



Discussion issues on Ethernet OAM

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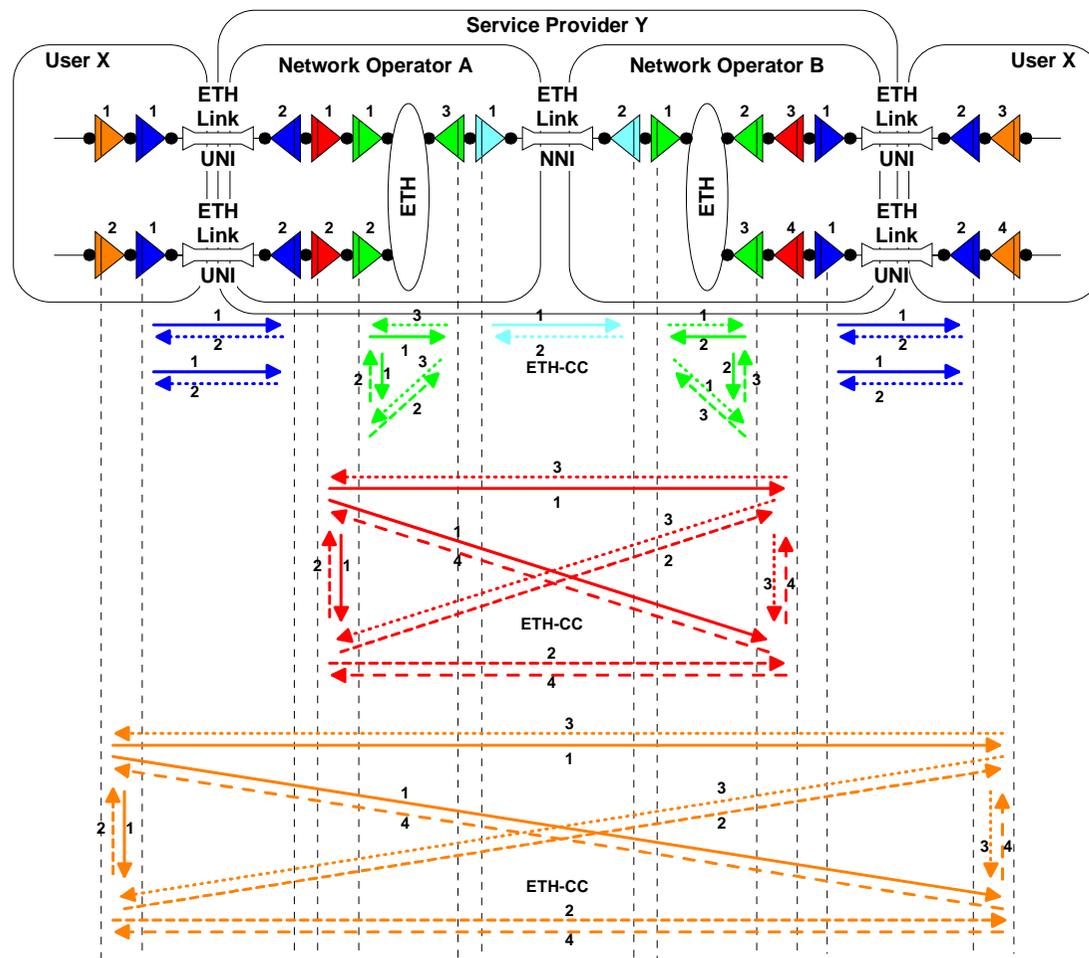
ITU-T SG13, Q.3/13 rapporteur

ITU-T SG13, Q.3/13 current status

- Last ITU-T SG13 meeting: Feb. 3-12, 2004
- Ethernet OAM requirements: Y.1730
 - Approved in Jan. 2004
 - Aligned with Ethernet architecture study in SG15 (G.8010/G.8011)
- Ethernet OAM mechanisms: Y.17ethoam
 - Under development
 - Discussed by people from IEEE 802.1 and MEF also
 - Progressed the area of maintenance entity and modeling
 - Worked on dual-bridge model
 - Clarified the relationships between IEEE 802.1 bridge model (baggy pants diagram) and ITU-T model (G.805/G.809 model)
 - Introduced a section on performance monitoring
 - Applicability where lower layer is not Ethernet phy (e.g., MPLS)
 - Need feedback from IEEE 802.1 and to be aligned with work here.

