

VN2VN Multi-Point and Point-to-Point

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Terminology

- **FIP Frames:**

- N_Port_ID Probe Request (multicast to All-VN2VN-ENode-MACs)**

- N_Port_ID Probe Reply (unicast)**

- N_Port_ID Claim Notification (multicast to All-VN2VN-ENode-MACs)**

- P2P Claim Notification: a N_Port_ID Claim Notification with the P2P flag set to one (multicast to All-PT2PT-ENode-MACs)

- N_Port_ID Claim Response (unicast)**

- P2P Claim Response: a N_Port_ID Claim Response with the P2P flag set to one

- N_Port_ID Beacon (multicast to All-VN2VN-ENode-MACs)**

- formerly VN2VN Advertisement

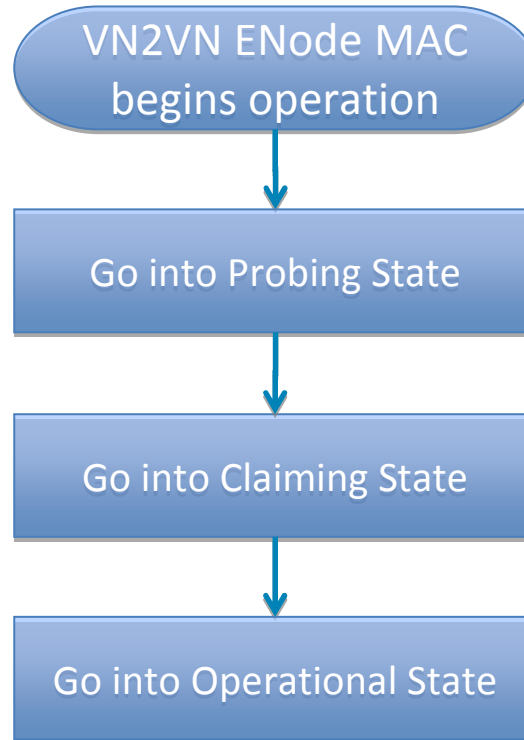
- P2P Beacon: a N_Port_ID Beacon with the P2P flag set to one (multicast to All-PT2PT-ENode-MACs)

- **LUID: Locally Unique N_Port_ID**

Agenda

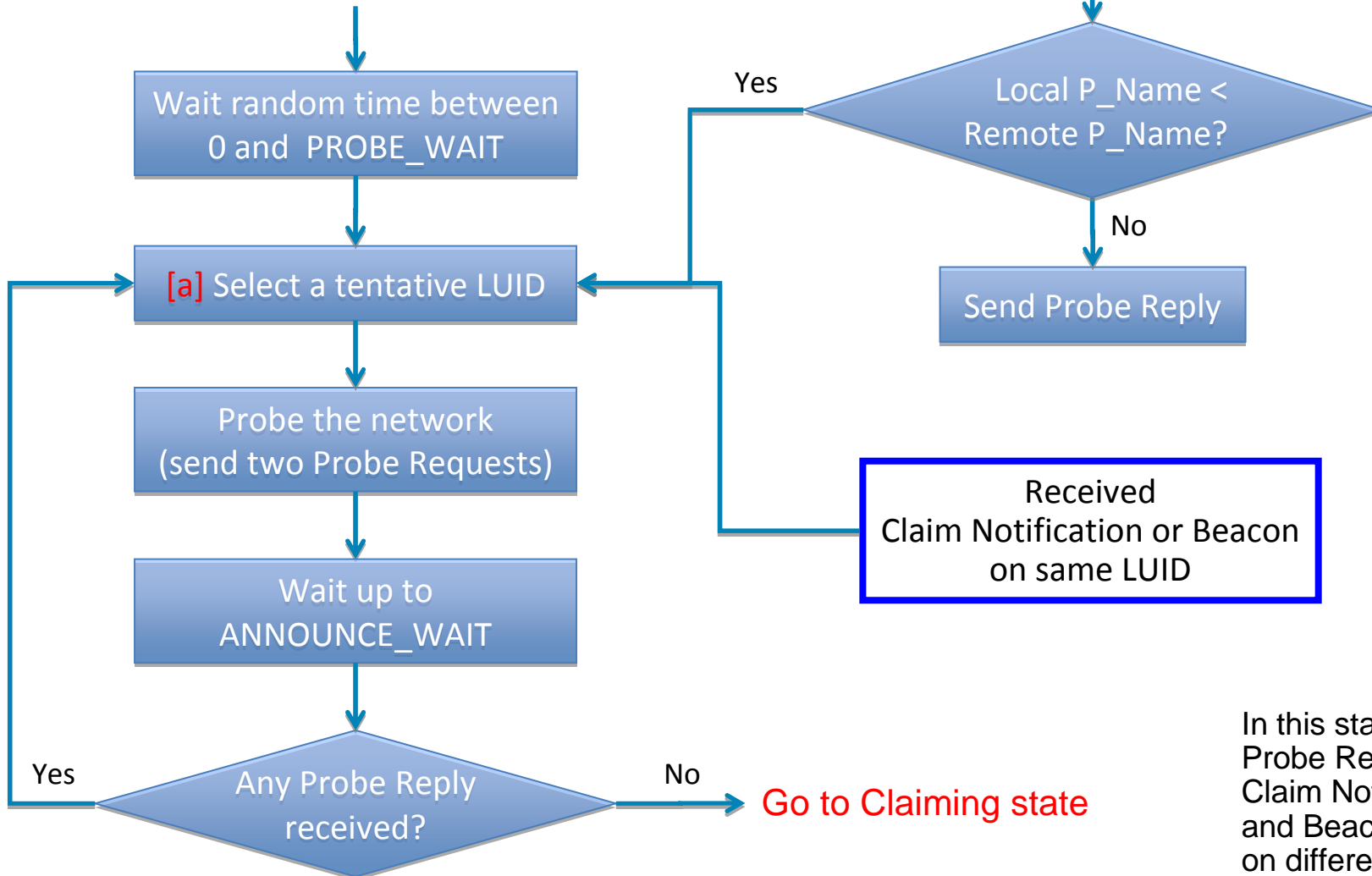
- **VN2VN Operation**
- **PT2PT Operation**
- **Combined Operation**

