Bridging Support for 802.16

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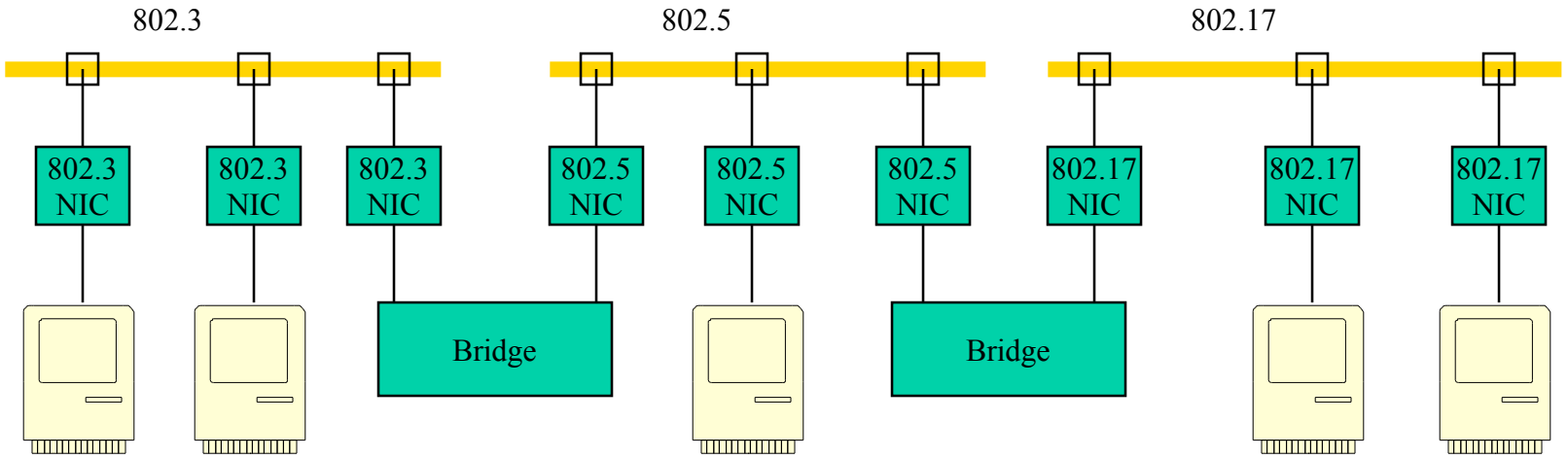
Purpose:

Review and adopt proposed model and text for the support of the 802 ISS within bridged networks

Support for Bridging in 802 Networks

- Bridged networks are made of things that look like LANs connected together by bridges.
  - LANs look in many respects like FYC (Fat Yellow Coax)
  - Bridges behave as described in 802.1D



