P802.1CB Layering Issues

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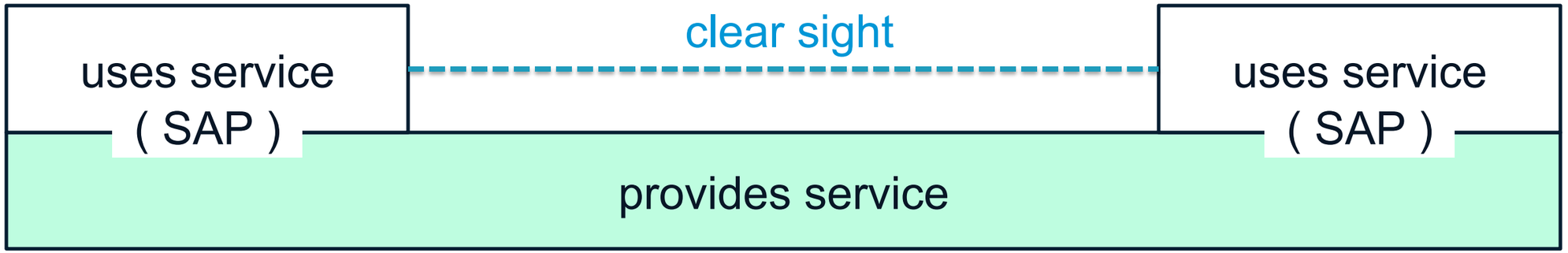
Issue with P802.1CB D1.0

