



IEEE 802.1 YANG Summary

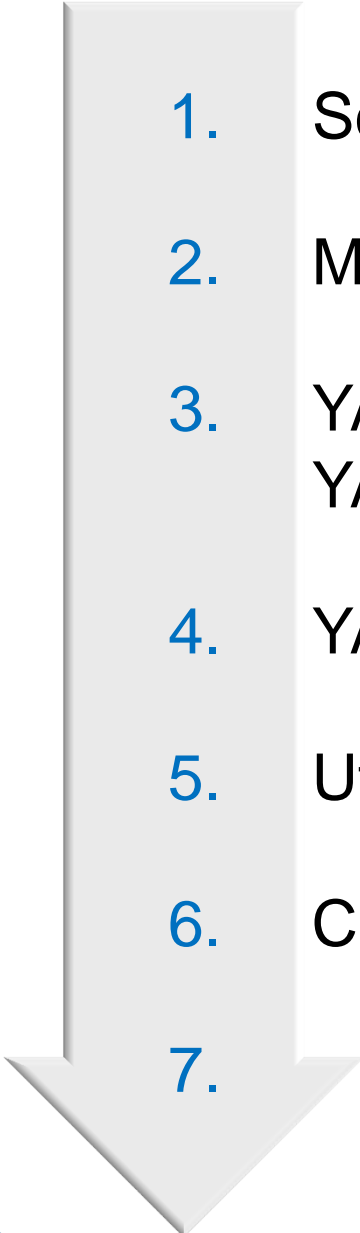
IETF-IEEE 802 Meeting

Marc Holness
Version 1.0
09 Sept 2016

802.1 YANG Projects

- Two active YANG projects in progress
 - 802.1Xck — Port-Based Network Access Control Amendment: YANG Data Model
 - 802.1Qcp — Bridges and Bridged Networks Amendment: YANG Data Model

802.1 YANG Project Progression

- 
1. Scope
 2. Models representation using UML
 3. YANG structure and relationship to existing YANG modules
 4. YANG modeling and module definition
 5. Utilization of GitHub as a YANG repository
 6. Comments and Comment Resolution
 - 7.



802.1 YANG Project Progression

1. Scope

- Subset of 802.1Q features scoped
 - Goal of the subset was to keep YANG content manageable (i.e., small), but still sufficiently large to provide a reliable framework for modeling future capabilities in YANG
 - Simple bridge (e.g., Two-Port MAC Relay), Customer VLAN Bridge, to a bit more complex Provider Bridge included in subset
 - Need to recognize that YANG is relatively new to members of the working group

802.1 YANG Project Progression

2. Model representation via UML

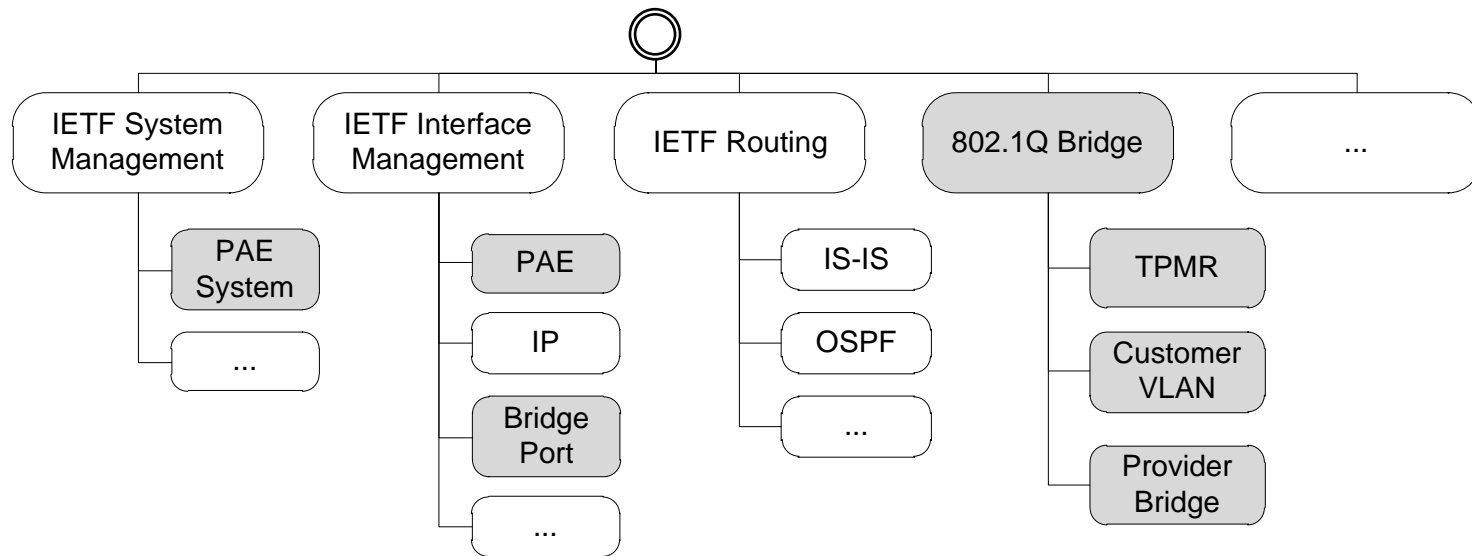
- Where UML representation was not available, took normative text (e.g., managed objects clause) and created UML representation
- UML representation has benefit of ease of communication to larger diverse group (that may or may not be YANG fluent)
- For 802.1Xck, there was a pre-existing UML representation. This was very useful, and this is what I used to derive the YANG model

NOTE: There is also some work being done in ITU-T (Study Group 15, Question 10/14) where they are creating UML models for networking protocols and entities

802.1 YANG Project Progression

3. Define YANG Structure and Relationships

- Understanding relationship of existing [foundational] YANG models (e.g., IETF Interface) to 802.1Q and 802.1X
- For example, the following hi-level YANG structure and relationships were defined