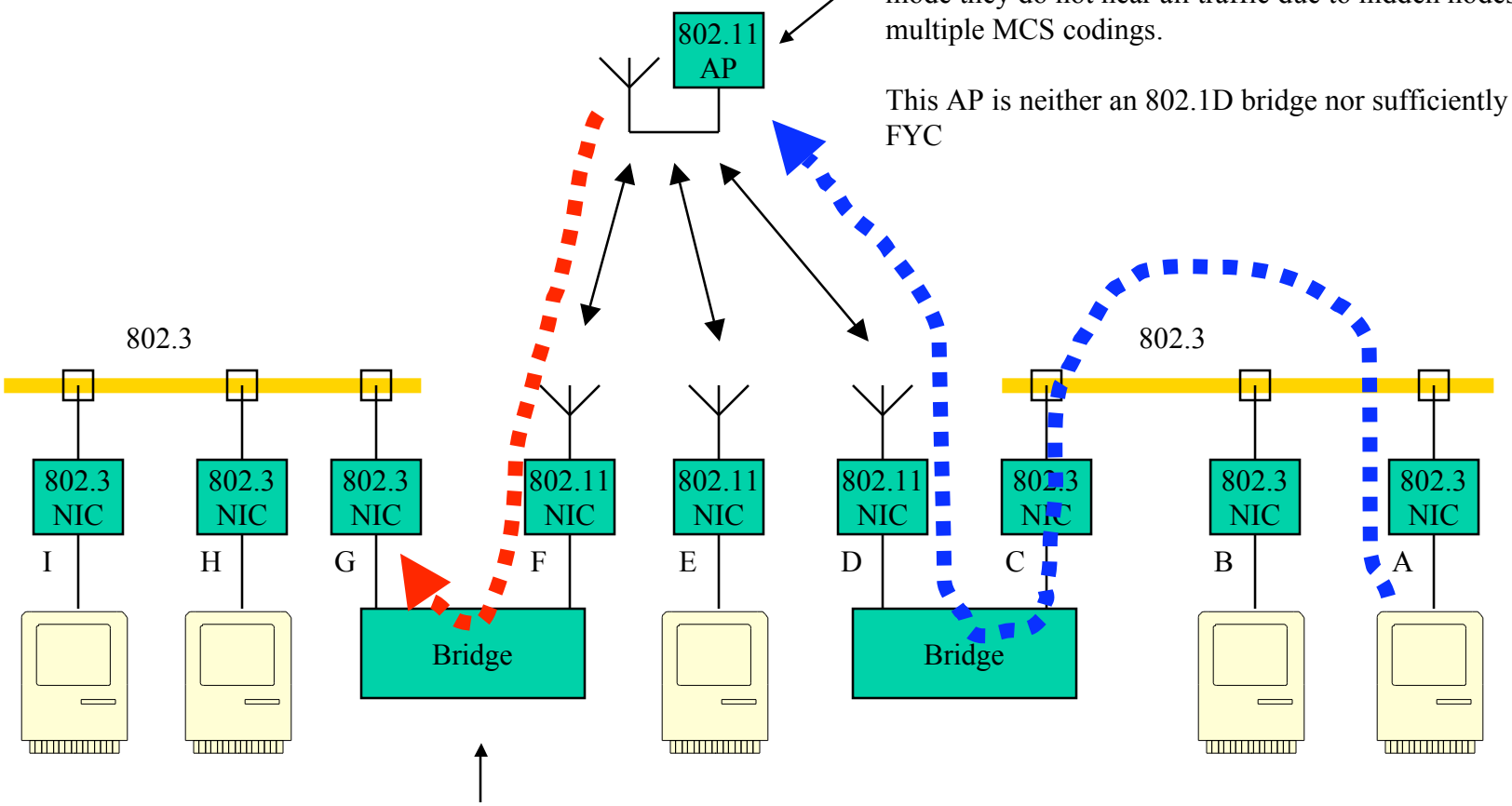
Bridges Assume LANs Behave in a Certain Way

- The original FYC (Ethernet) had properties that bridges rely on
  - Attached bridges can hear all the traffic on the wire
  - Traffic on the wire isn't reordered
  - Etc.
- All 802 networks must model this behaviour if attached bridges are to work.
- There is a 5C requirement to do this
- But this behaviour isn't universal in 802
  - 802.11 systems often filter by address preventing STA attached bridges from hearing all traffic and so preventing topology learning working
  - 802.16 doesn't go as far as specifying whether filtering by address takes place, so it may or may not take place.

The Address Filtering Problem

This AP doesn't forward traffic to {G,H,I) or {A,B,C} because STAs hear only traffic to themselves and even in promiscuous mode they do not hear all traffic due to hidden nodes and multiple MCS codings.

This AP is neither an 802.1D bridge nor sufficiently like a FYC



So this bridge doesn't hear traffic from A to G

The 802.11 Bridging Broadcasts Problem

Broadcast traffic reaching an AP gets rebroadcast by the AP.