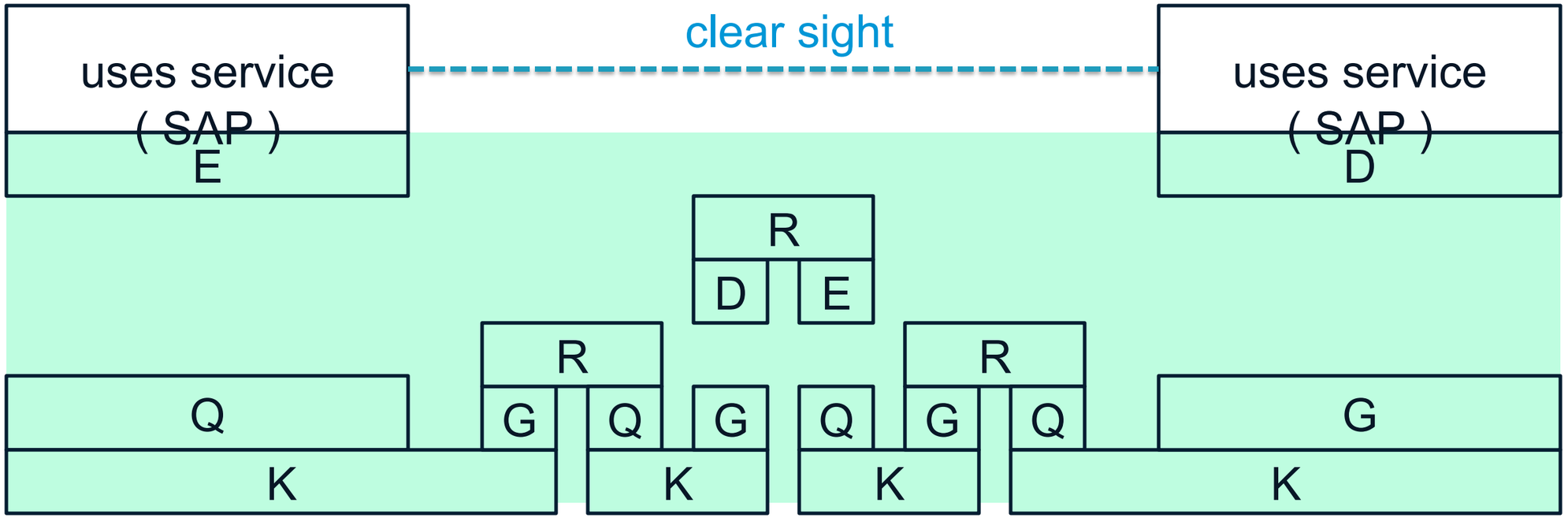
Fundamental layering



SAP == Service Access Point

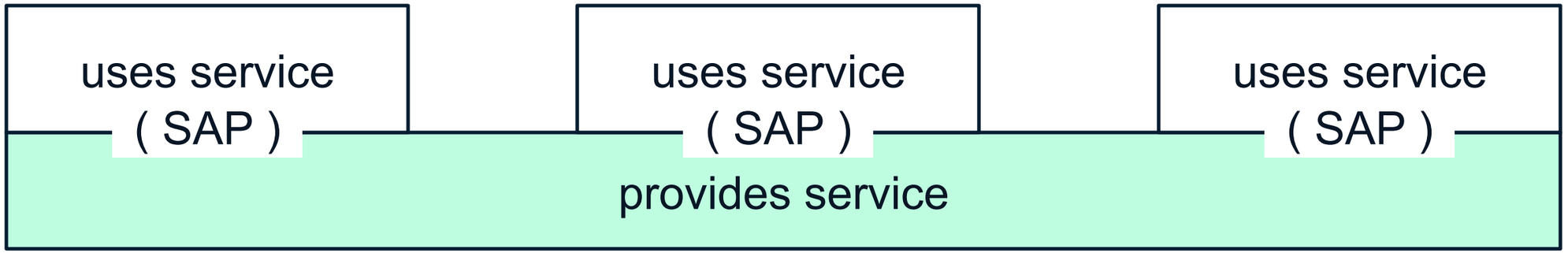
- Peers talk to each other by sending requests down the stack to the lower layers, and receiving indications up the stack from lower layers.

Fundamental layering



- Service can be very complex, but that is invisible to the users of the service.
- Imagine MACsec (or something similar) hiding all of the details.

Fundamental layering



You CAN have multiple peers, of course.