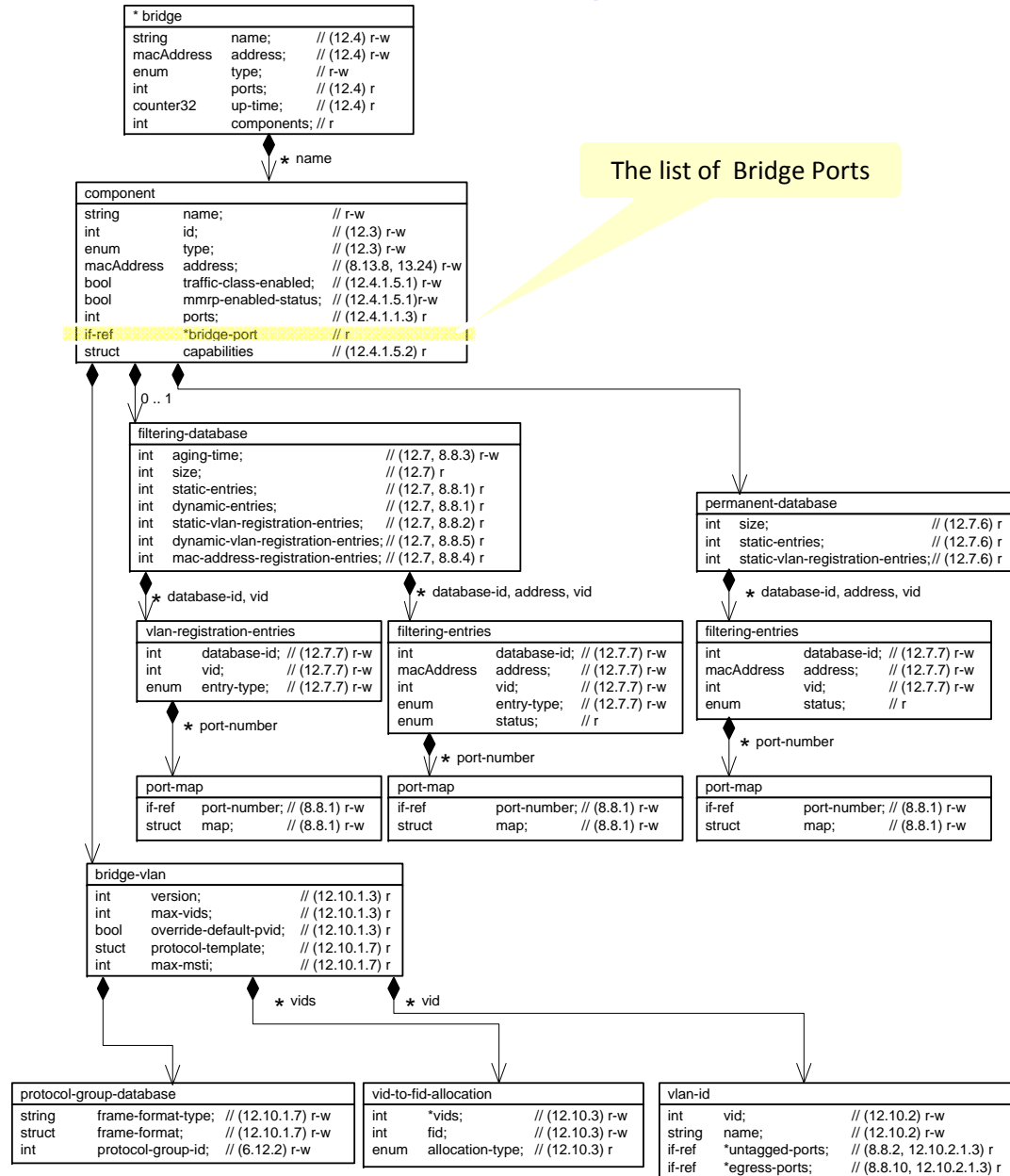
802.1 YANG Project Progression

4. YANG Modeling and Module definitions

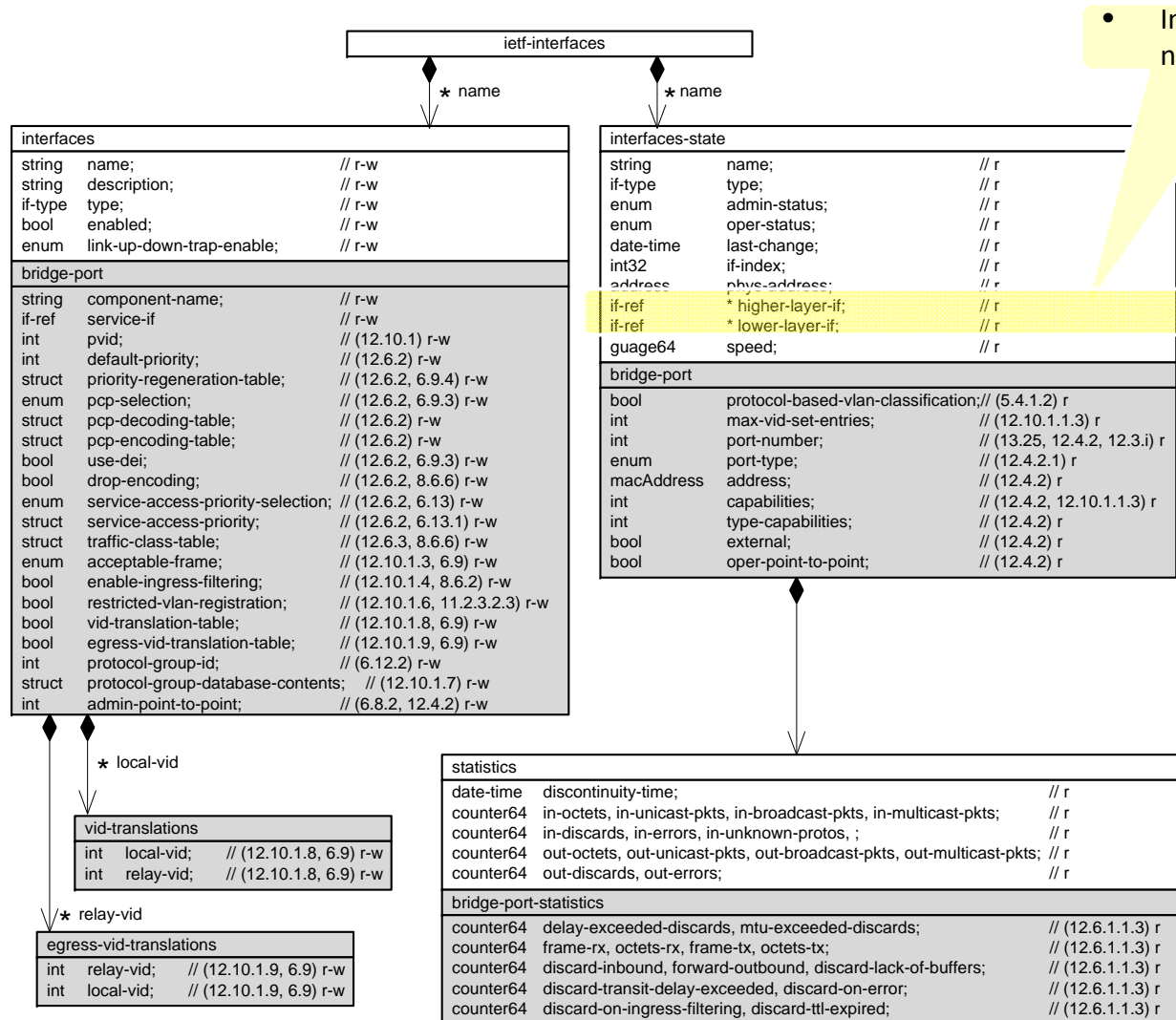
– Focusing on YANG module structure and relationships

- Analyzing the merits of augmenting an Interface versus referencing an Interface
- We have many protocol entities (i.e., service shims) that can be stacked/inserted/etc that our IEEE 802.1 Bridge port model supports. Our YANG model needs to gracefully accommodate this flexibility
- Performing analysis of how YANG model can accommodate future [complex] features such as CFM, LAG, MAC Security, etc.