802.3 frame SA=H, DA=BCAST

Bridge Forwards packet

802.11 frame toDS SA=H, DA=BCAST, BSSID=G

802.11 frame fromDS SA=H, DA=BCAST, BSSID=G

AP Rebroadcasts frame

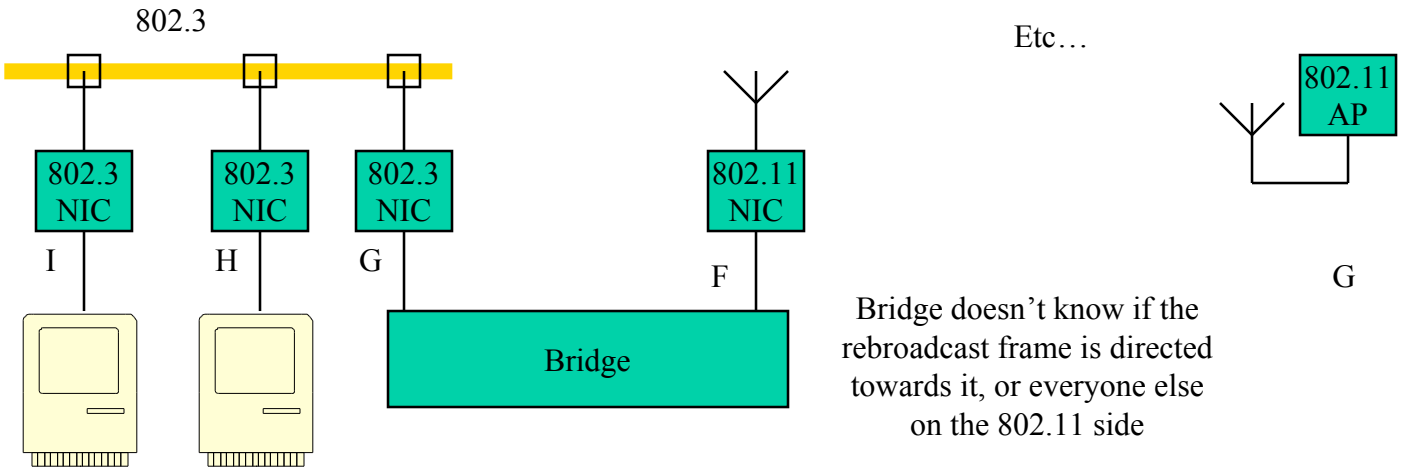
802.11 frame toDS SA=H, DA=BCAST, BSSID=G