Current diagram for ladder redundancy

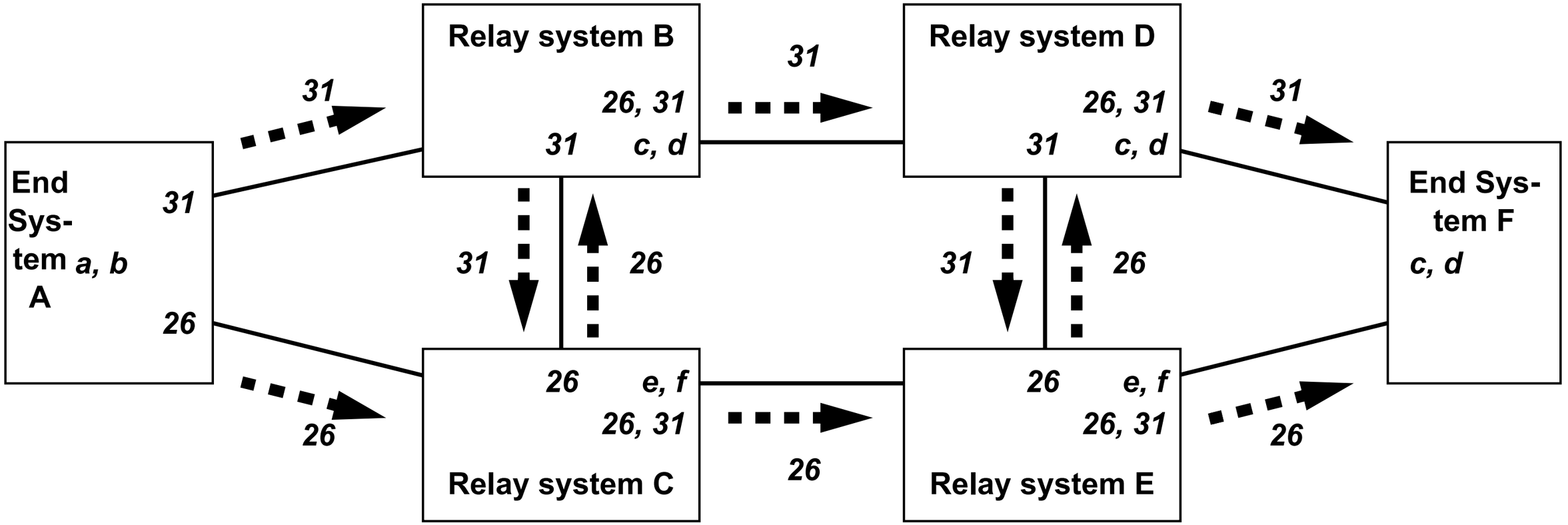


Figure F-6 Ladder Redundancy

Perhaps a better diagram for ladder redundancy

