# Enhancement to Loopback defined in 802.1ag

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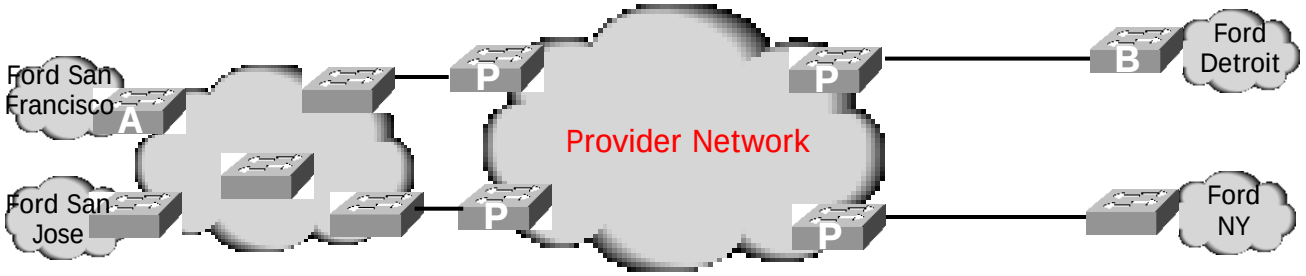
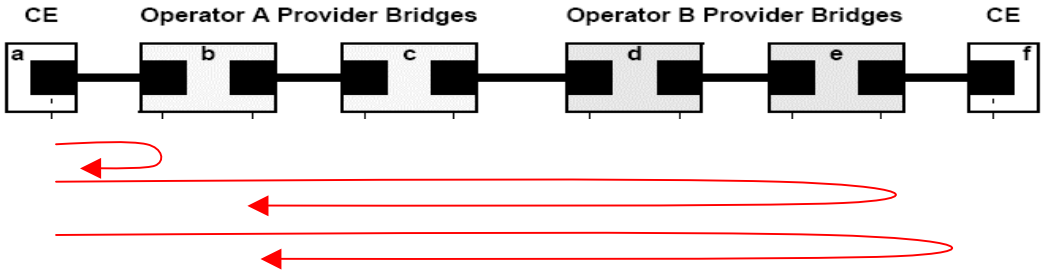
# *Analysis of Current Loopback defined by 802.1ag*

- Loopback described by 802.1ag (Section 18.7.3):
  - *A special loopback CFM message sent to an unicast address. The receiver validate the message and send Loopback response*
- Comparison of Loopback defined by 802.1ag with IP network:
  - The 802.1ag defined Loopback <==> Ping used in IP network
  - The current 802.1ag loopback is more like ECHO than loopback.
- Following maintenance need hasn't been addressed by 802.1ag:
  - When customer encounters packets drops or bandwidth between two end points (A and B) not meeting the SLA, customer and provider need to trouble shoot where the packet drops occur and where the bottleneck is for the bandwidth drop.

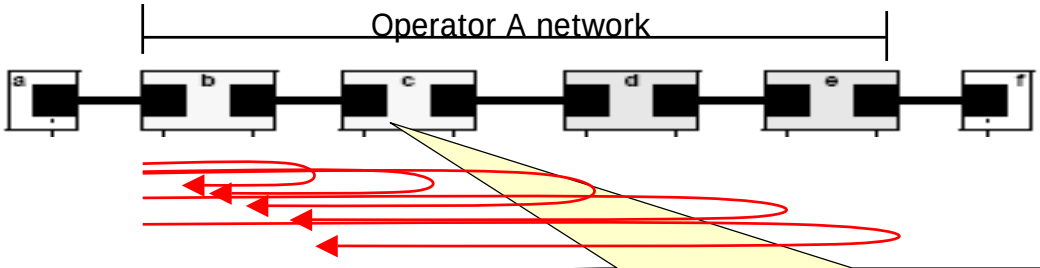


# *802.1ag Should Enhance Loopback for Better Network Trouble Shooting*

- Payload loopback should be supported for trouble shooting following network issues:
  - Packet drops between two end points
  - Bandwidth between two end points don't meet agreed SLA
- Two types of loopbacks to achieve the above maintenance goal:
  - CE MEP initiated payload loopback within its own Maintenance Association