The bridge sends it back

802.11 frame fromDS SA=H, DA=BCAST, BSSID=G

AP Rebroadcasts frame

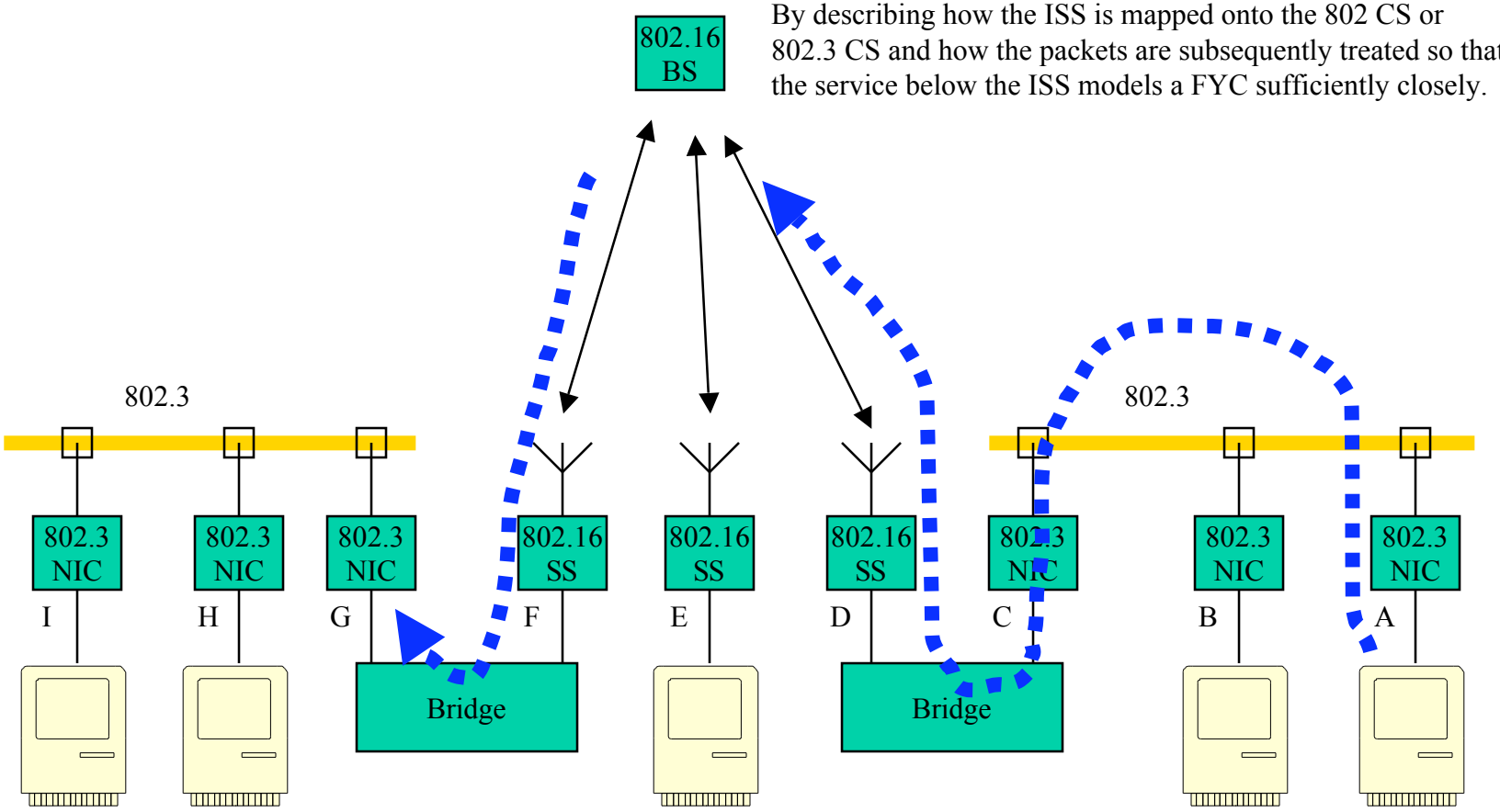
Etc…



Bridge doesn't know if the rebroadcast frame is directed towards it, or everyone else on the 802.11 side

