Thoughts on PBB TE based Port Extension

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br-pelissier-PBBTEPortExtenderThoughts-0711

Thoughts

- **Paul Bottorff, et. al, have proposed a new direction for Port Extension utilizing PBB TE technology**

  Hoping to increase the likelihood of success of the project

  It is a good thing to reuse technology when possible

- **However:**

  How much is really reused?

  How much is new and needs to be defined?

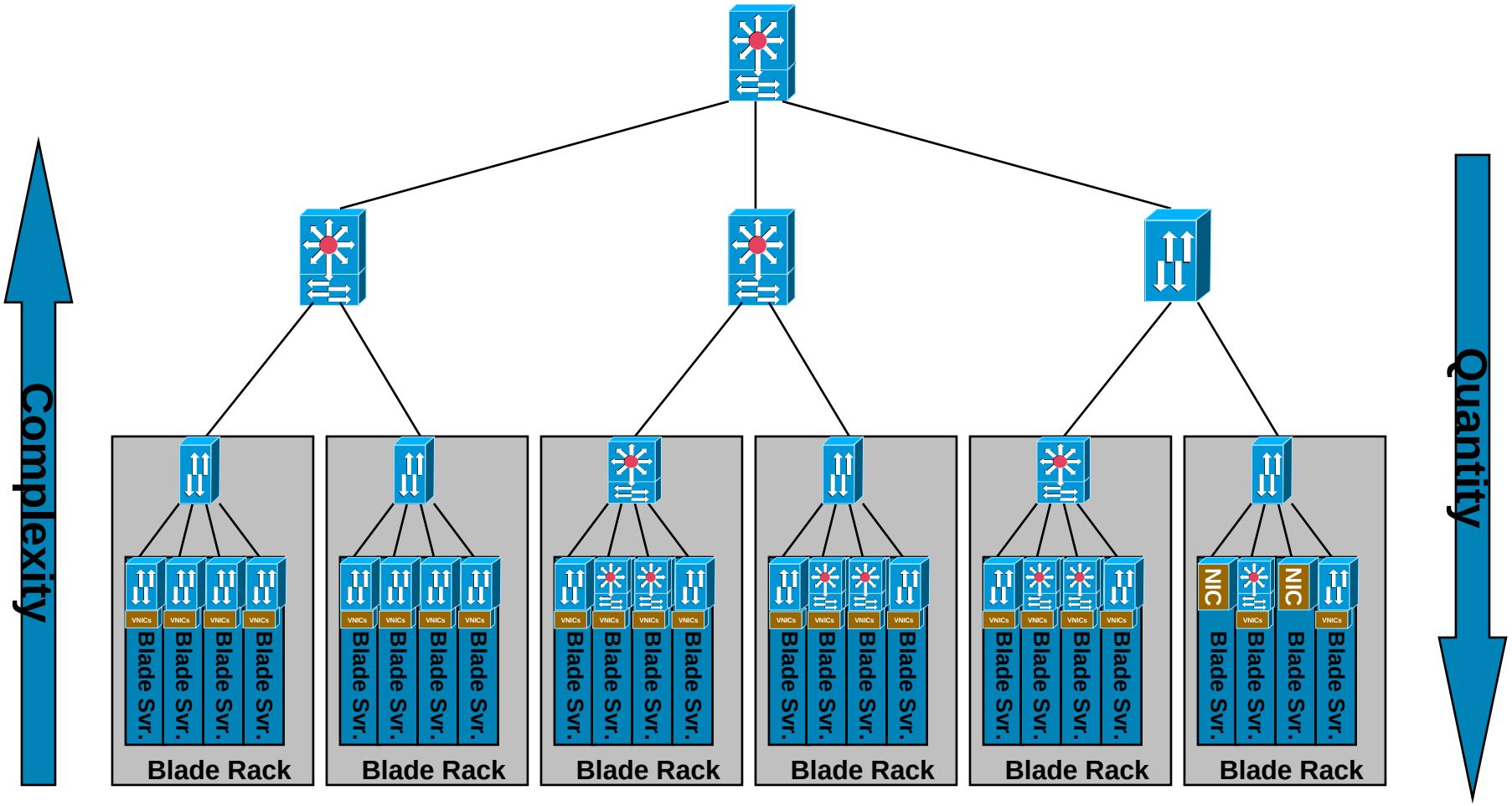
- **Other important considerations:**

  Keep it simple

  Avoid features creep

The Port Extension Environment

- **Port Extension targeted at the “near edge”**



The Port Extension Environment

- **Intended for use at or near the edge of the network**
- **The goal is to reduce the number of bridges in the network by collapsing layers into a single Extended Bridge**
- **The requirements in this neighborhood are extremely modest**

  It seems counter-intuitive to “simplify” the network by replacing the existing bridges with an even more sophisticated bridge

  It is also clear that the modest requirements at the edge are insufficient for the core

- **One size does not fit all**

  Lacking a finite scope results in an infinite project

From the P802.1Qbh Approved Five Criteria

- **1. Broad Market Potential**

  c. Balanced costs (LAN versus attached stations)

  This technology has been expressly designed for balanced costs. It is deployable with no change to existing attached stations (that is, the technology interoperates with existing NIC cards). The design of the Port Extender function has been carefully considered to keep costs constrained. This has been a high priority since it is expected that Port Extenders may well outnumber bridges in typical deployments and are likely to be integrated in with attached stations.