VN2VN Operations



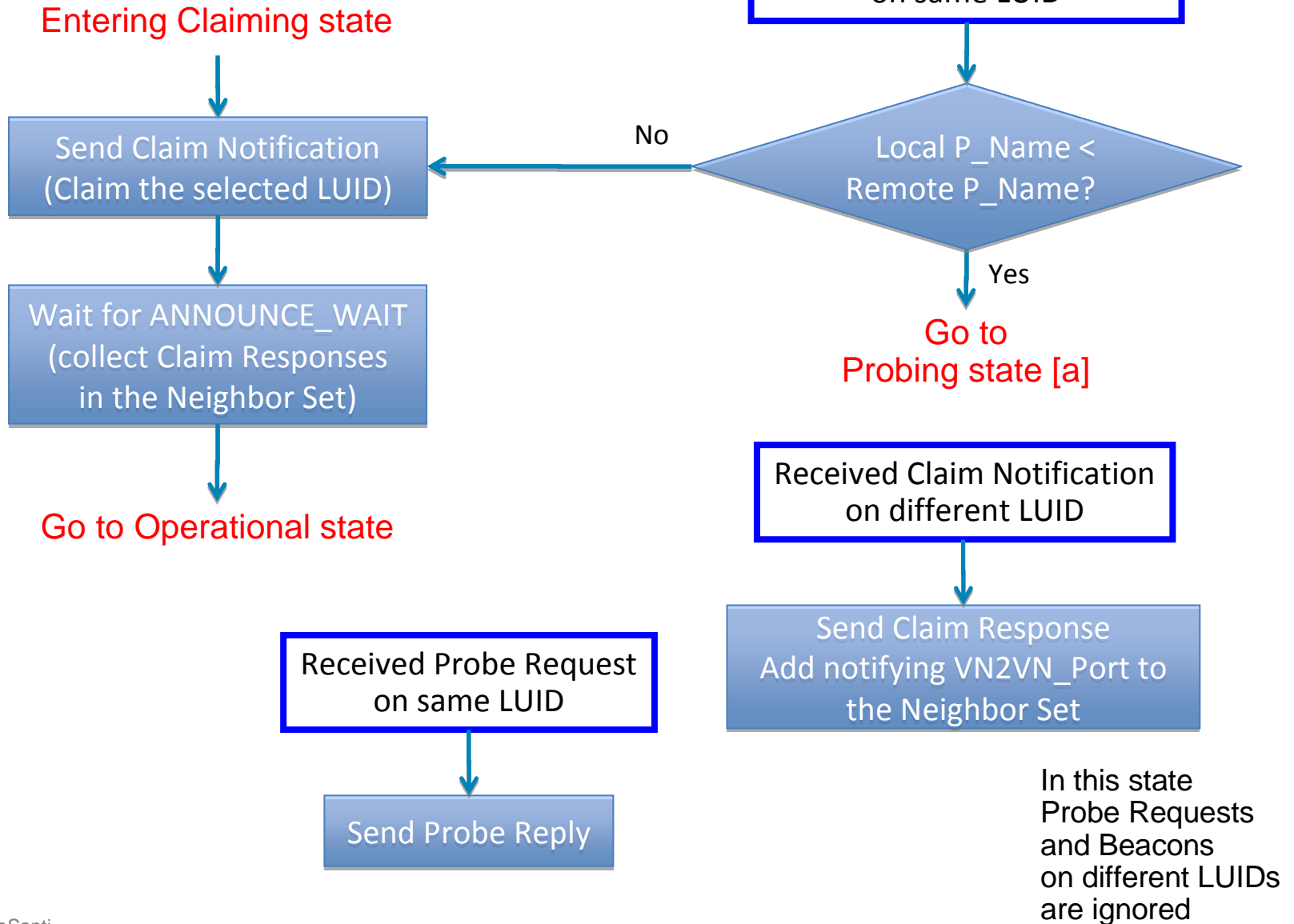
Probing State

Entering Probing state



In this state
Probe Requests,
Claim Notifications,
and Beacons
on different LUIDs
are ignored

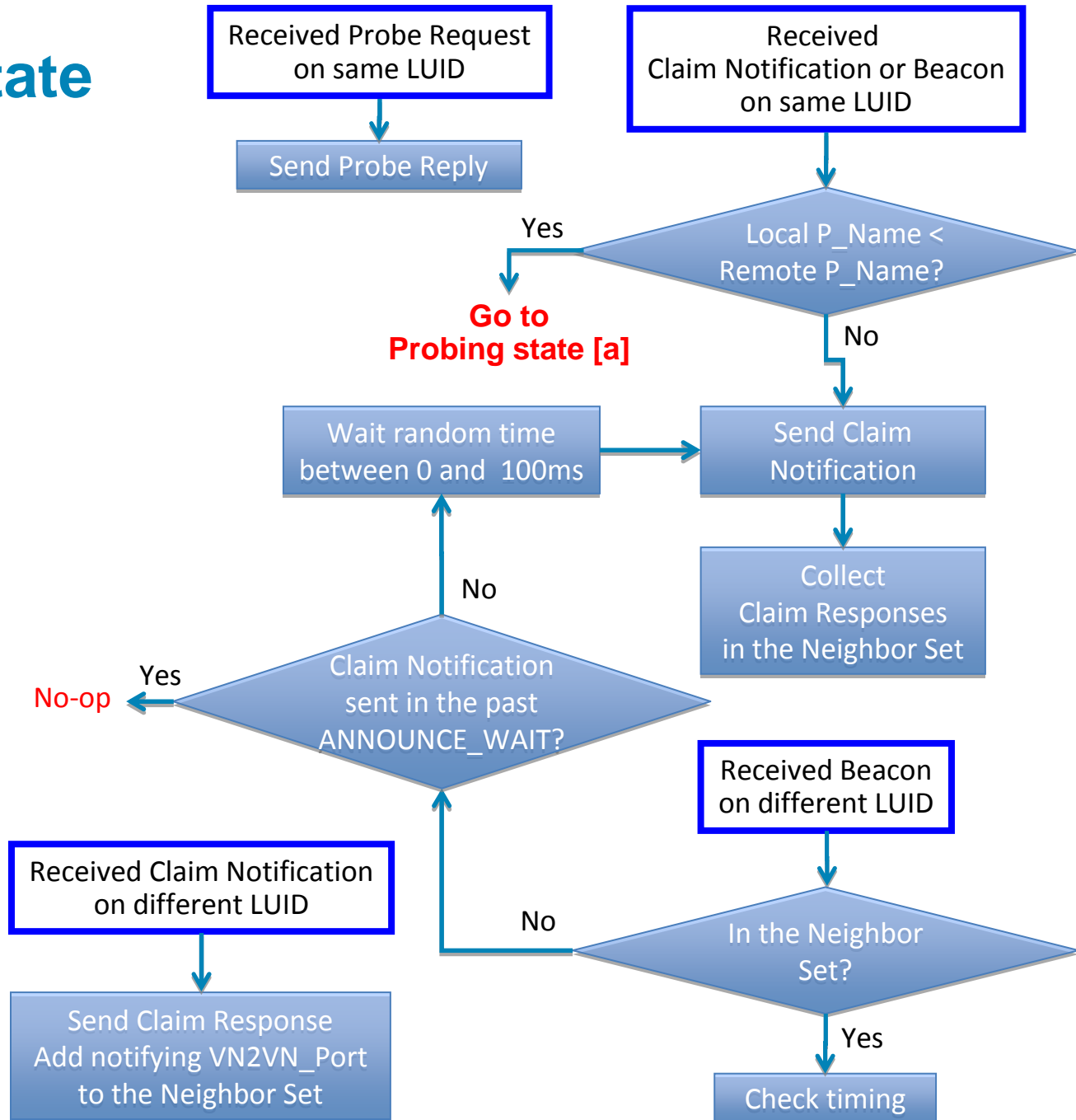
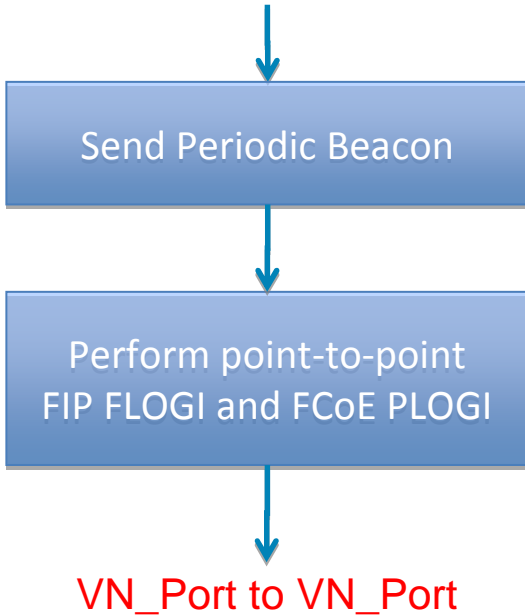
Claiming State



