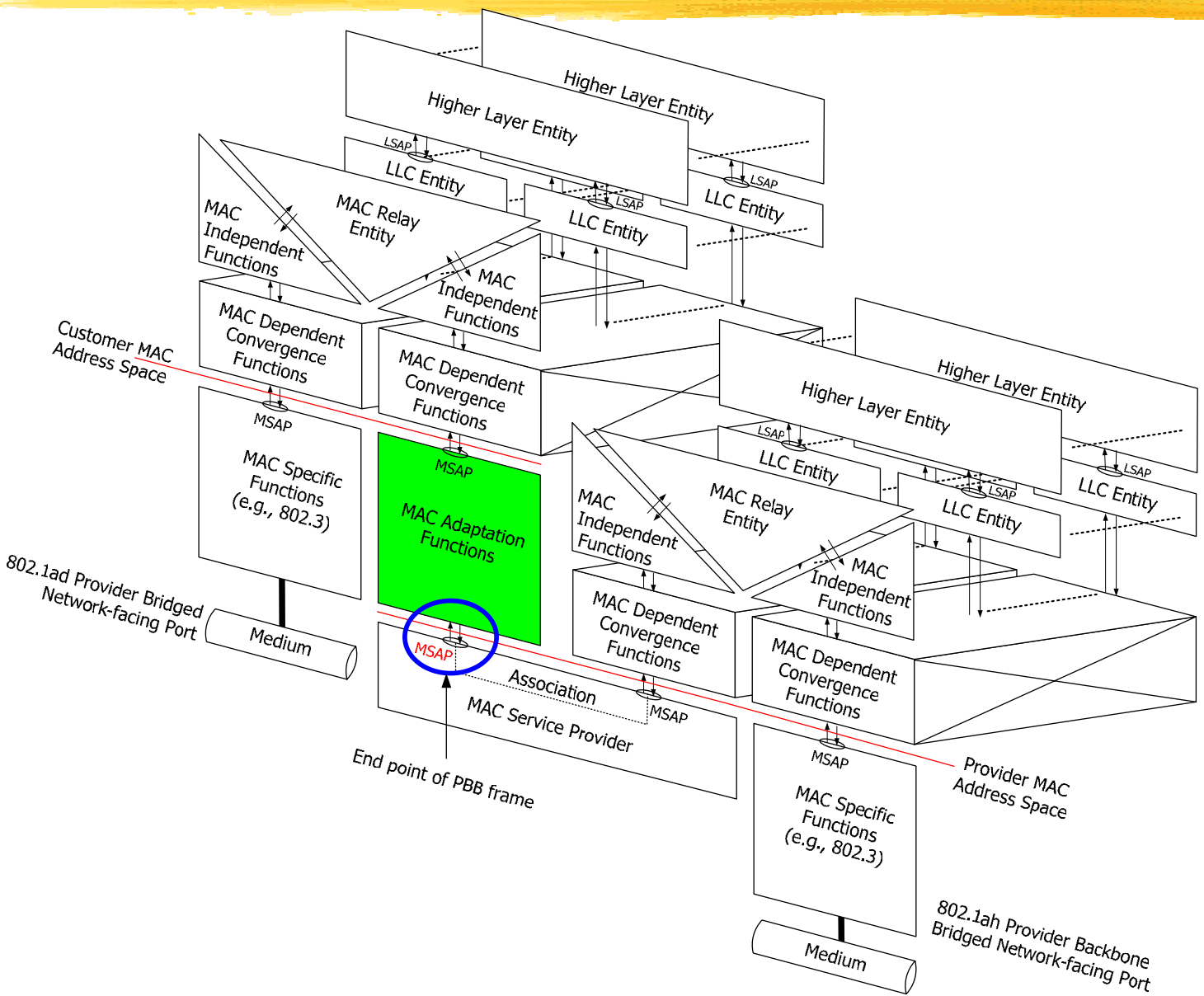
- Provider Backbone Bridge (PBB) Frame encapsulates 802.1ad frame
  - S-TAG in 802.1ad frame may be an optional field
  - FCS in 802.1ad frame may be an optional field
  - B-TAG in PBB frame may be an optional field ???
- Issues
  - ES-VID length and format
  - TPID values for B-TAG and ES-TAG
  - MSAPs (B-POP addresses) identified by B-DA
  - MSAP (B-POP address) identified by B-SA

