

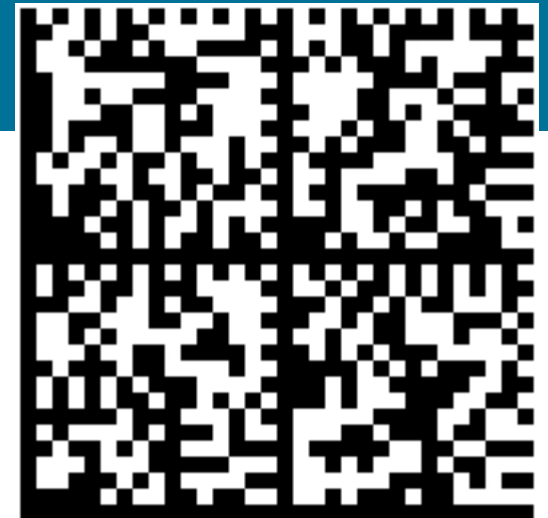


# End-to-End FCoE

Adding details to the idea

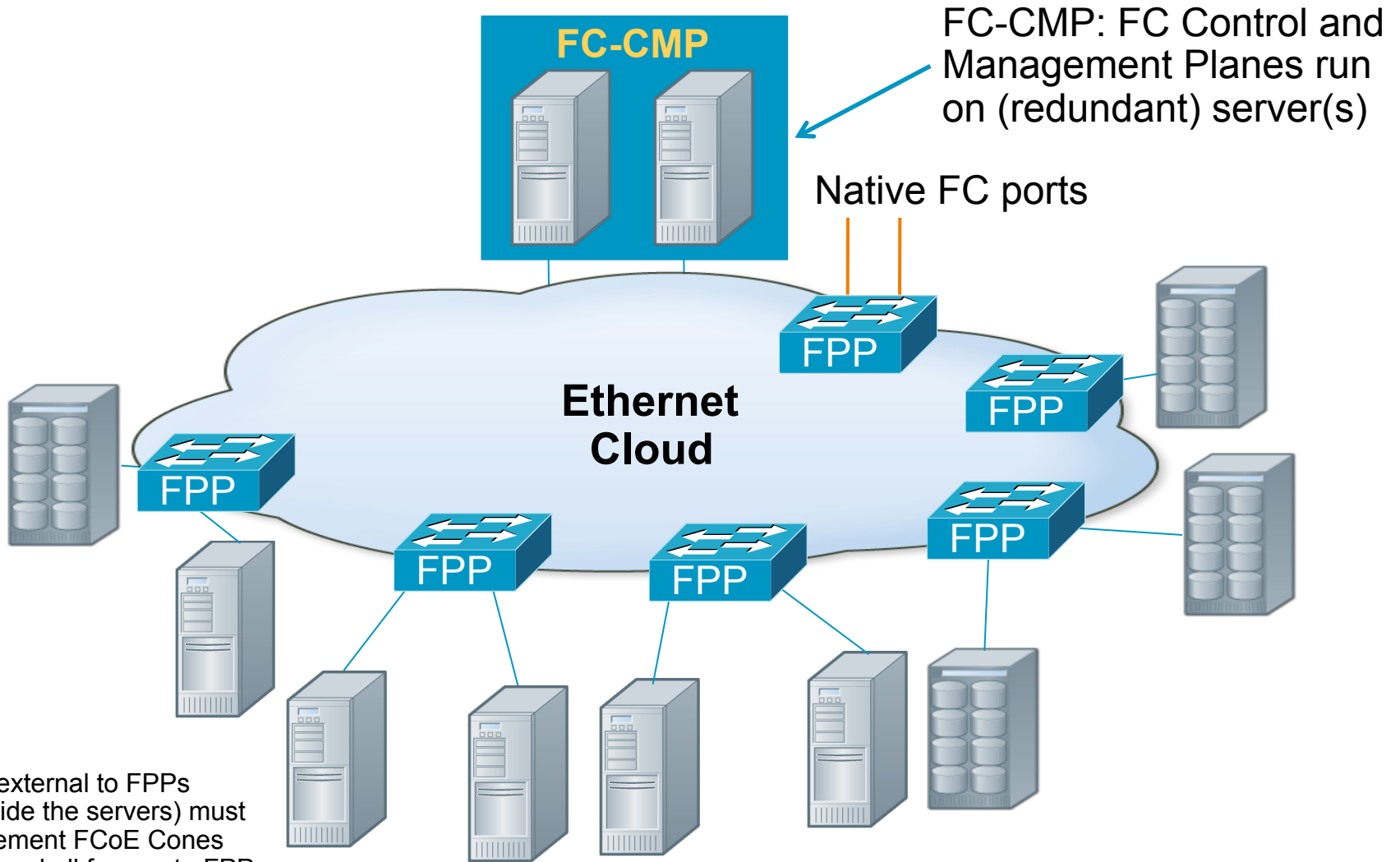
T11/09-539v0, October 2009