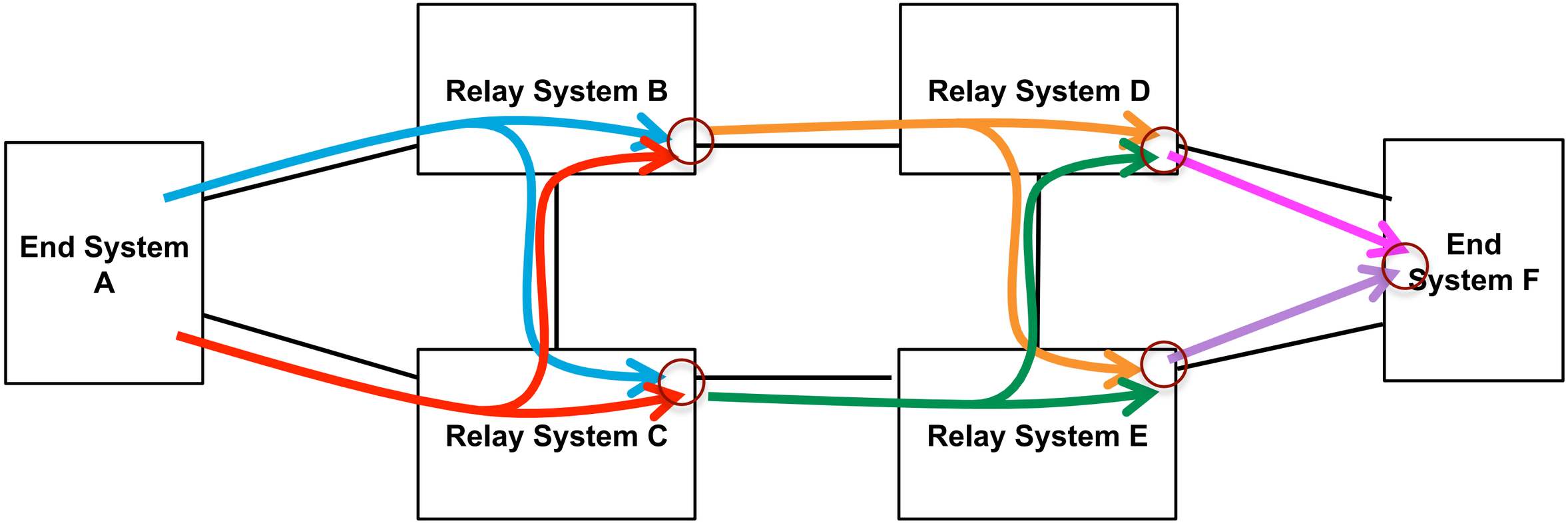
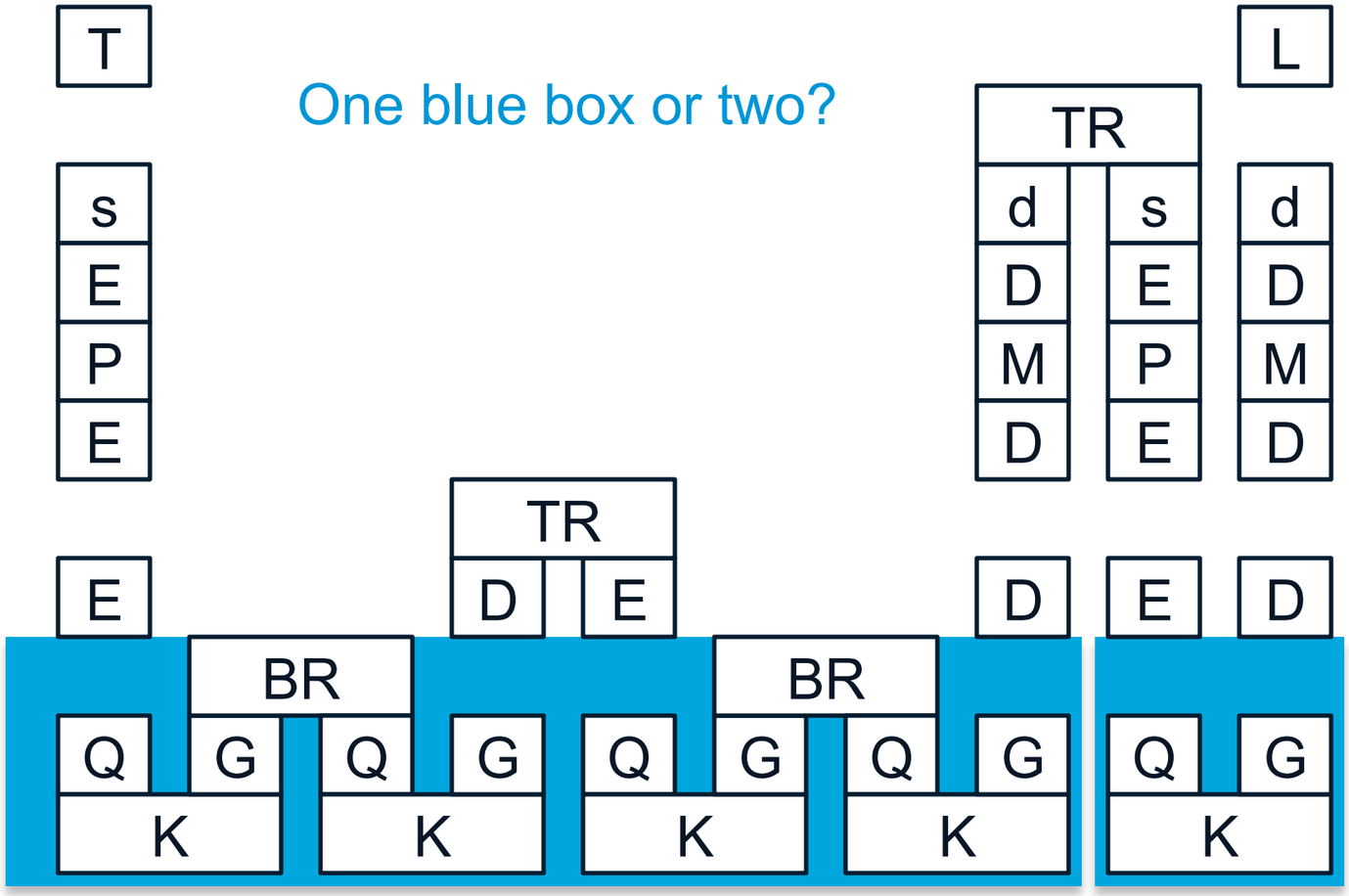


Figure F-6 Ladder Redundancy

- We seem to agree that this is what we want to happen.