- **5. Economic Feasibility**

  a. Known cost factors, reliable data

  Port Extenders are expected to cost less than existing bridges due to their relative simplicity (e.g. by simplifying the address table structure and eliminating many of the advanced functions typically found in the bridges that Port Extenders would replace). This is supported by experience in existing deployments of this technology. In addition, the resultant reduction in management complexity brings significant cost advantages. The Port Extender creates many lower cost Ports for every controlling bridge Port further benefiting the overall system cost. Existing experience also indicates no significant increase in the cost of the bridges that attach to the Port Extenders.

- **This text is also in the proposed P802.1BR PAR**

Support for Provider Bridges

- **During review of draft 0.2 (March, 2010), it was observed that the current approach precluded support of Provider Bridges (i.e. S-TAGs)**
  - **At that time, providing support seemed trivial**
  - **Four options considered**
    - Do nothing
    - Stack S-TAGs
    - Create something like an S-TAG with a new Ethertype
    - Expand the use of the M-TAG
- **During review of draft 0.4 (Aug, 2010), consensus was reached to expand use of M-TAG. Added to draft 0.5 (Oct 2010)**
- **In retrospect, what seemed like a trivial bonus that was almost free has generated tremendous scope confusion**
- **On July 18, 2011, consensus was reached in DCB to remove support for S-components to re-focus scope to the near edge**
  - **Including agreement by the original commenter**

What is a PBB TE based Port Extender?

As proposed in bh-bottorff-pbbte-pe-draft-0711-v1:

It is a fully compliant TESI BEB that supports PE CSP

As currently defined in P802.1BR, a Port Extender is one of the simplest devices defined by 802.1

The PBB TE approach makes it one of the most sophisticated devices defined in 802.1

- **Scope appears unbounded**

  Therefore, every possible capability can be argued as desirable since we may need it

What is Required for a PBB TE based Port Extender?

- **The proposal has many contradictions**
  - **e.g., TESI requires that every managed object be controllable**
    - However, the entire basis of Port Extension is that the Port Extender is controlled by the controlling bridge ***only***
  - **PE CSP does not provide complete control of every manageable object**
    - Paul's latest proposal suggests that PE CSP be expanded to fully control a BEB
    - It is highly undesirable to do so – it results in much greater and unnecessary complexity, likely reducing interoperability
- **Of course, we could define a reduced functionality BEB for Port Extension**
  - **In fact, this is required to make Port Extension practical**
  - **However:**
    - once the unneeded functionality is removed,
      the remaining functionality is modified to support Port Extension,
      the required new functionality is added,
  - **we end up with a BEB in name only**

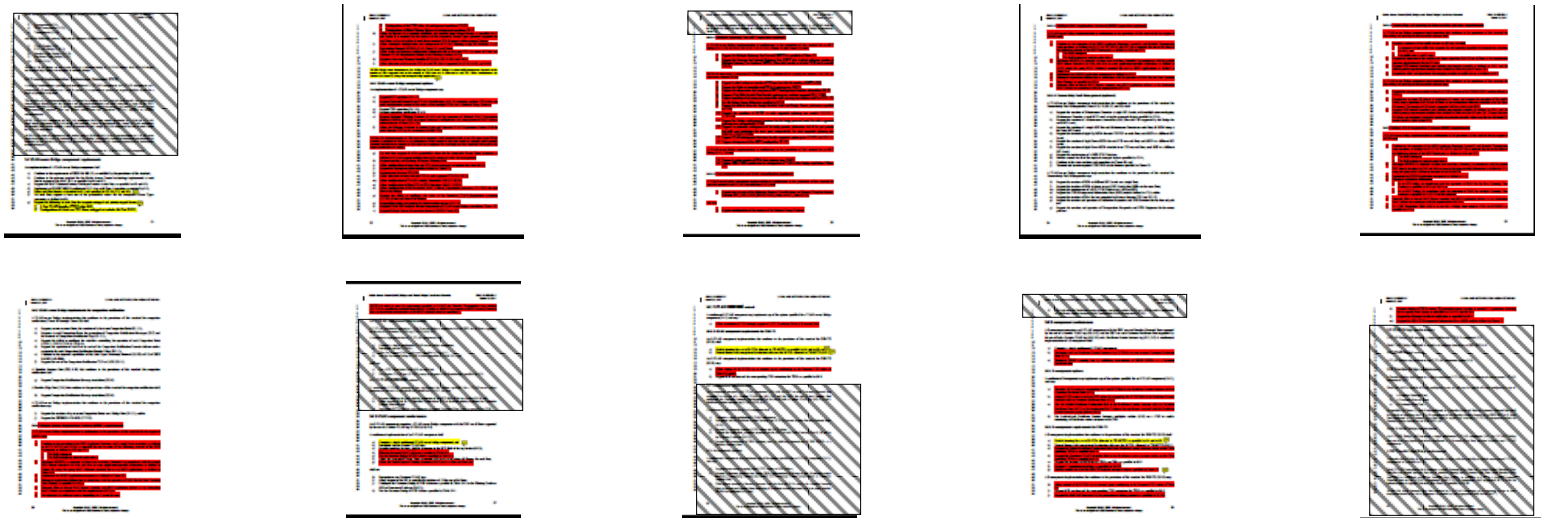
PBB TE based Port Extender Conformance (1)