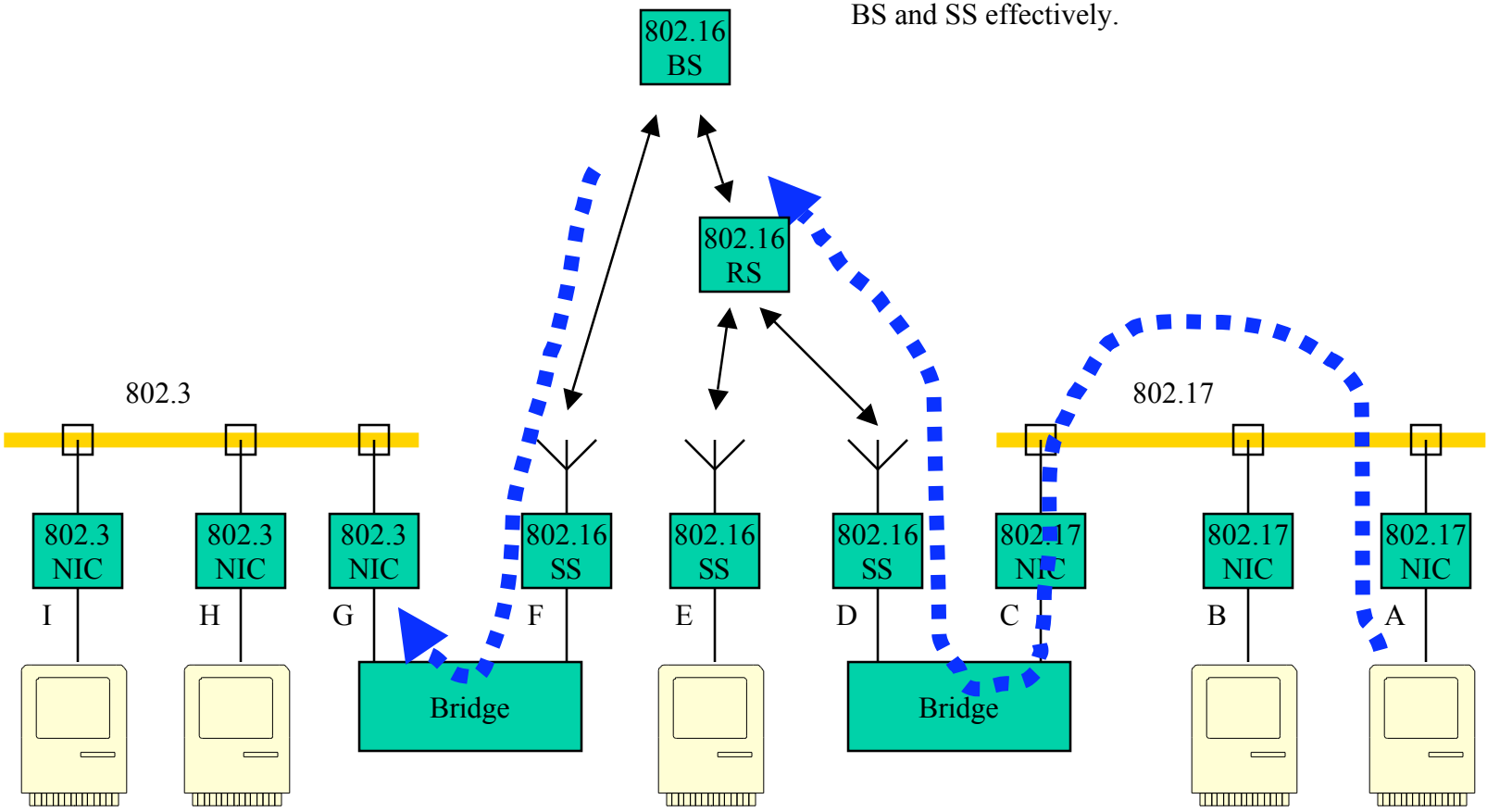
802.16k Makes Sure This Works

By describing how the ISS is mapped onto the 802 CS or 802.3 CS and how the packets are subsequently treated so that the service below the ISS models a FYC sufficiently closely.

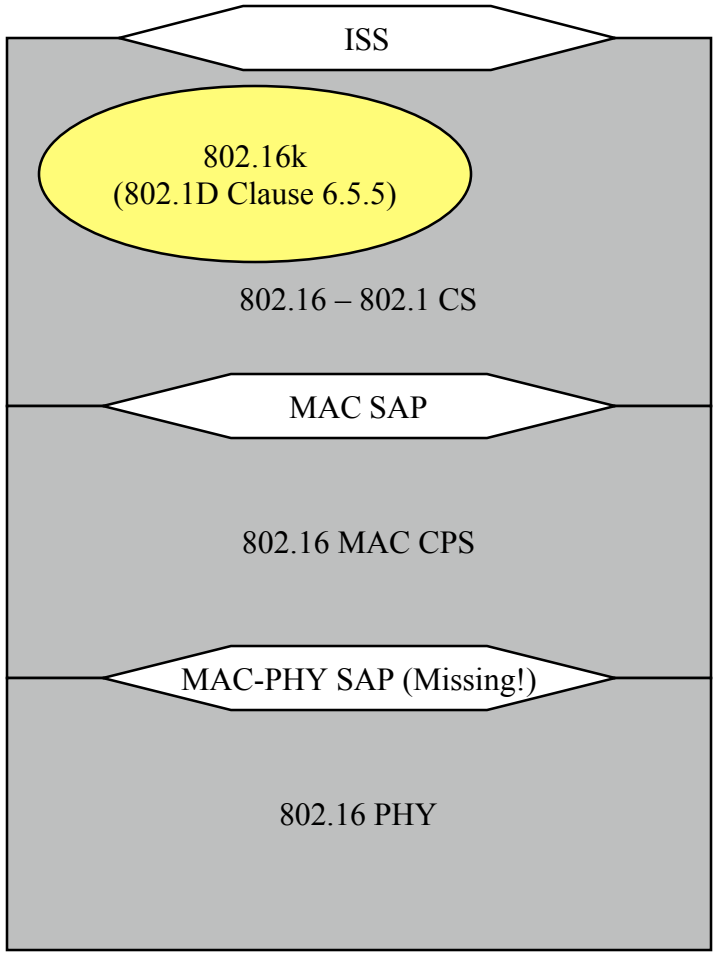


And This

802.16k will ensure that MMR relay stations support ISS as BS and SS effectively.