Operational State

In this state Probe Requests on different LUIDs are ignored

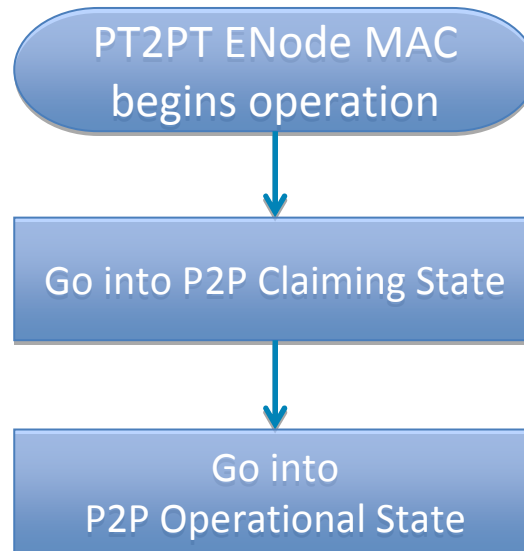
Entering Operational state



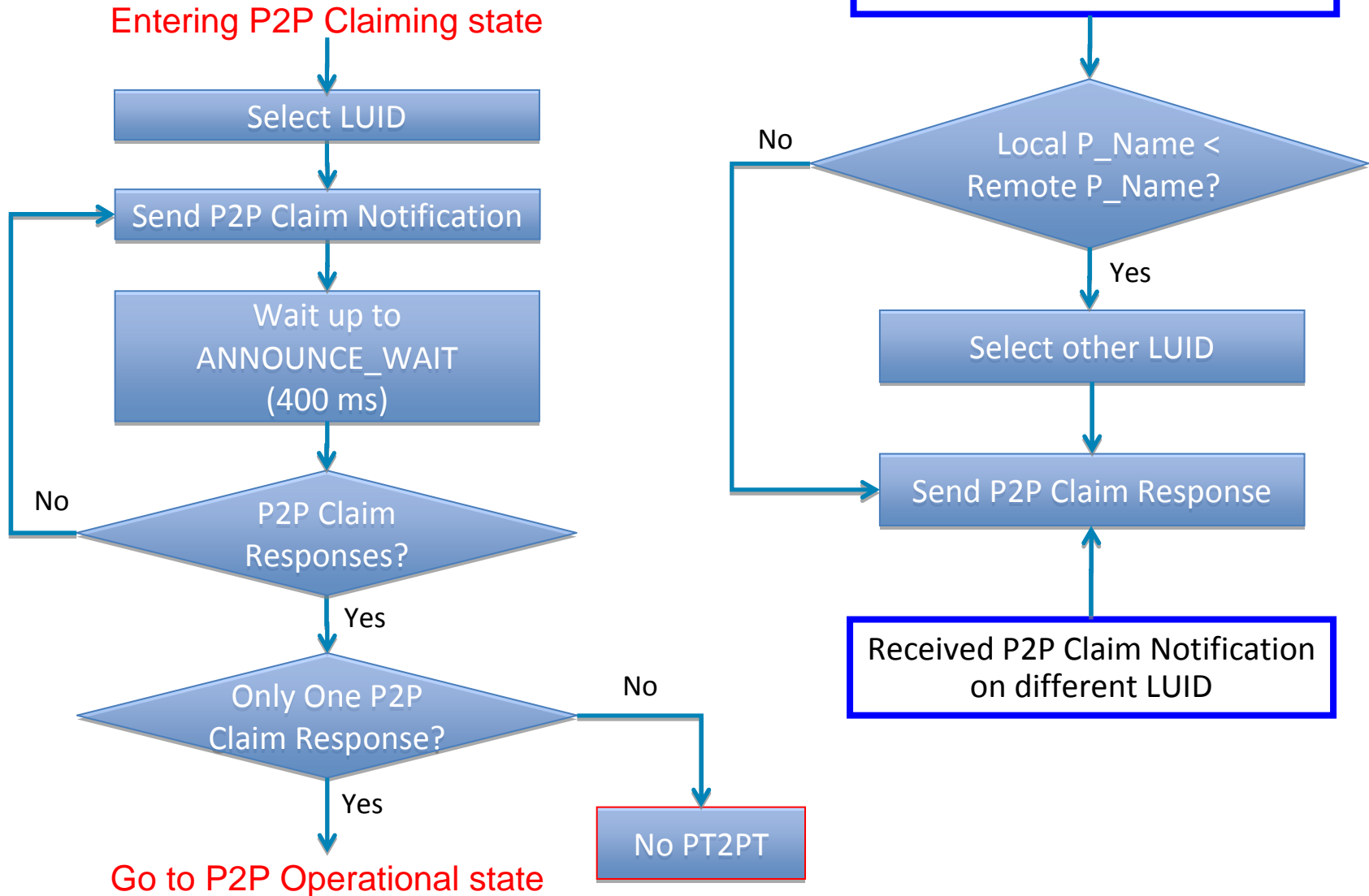
Agenda

- VN2VN Operation
- **PT2PT Operation**
- Combined Operation

PT2PT Operations

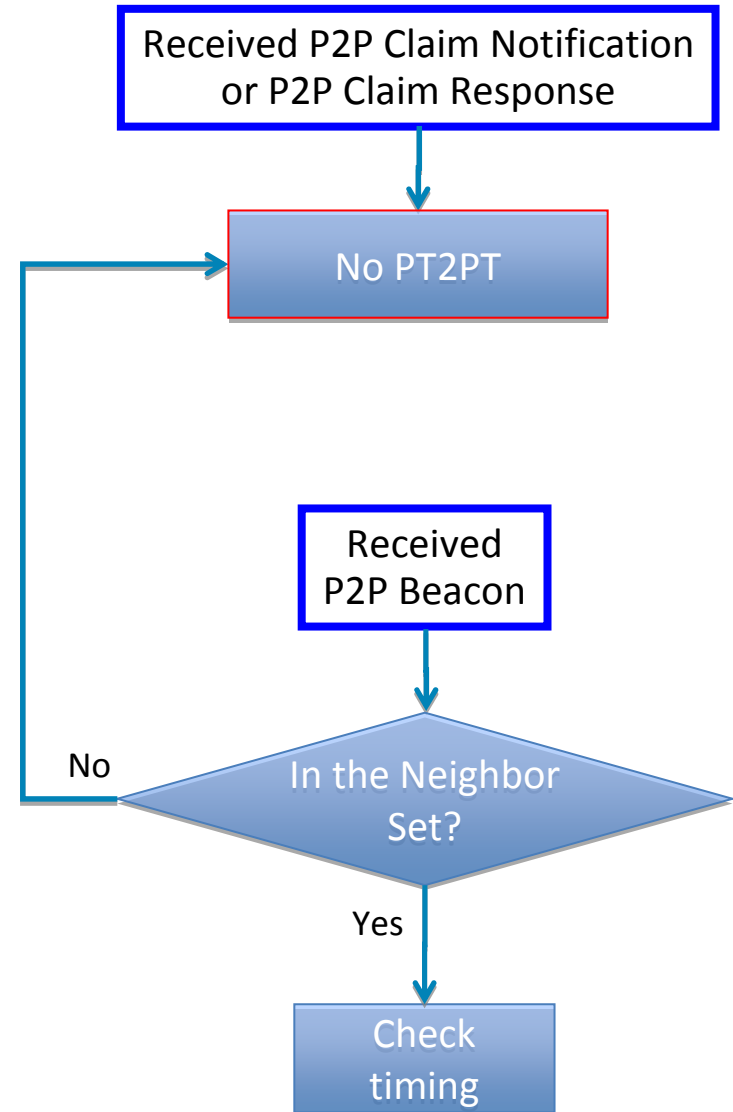
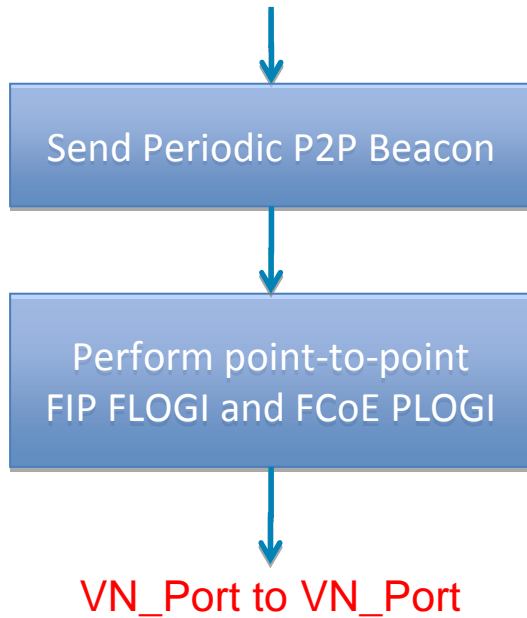