Silvano Gai



Mobile Code  
Courtesy of  
<http://mobilecodes.nokia.com/> 1

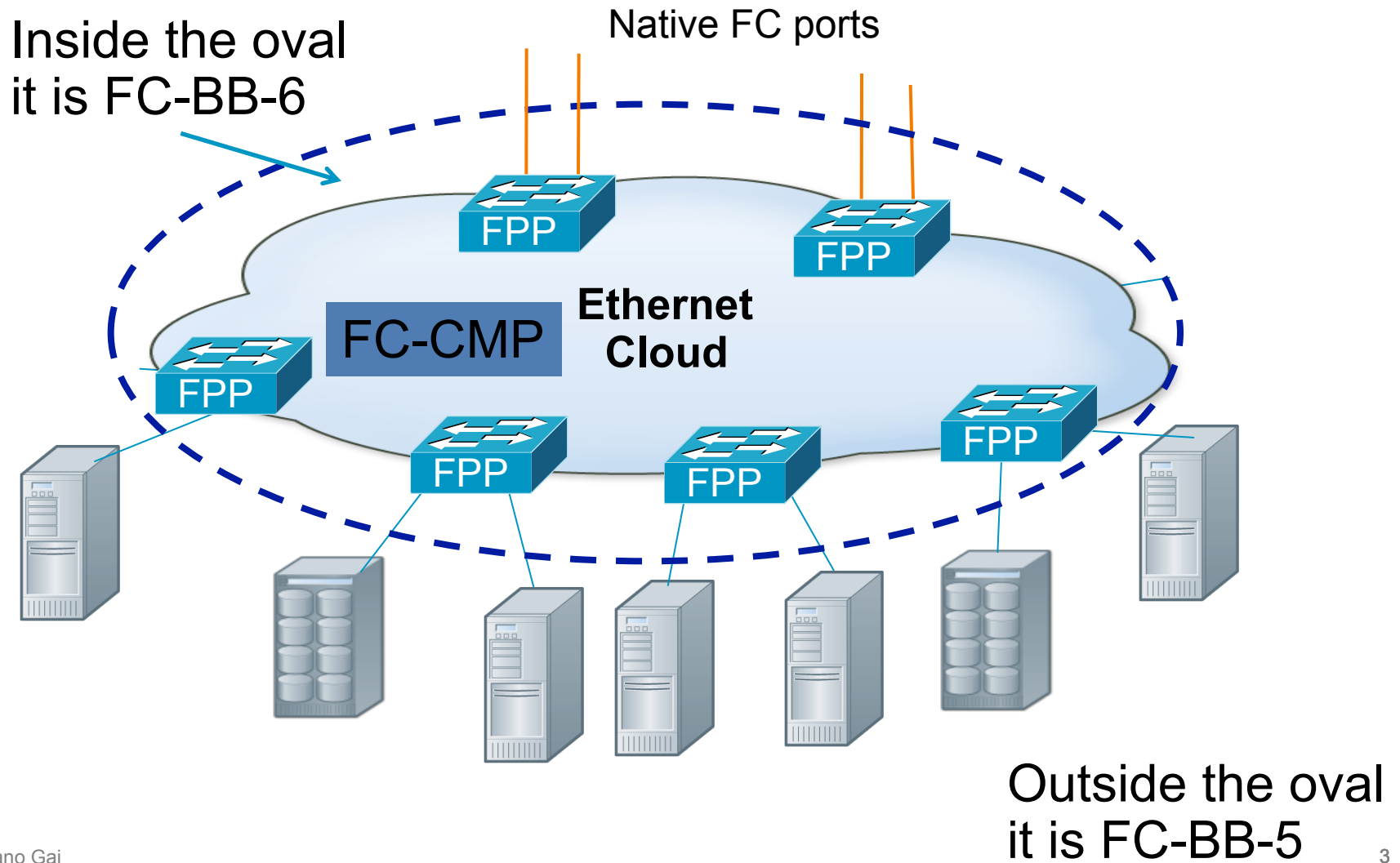
# From 09-425: Introducing FPPs and FC-CMP