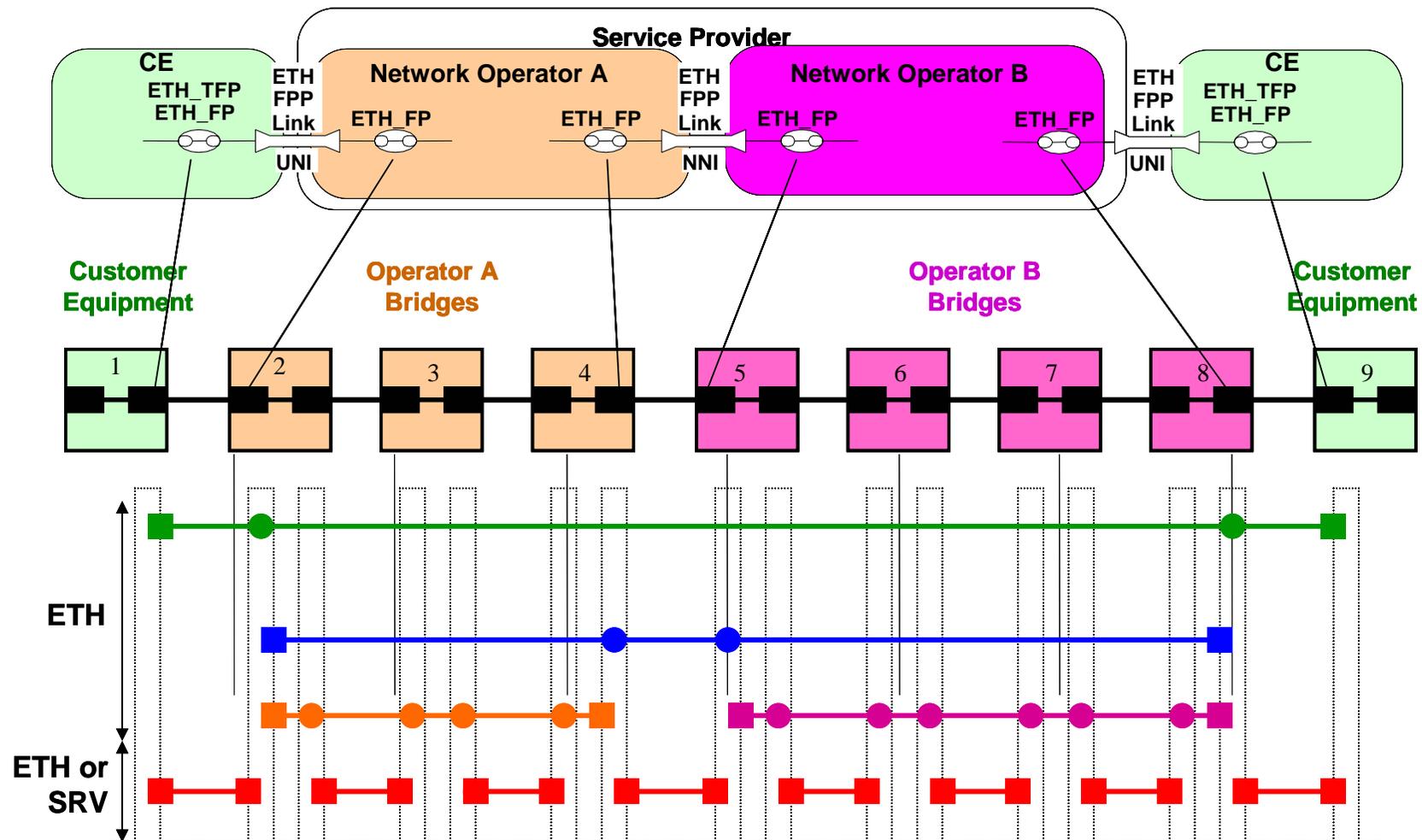
Maintenance entity (ME)

- OAM target includes multipoint-to-multipoint connectivities
- ME is defined for point-to-point connectivities
- A multipoint connectivity is handled using a group of MEs.



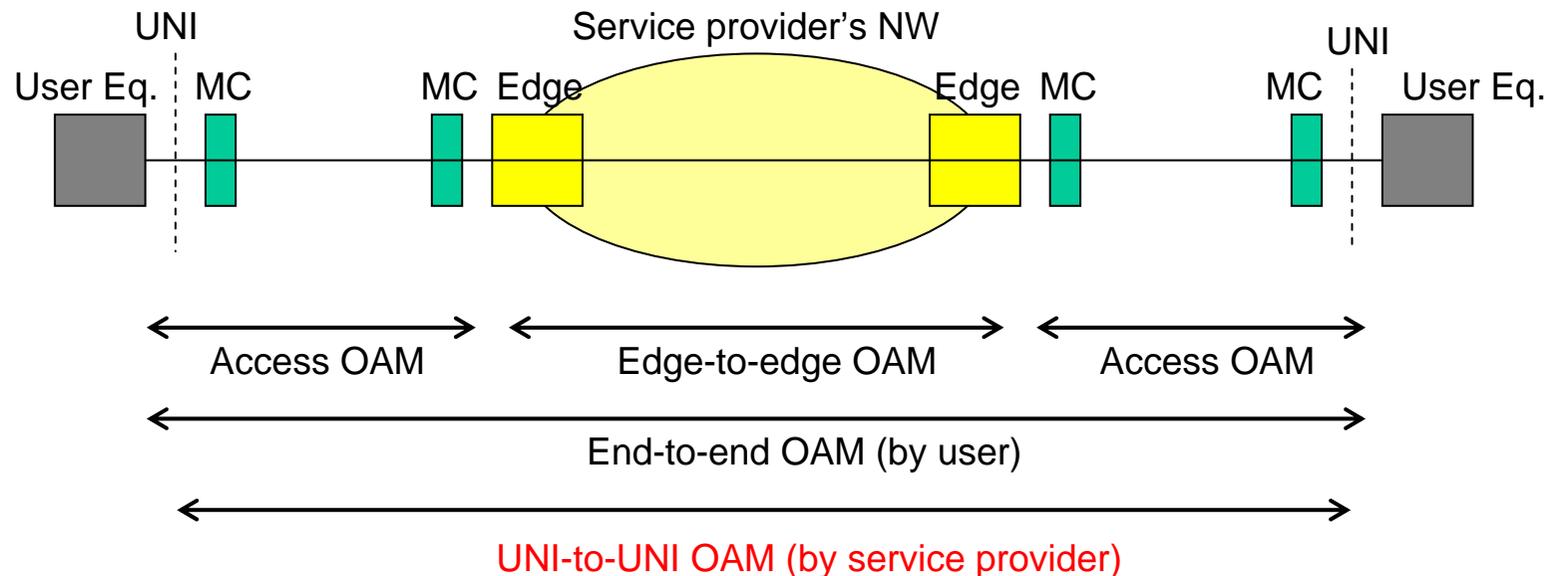
Multi-level Ethernet maintenance entities