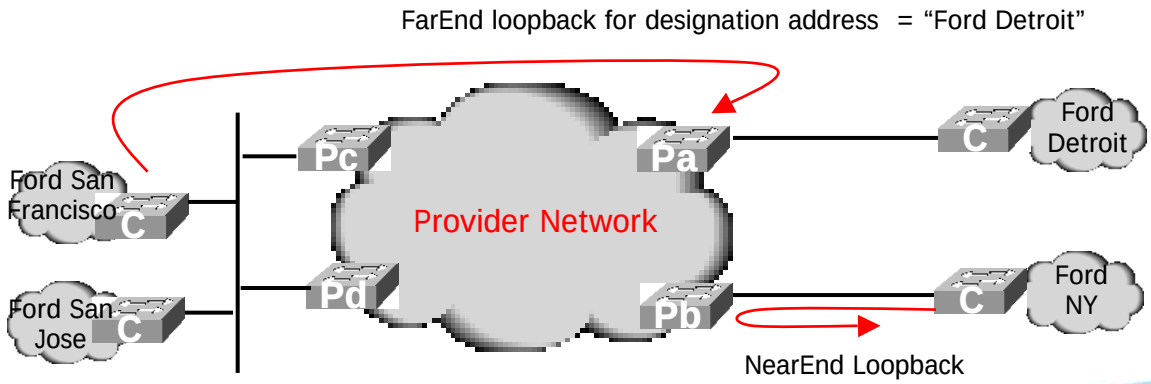

  - Provider initiated loopback of customer flow to pin point where the problems are




Any Provider Bridge can loop back a particular customer's traffic for diagnostics purpose.

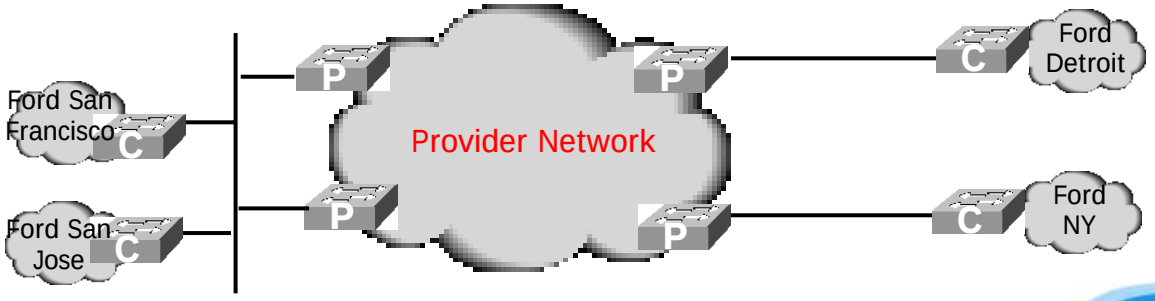
# Customer Initiated Payload Loopback within Its MA Level

- Why needed:
  - When customer encounters packet loss
  - When customer want to check the bandwidth between two MEP through the provider networks
- Multiple types of Loopback needed:
  - Loopback with Unicast address. The Unicast address could be:
    - customer MAC within the same MA level, or
    - Provider edge (MIP)'s MAC address
  - Near End and Far End Loopback at Provider Network's edge without specifying the Provider Edge's MAC address.
    - Why?
      - For simplicity and easy of operation from customer point of view
    - Destination address of Near End or Far End should still be the MAC address of customer MEP
      - E.g: From "Ford Detroit" to "Ford San Francisco", the NearEnd Provider Edge is "Pa", the FarEnd Provider Edge is "Pc" and "Pd".



# *Provider initiated Customer payload loopback*

- Why?
  - The intermediate bridges within Provider networks (ISAP) are not exposed to customer bridges. When customer find packet loss between NearEnd Loopback and FarEnd Loopback, Provider has be to be notified and be required to perform more detailed trouble shooting within Provider Networks.
- Simple ECHO and Link Trace for connectivity check is not enough.
  - It is possible that multiple customers are supported by one provider network, only one customer complain packet loss or bandwidth not meeting SLA. Other customers are fine. Under this circumstance, customer payload loopback is needed to trouble shooting the problem
- Need to perform payload loopback for entire C-VLAN or S-VLAN depending on the exact network faults:
  - It could be packet loss between “Ford San Francisco” and “Ford Detroit”, or only one direction (C-VLAN)
  - It could be packet loss among all the Ford locations (Entire service instance)



# Payload Loopback Mechanisms

- **Two new CFM messages are required**
  - Payload Loopback Start
  - Payload Loopback Ends
- **Address Scheme**
  - Exact Unicast address
    - Destination address is the MAC address of the MEP or MIP where the loopback should occur
    - The destination nodes of the Payload Loopback request could be any nodes within the MA domain, or MIP to provider networks.
  - Abstract Address
    - NearEnd Provider Edge
    - FarEnd Provider Edge
      - There could be multiple FarEnd Provider Edge ports. Customer could send the Payload loopback request to individual Provider Edge, or all the FarEnd Provider Edge ports.
- **Payload Loopback Attributes**
  - Should specify the flow (C-VLAN or S-VLAN) which are to be looped.
- **Operation:**
  - When a bridge receive a Payload Loopback Start CFM request, if it is destined to him, he will loopback entire flow of the specified C-VLAN or S-VLAN
  - When a bridge receive a Payload Loopback  End CFM request, if it is destined to him, he will stop the payload loopback.