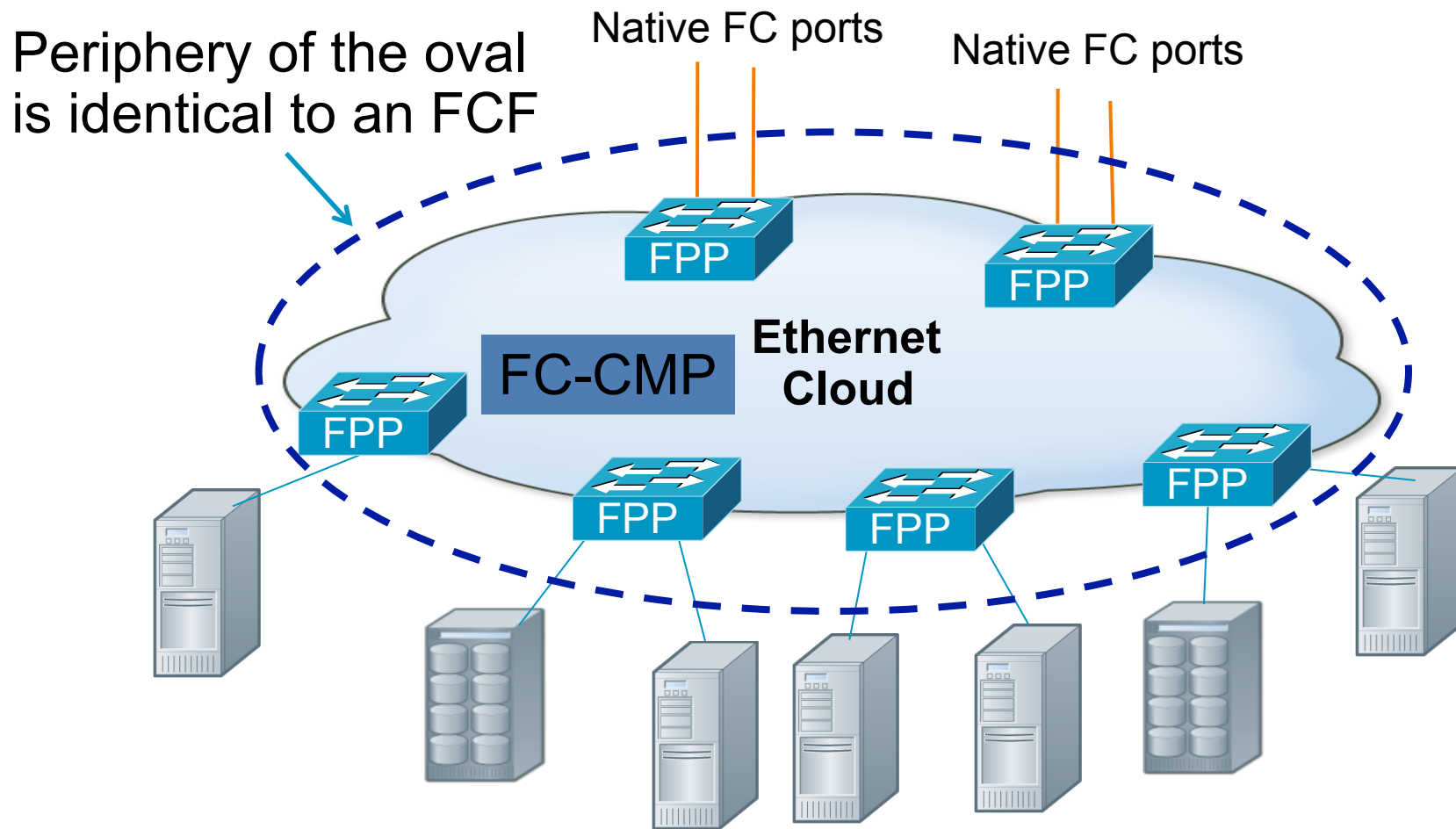
Bridges external to FPPs (e.g., inside the servers) must still implement FCoE Cones (i.e., forward all frames to FPPs and not switch them locally)