P2P Claiming State

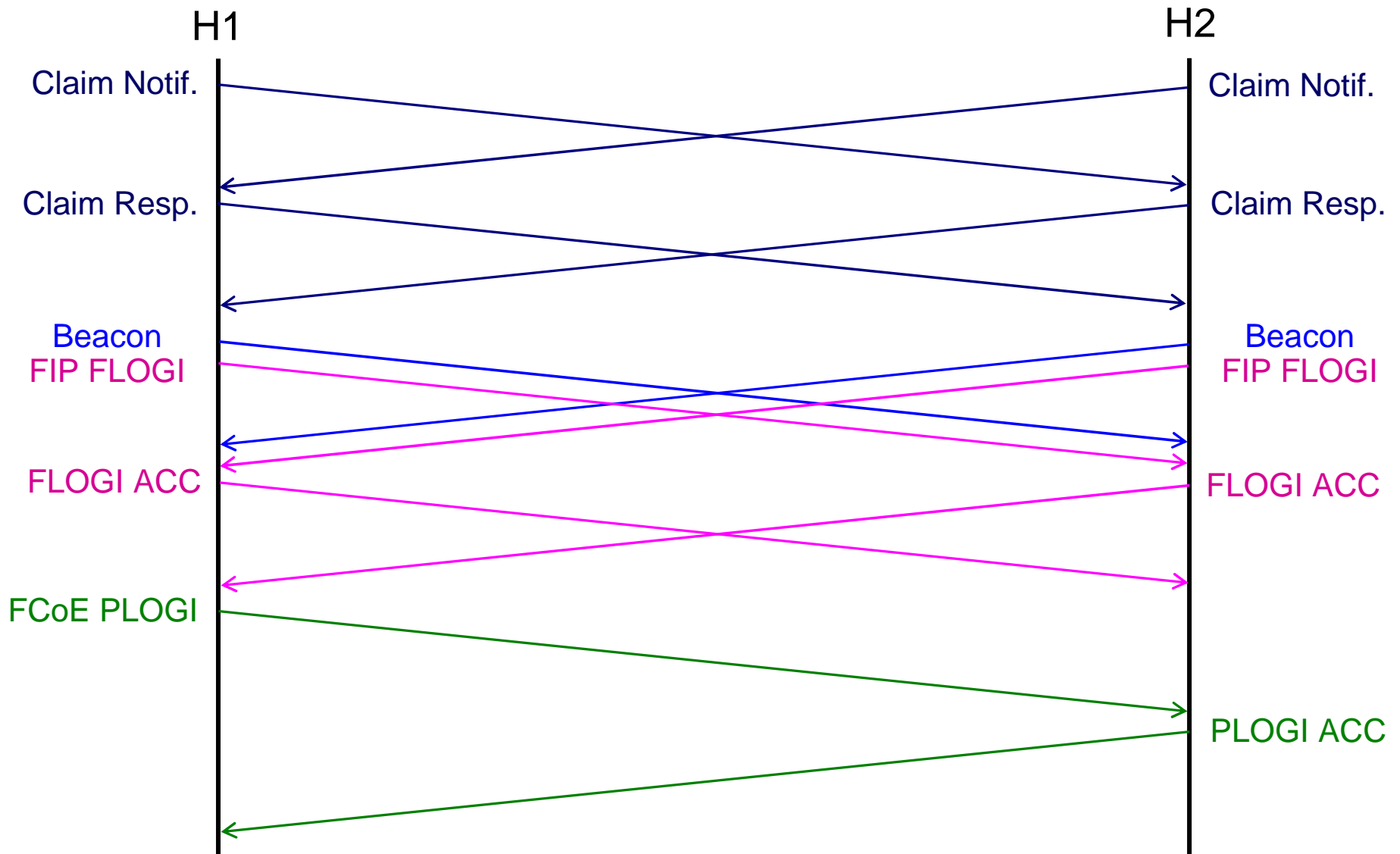


P2P Operational State

Entering Operational state



Ladder Diagram Example



Agenda

- VN2VN Operation
- PT2PT Operation
- **Combined Operation**

Point-to-Point vs. Multipoint

- **In Point-to-Point mode, discovering more than one VN2VN neighbor is an indication of a non Point-to-Point situation**

The protocol stops

- **In Multipoint mode, having more than one VN2VN neighbor is perfectly normal**

The protocol handles the situation

- **Therefore a configuration is needed upfront for a VN2VN ENode MAC: operate in Point-to-Point mode or in Multipoint mode**

To determine the VN2VN ENode MAC behavior over the discovered network configuration

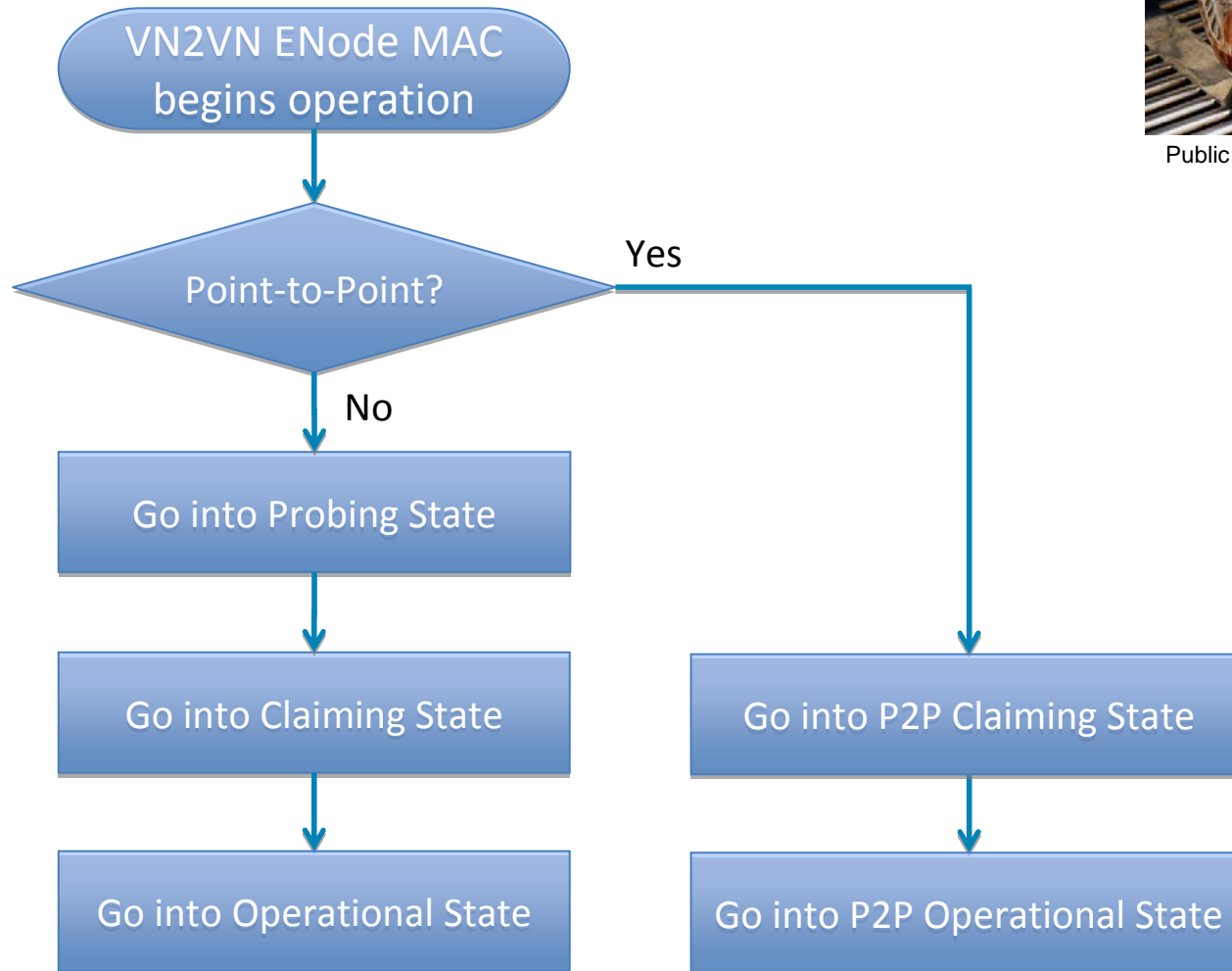
Multicast Addresses

- **Multicast PT2PT FIP frames are sent to the address All-PT2PT-ENode-MACs**
- **Multicast VN2VN FIP frames are sent to the address All-VN2VN-ENode-MACs**
- **A VN2VN ENode MAC shall listen to both addresses and act on the protocol messages independently from the address they had**
- **In this way the Point-to-Point and Multipoint protocols act as a single protocol, while enabling selective filtering by network bridges through ACLs based just on MAC addresses**