- **Below are the conformance pages for a B-component within a BEB:**

  Red indicates functionality that must be removed or is unnecessary

  Yellow indicates functionality that must be changed

  Hashed area indicates conformance requirements not related to the B-component in a BEB



- **For reference, the conformance clause in P802.1BR for a Port Extender occupies approximately half a page**

PBB TE based Port Extender Conformance (2)

- **Note that the previous slide covers only the B-component portion of a PBB TE based Port Extender**

  And it does not address the extension necessary to a B-component that would be utilized only in a Port Extender

- **A similar situation occurs with the T-component and the 2-port VLAN component**

Some details about the B-component (1)

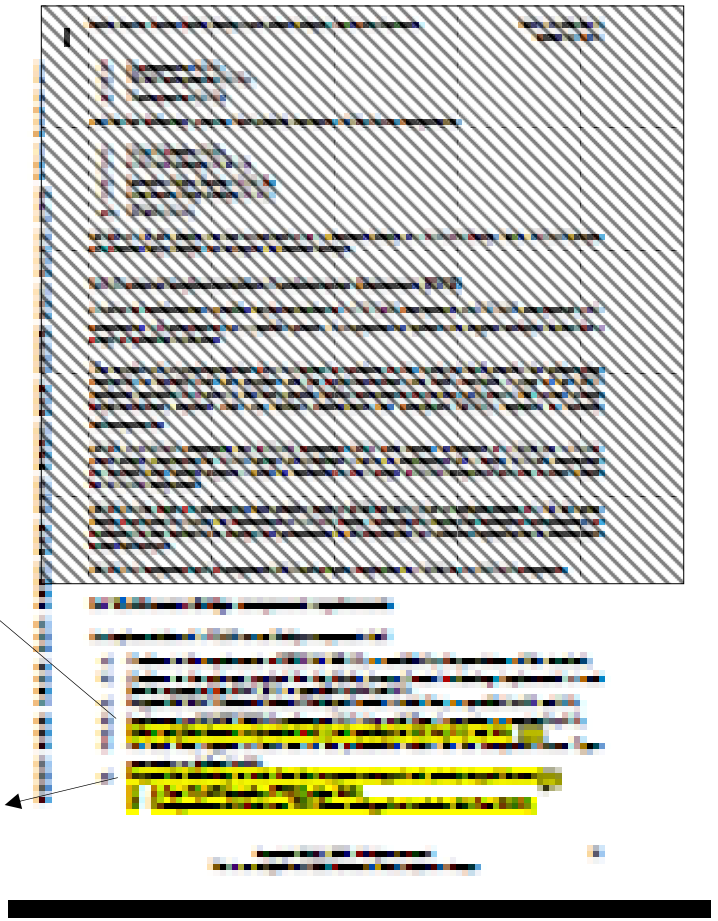
- **A B-component within a PBB TE based PE is comprised of a VLAN-aware bridge component except:**

  It does not use VLANs

- **Relay and filter frames as described in 8.1 and specified in 8.5, 8.6, 8.7, and 8.8**

  Except that very little functionality defined in these sections is actually used

  VLANs are not required, so this is set to default values and the VLAN information is essentially ignored