Generic IEEE 802.1Q Bridge Model



Generic IEEE 802.1Q Bridge Port Model



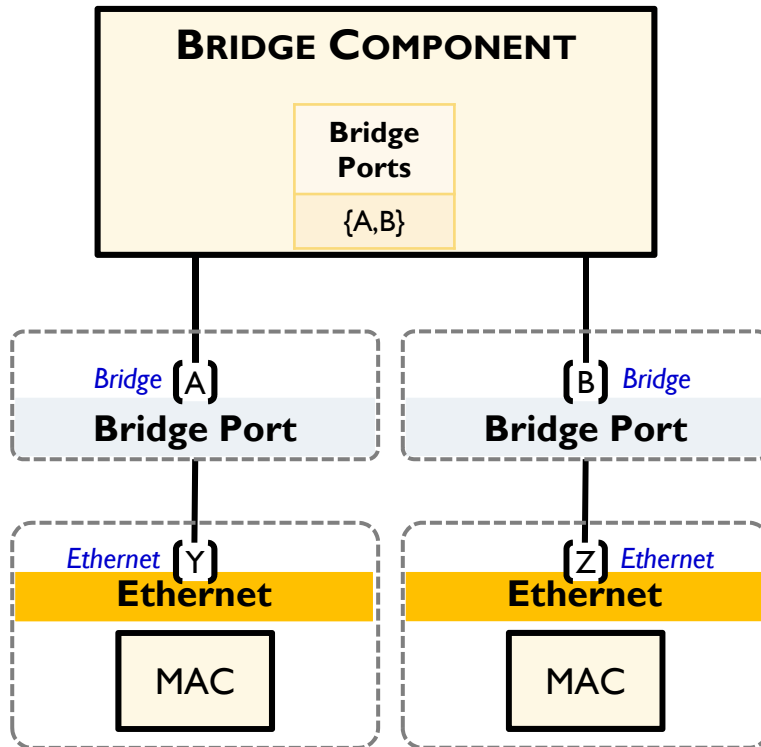
• Interface stack leaf nodes

- ❑ Data attributes in white are generic Interface (RFC7223)
- ❑ Data attributes in grey are IEEE 802.1Q Bridge Port specific

Basic Bridge (Port) Models

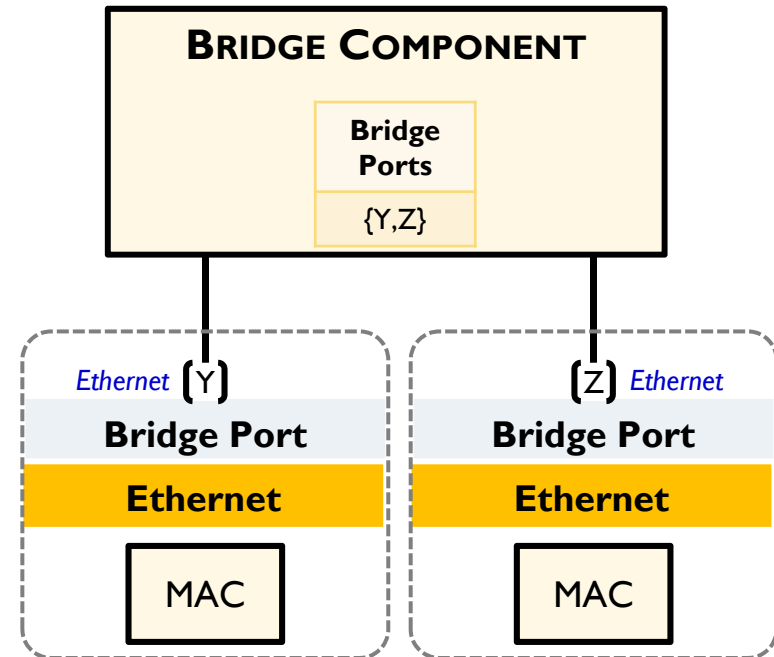
Model-1

- Bridge Ports are assigned to an Interface that is independent of the underlying MAC (or service)
- Bridge Port data and MAC data attributes are associated with separate Interfaces



Model-2

- Bridge Ports are underlying MAC (or service) share the same Interface
- Bridge Port and MAC specific data attributes associated with same Interface