Provides OAM capabilities for network operators (link and edge-to-edge), service providers and users



How to manage a NW including media converters?

- Media converters (MCs) are widely used. UNIs are located between MCs and user equipments.
- Users can run OAM from an user equipment to another user equipment. But this activity is controlled by the user.
- How can service provider run end-to-end OAM? Is the combination of edge-to-edge OAM and access OAM enough?
- MCs can be under control of the carrier, but user equipments are not.
- **To realize UNI to UNI OAM for carriers, MC needs to have Ether network OAM as well as link OAM.**



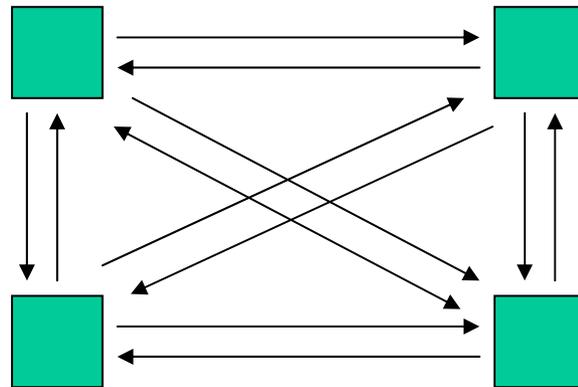
OAM functions (being discussed within Q.3/13)

- Continuity check (keep alive)
- Loopback (non-intrusive and intrusive)
 - Defect detection
 - Defect localization
 - Performance measurement
- AIS/RDI
- Traceroute
- Discovery

- Performance management
 - Frame loss
 - Frame delay
 - Frame delay variation
 - Others (errored frame seconds, service status (up/down), frame throughput, etc.)

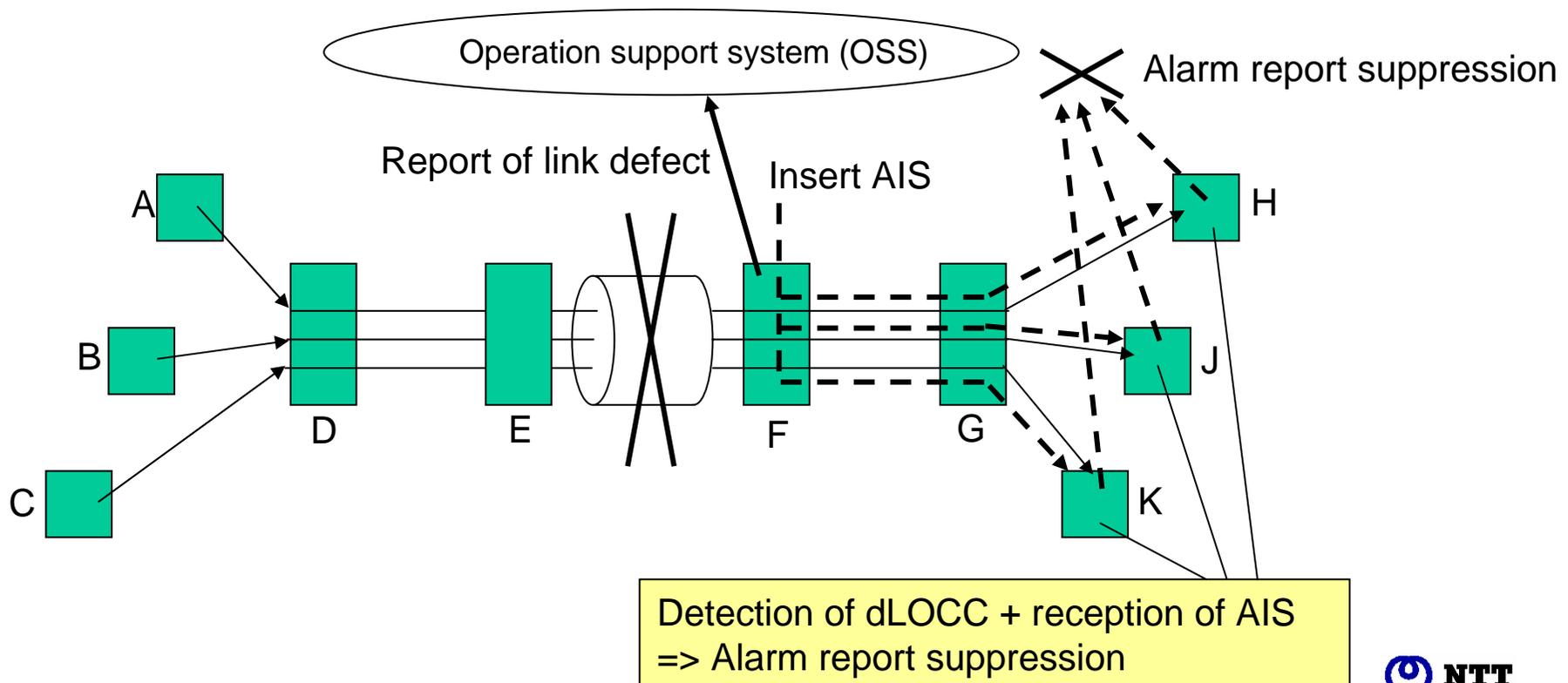
CC (Continuity Check / Keep Alive)