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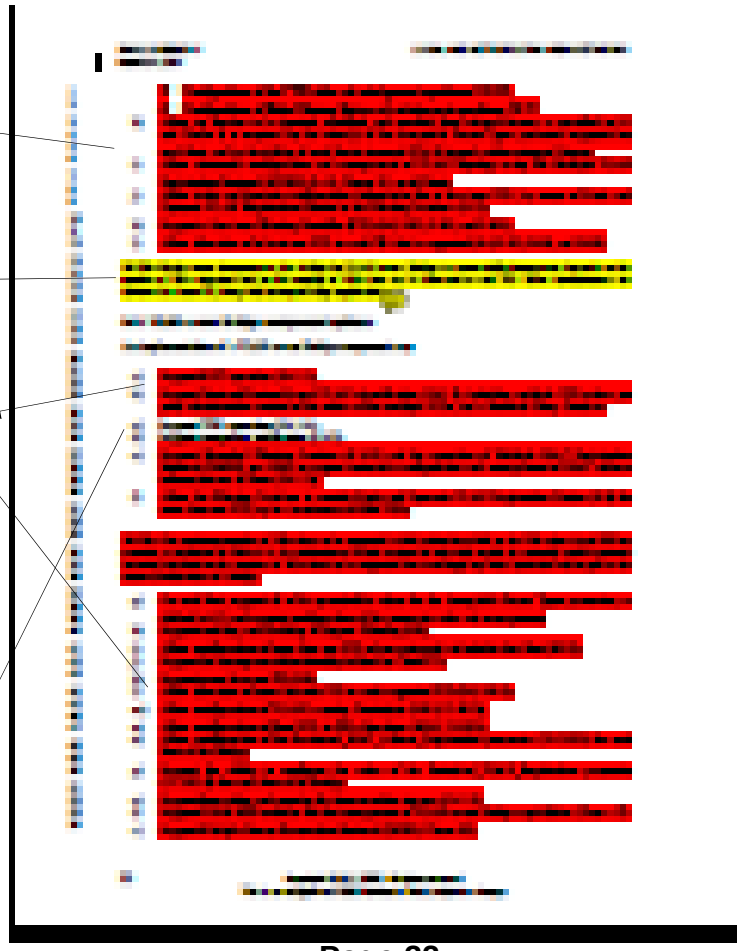
Some details about the B-component (2)

- **A B-component within a PBB TE based PE is comprised of a VLAN-aware bridge component except:**
  - **Management configuration of PVID and static VLAN entries, insertion and removal of tag headers, MVRP, dynamic VLAN entries, and VID to FID allocations are not needed**
  - **The interoperability note does not apply**
  - **Optional capabilities would cause improper operation or are not needed, including: MST, port and protocol VLAN classification, extended filtering services, MMRP, multiple VLAN filtering entries, setting of acceptable frame types, ingress filtering, multiple VIDs in untagged set, management, multiple VIDs, assignment of multiple VIDs to FIDs, VLAN learning constraints, fixed VID to FID assignments, Restricted_MAC_Address_Registration, Restricted_VLAN_Registration, time sensitive streams, SNMPv2 MIB modules, and MSRP**
- **CFM and CN are applicable**
  - **However, CFM and CN are applicable to most everything, not just B-components**



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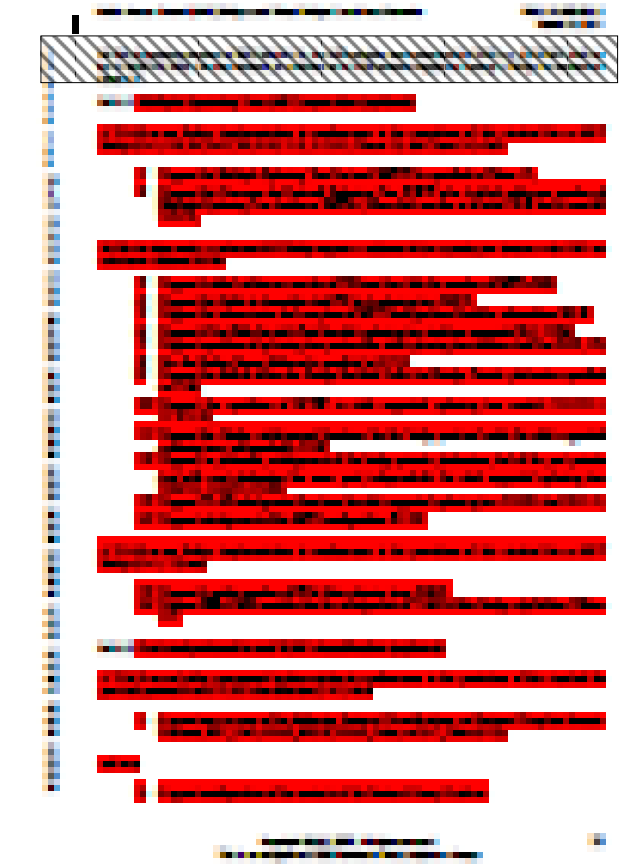
Some details about the B-component (3)

- **A B-component within a PBB TE based PE is comprised of a VLAN-aware bridge component except MST and Port and Protocol VLAN classification is not used**