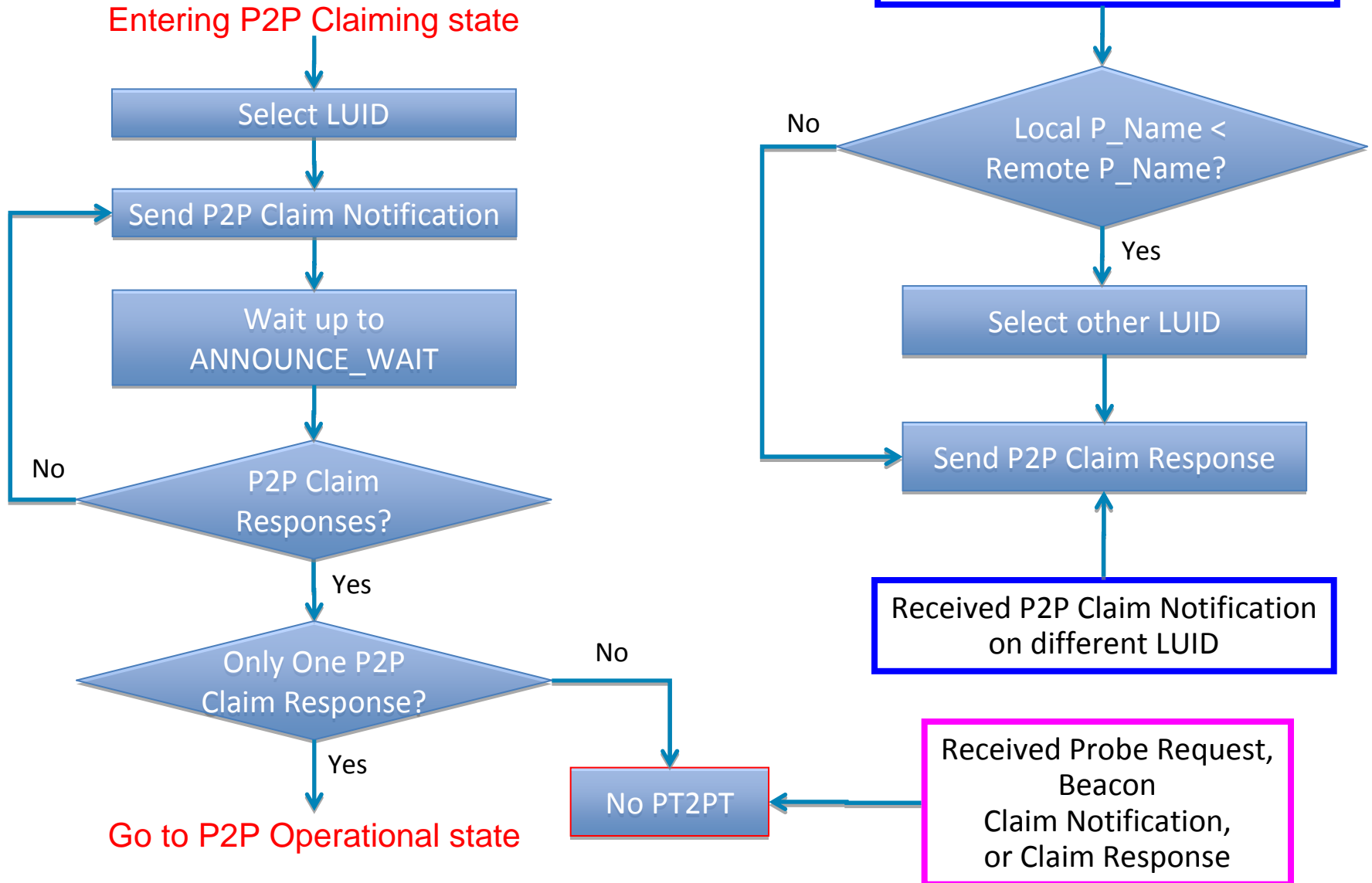
Point-to-Point and Multi-Point Operations



Public domain photo by Mark Prince

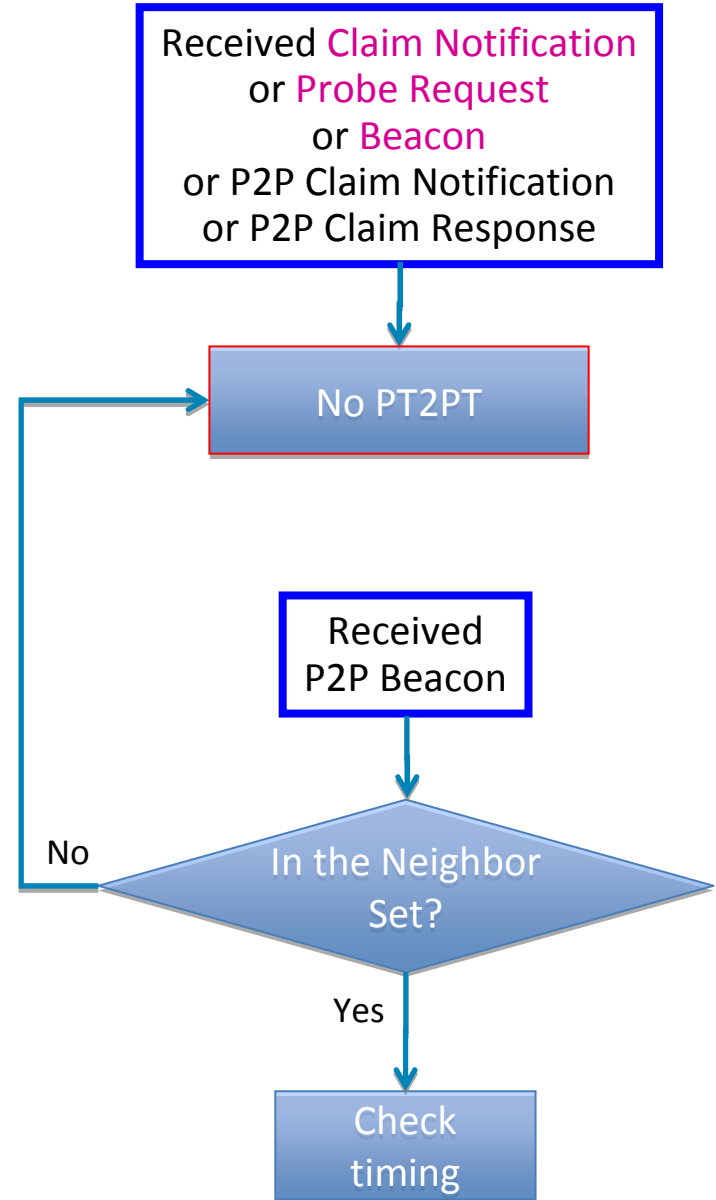
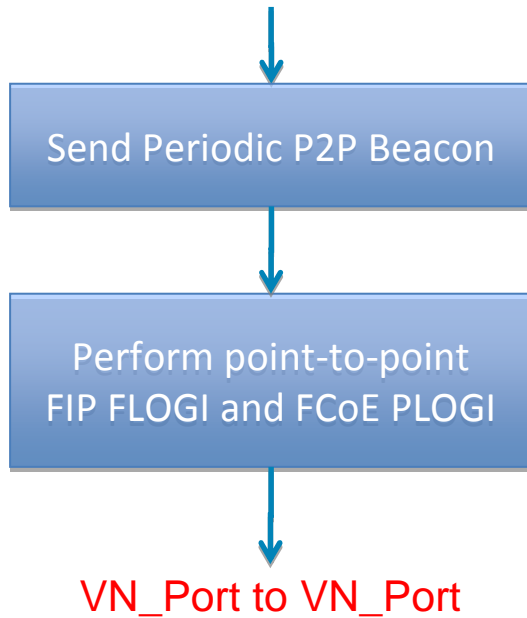