- Send CC OAM frames periodically (e.g., 1/sec)
- Each source sends to a unicast (p-p case) or multicast (mp-mp case) DA.
- Interval may need to be variable (configurable)
- Each sink detects CC OAM frames. It understands expected source by receiving the first CC frame
 - This saves configuration work at the sink.
 - Initial fault issue should be addressed.



AIS/RDI (FDI/BDI)

- Suppresses unnecessary alarm report to OSS to avoid 'alarm storm'.
- Widely used in connection oriented networks (e.g., SONET/SDH, ATM, MPLS).
- Further study is needed to apply to Ethernet.



Loopback (LB)

- Non-intrusive loopback
 - Only LB OAM frames are looped back (like ping)
 - Can be used for in-service test
 - Both unicast LB and multicast LB are possible.
 - Primary objective is to localize defects after detection (e.g., by CC)
 - Could be used for defect detection by running LB periodically
- Intrusive loopback
 - All the frames are looped back
 - Only unicast LB is possible

Other OAM functions (under study)

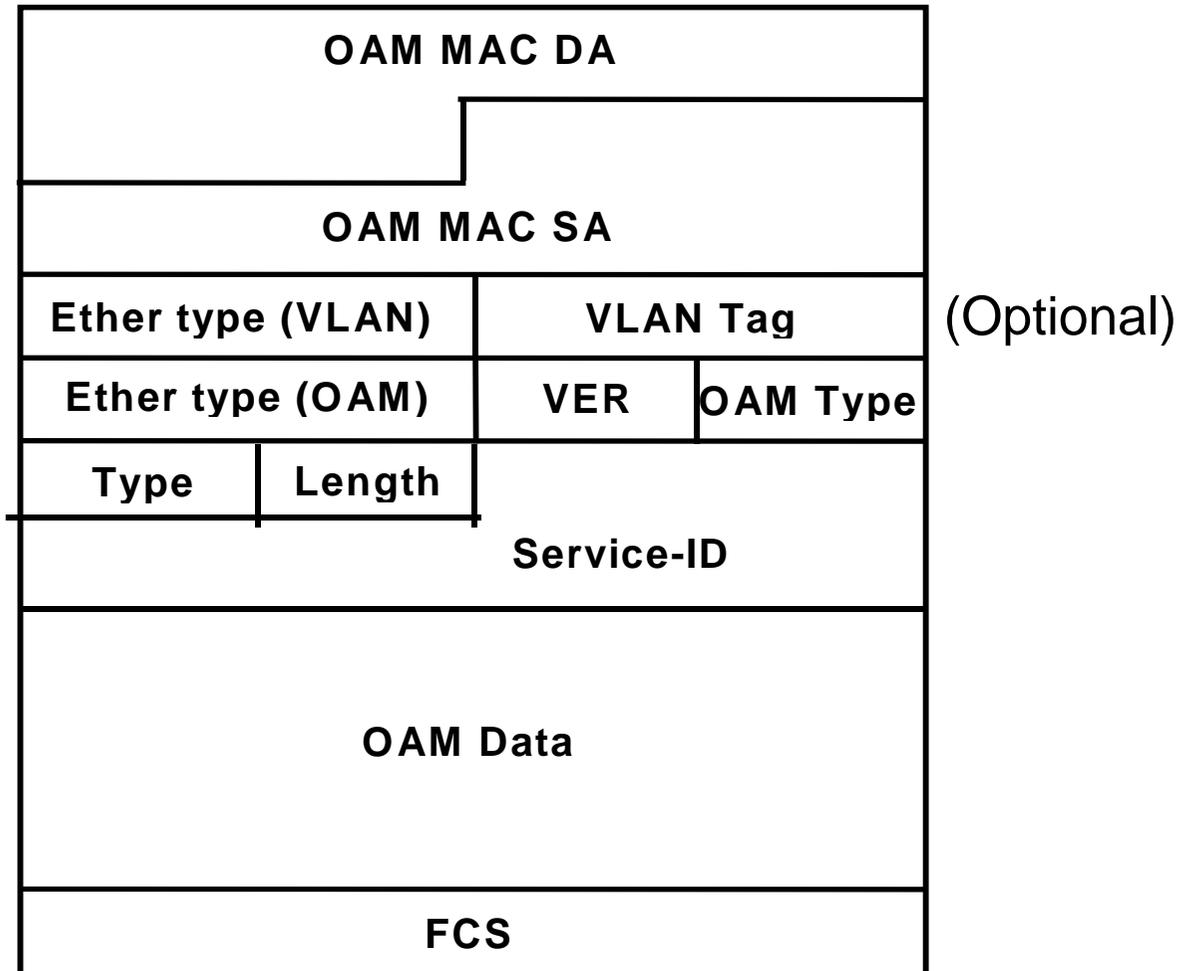
- Traceroute
- Discovery

Other possible OAM function

- Pre-service bandwidth test (point-to-point)
 - In the bandwidth guaranteed service, **bandwidth (throughput) performance** needs to be measured before it is released for services
 - Customers may require bandwidth performance in other cases also
 - Could be realized by implementing test stream generator/detector.

OAM frame formats (under study)