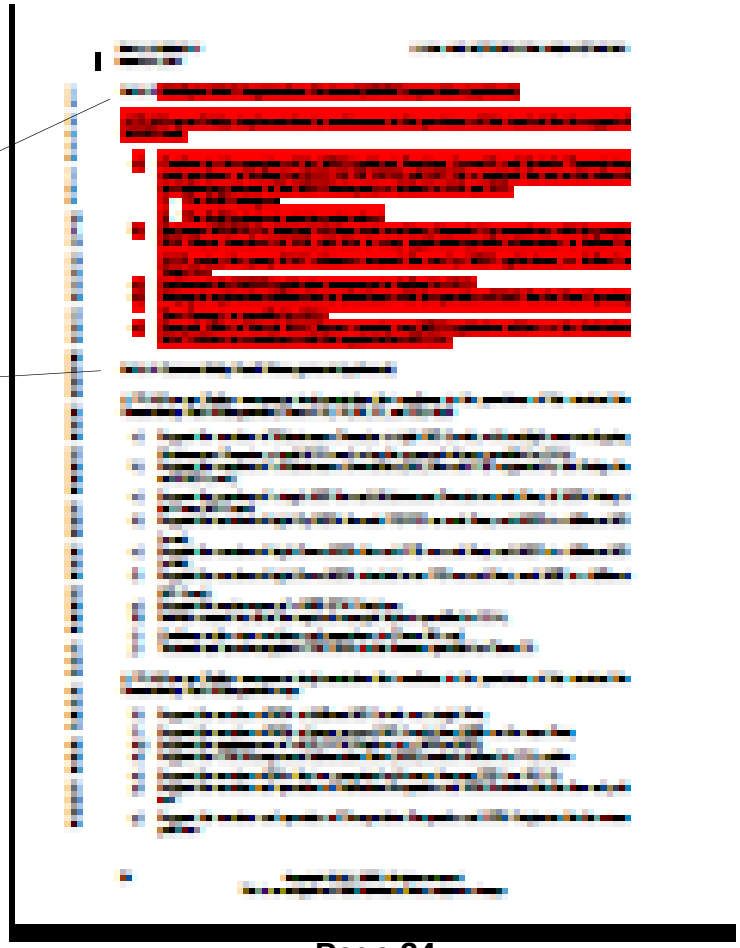
Some details about the B-component (4)

- **A B-component within a PBB TE based PE is comprised of a VLAN-aware bridge component except:**

  MMRP is not applicable

- **CFM is applicable**

  However, CFM is applicable to most everything, not just B-components



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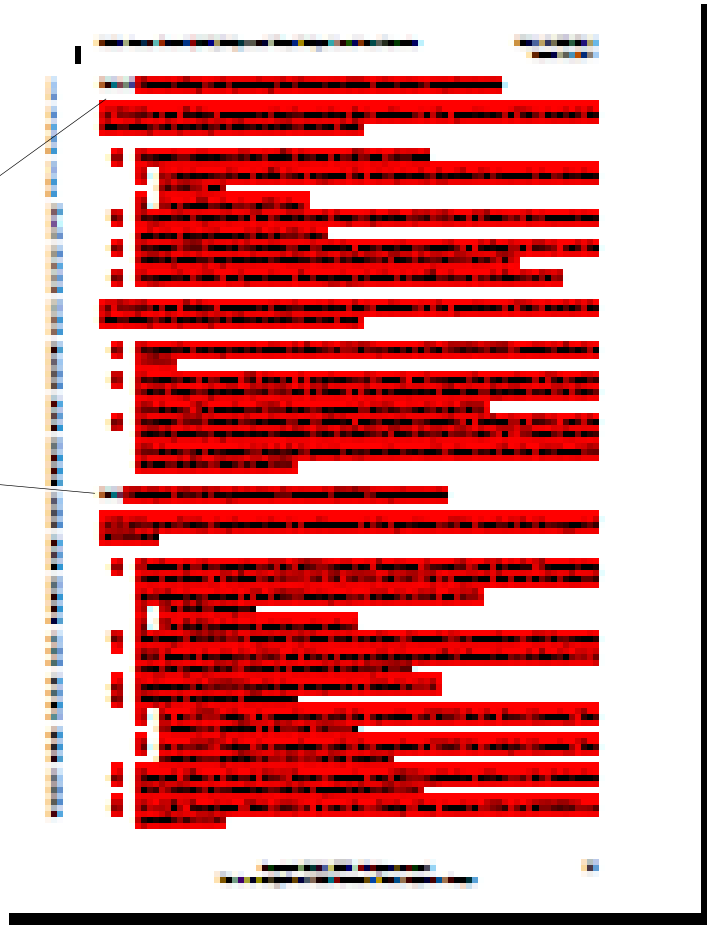
Some details about the B-component (5)

- **A B-component within a PBB TE based PE is comprised of a VLAN-aware bridge component except:**
  - **Forwarding of time sensitive streams is not applicable**
  - **MVRP is not applicable**