Instinctive Approach



- MSAPs identified by B-DA/B-SA may be:
  - 802.1ad Provider Bridged Network-facing ports,
  - 802.1ah Provider Backbone Bridged Network-facing ports, or
  - Virtual ports in Provider Backbone Bridge
- But we need analytical solution

Reference Model of Provider Backbone Bridge



MAC Adaptation Functions

- MAC Adaptation Functions ("S-VLAN MAP Shim" in Paul's slides)
  - Encapsulation/decapusulation of 802.1ad frame
  - S-VID <--> {ES-VID, B-VID} translation
  - B-DA/B-SA, SA/DA learning
  - Control frame filtering
- In terms of protocol architecture, MAC Adaptation Functions are a protocol entity that is a:
  - MAC service provider whose MSAP is identified by a MAC address in customer MAC address space, and
  - MAC service user via MSAP identified by a MAC address in provider MAC address space
- B-DA/B-SA in Provider Backbone Bridge Frame identify the latter MSAPs where PBB frame is terminated
- Note: Customer and provider MAC address spaces belong different protocol layers and are therefore independent

B-SA in PBB Frame

- B-SA in Provider Backbone Bridge Frame is:
  - Virtual port address in Provider Backbone Bridge,
  - 802.1ah Provider Backbone Bridged Network-facing port address, or
  - 802.1ad Provider Bridged Network-facing port address
- Notes:
  - B-SA identifies end point of PBB frame, thus:
    - It is essentially a virtual port address in Provider Backbone Bridge
    - It belongs to provider MAC address space
  - 802.1ah Network-facing port address could also be used for B-SA
    - Because it corresponds to a single end point of PBB frame
  - 802.1ad Network-facing port address could also be used for B-SA
    - Because it identifies a virtual port which corresponds to a single end point of PBB frame
    - It belongs to provider MAC address space, thus it does not identify an 802.1ad Network-facing port

B-DA in PBB Frame

- B-DA depends on flooding of Provider Backbone Bridge Frame
- If DA in 802.1ad frame is a learned unicast address, flooding of PBB frame is not required
- In this case, B-DA in Provider Backbone Bridge Frame is:
  - Virtual port address in Provider Backbone Bridge,
  - 802.1ah Provider Backbone Bridged Network-facing port address, or
  - 802.1ad Provider Bridged Network-facing port address
- If DA in 802.1ad frame is the broadcast, multicast, or unlearned unicast address, flooding of PBB frame is required
- In this case, B-DA in Provider Backbone Bridge frame is:
  - The broadcast address,
  - A reserved multicast address for flooding, or
  - The same address as DA in 802.1ad frame (multicast DA case only)

Interoperability among schemes

- In terms of Provider Backbone Bridged Network, MSAPs addressed by B-DA/B-SA behave as end stations
- Virtual port address scheme:
  - B-DA/B-SA directly identify end points of PBB frame
- 802.1ah/ad Network-facing port address schemes:
  - B-DA/B-SA indirectly identify end points of PBB frame
  - Relationships between B-DA/B-SA and end points are known
- Thus, addressing schemes don't impact on .1ad fame interoperability
- Addressing schemes don’t impact on xSTP interoperability in Provider Backbone Bridged Network
  - End stations don’t participate spanning tree, thus there is no BPDU whose B-SA is Virtual or 802.1ah/ad Network-facing port
- Addressing schemes don’t impact on GARP interoperability
  - GARP in Provider Backbone Bridged Network is used for multicast addresses/VLAN IDs registration from end stations
- Addressing schemes don’t impact on 802.3 specific protocols

Questions

- Which B-DA/B-SA addressing scheme is desired?
  - Number of addresses to be learned
  - Flooding suppression in Provider Backbone Bridged Network
  - Efficiency of frame replication for flooding
  - Independency from IF card MAC address
- Do we need to standardize "one" scheme?
  - Provider Backbone Bridge Frames, including 802.1ad frame or Bridge Protocols frame, based different addressing schemes may be interoperable
  - However, in terms of network management, addressing should be unified and there may be critical cases.....