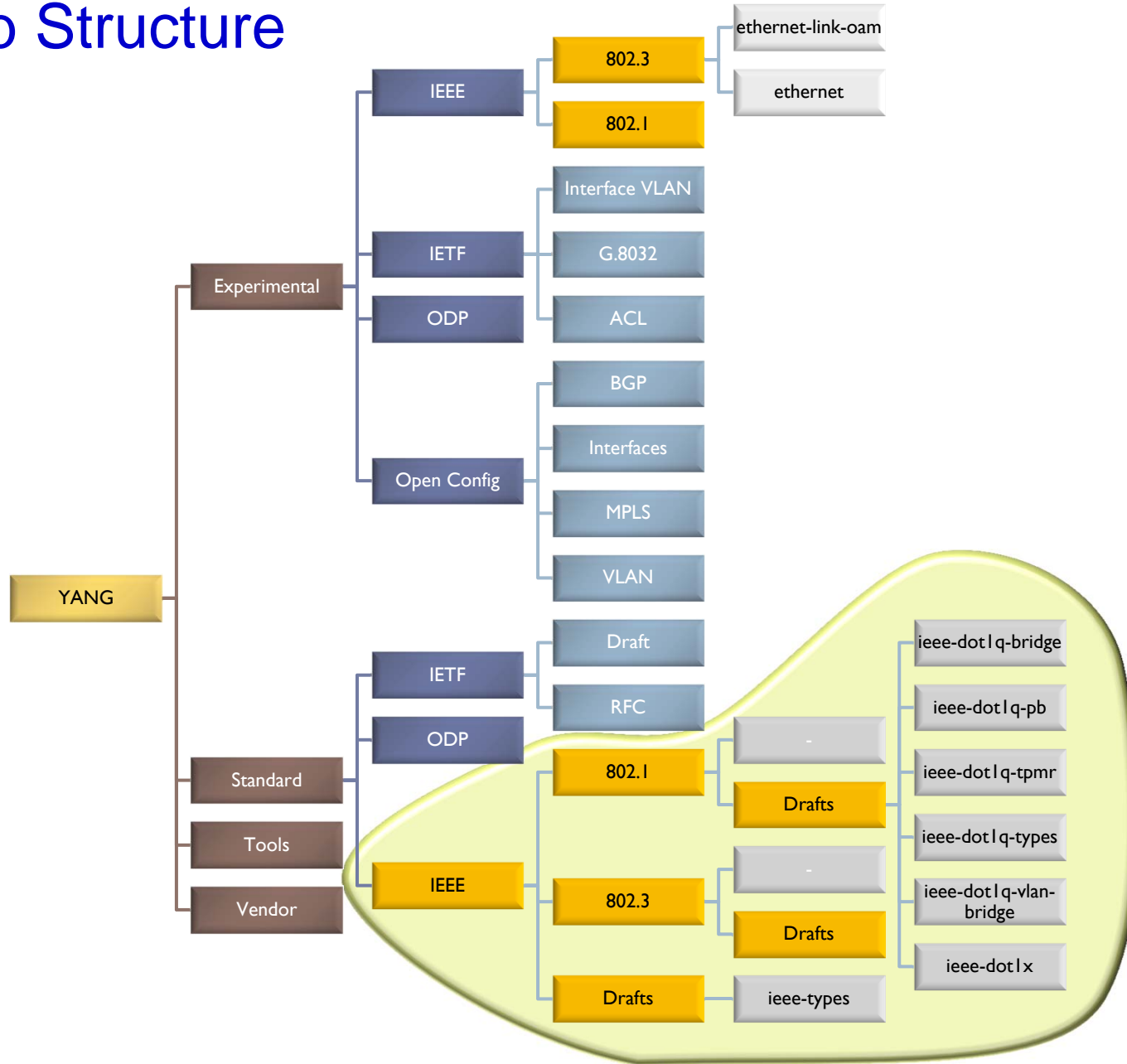
802.1 YANG Project Progression

4. GitHub as a repository

- Utilized GitHub as a repository to store 802.1 YANG models
 - This allowed other interested members to view the IEEE 802.1 YANG models (which are draft at this time)
 - The standardized models will also be deposited in GitHub, in the relevant directories



GitHub Structure



802.1 YANG Project Progression

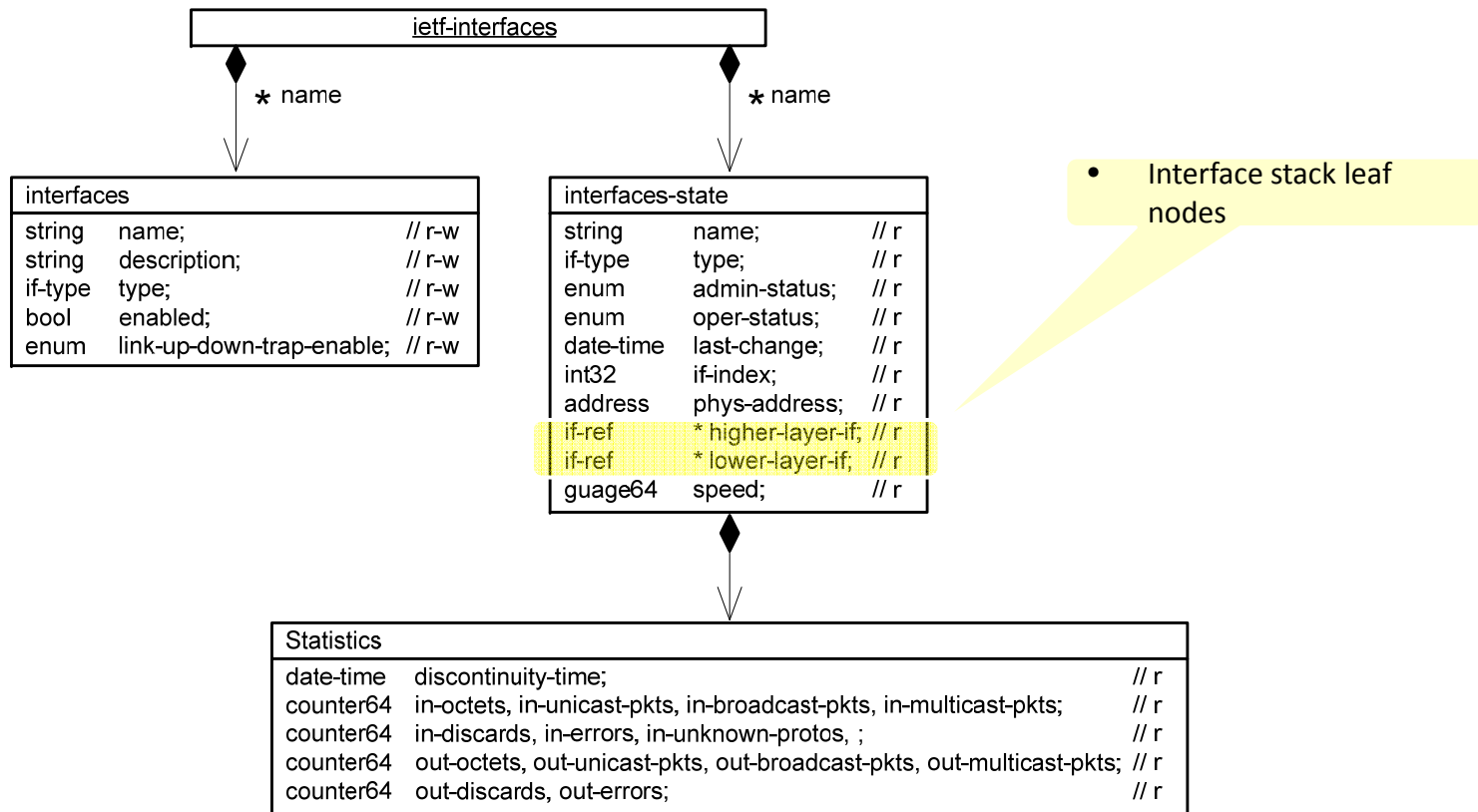
5. Comments and Comment Resolution

- Both projects are currently cycling through various rounds of Task Group balloting
- Current draft version of P802.1Xck is Draft 0.61
- Current draft version of P802.1Qcp is Draft 0.5

