Effects of Residential Ethernet Standard on other 802.1/802.3
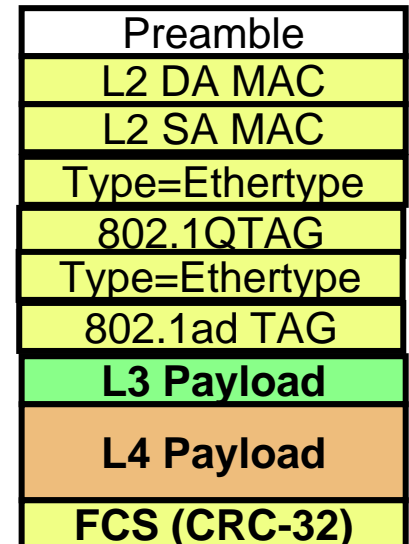
Yong Kim

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802.1 Dependencies – 802.1D Bridge

- **Residential Ethernet is compatible and deemed to be complaint to 802.1D Bridges for existing services.**
  - Spanning Tree compatibility
  - Compatible to the generally accepted 8 bridge hop

- **Likely to require MAC services addition to support time sensitive frame forwarding function.**

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802.1 Dependencies – 802.1Q VLAN

- **802.1Q VLAN Tag/802.3ac Ethernet VLAN Tag**
  - Compatible with ResE

- **802.1Q-Rev**
  - Stacked Q-Tag

- **802.1ad Provider Bridging**
  - Stacked Q-Tag and control plane protocol management

- **May adopt 802.1Q GARP protocol to provide Residential Ethernet BW registration, although the favorite now is to do a subset of RSVP at layer 2.**

- **Residential Ethernet is compatible, and embrace 802.1Q framework without effecting any changes (except.. the GARP thing..)**

Ethernet Frame

Preamble
L2 DA MAC
L2 SA MAC
Type=Ethertype
802.1QTAG
Type=Ethertype
802.1ad TAG
L3 Payload
L4 Payload
FCS (CRC-32)

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802.1 Dependencies - 802.1ab MAC Connectivity Discovery (LLDP)

- **Single Packet Advertisement to the connected neighbor**

- **"Discovery", not Discovery-&-Configuration.**

  - ITU work in process to do Discovery-&-Configuration of IP Phones

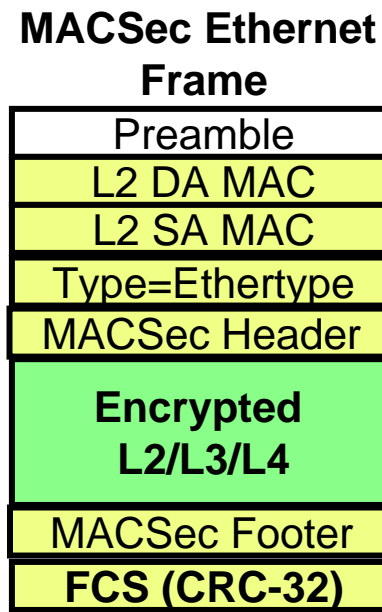- **Upper Layer protocol available (uPnP)**

- **Residential Ethernet MAY use 802.1ab for neighbor discovery (device type) and provide this information to the upper layer mgmt and application – in this case, no changes are expected to 802.1ab.**

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802.1 Dependencies - 802.1X-Rev Port-Based Network Access Control

- **Port-based authentication**

- **Residential Ethernet is compatible to 802.1X-Rev and does not effect any changes.**

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802.1 Dependencies - 802.1AE MACSec 802.3as Frame Extension

- **802.1AE MAC Security motivated and address pent-up demand for other encapsulation allowances.**

- **Current thought is to leave MAC DA, SA, and 802.2/Ethertype in clear text, and encrypt the rest**

- **Consider ResE**

  - MACSec interface to a MAC is clear text, therefore, there is no change (need to have key security mgmt to be done before end-point synchronization).
  - WILL add more latency from AES block cipher
  - MAY be orthogonal for contents protected by DRM (already encrypted.)

MACSec Ethernet Frame

Preamble
L2 DA MAC
L2 SA MAC
Type=Ethertype
MACSec Header
Encrypted L2/L3/L4
MACSec Footer
FCS (CRC-32)

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802.1 Dependencies - 802.1ag Connectivity Fault Management

- **This standard specifies protocols, procedures, and managed objects to support transport fault management. These allow discovery and verification of the path, through bridges and LANs, taken for frames addressed to and from specified network users, detection, and isolation of a connectivity fault to a specific bridge or LAN.**

- **Residential Ethernet is compatible, and embrace 802.1ag framework without effecting any changes.**

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802.3 Dependencies – 802.3af POE, 802.3 POE-Plus SG

- **Power over Ethernet, more Power over Ethernet.**

- **ResE is compatible to 802.3af – only change expected is that if 802.3af implemented, then no optional parameters (of course, power negotiation will still happen).**

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802.3 Dependencies – 802.3 Auto-Negotiation

- **Residential Ethernet expect to add its capability in the selector field**

- **Will adopt new auto-negotiation page(s) under consideration in 802.3an and 802.3ap.**

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802.3 Dependencies – 802.3ad Link Aggregation

- **Residential Ethernet is compatible to 802.3ad Link Aggregation and does not effect any changes**

- **Note: Any function that requires real-time access to the physical MAC, e.g. timestamp function, may force incompatibility to this standard.**

802.3 Dependencies – 802.3ar Congestion Management TF

- **Current direction of 802.3ar's scope is orthogonal to Residential Ethernet.**

  - Current scope is just add "shaping and rate-limiting" to Ethernet MAC services.
  - May help to reduce dropped frames in Residential Ethernet bridges for the best effort services (not really for TCP-IP).

- **Residential Ethernet is compatible to 802.3ar and does not effect any changes**

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Summary

Standard	Description	ResE Dependencies
802.1D	Bridging + RSTP	Time-sensitive Queue/MAC Services
802.1Q, Q-Rev, 802.1ad	VLAN, Q-tag, provider bridging	None
802.1ab	Link Layer Discovery	None – May be used.
802.1X	Port Authentication	None
802.1AE/802.3as	MACSec, Frame Extension	None
802.1ag	Conn. Fault Mgmt	None – May be used
802.3af, af+	POE, POE_Plus	Will require no options.
802.3	Auto-negotiation	Add selector encoding
802.3ad	Link Aggregation	None – May be used
802.3ar	Congestion Mgmt	None