Support for the ISS

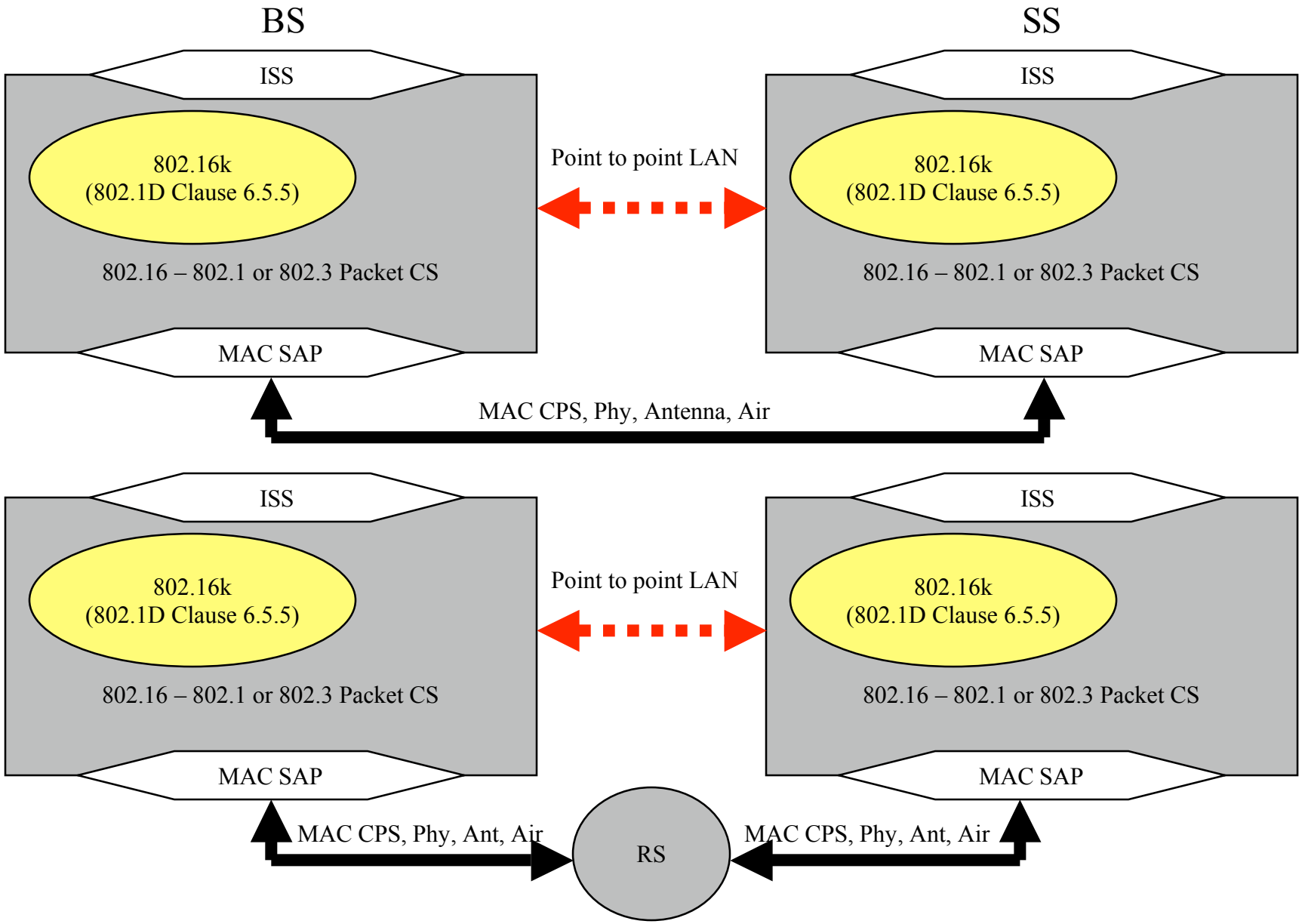


- The ISS (Internal Sublayer Service) is the 802.1 model of the MAC service. Bridges assume all MACs can provide the ISS and through the ISS, FYC functionality can be accessed.
- Section 6.5 of 802.1D contains descriptions of mappings between the ISS and the MAC service of various media in 802.
- 802.16 needs to write its own section here describing its own mapping and must do it in such a way that it 802.16 systems model FYC sufficiently that 802.1D bridges can work.