Backup Material

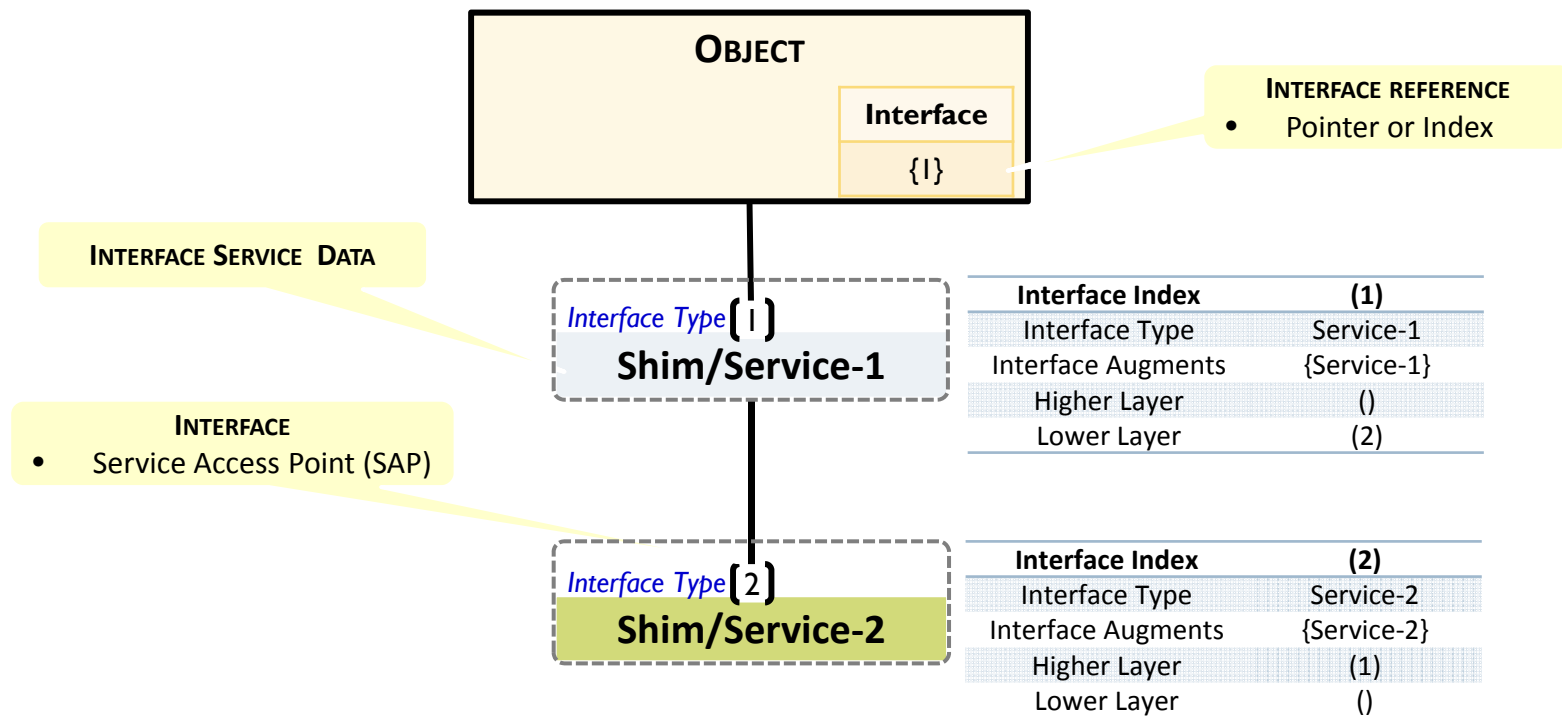
IETF Interface Management Model

- IETF Interface Management Model (RFC 7223) can be represented using UML as shown below



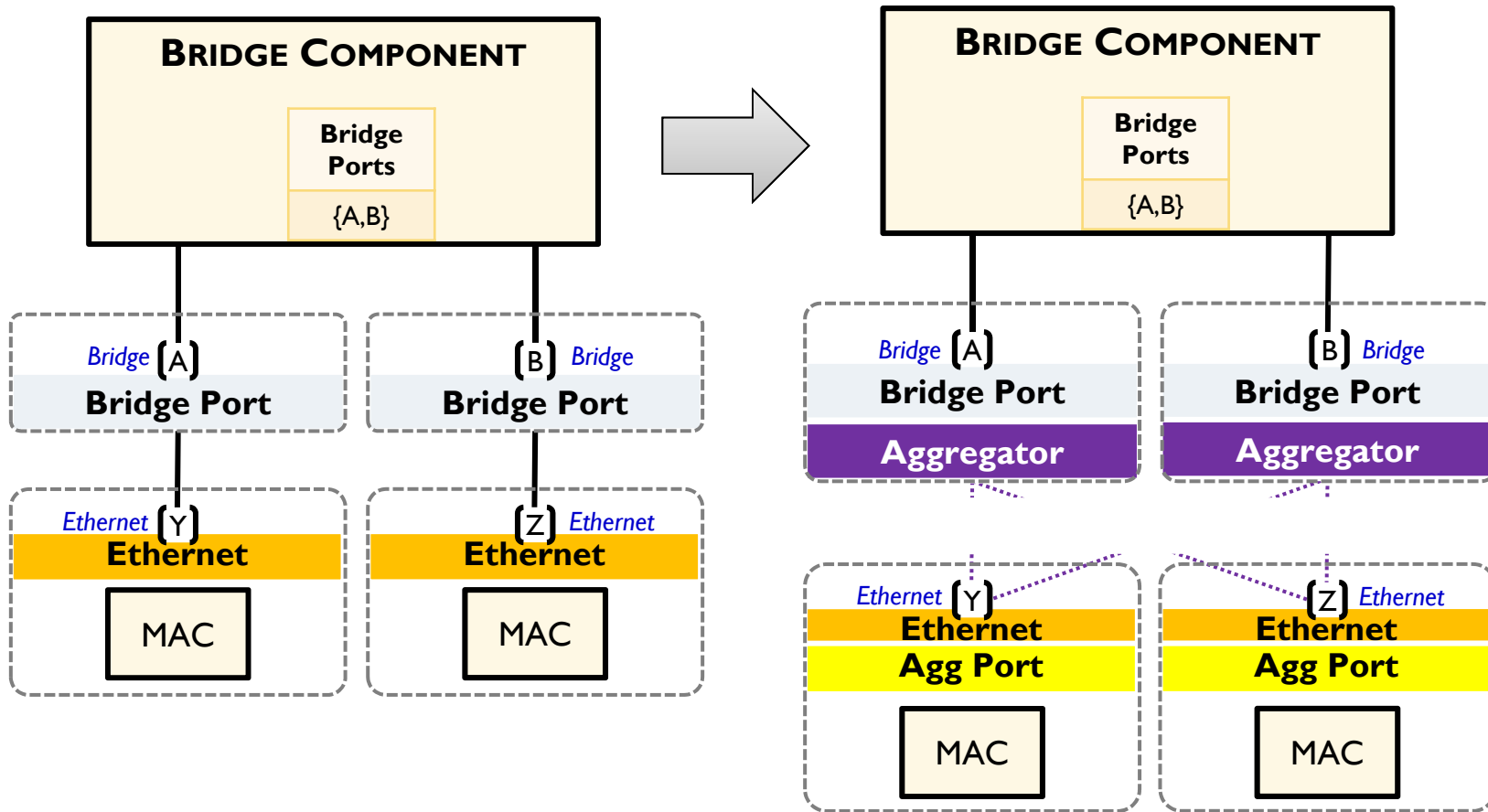
Interface Stack Diagram Representation

- A SAP is an abstraction and does not necessarily correspond to any concrete realization within a system
- The entities that support a particular SAP compose an interface stack
- Each YANG Interface definition contains an interface stack table