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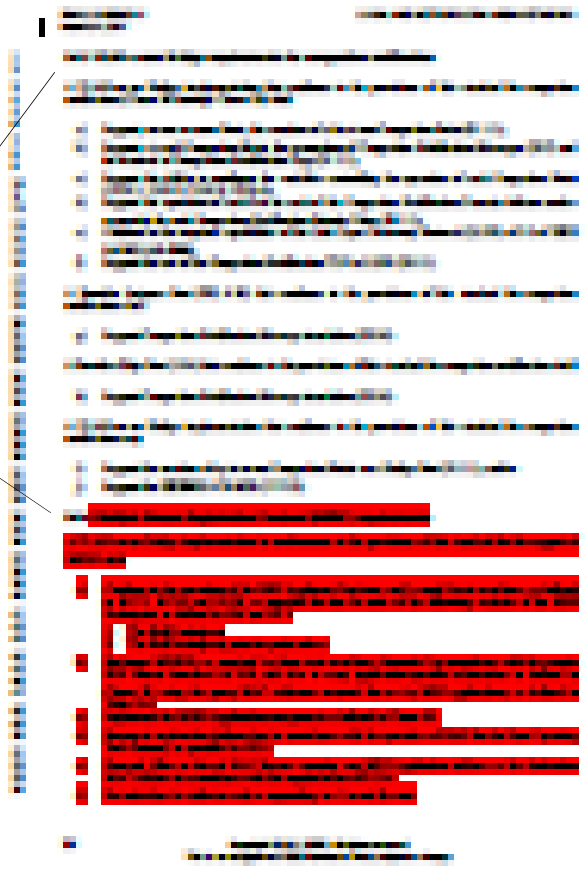
Some details about the B-component (6)

- **A B-component within a PBB TE based PE is comprised of a VLAN-aware bridge component except:**
  - **MSRP is not applicable**
- **Congestion notification is applicable**
  - **However, CN is applicable to most everything, not just B-components**



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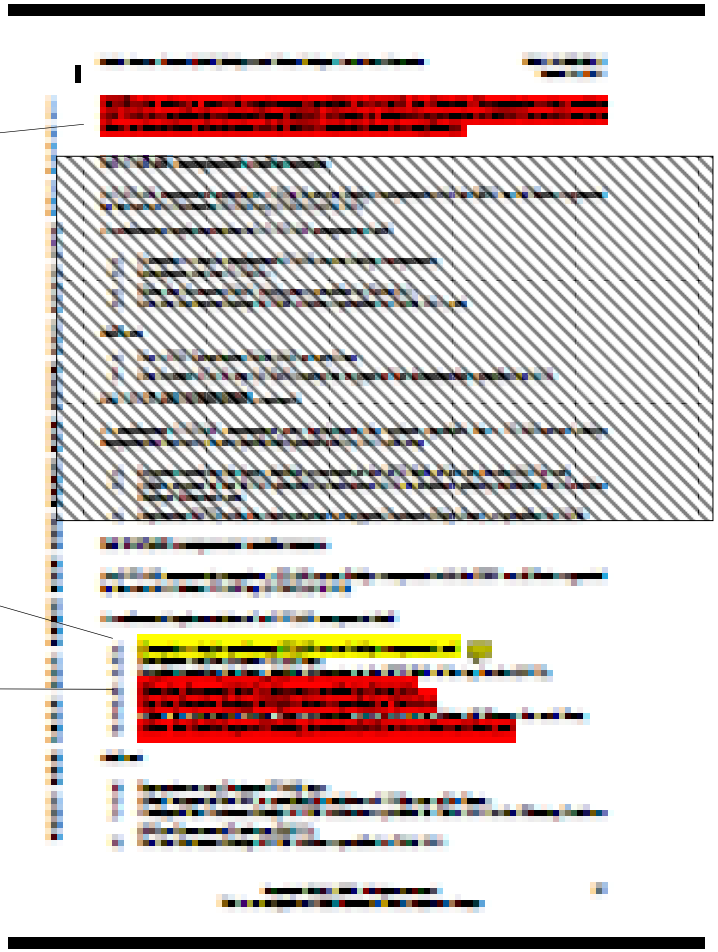
Some details about the B-component (7)

- **A B-component within a PBB TE based PE is comprised of a VLAN-aware bridge component except:**
  - **MSRP is not applicable**
- **A B-component within a PBB TE based PE is comprised of a S-VLAN component except:**
  - **S-VLANs are not used**
  - **The S-VLAN component operation is modified**
  - **Reserved MAC addresses are not filtered, does not use the provider bridge MVRP address (nor does it do MVRP at all), and does not support the enable ingress filtering parameter**