P2P Claiming State



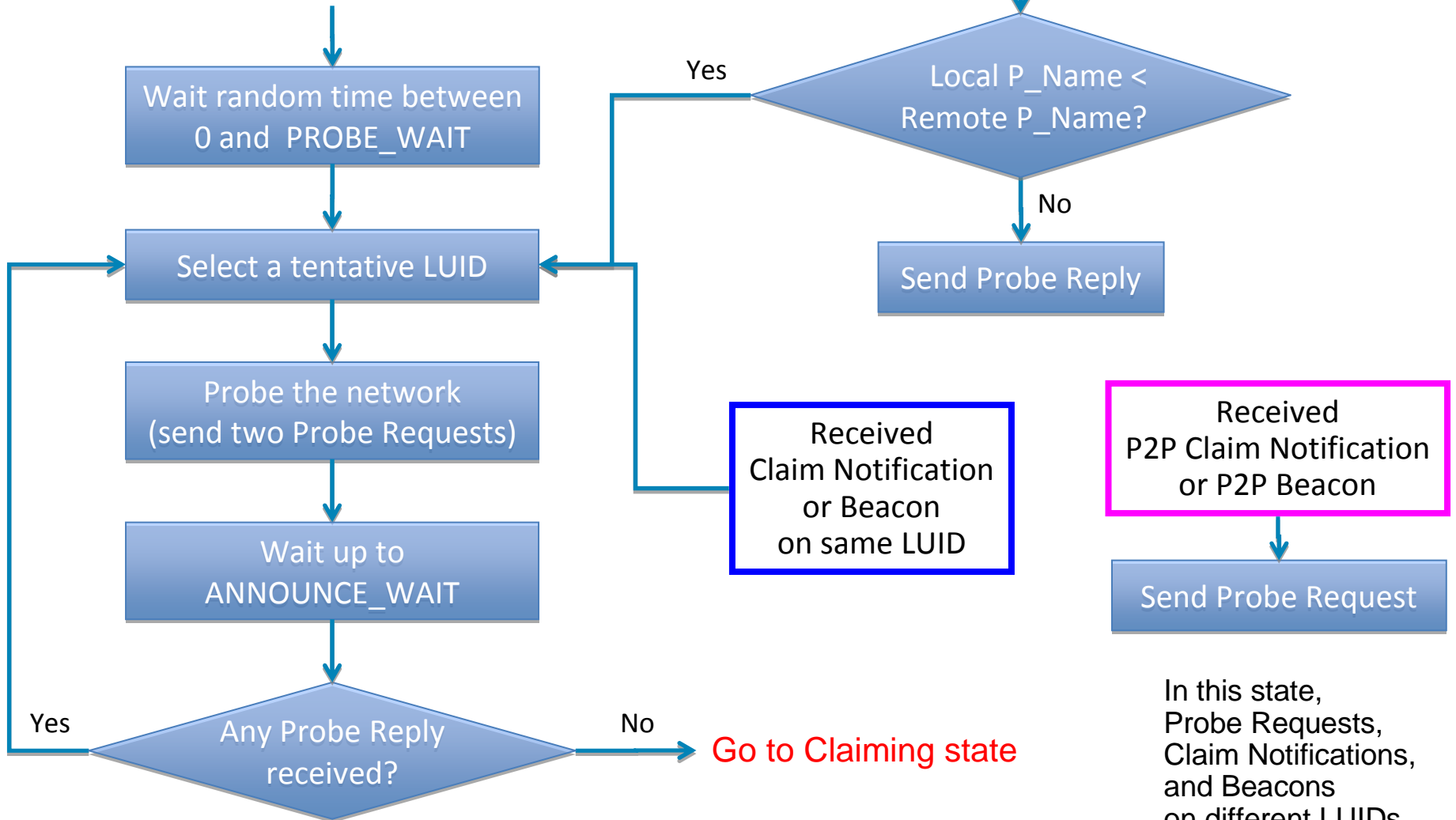
P2P Operational State

Entering P2P Operational state



Probing State

Entering Probing state



In this state, Probe Requests, Claim Notifications, and Beacons on different LUIDs are ignored

Claiming State

Entering Claiming state

Send Claim Notification
(Claim the selected LUID)

Wait for ANNOUNCE_WAIT
(collect Claim Responses
in the Neighbor Set)

Go to Operational state

Received
Claim Notification or Beacon
on same LUID

Local P_Name <
Remote P_Name?

No

Yes

Go to
Probing state [a]

Received Claim Notification
on different LUID

Send Claim Response
Add notifying VN2VN_Port to
the Neighbor Set

Received Probe Request
on same LUID

Send Probe Reply

Received
P2P Claim Notification
or P2P Beacon

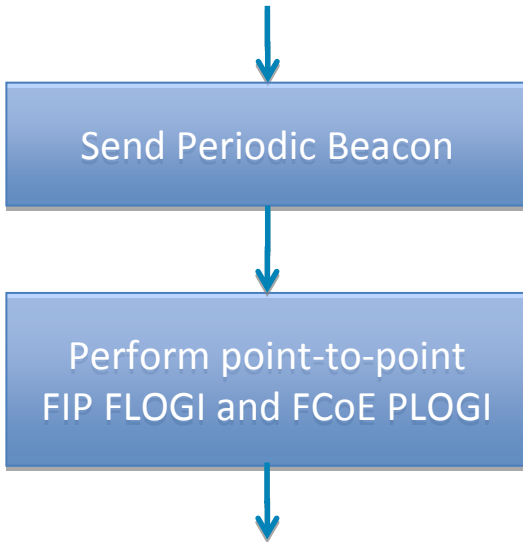
Send Probe Request

In this state,
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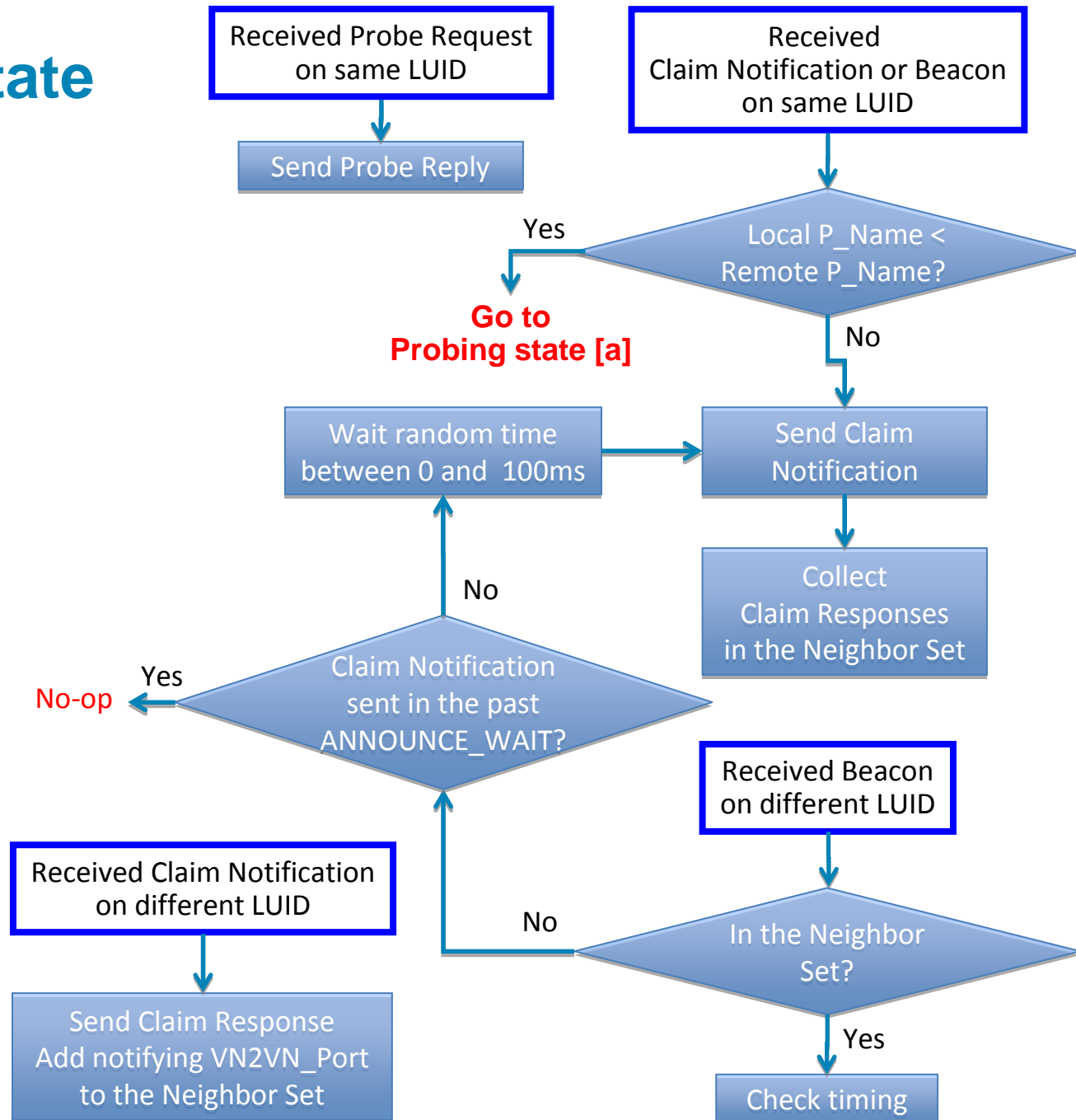
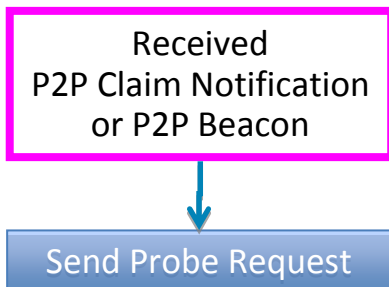
Operational State