**FPP: FC Proxy Point**

# Maintaining FC-BB-5 at the Periphery



# What is Inside the Oval?



To implement End-to-End FCoE  
we only need to decompose the FCF

# What to Modify? FCF versus ENodes

- **Decomposing the FCF:**

  - Does not require to change any protocols spoken on the wires

  - Just adds “internal” protocols

- **Modifying the host has negative connotations:**

  - The N\_Port to F\_Port connection is the real standard connection in the FC world

    - Touch it as less as possible!

  - Changing the host behavior while customers are starting to adopt FCoE creates confusion

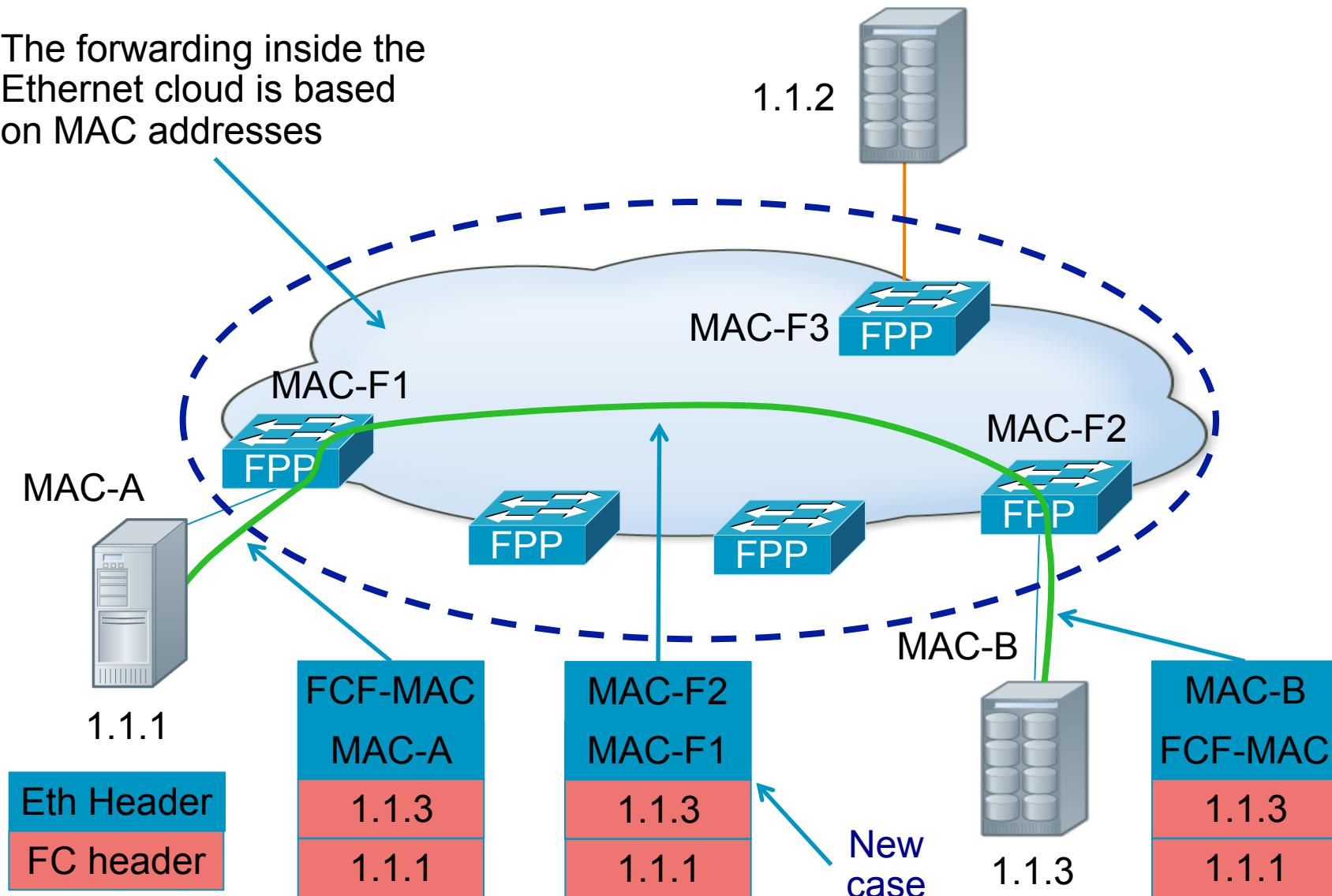
  - Any solution in which a host is allowed to set-up a data path with a storage arrays creates a great security risk:

    - An Ethernet path that didn't exist when the network was designed may come into existence and bypass all security checks

**Let's not touch the ENodes!**

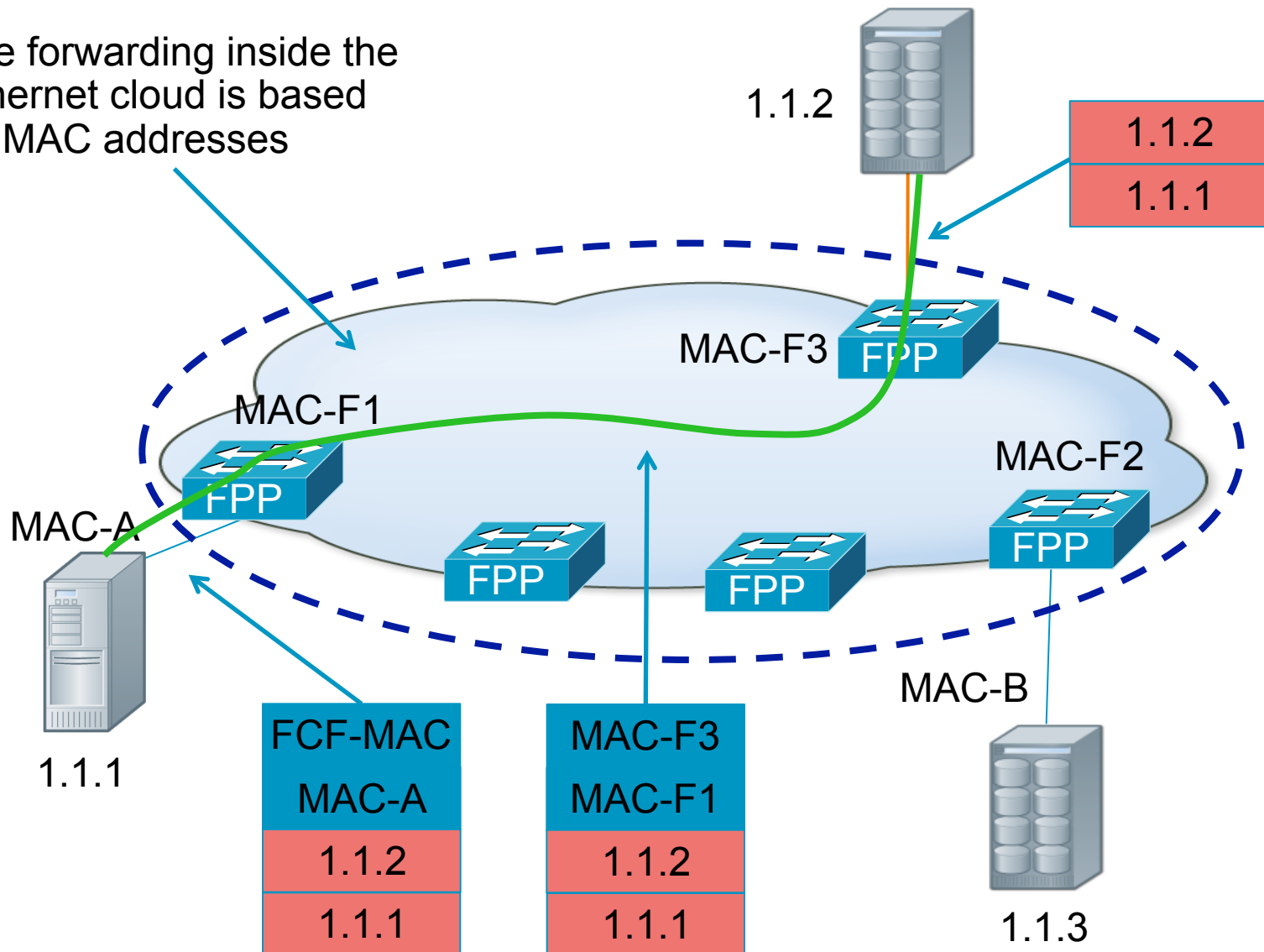
# Data Plane – Example #1

The forwarding inside the Ethernet cloud is based on MAC addresses



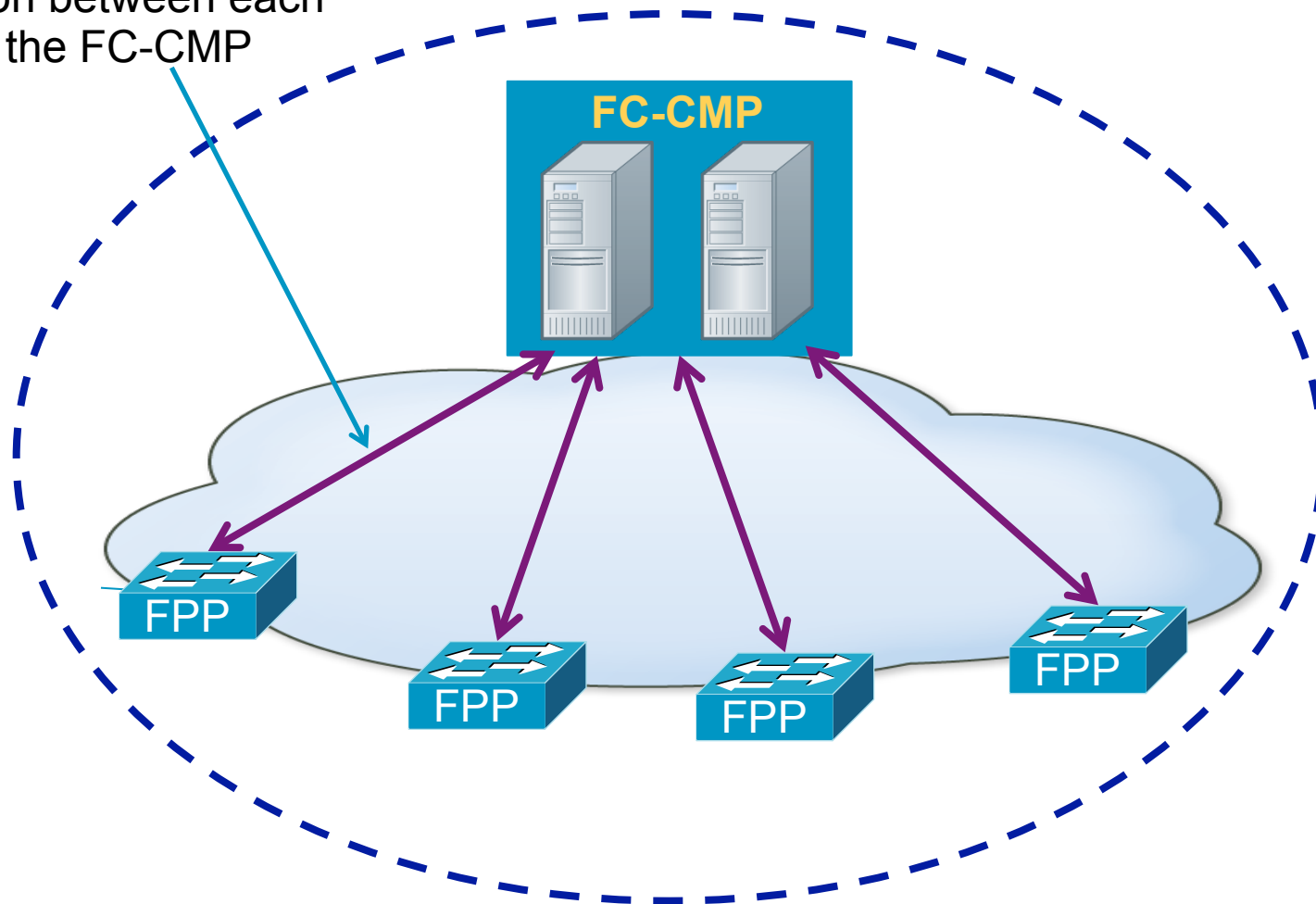
# Data Plane – Example #2

The forwarding inside the Ethernet cloud is based on MAC addresses



# Control Plane

A virtual point-to-point connection between each FPP and the FC-CMP



# FPP to CMP connection

- **Encapsulate FIP messages**
- **Support a delegation protocol used by the FC-CMP to delegate to the FPP**
  - Forwarding**
    - “Distributed” zoning (FCoE ACLs)**
  - Proxying the FIP protocol**
    - Including VLAN Discovery
  - Proxying the keepalive protocol**
- **Support a protocol to collect statistics and monitor traffic**