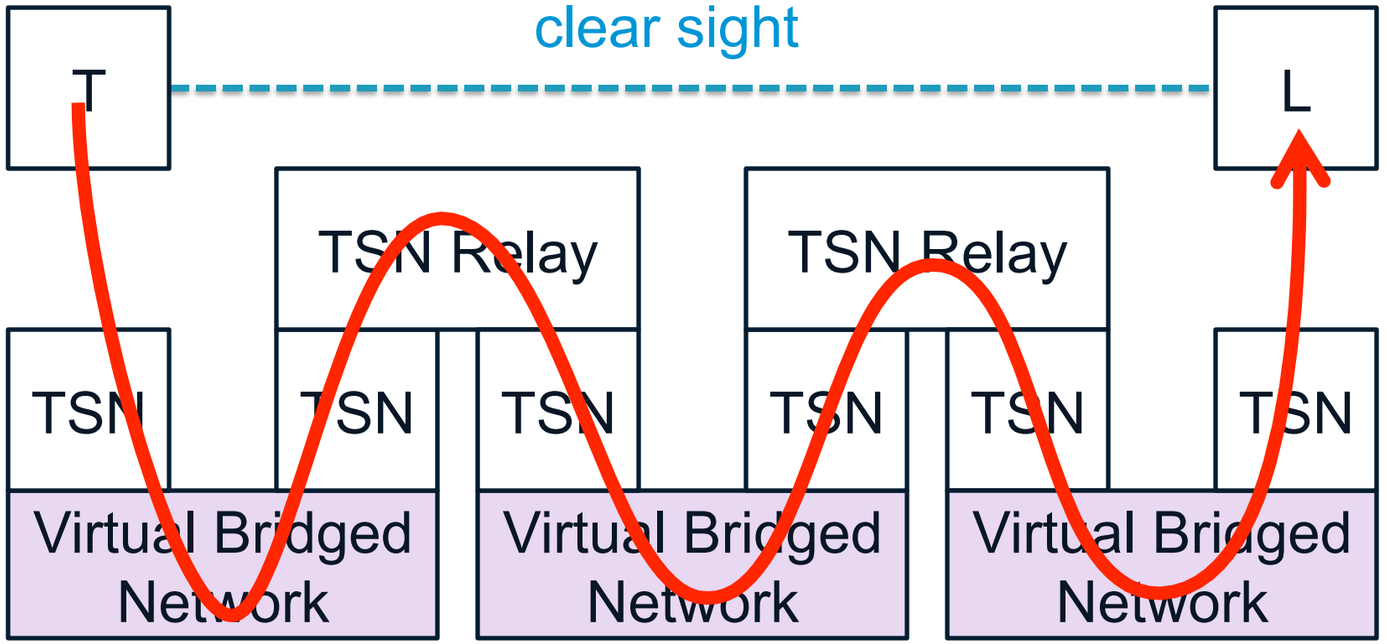
Model in P802.1CB D1.0



KEY

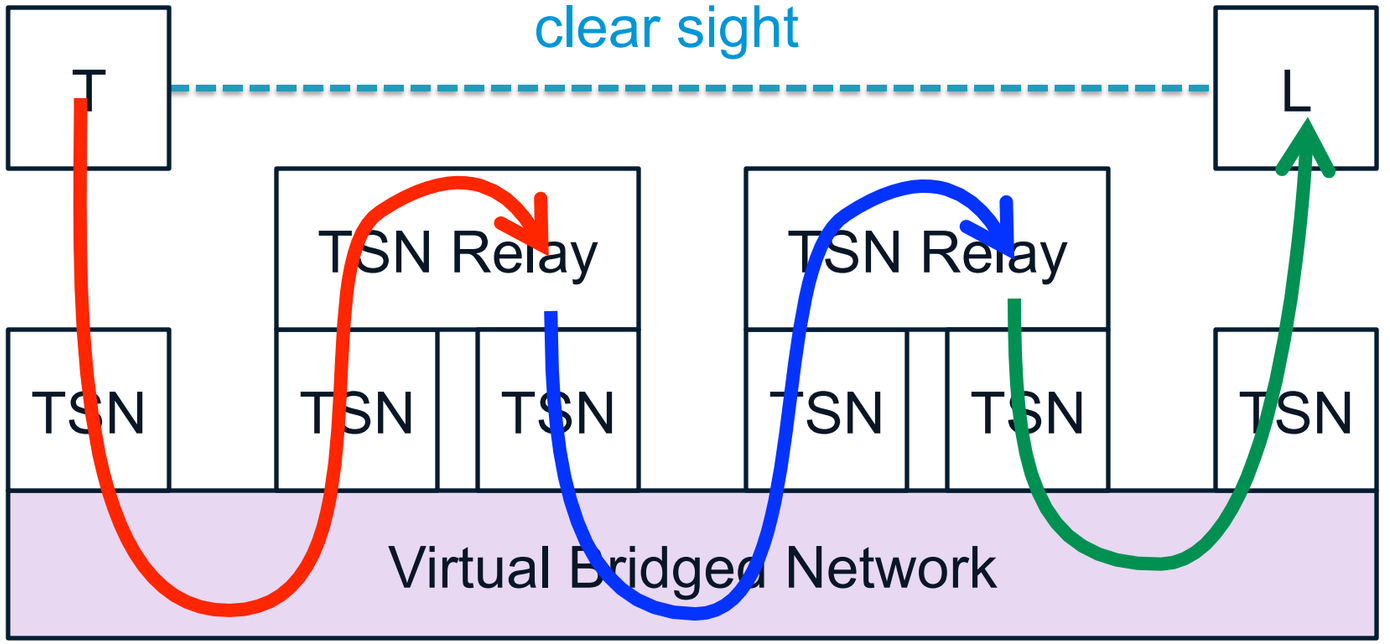
T	**T**alker
L	**L**istener
s	seamless redundancy **s**erializer
d	seamless redundancy **d**iscarder
P	seamless redundancy s**P**litter
M	seamless redundancy **M**erger
E	**E**ncapsulate (maybe null)
D	**D**ecapsulate (maybe null)
Q	TSN **Q**ueuing/shaping
G	TSN input **G**ates
R	bridge/route/2-port **R**elay function
K	lin**K** (may be point-to-multipoint)

Routing among bridged networks example



- What we're doing, now, is either **chopping the network into pieces**, so the TSN relay is making (absolutely trivial – in left, out right) routing-type decisions . . .

Tunneling endpoints on one bridged LAN



- . . . or we're **double (triple) dipping** into the same bridged network, so we have to take steps (tunnels) to keep the various conversations separated.

  (That is, we have to ensure that the blue center arrow doesn't go back to the Talker.)

