Connectivity Fault Management

An Update on Bridging Technologies

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What is Metro Ethernet? Traditional view:

Customer 2 Site r

2r

Provider Network

2q

Customer 2 Site q

Customer 1 Site x

1x

Customer 2 Site p

2p

1y

Customer 1 Site y

1z

Customer 1 Site z
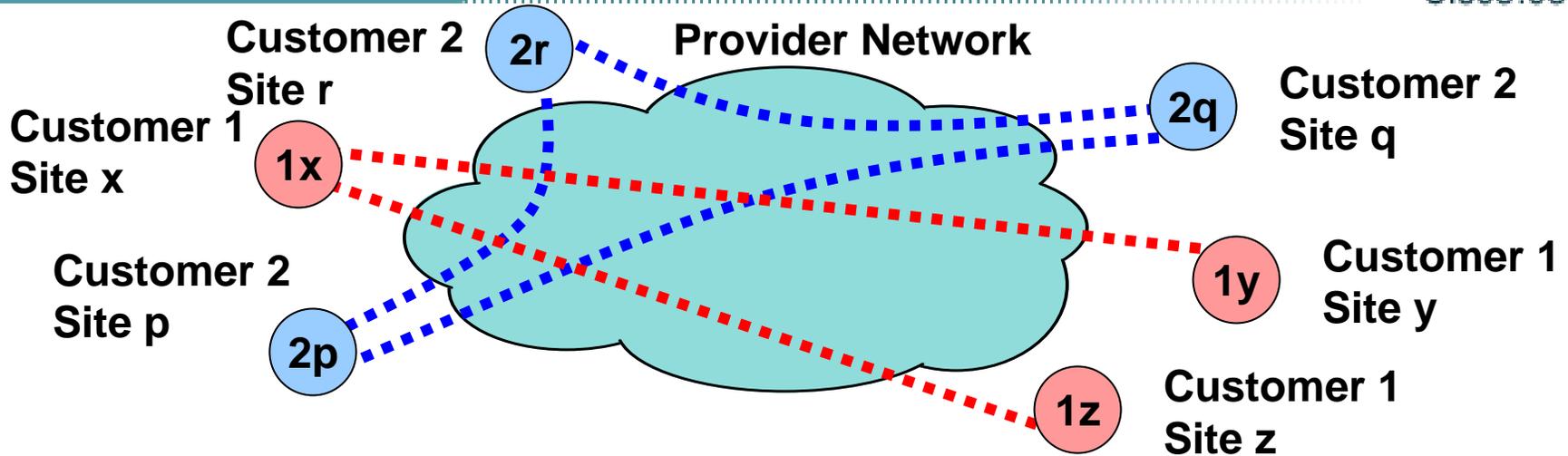
- **Carrier provides point-to-point data services.**

- **Customer builds network by balancing connectivity of point-to-point links against cost.**

What is Metro Ethernet? New view:
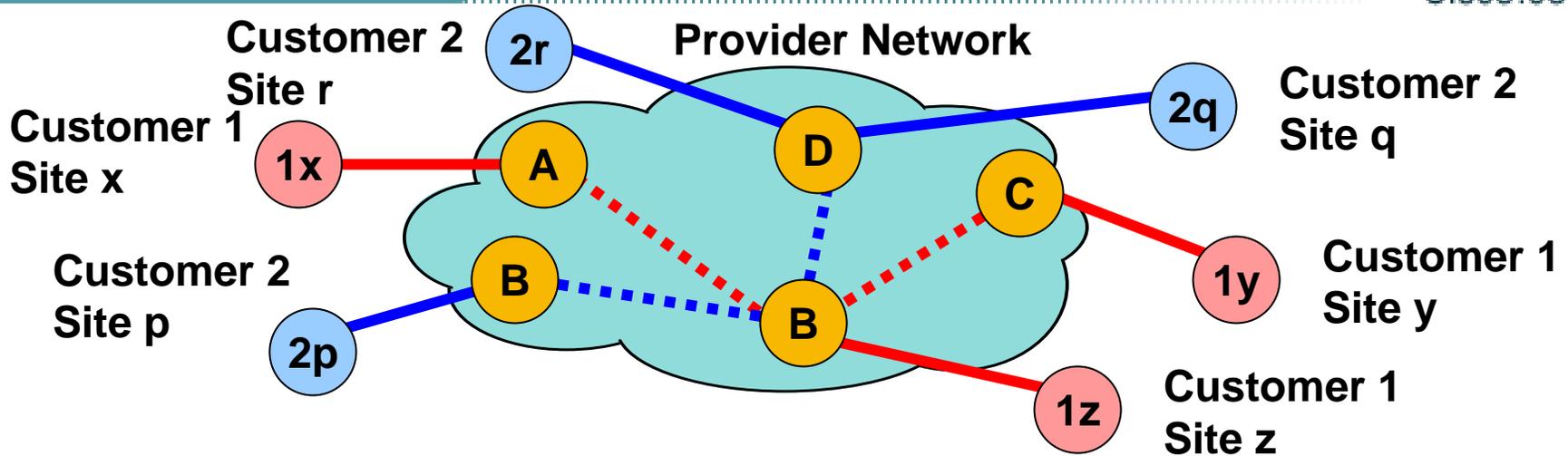
- **Carrier may provide multipoint-to-multipoint Ethernet data services.**