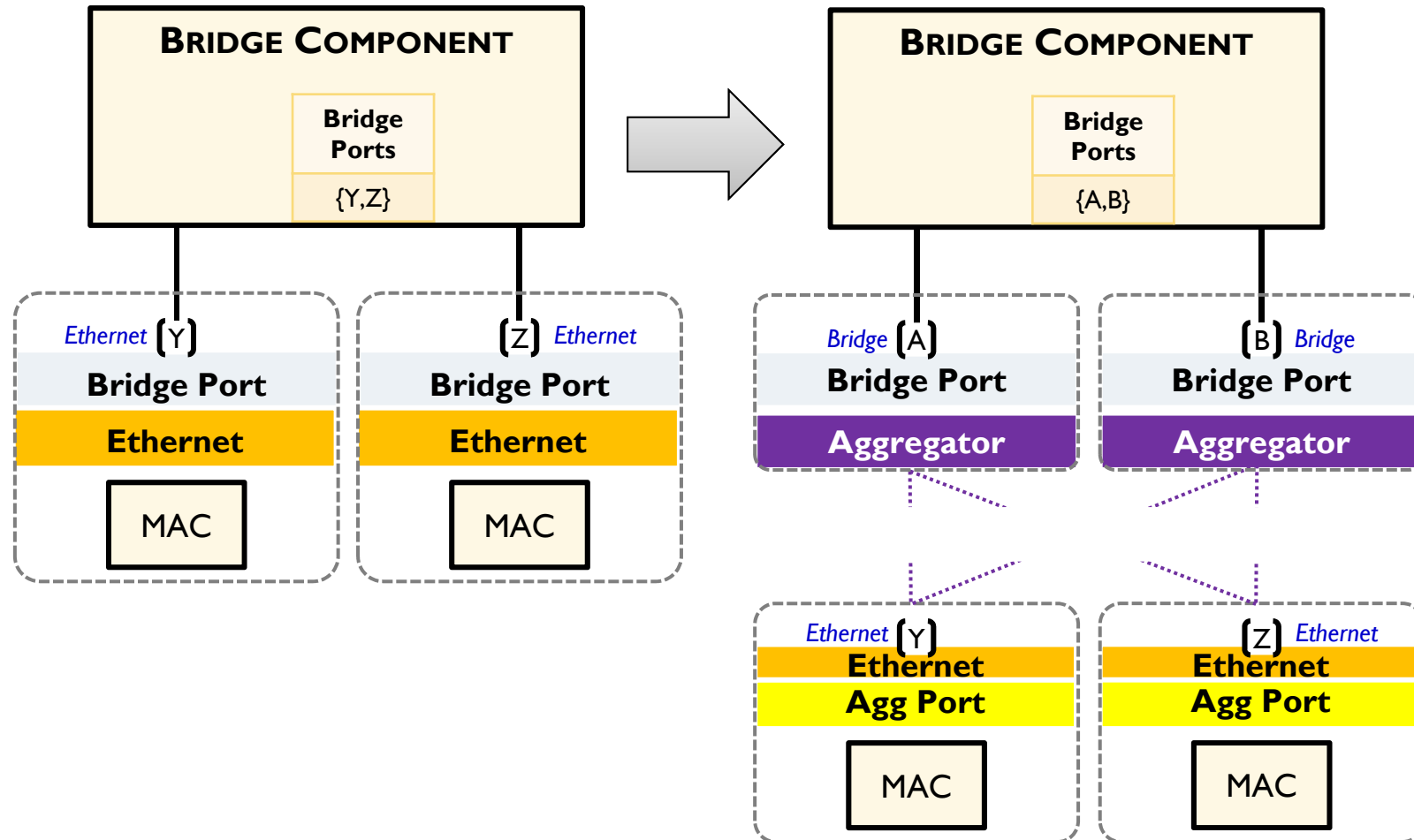
Evolution of Bridge Port Model-1

— Link Aggregation



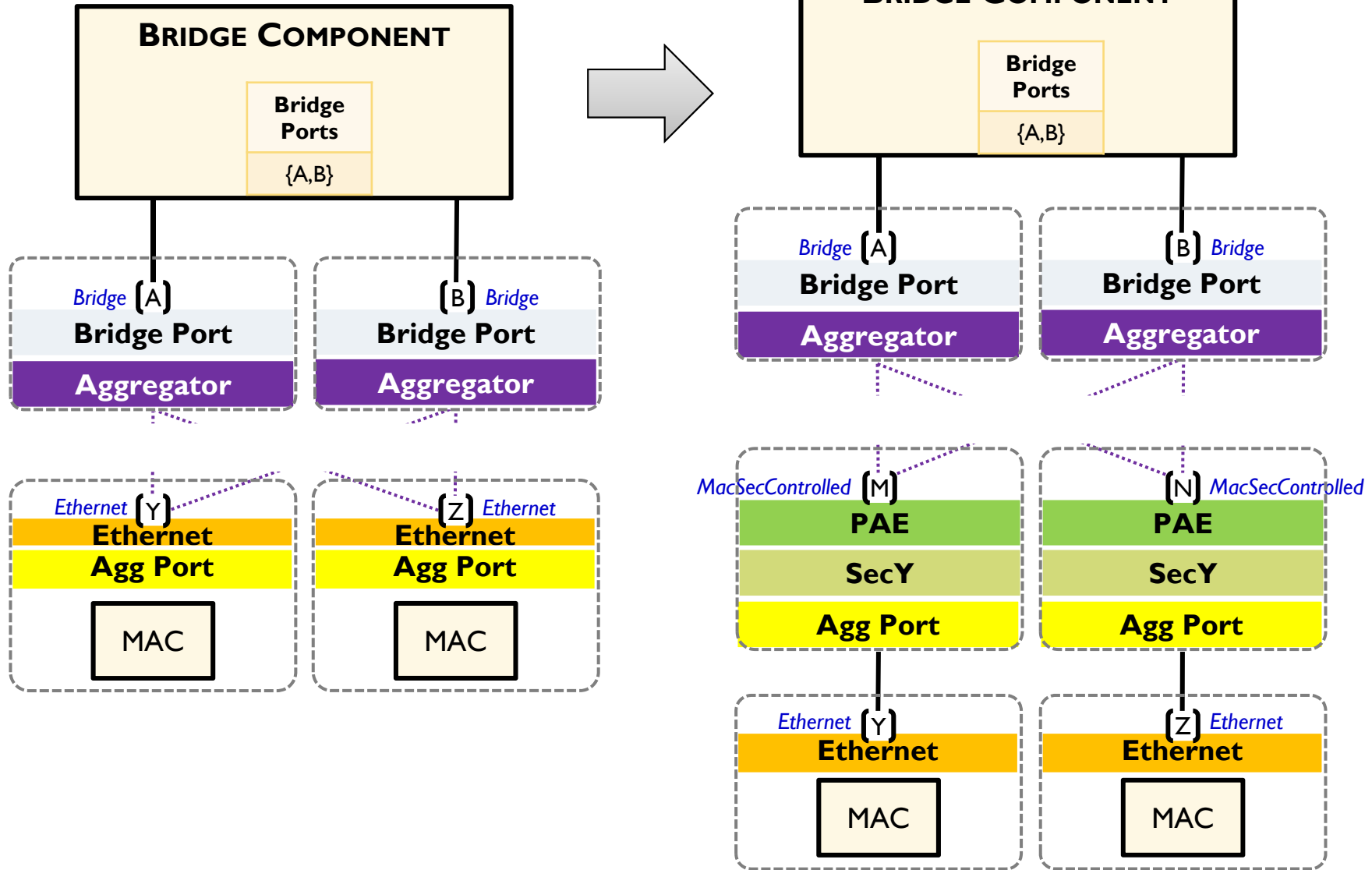
Evolution of Bridge Port Model-2

— Link Aggregation

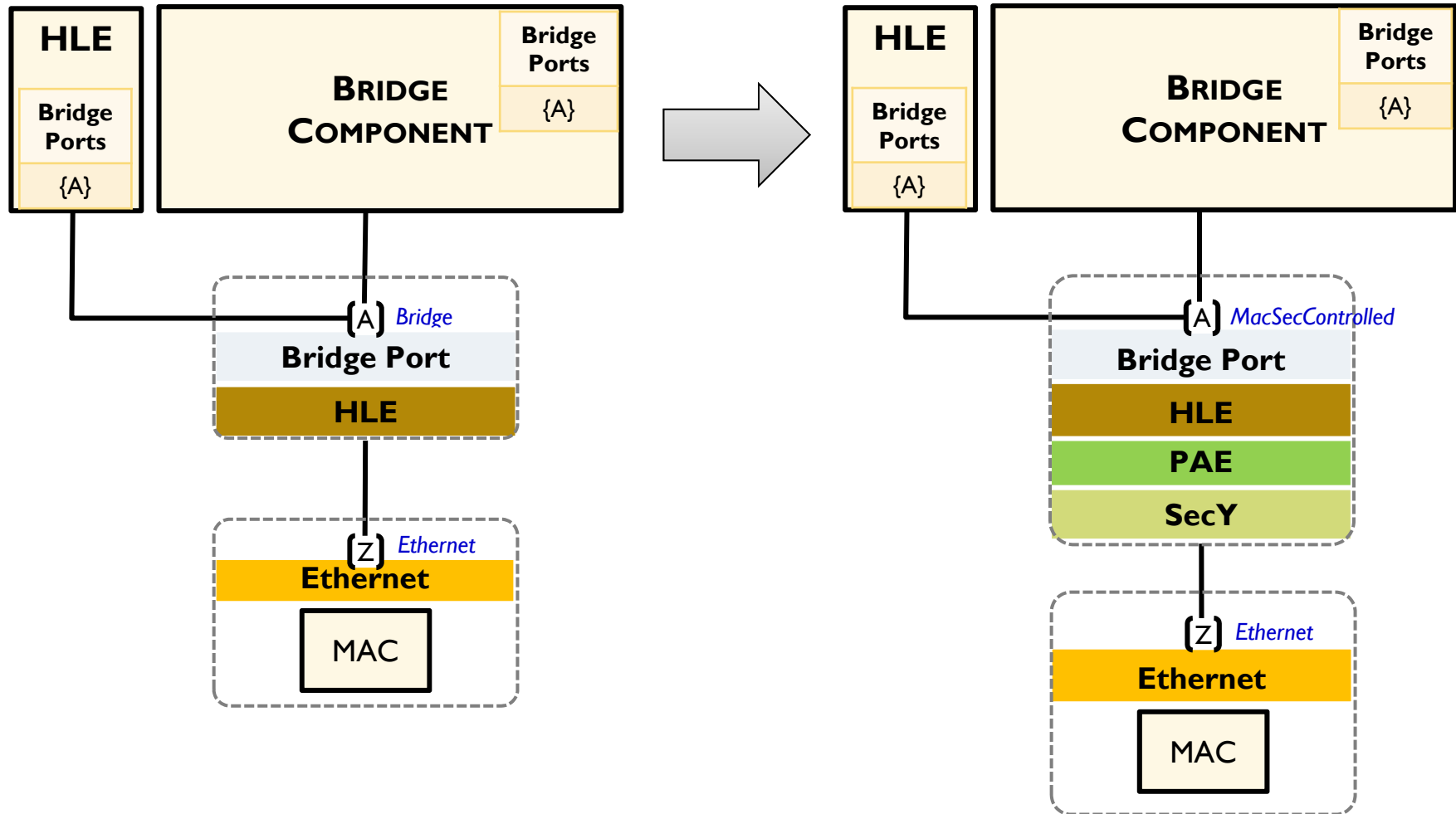


Evolution of Bridge Port Model

— MAC Security and LAG