P802.1CB D1.0

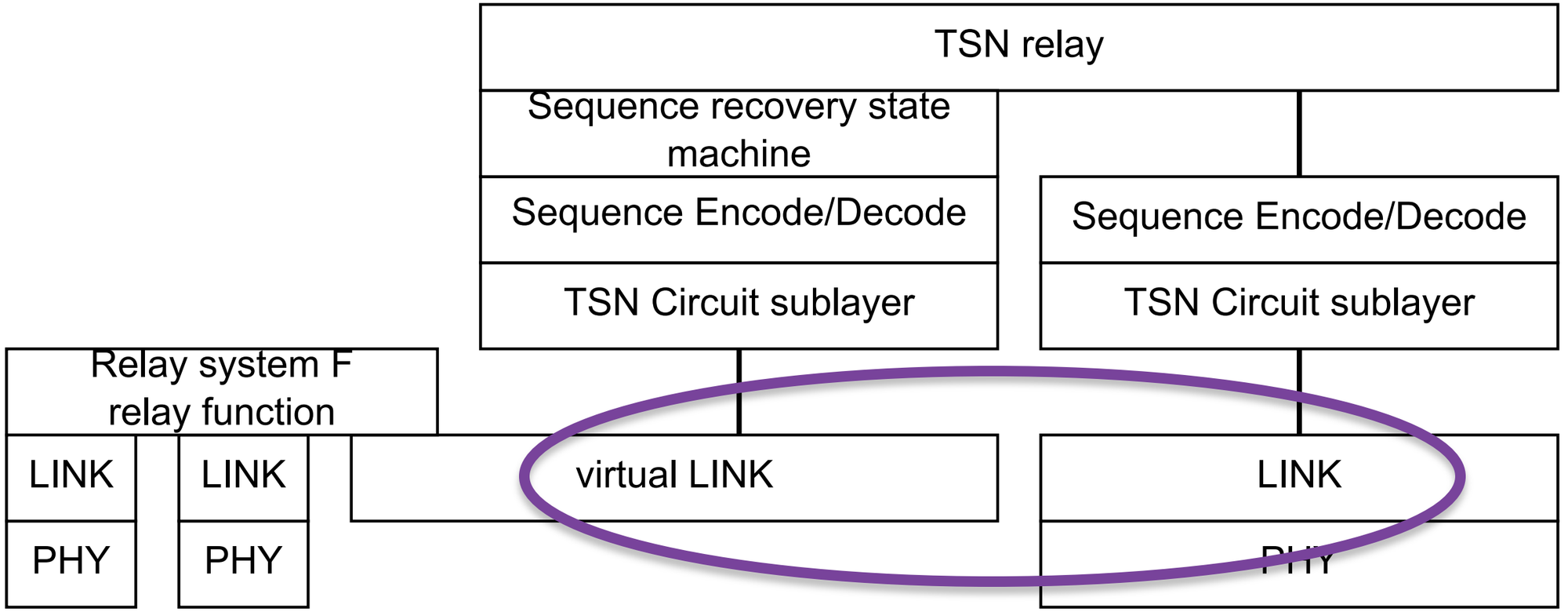
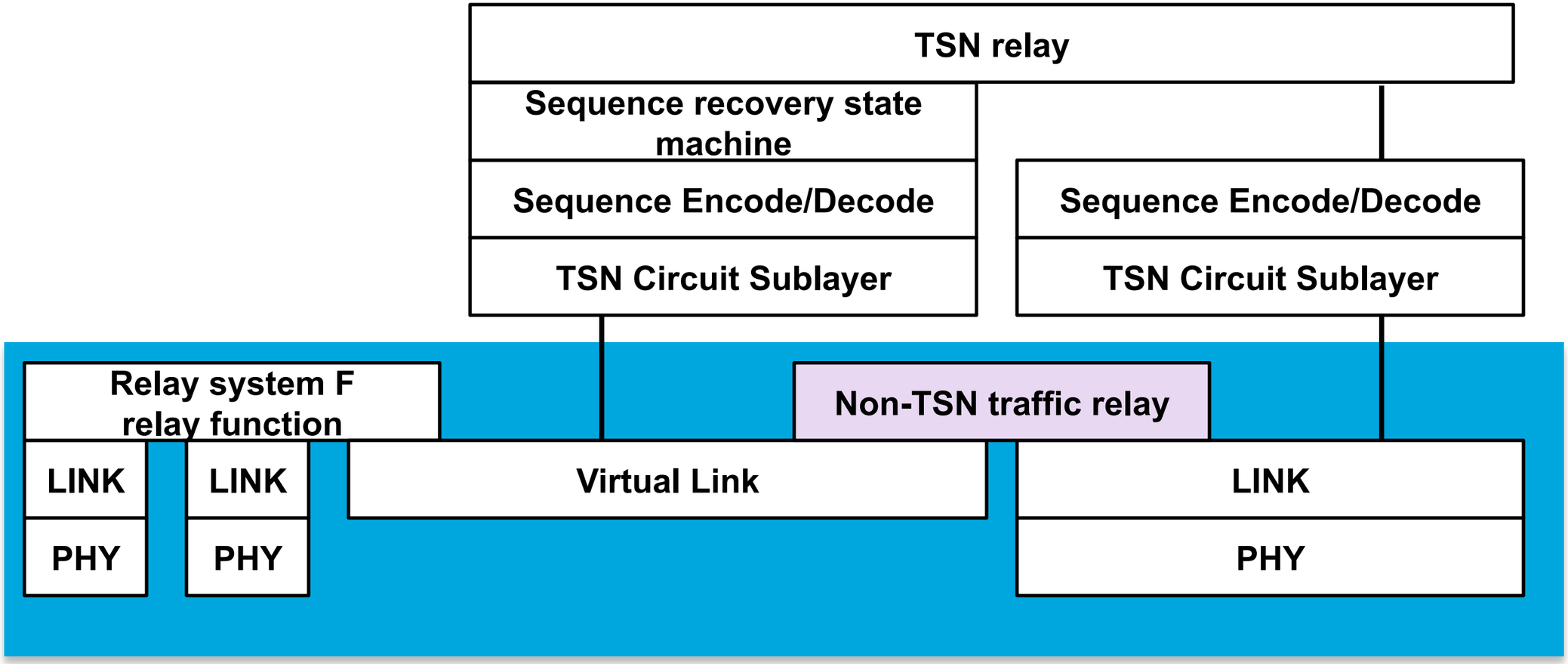


Figure F-4—Protocol stack for relay system F in Figure F-1

- **Problem:** Where is the **non-TSN traffic** in the “TSN relay”?

One answer

Where is the non-TSN traffic?



- **One answer:** A **Non-TSN relay** keeps the non-TSN traffic where it belongs.