How can 802.16 look like a FYC?

- An 802.16 BS could emulate a FYC joining all the registered STAs
  - It would need to ensure that every SS hears all traffic presented to all other attached SSs.
    - This would impact efficiency.
    - To be heared by everyone, all DL packets would need to be sent at the lowest, most robust date rate, without AAS. All UL packets would need to be retransmitted on the DL.
- Each CS-CS peer association is a point to point LAN
  - These p2p LANs may or may not be bridged at the BS or SS.
  - Traffic could be forwarded according to 802.1D
  - This is exactly what 100/1G base-t switched ethernet does

CS@BS to CS@SS = P2P LAN



What this means for the 802.1D Text (1)

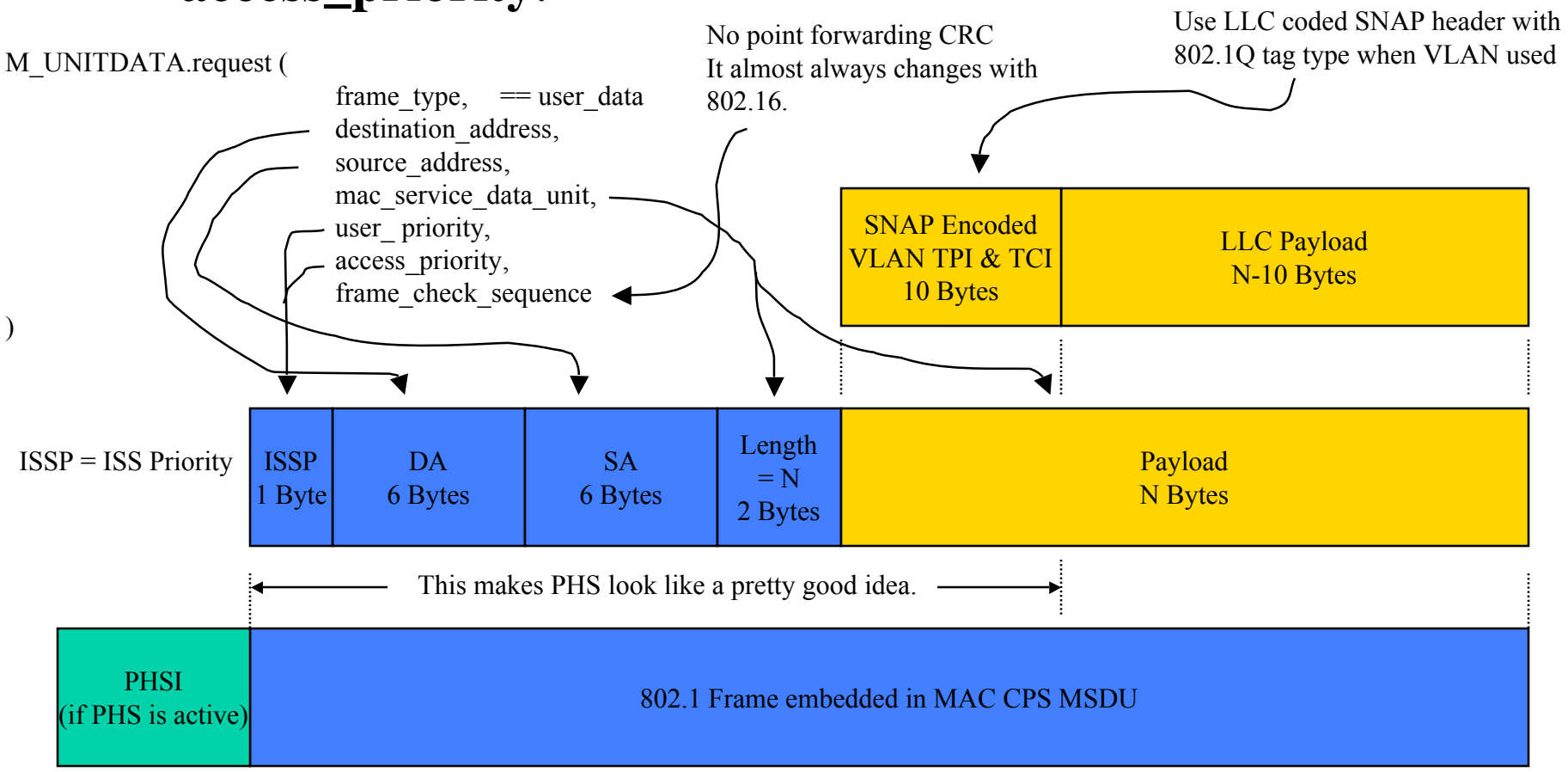
- Assert that
  - Each SS with an 802.3 or 802.1 CS service registered with a BS implements an independent point to point 802 network.
  - The BS or SS **may** be an 802.1 bridge (implicitly)
  - The 802 CS SAP **IS** the ISS
    - No need to define the primitives in the spec.