In this state, Probe Requests on different LUIDs are ignored

Entering Operational state



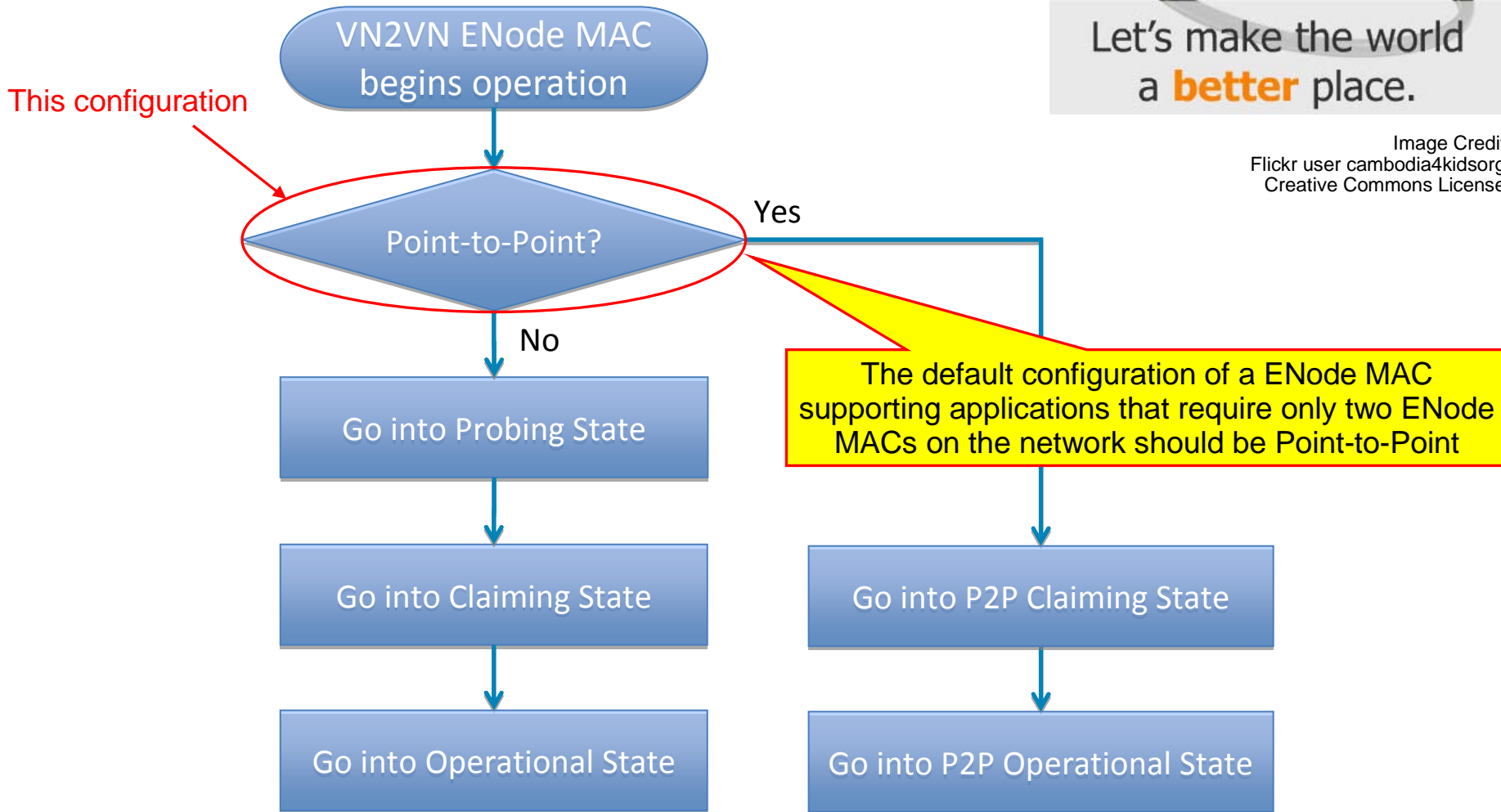
VN_Port to VN_Port



Automating the Configuration



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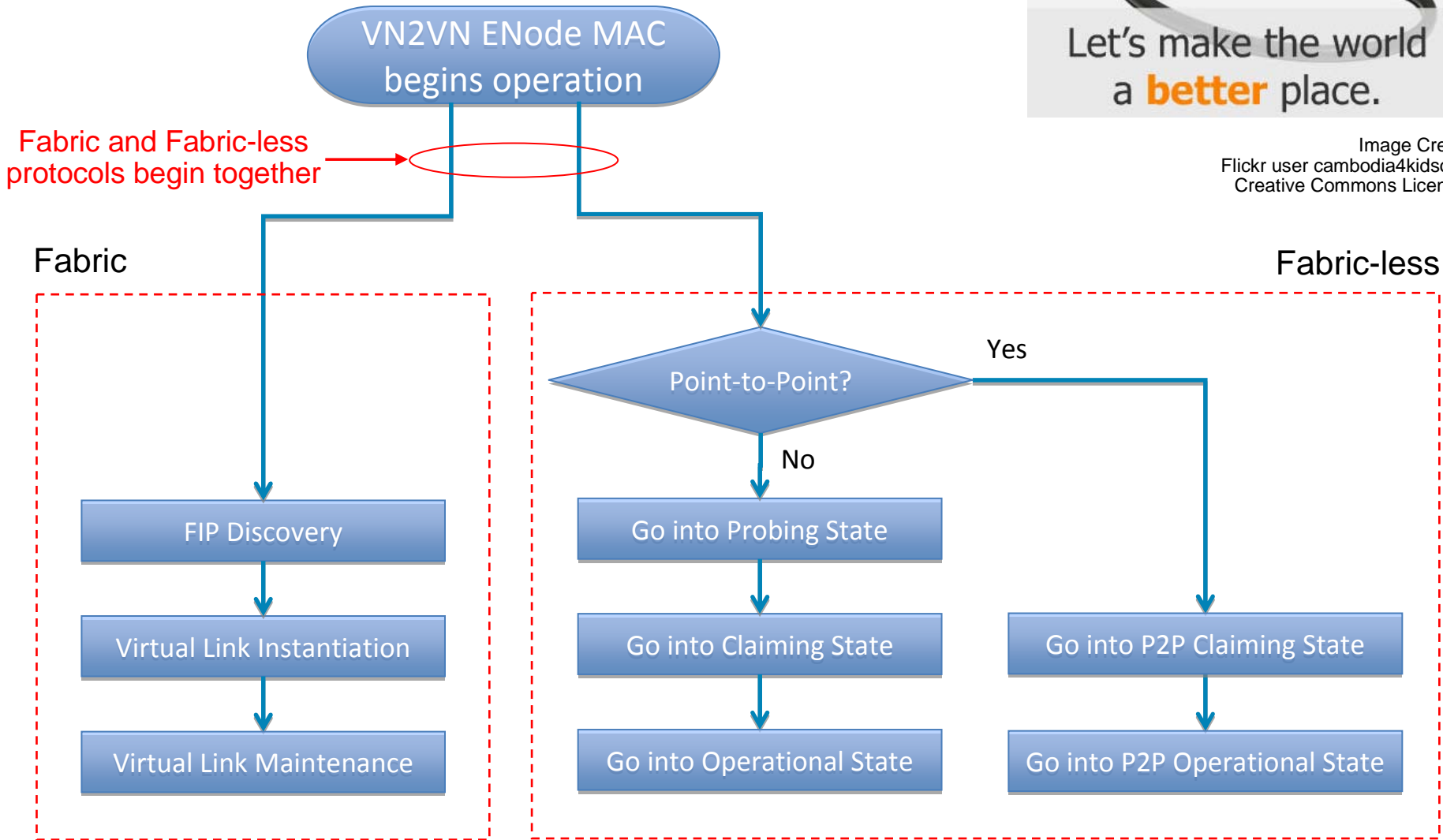
Fabric Interaction

- **The protocol for VN_Port to VN_Port is independent from the protocol for VN_Port to VF_Port**
- **This enables concurrent operations**
 - E.g., the two protocols may run in parallel and an ENode MAC may instantiate a VN_Port for Fabric operations and a VN_Port for VN2VN operations
- **However concurrent operations are NOT required**
 - Specific environments may specify that if a Fabric is detected then the VN2VN protocol is aborted

Putting All Together (1)



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Putting All Together (2)

- **If an FCF is detected and the VN2VN ENode MAC is configured to operate in Point-to-Point mode, the ENode MAC shall operate in Fabric mode**

The Point-to-Point protocol stops

- **If an FCF is detected and the VN2VN ENode MAC is configured to operate in multipoint mode, the ENode MAC may operate in Fabric mode or in concurrent mode**