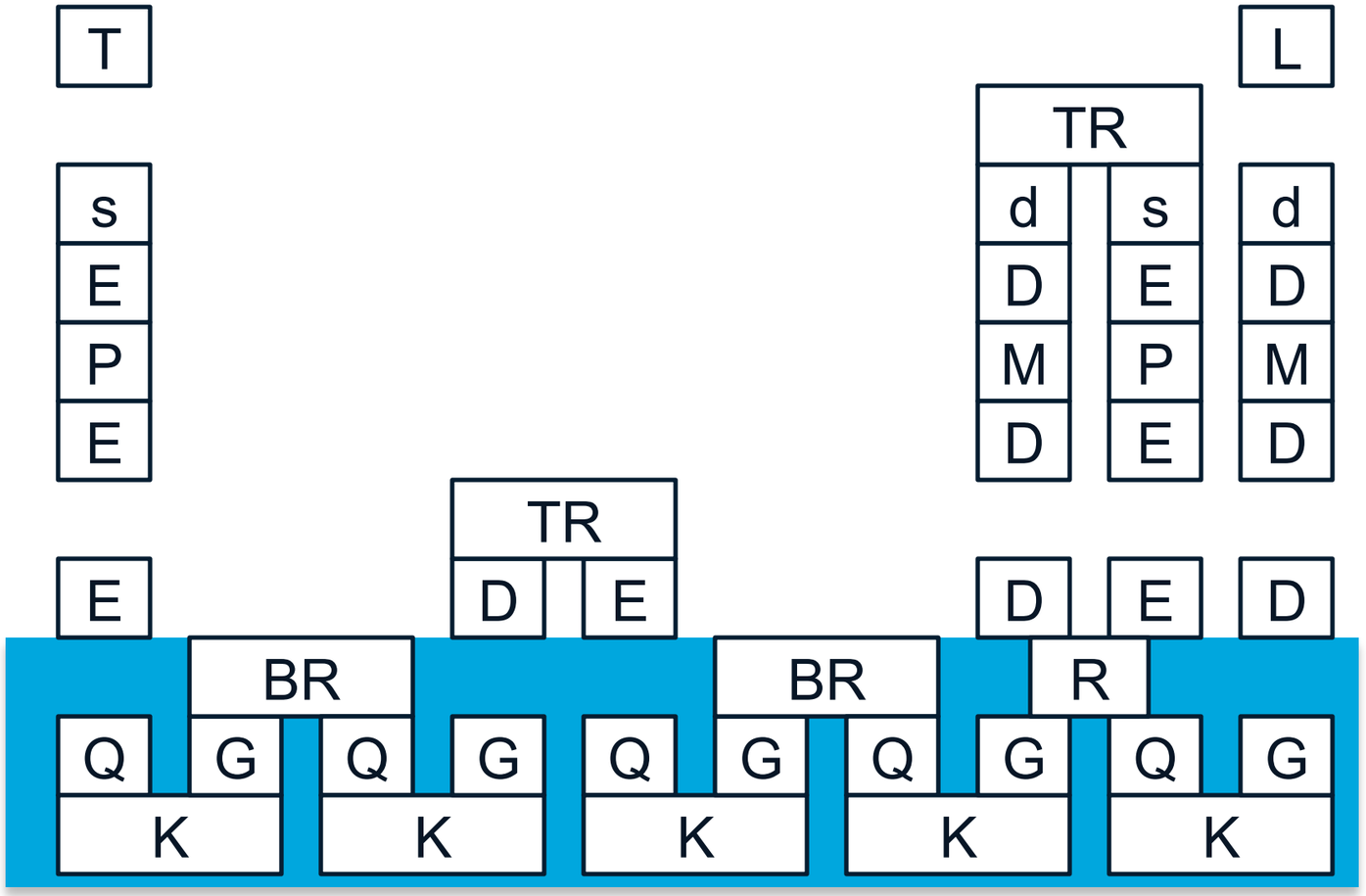
VLAN tags vs. CB tags

- **Norm's erroneous thinking:** With "proper layering," P802.1CB can ignore whether it is dealing with bridges or routers.
- QUESTION: Suppose the network uses MAC-in-MAC-in-IPsec-in-VPN? A device near the center has to **unravel the whole stack to get to the CB-tag**, and thus tell whether this is TSN traffic or non-TSN traffic.
  - Obviously, the IPsec would make that impossible.
- QUESTION: What is the non-TSN relay?
  - **A TPMR?** I don't think we want the "Popeye arm" to intercept xx-0E LLDP PDUs!
  - **A TPMR?** What if the relay system is a router, and not a bridge? There is no equivalent of the TPMR in the routing world.

A possible “solution”

1. We define, as loosely as possible, the non-TSN relay.
2. We decode as much of the stack as necessary to identify our packets and deal with them.
3. We accept that this is a layer violation, in the same sense that we told IEEE 1588 that the transparent clock is a layer violation.
4. We should consider changing the source MAC address of the regenerated packet, as for IEEE 1588, on the grounds that the stream is re-entering the virtual bridged LAN service.