- **Data is (often) carried over physical Ethernet links.**

Problem:

- **There are different technologies from different standards bodies for carrying Ethernet services:**

    IETF: Ethernet over MPLS "Pseudowires", Ethernet over L2TPv3, VPLS meshes, ...

    ITU-T: Ethernet over SDH, ...

    Ethernet over cable modems.

    IEEE 802.1 and 802.3.

Hence, **Connectivity Fault Management**
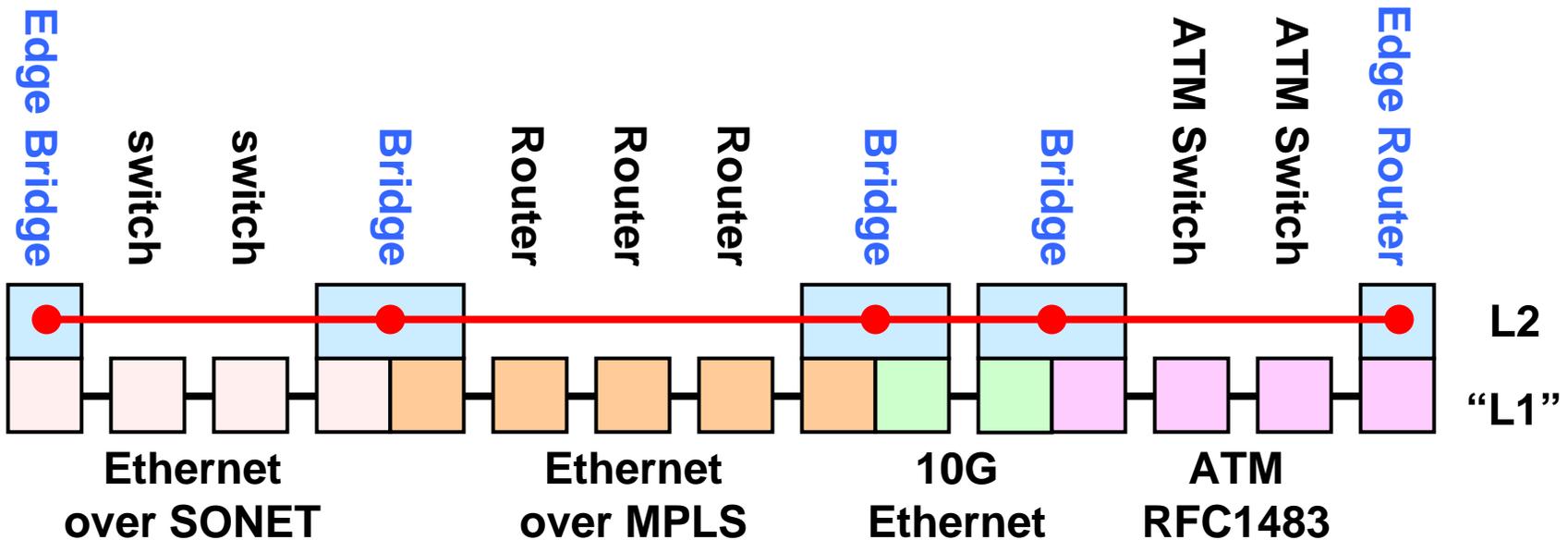
- **The <u>only</u> thing that is constant across all technologies is the Ethernet frames, themselves.**

- **So, CFM is Ethernet frames, not MPLS, ATM, or SONET frames, packets, cells, or physical layer control information.**

Who is Ethernet Connectivity Fault Management?

Joint effort:

- **IEEE P802.1ag Connectivity Fault Management.**

- **ITU-T Study Group 13 Question 5 Y.17ethoam.**

The OAM Environment

Customer Domain

Provider Domain

Operator A Domain

Operator B Domain

Operator C Domain
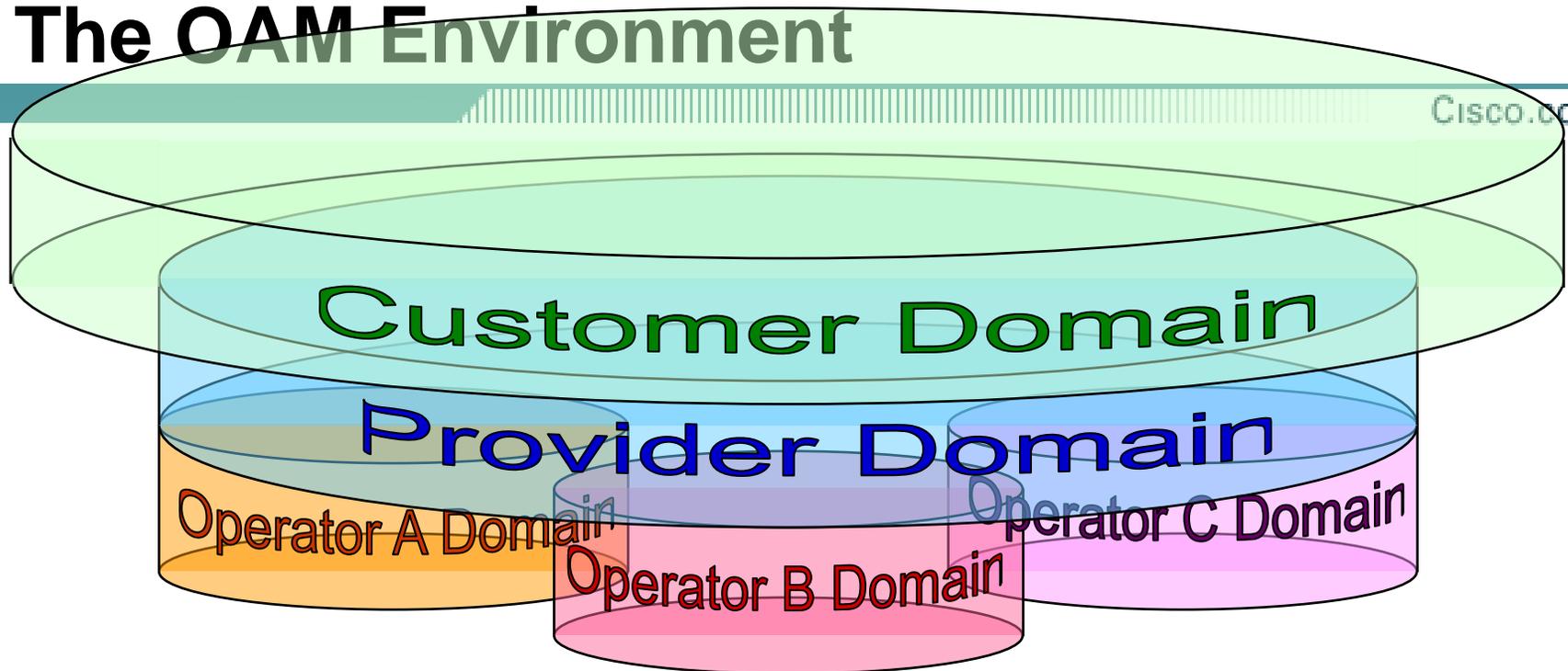
- **Customer contracts with Provider for end-to-end service.**

- **Provider contracts with Operator(s) to provide equipment and networks.**

- **Provider and Operator(s) may or may not be the same company or same division.**

Nested services

- **At each layer, a "customer" is getting a service from a "provider", and may in turn offer a service to a higher-layer "customer".**

- **As a "provider", one must ensure that the service offered is operational.**

- **As a "customer", one must ensure that the service purchased is being delivered.**

CFM Packet Types

- **Continuity Check**

  Multicast from Maintenance End Points. Received by MEPs. Catalogued by receiving MEPs.

  Basis for all CFM – determines whether service is or is not connected.

- **Linktrace**

  Next-hop Multicast from MEP to next MEP or Intermediate Point (MIP) along route. Receiver both replies with unicast to original MEP, and sends Linktrace to next MEP/MIP.

- **Loopback (Ping)**

  Unicast from MEP to MEP or MIP, which replies with unicast to originating MEP.

- **Alarm Indication Signal**

  Multicast outward from MEP. Receiving MEP logs.

Detectable faults

- **Loss of connectivity due to equipment failures or configuration errors.**

- **Cross-connected, merged, or segmented services.**

- **Many Service Level Agreement failures.**

Metro Ethernet Connectivity Fault Management on one slide

- **Different organizations' Domains are nested in Maintenance Levels.**

- **MEPs are active, configured points of reference; MIPs are passive, usually representing MEPs at lower level.**

- **Six kinds of CFM packets: Continuity Check, Traceroute Message / Reply, Loopback Message / Reply, Alarm Indication Signal.**

URLs

- **This presentation: http://www.ieee802.org/1/files/public/docs2005/nfinn-connectivity-fault-management.pdf**

- **Connectivity Fault Management: http://p8021:go_wildcats@www.ieee802.org/1/files/private/ag-drafts/**

  (or http://www.ieee802.org/1/files/private/ag-drafts/, username p8021, password go_wildcats)