# Security Considerations

- **The FPP to FC-CMP connection may be implemented and secured using:**

**MACsec (IEEE 802.1AE - Media Access Control (MAC) Security)  
or**

**By adding security TLVs to FIP(\*)**

**Not clear if IEEE 802.1X or OASIS KMIP/IEEE 1619.3 should be used for FC Key Management Services**

- **Other solutions considered:**

**Since FIP is not an FC protocol, and the delegation protocol and the monitoring protocol are not FC protocols:**

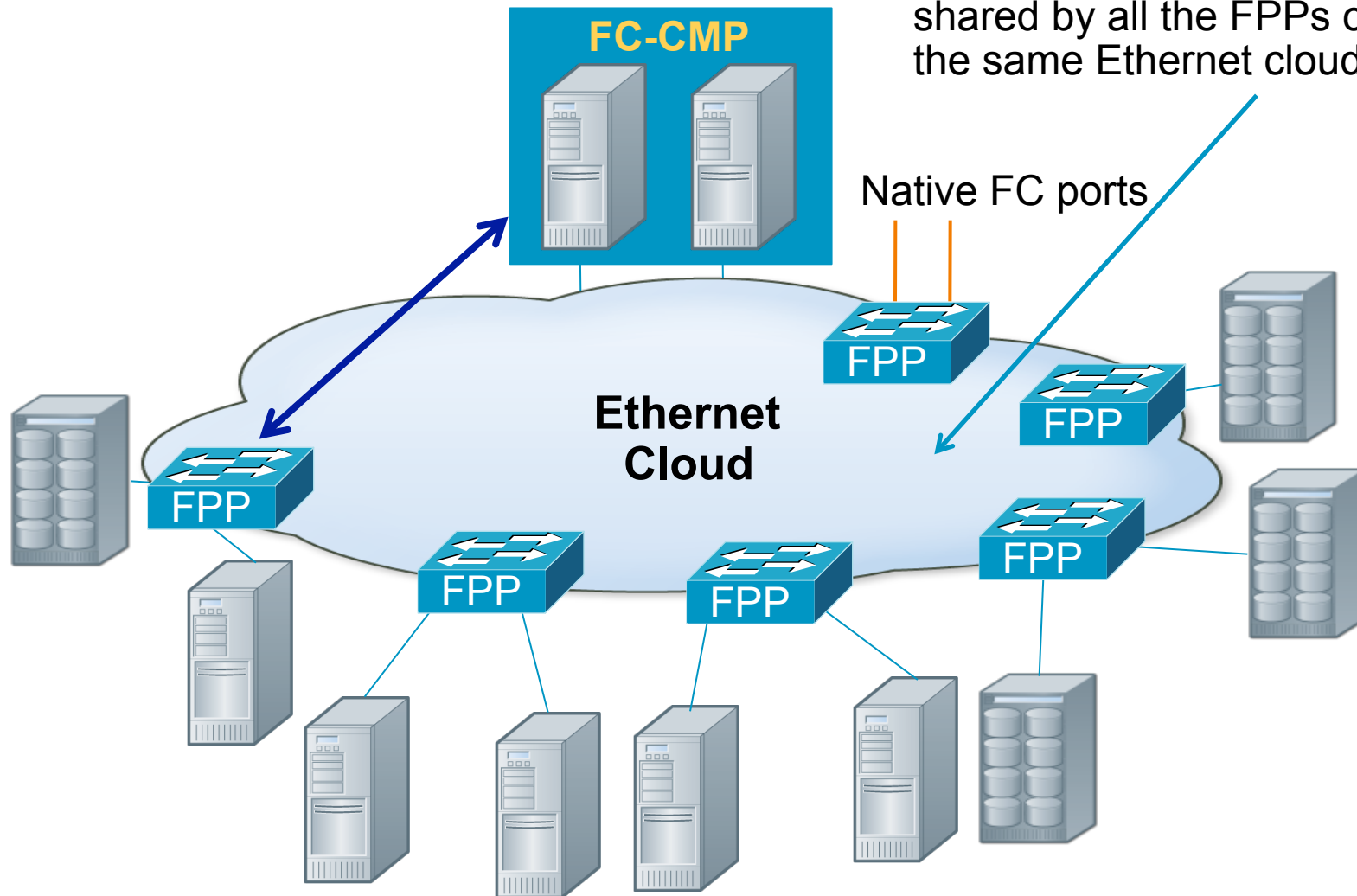
FCIP + IPsec is not suitable

FC-SP is not suitable

(\*) before making a final decision on the topic, the nature of the delegation and monitoring protocol must be better understood

# Domain\_IDs

One or more FC Domain\_IDs can be associated with the FC-CMP and shared by all the FPPs connected to the same Ethernet cloud



# What is Unchanged

- **ENode are unchanged, they remain compliant with FC-BB-5**
- **E\_Ports, F\_Ports, N\_Ports, VE\_Ports, VF\_Ports, VN\_Ports are unchanged**
- **No need to touch any other FC protocol**

# Required Enhancements

- **Two protocols need to be defined between the FC-CMP and the FPP**
  - A delegation protocol
  - A monitoring/statistic protocol
- **Virtual Link maintenance should be extended to these “end-to-end virtual links”**
- **High Availability of the the “FC Control and Management Planes” may be standardized or left to the implementations**

# Advantages

- **More modern architecture that decouples the data plane from the services**

**For example, in IP the DNS, DHCP, LDAP servers are not typically implemented in the routers**

- **More scalable**

**Each Ethernet cloud can use one or more Domain\_IDs**

**Each Domain\_ID can connect 64K ENodes**

**Zoning, FIP and keepalives can be delegated to the periphery**

**Zoning becomes more scalable since there are fewer FC-CMPs compared to FCFs**

Thank you

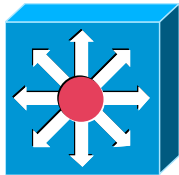


Image Credit:Flickr user kimerlyfaye  
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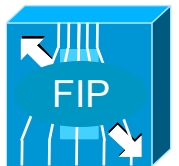
# Icons



FCF



Ethernet Switch



Ethernet Switch with FIP snooping



FC Proxy Point

**If you want to do modification to this presentation, please don't reinvent these icons, I will email you the PPT file**