backup slides

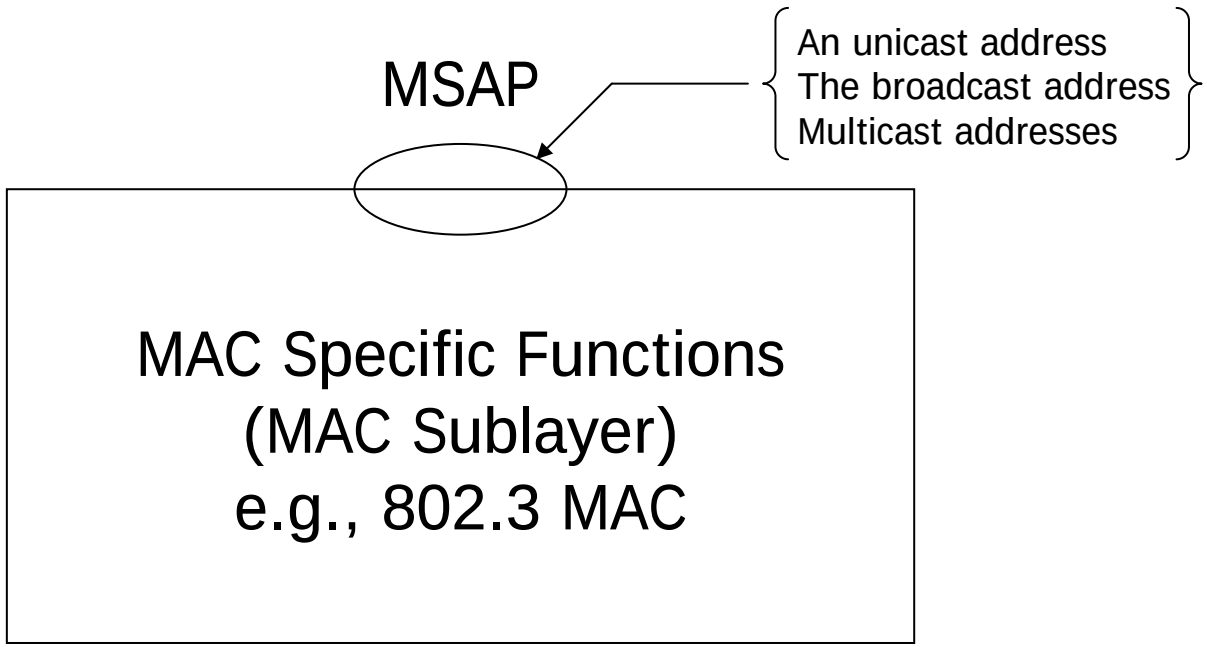
(reference model issues)

What is address

- OSI definitions in ISO/IEC 7498-1|X.200 (1994)
  - **(N)-SAP:** The point at which (N)-services are provided by an (N)-entity to an (N+1)-entity. (Clause 5.2.1.8)
  - **(N)-SAP-address:** An (N)-address that is used to identify a single (N)-SAP. (Clause 5.4.1.2)
- MSAP definition in IEEE 802-2001
  - The MAC sublayer provides a single MSAP as an interface port to the LLC sublayer in an end station. In general, the MSAP is identified (for transmission and reception) by a single individual MAC address and (for reception) by the LAN-wide broadcast MAC address; it can also be identified (for reception) by one or more group MAC addresses. (Clause 6.2.1)
- Group MAC address definition in ISO/IEC 15802-1 (1995)
  - **Group-MSAP-address:** A value, otherwise valid as a MSAP address, identifying a set of MSAPs, the set of end systems on which the identified SAPs are located being any subset of all stations on a particular local area network. (Clause 3.3.1)

802 extended OSI address definition

- MSAP provided by MAC Specific Functions (e.g., 802.3 MAC) is identified by an unicast MAC address, the broadcast MAC address, and multicast MAC addresses



Bridge/GARP protocols are identified by DA

Bridge Protocols (802.1D 7.12.6)		Destination Address	TYPE/LENGTH	LLC	Protocol ID
	STP	01-80-C2-00-00-00	Length	42-42-03 (802.1)	0
	RSTP				
	MSTP				

	Destination Address	TYPE/LENGTH	Opcode
802.3 MAC Control	01-80-C2-00-00-01	88-08 (MAC Ctrl)	1 (PAUSE)

	Destination Address	TYPE/LENGTH	Subtype
Slow Protocols	01-80-C2-00-00-02	88-09 (Slow)	1 (LACP)
			2 (Marker)
			3 (EFM OAM)

	Destination Address	TYPE/LENGTH
802.1X PAE	01-80-C2-00-00-03	88-8E (PAE)