- Uses Ether type and OAM type to identify OAM frames and its function

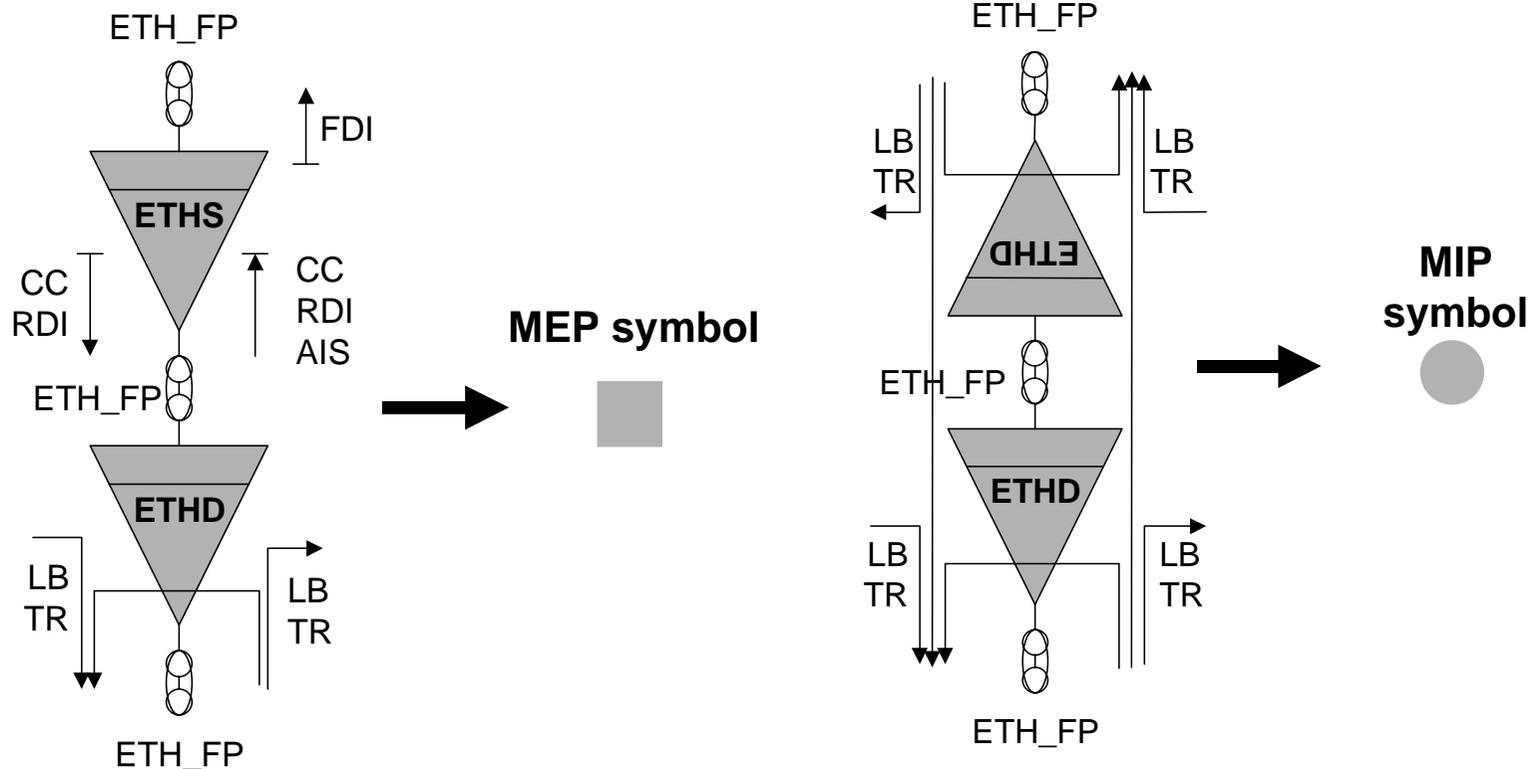


Summary and Future ITU-T meetings

- Some discussion issues were raised based on the work in SG13, Q.3/13
- Would like to have feedbacks from IEEE 802.1
- Need alignment and cooperation with IEEE 802.1 and MEF
- Future ITU-T meetings
 - Interim: June 7-11 in Geneva
 - Additional interim: September ?
 - SG13 plenary: Nov. 30 – Dec. 10 in Geneva