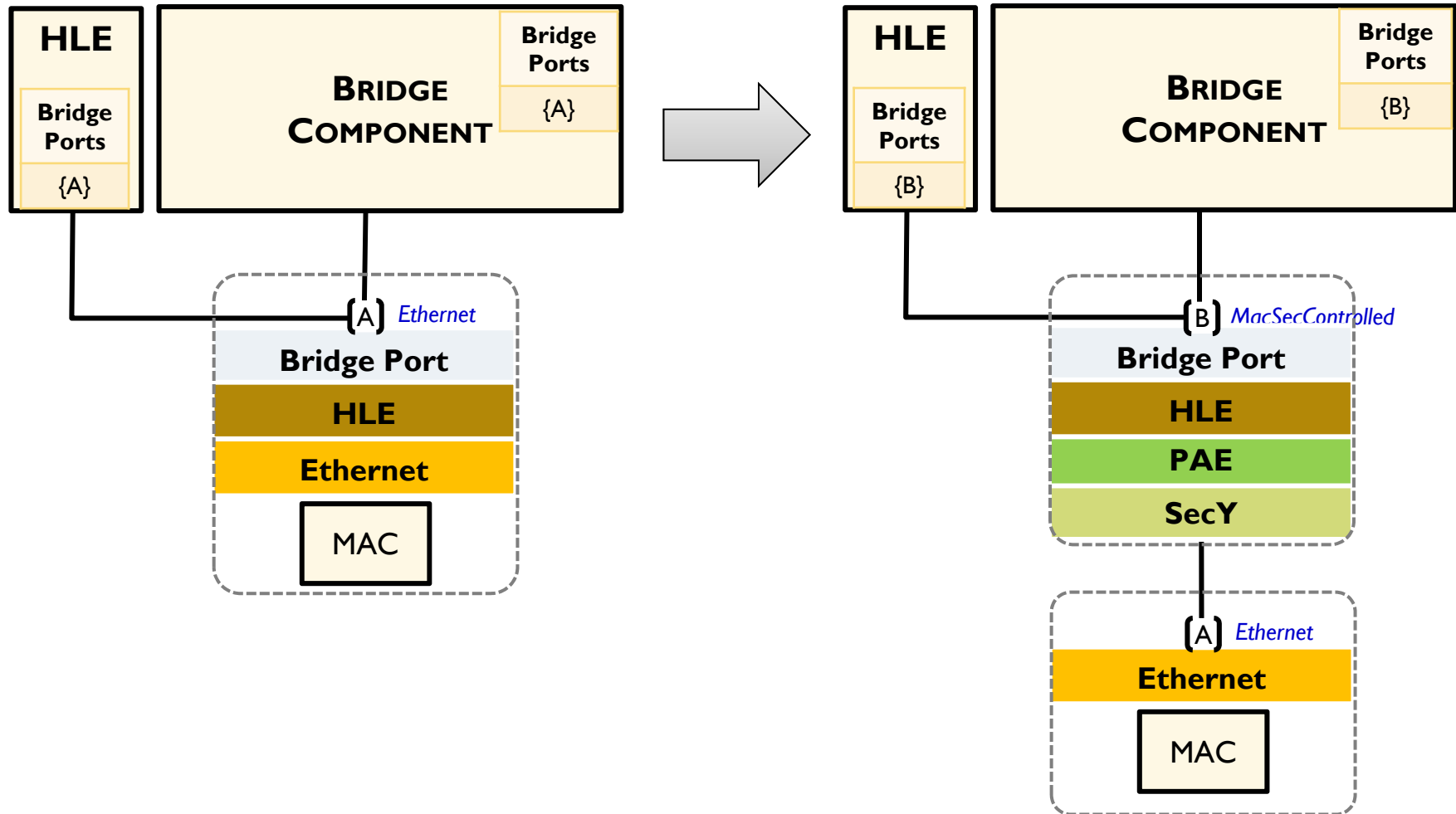


Evolution of Bridge Port Model-1 — MACSec and HLE



Evolution of Bridge Port Model-2

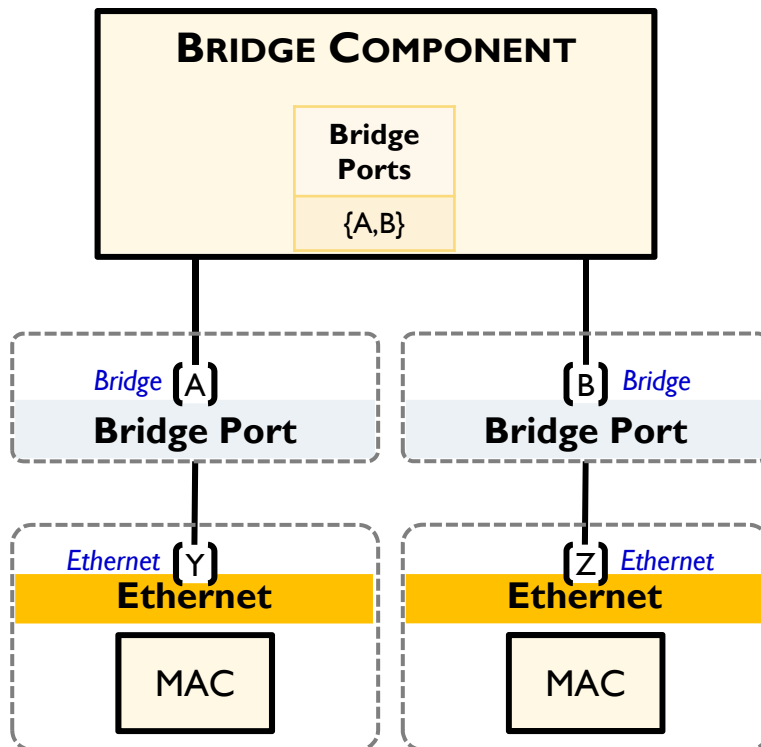
— MACSec and HLE



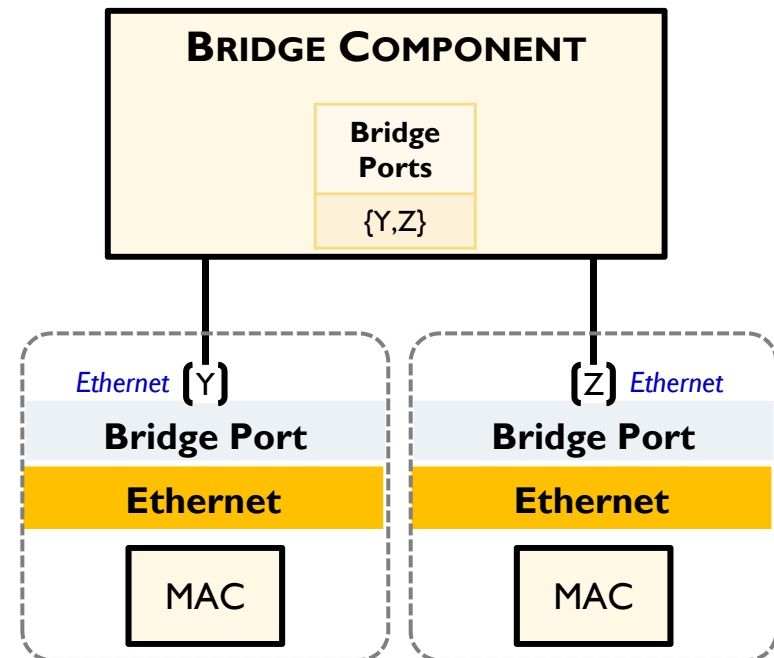
Recommendation

- Both models (Model-1 and Model-2) have pros and cons, and can work
 - It is a matter of perspective and the device that the model may be realized on
- The Bridge Port YANG model (used by the 802.1Q Bridge) will be developed to accommodate both Model-1 and Model-2

Model-1



Model-2



Evolution of Bridge Port Model-1 — Internal LAN