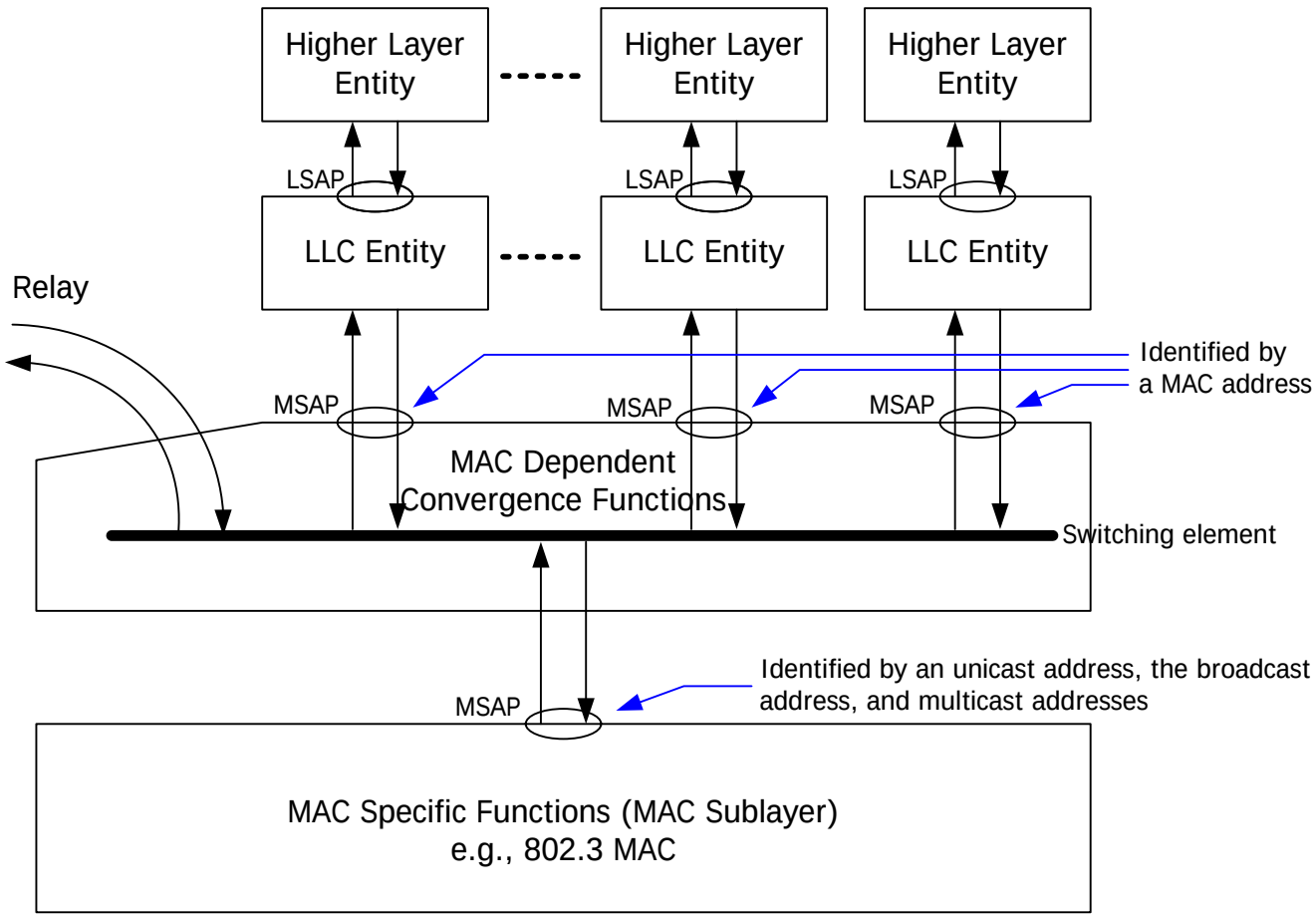
	Destination Address	TYPE/LENGTH
802.1AB LLDP	01-80-C2-00-00-0E	88-CC (LLDP)

GARP Protocols (802.1D 7.12.3)		Destination Address	TYPE/LENGTH	LLC	Protocol ID
	GMRP	01-80-C2-00-00-20	Length	42-42-03 (802.1)	1
	GVRP	01-80-C2-00-00-21	Length	42-42-03 (802.1)	1

- LLC protocol entity does not fully identify Bridge/GARP protocol entities
- (Type field is regarded as a part of LLC protocol)

Switching capability in MCF

- Therefore, in MAC Dependent Convergence Functions, "switching capability" is required to exchange MAC service primitives among MAC Specific Functions and LLC entities



Derived Bridge Reference Model