Back up

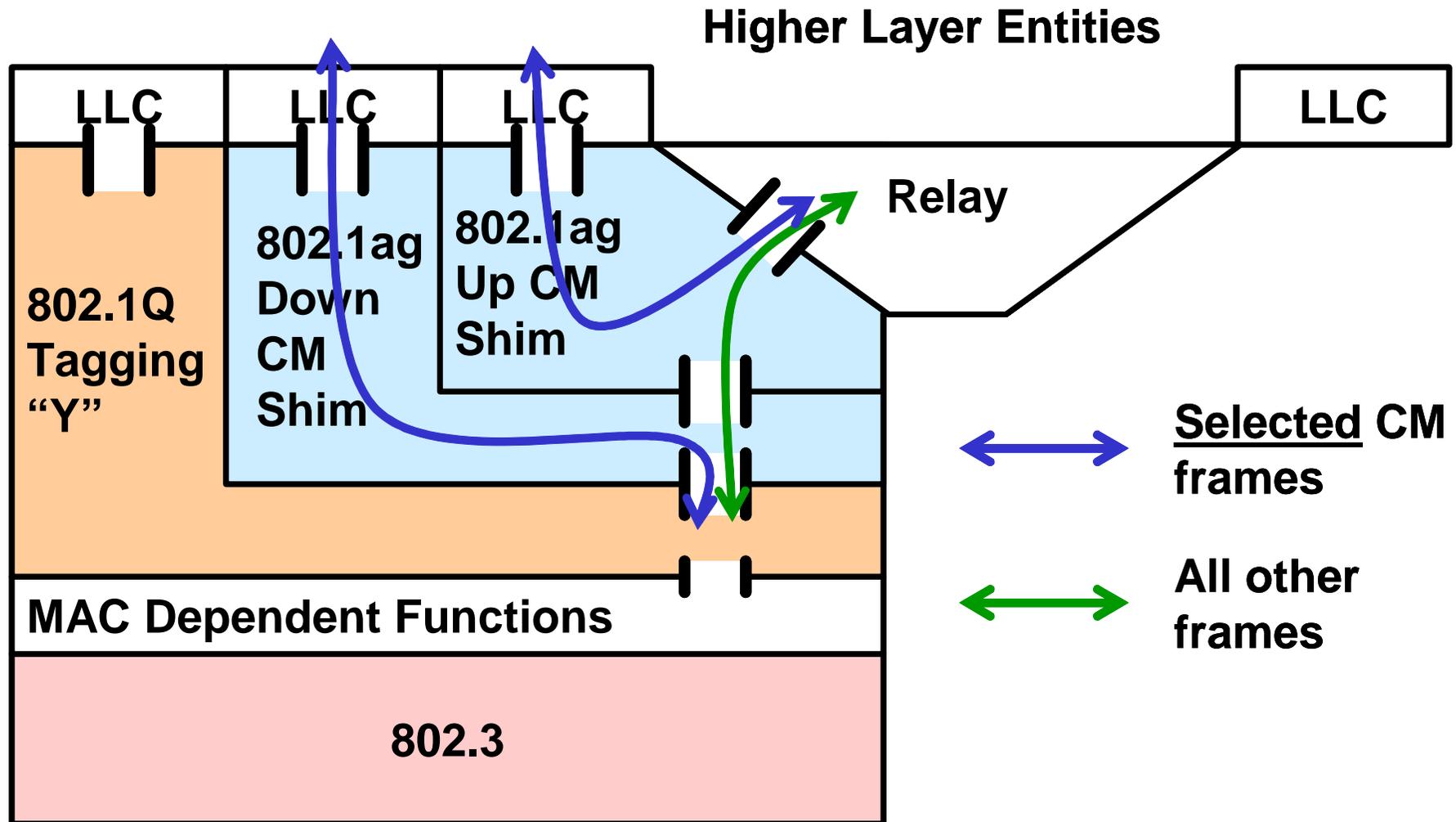
MEP and MIP models using G.805/G.809



MEP: Maintenance End Point

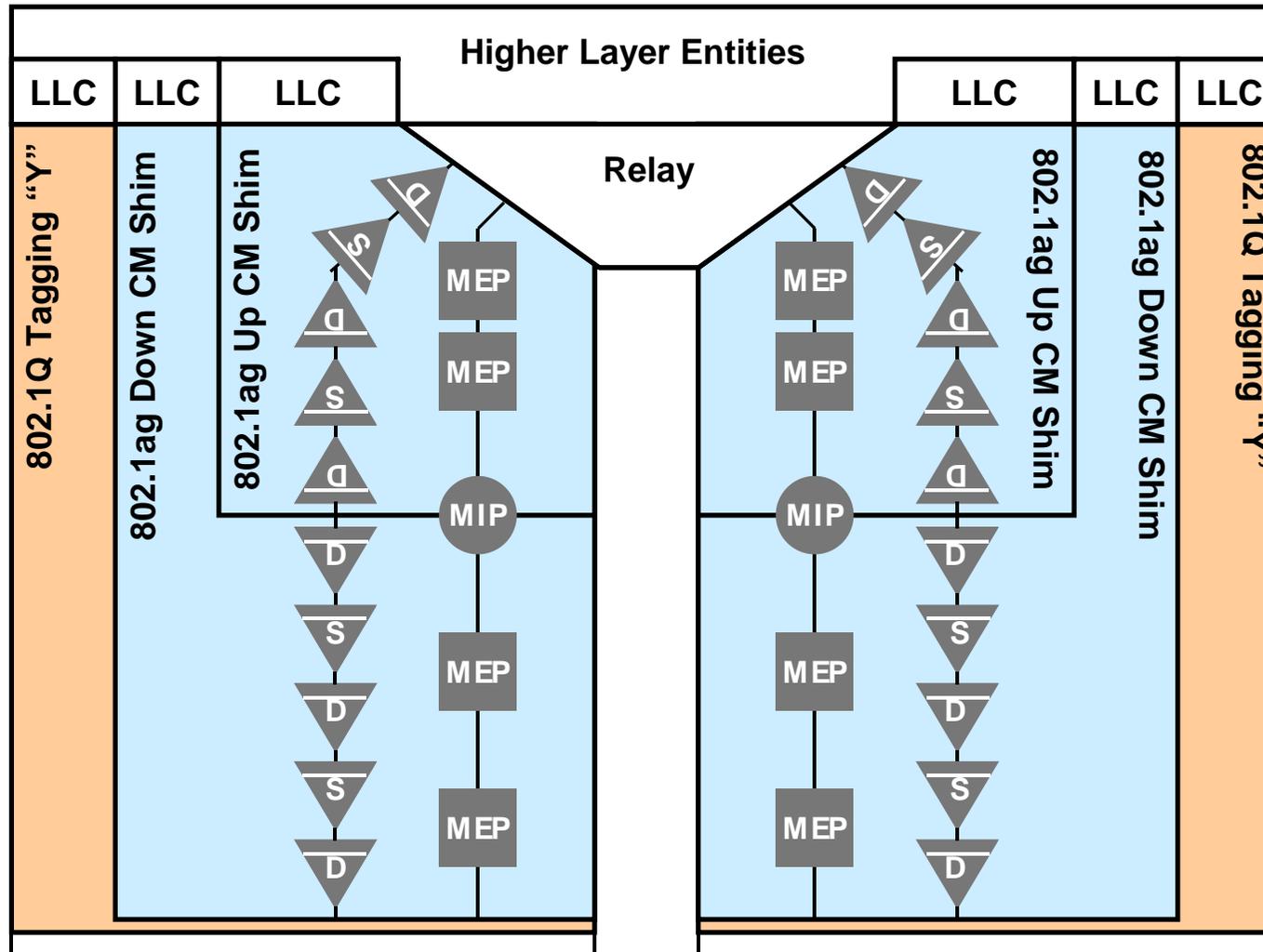
MIP: Maintenance Intermediate model

OAM (Connectivity Monitoring) shim in the baggy pants model