In other words, there is only one blue box



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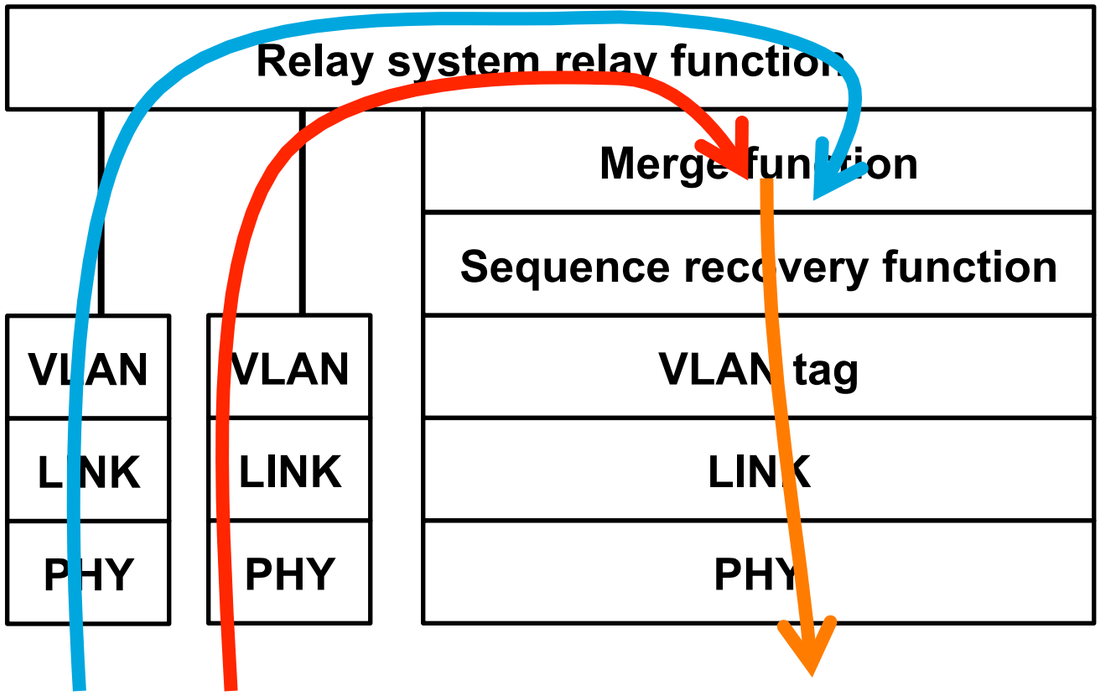
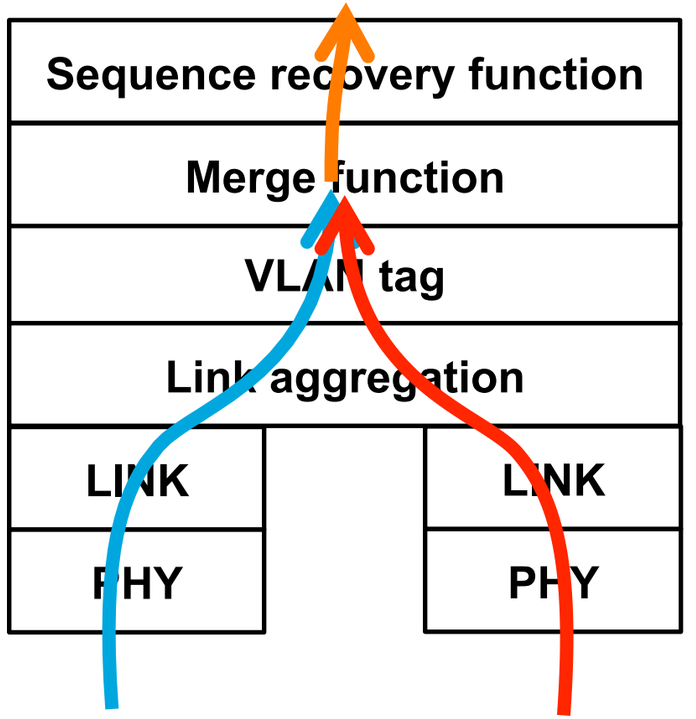
Another answer

MSDU manipulation

Edge Relay System proxying for Listener



LinkAgg Listener



- Eliminate the Popeye diagrams.
- Define functions that manipulate the mac_service_data_unit (MSDU)

MSDU manipulation

- Although the functions operated only on the outside of the MSDU, this formulation still violates layering, in that the seamless redundancy peers do not have clear sight of each other over the intervening relay functions, and the peers do not reach each other by talking down the stack. (Exactly like 802.1ag CFM!)
- This also has the disadvantage that the functions have to work both “rightside up” and “upside down” – note that the order of the layers and the direction of the packets handled are reversed for the bridge and the end station in the previous slide. (Like CFM!)
- But, it is likely that this description is closer to how an actual implementation would be built.

Summary

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- I conclude that 802.1CB in some sense “violates proper layering” when applied to bridging and/or routing as they exist, today.
- This does not mean that P802.1CB is evil, and must be discarded
- We should consider changing the source MAC address at the points where the first suggested answer pops up above the relay functions. That also might make debugging easier. It is not clear that the CB-tag demands this.
- The editor recommends that both formulations (D1.0 and MSDU manipulation) be in the document. We must pick which is to be in the normative sections. Expediency favors D1.0.
- The D1.0 formulation Popeye diagrams need a “non-TSN relay” at the level of the bridge/router relay to keep non-TSN packets below the line.

Thank you.