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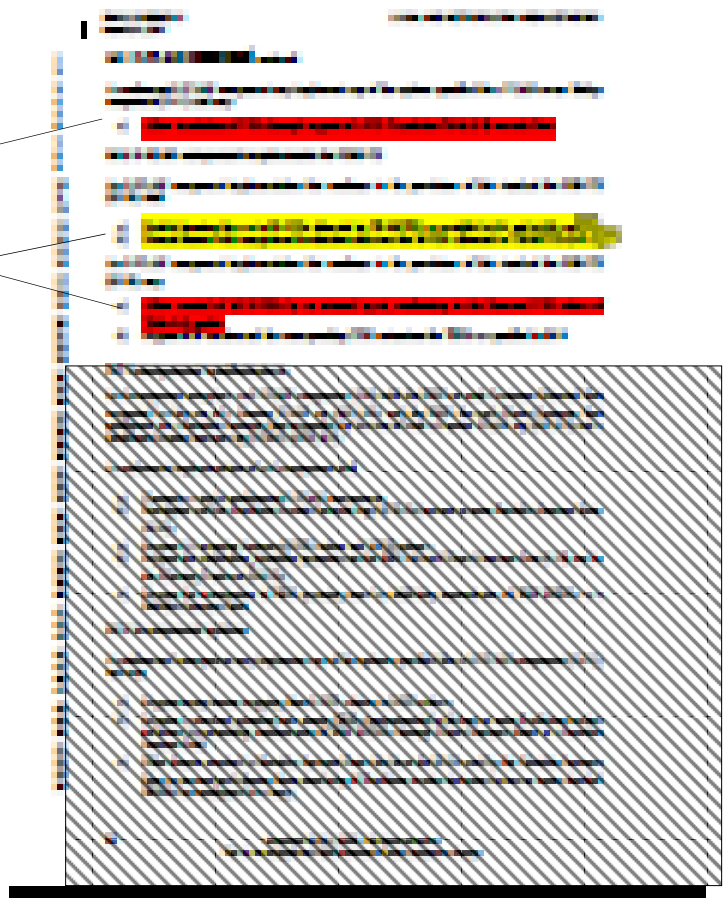
Some details about the B-component (8)

- **A B-component within a PBB TE based PE is comprised of a S-VLAN component except:**
  - **VLANs are not applicable**
  - **A specific TE-MSTID is not required**



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Some details about the B-component (9)

- **The B-component within a PBB TE based PE is compliant except:**

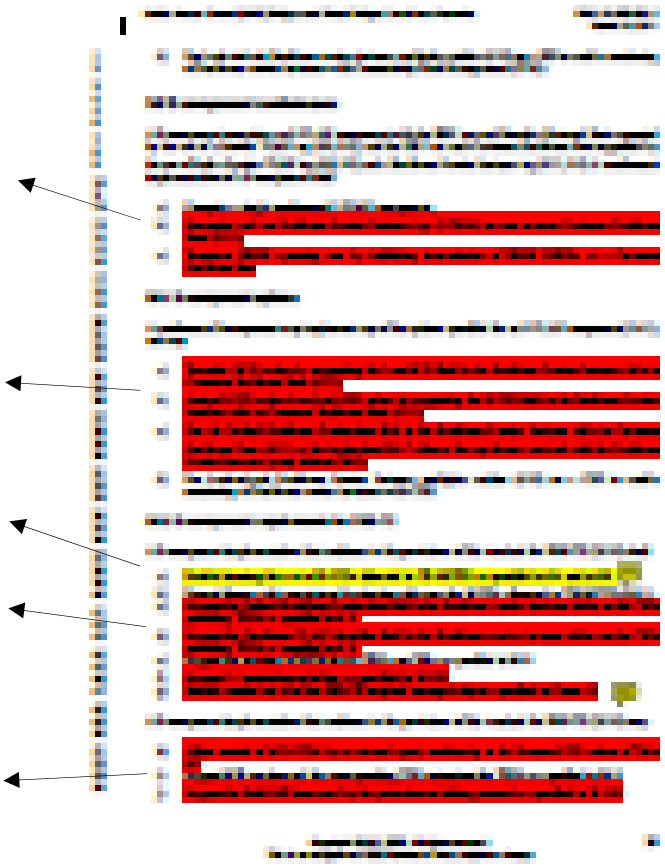
  I-SIDs are not required and PBBN PDUs are not required therefore it is not necessary to explicitly prevent their transmission

  I-SIDs, translation of I-SIDs, assignment of BVID based on I-SID, and the service instance table are all not applicable

  A specific TE-MSTID is not required

  Support of the service instance table, protection switching, and the management objects is not required