What this means for the 802.1D Text (2)

- Primitive Parameter Mappings – 802.3 CS
  - The mappings of the parameters of the M_UNITDATA primitives are described by referring to the relevant 802.1 CS or 802.3 CS text in 802.16 and section 6.5.1 of 802.1D.

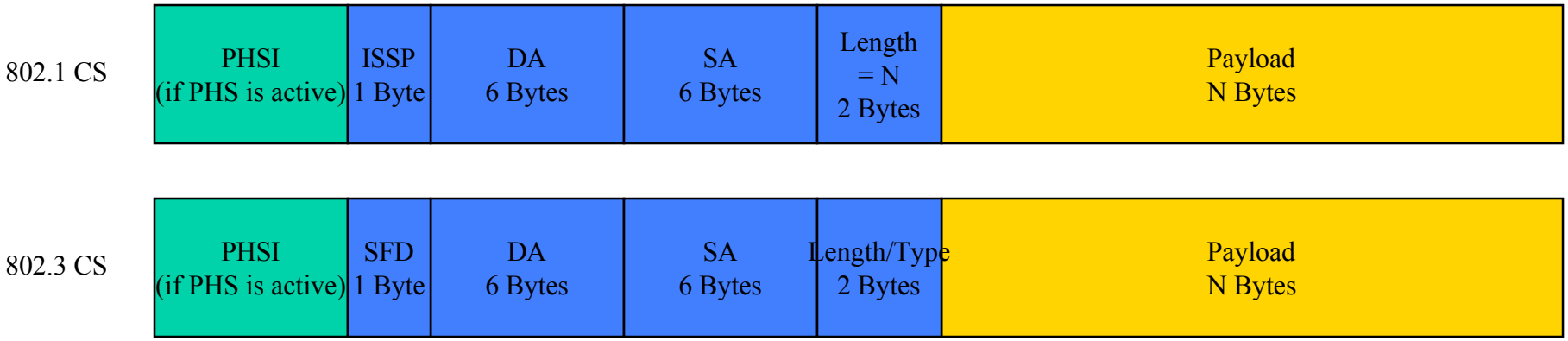
What this means for the 802.1D Text (3)

- Primitive Parameter Mappings – 802.1 CS
  - The encoding of the primitive fields must be defined
  - This proposal uses a structure similar to 802.3, but uses the initial byte to directly encode **user_priority** and **access_priority**.



Why this format?

- The proposed format closely matches the 802.3 header format, but improves support for the end to end maintenance of the user_priority value.



What this means for the 802.1D Text (4)

- ISS Support
  - ISS is supported for 802.1 CS
  - ISS is supported as per 802.3 for the 802.3 CS
  - ISS is not supported for ATM and IP CS
- Priority Mappings
  - Priority mappings of 8 level user priorities to 802.16 CS CID mapping and service flows are defined in Packet CS already.
- Annex A PICS Proforma
  - Support for 802.16 must be added to the PICS proforma in Annex A of 802.1D

Summary

- Explicit support for bridging of 802.16 between and other 802.* devices.
- Ambiguities in VLAN tagging format disambiguated
- Declaration of point to point nature of BS-SS CS peers provides background for correct bridging over new entities such as relay stations
- Explicit support for 802.1p end to end priority data through explicit encoding of user_priority
- Physical format of 802.1 CS and 802.3 CS headers close
- PAR and 5C commitments met