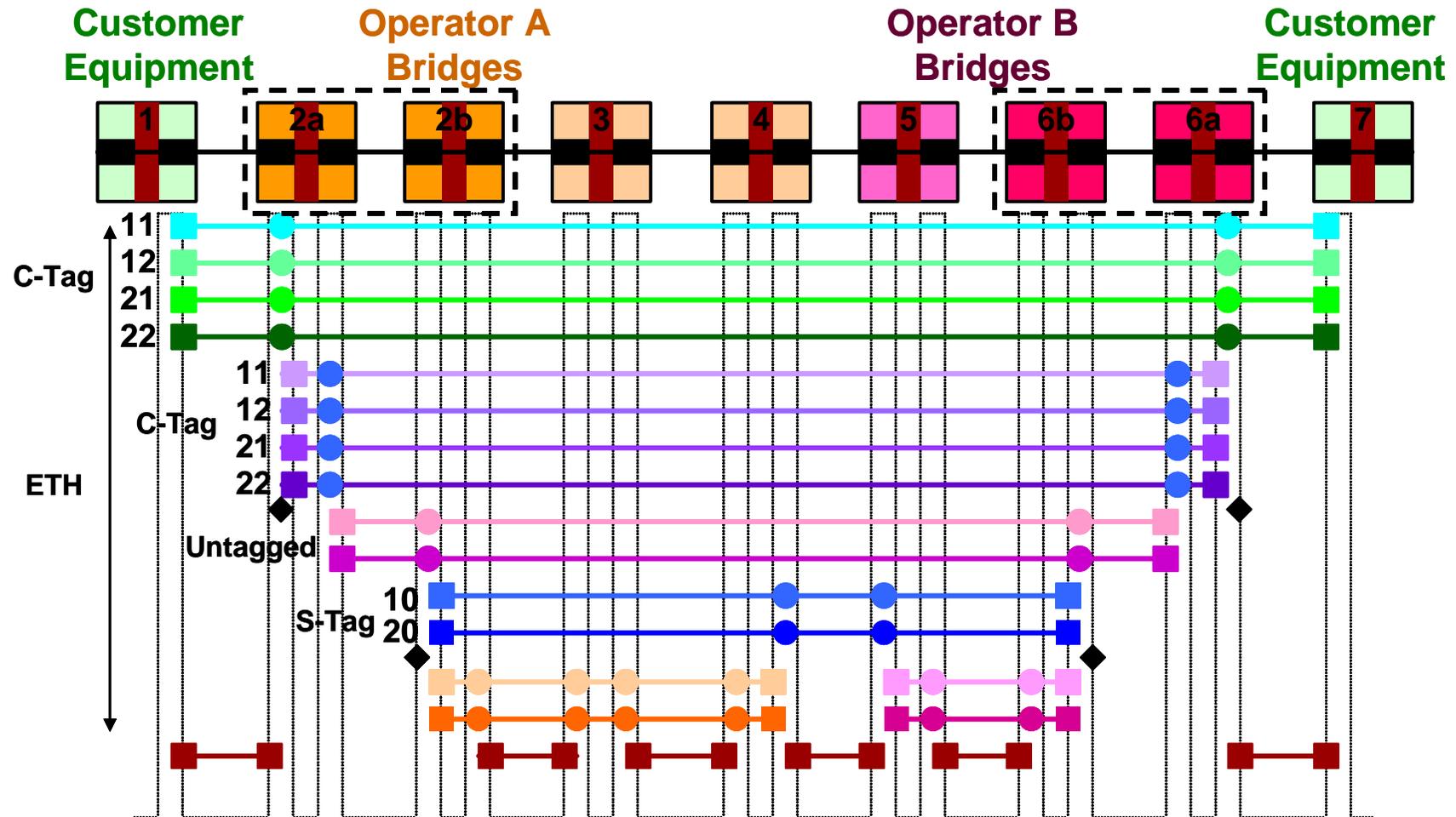


Baggy pants model and G.805/G.809 notation

Some MEPs or MIPs may not be activated depending on the location of the bridge.

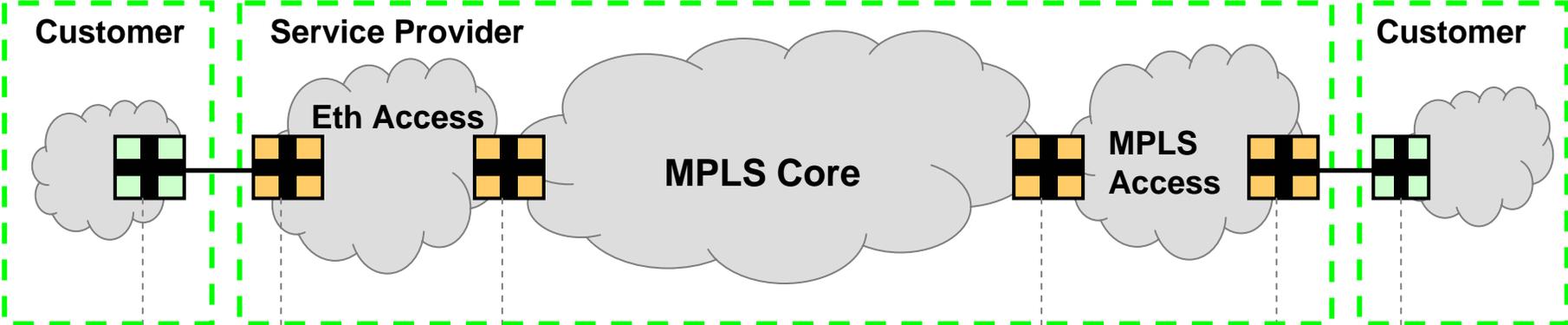


Dual-relay model with service bundling



2a, 6a: peer customer L2CP protocols, multiplex user flow
 2b, 6b: accommodate multiplexed user flow into a VLAN

Application example to Ethernet over MPLS





 bridge/bridge equivalent ... OAM MEP/MIP

Looking into more details ...