  Control of B-VIDs and the protection hold-off timer is not applicable



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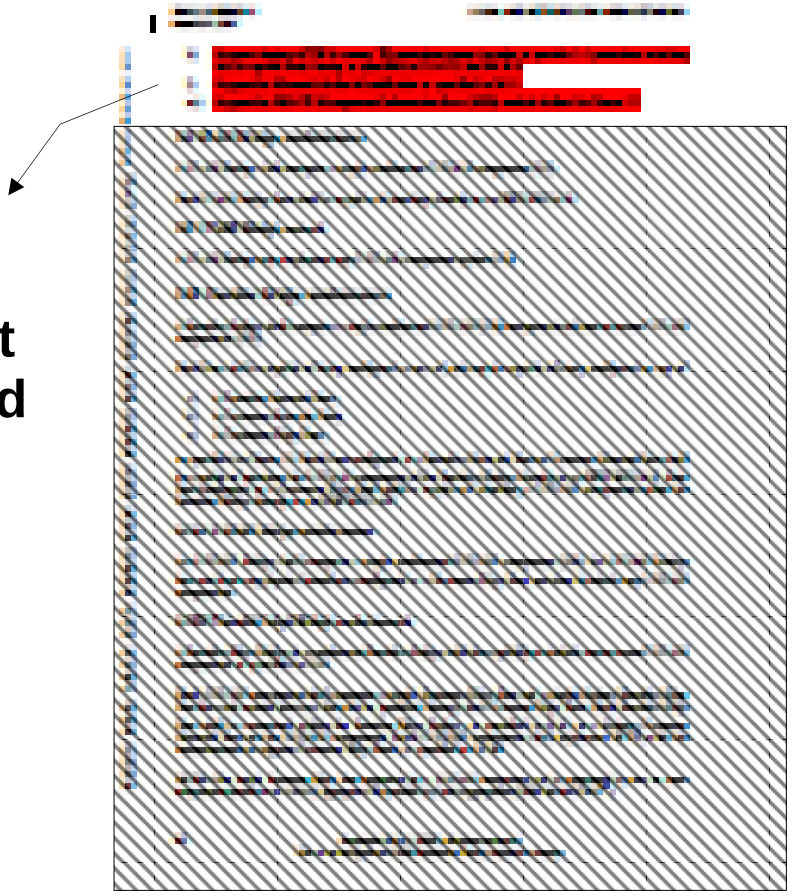
Some details about the B-component (10)

- **The B-component within a PBB TE based PE is compliant except:**

  Sharing TESIs among protection groups, support of mismatch defect identification, and support of the PBB TE MIB is not required



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But that's not all folks…

- The entire Enhanced Internal Sublayer service is not required
- Active topology enforcement is not required
- Ingress filtering is not required
- Everything related to VIDs and FIDs in filtering is not required
- Reserved group addresses are not required
- The learning process is not required
- MST and FID to MST allocation is not required

…and this is just the B-component

- Repeat for the T-component and VLAN-aware Bridge component

So what's left?

- **Insert a MAC header**
- **Forward based on the MAC header**

However…

- **As proposed in bh-bottorff-pbbte-pe-draft-0711-v1, it is not really a MAC header (see 44.4)**

  It is actually an E-Tag disguised as a MAC header

  The E-TAG parameters are encoded into the MAC header, along with two new bits that are not necessary in the E-TAG

  This is not MAC/FID forwarding as we know it today

Additional functionality required…

- **New functionality within the BEB components is required to make Port Extension work:**

  This functionality is Port Extension specific and has no applicability for use in PBB:

  Ability to support two MAC addresses per PIP

  Ability to do echo cancellation

  Ability to pass a B-MAC in the connection_identifier

  Deprecated MIB

Making a PBB TE based Port Extender

- **Start with a BEB**
- **Delete almost everything that makes it a BEB**
- **Add everything currently specified in P802.1BR**

What you get:

- **Pretty much exactly what is specified in P802.1BR except:**

  It creates and processes an E-TAG disguised as a MAC header

Architectural Re-use

- **Very little is reused when looking at the details**
- **By far much more needs to be deleted from the BEB model than what is currently defined in P802.1BR**

  For reference, the specification of a PE in P802.1BR is 18 pages including approximately seven pages of descriptive material.
- **Likewise, additional Port Extension specific functionality is needed in the PBB TE approach to Port Extension:**

  Generation of MAC addresses

  Dual PIP MAC addresses

  Echo cancellation

  Mapping of PE CSP to the BEB managed objects
- **The PBB TE approach encapsulates the E-TAG in a MAC header**

  It is a bit of a stretch to claim it does not create a new encapsulation

  The MAC header enhancements to encapsulate the E-CID is new

Hardware reuse

- **Hardware reuse**
  - **No currently existing PBB TE ASIC is likely to be able to support Port Extension as is**
    - Need to add echo cancellation
    - Likely to be a much more sophisticated part in comparison to a part compliant with the current BR
      - This challenges the economic feasibility criteria
  - **MAC-in-MAC encapsulation is inconvenient for NIC implementations**
    - Increases internal buffering required for MAC headers
    - Misaligns the rest of the headers and tags
      - The C-DA starts at octet offset 22
      - Had long discussions in the TG about 32-bit alignment

Considering the users of our technology…

- **Users of networking services and equipment**

  Frequently (almost universally) asked questions:

  How soon will the standard be complete?

  When can I buy compliant equipment?

  Rarely (if ever) asked questions:

  Does this create a new tag?

  Does this leverage PBB TE?

Comparison of Approaches

	E-TAG Approach	PBB TE Approach
Simplicity		
Clarity of specification		
Finite scope		
Minimize PE impact to existing components		
More convenient NIC implementation		
Timely completion		
Does not require a new tag		

Thank You!