Concurrent mode: A VN_Port for VN2VN operations and a VN_Port for Fabric operations

Summary

- **This presentation defines the protocol to enable FCoE operations in a Fabric-less environment**

Based on Locally Unique N_Port_IDs

- **Multipoint and point-to-point configurations are fully supported**

Meeting the constraints of both environments

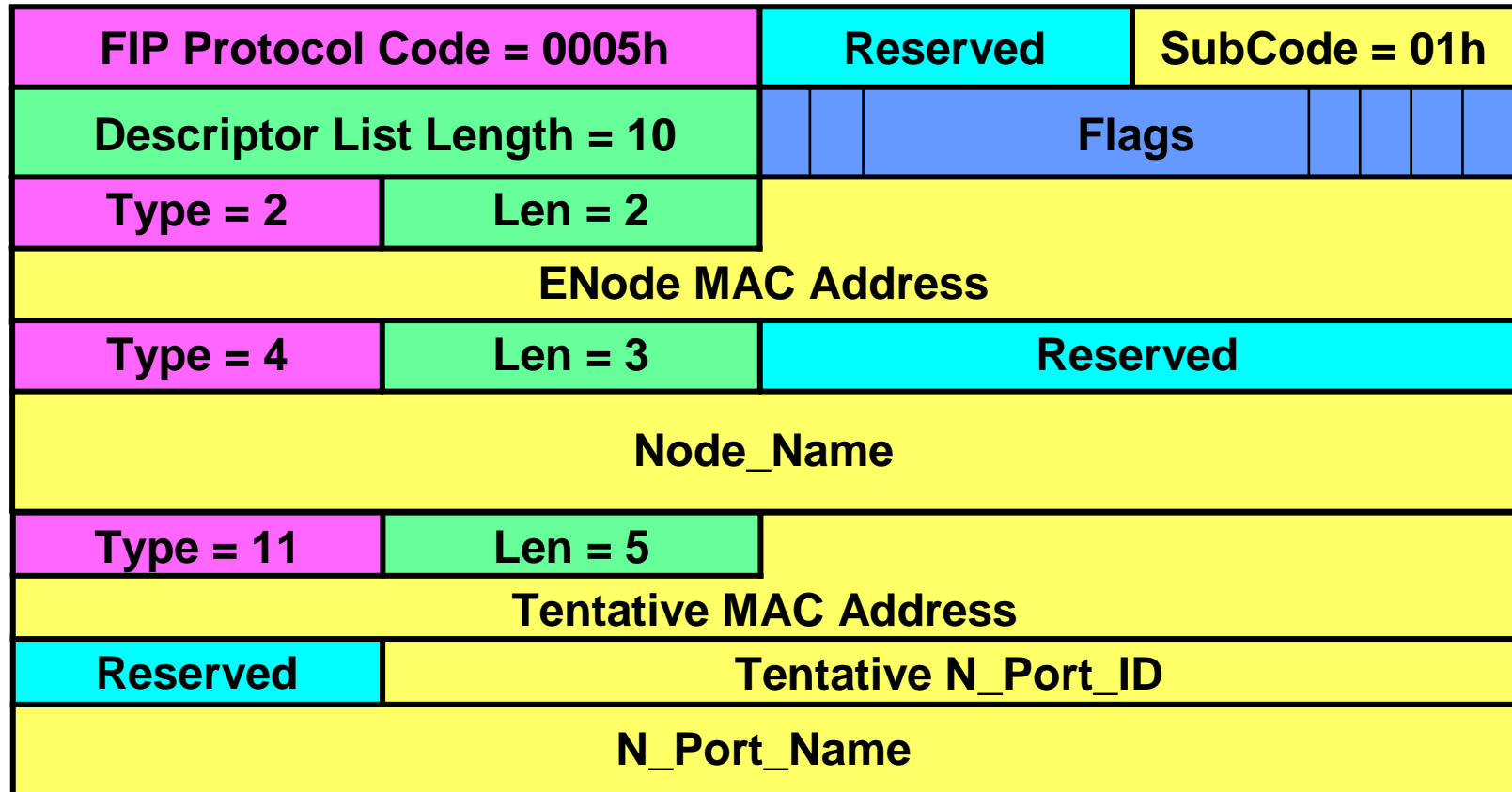
- **Many thanks to all involved!**

Thank You



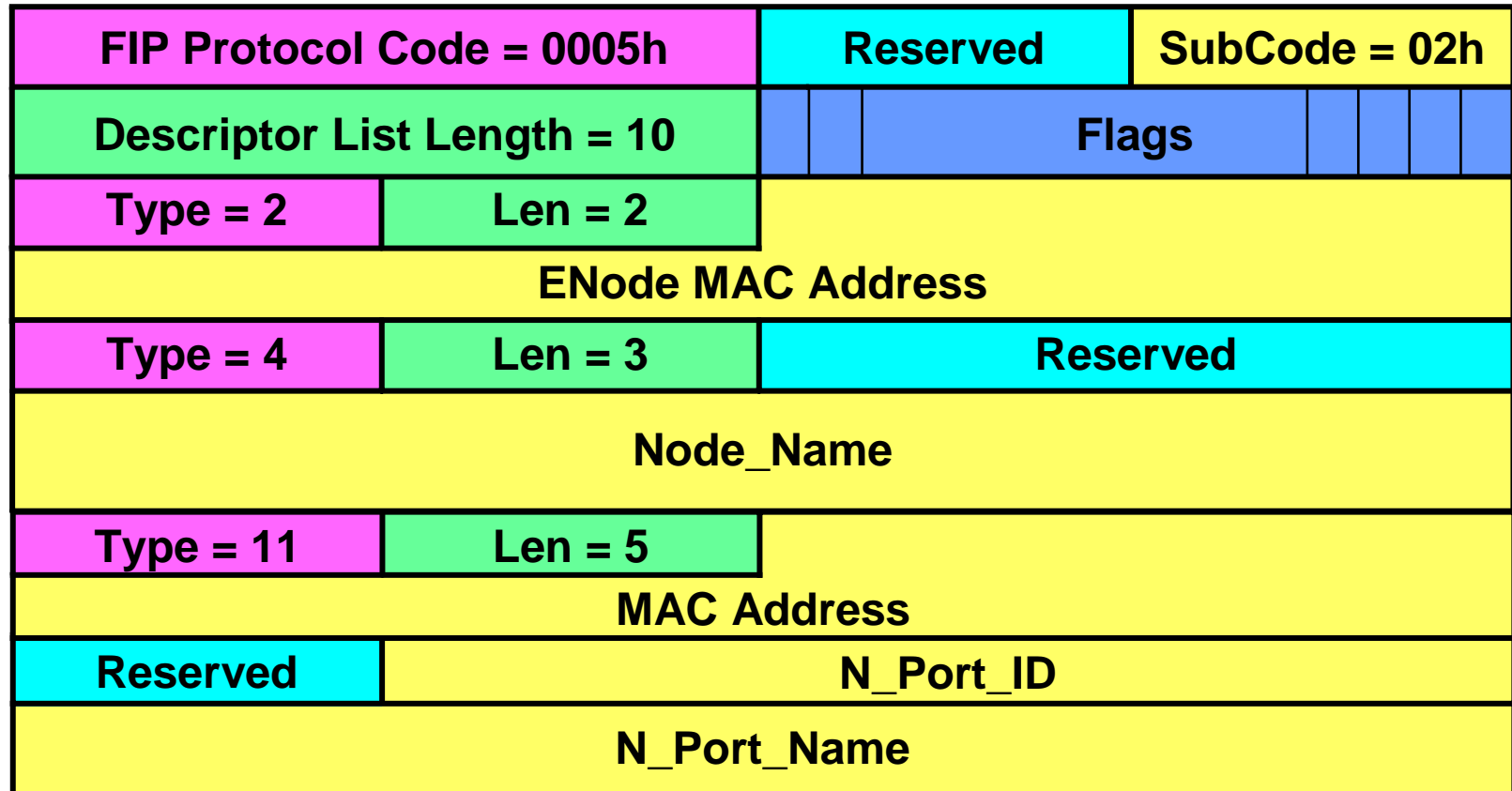
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N_Port_ID Probe Request



- SA = ENode MAC Address
- DA = All-VN2VN-ENode-MACs or All-PT2PT-ENode-MACs

N_Port_ID Probe Reply



- SA = Source ENode MAC Address
- DA = Destination ENode MAC Address

N_Port_ID Claim Notification

SA = ENode MAC Address
 DA = All-VN2VN-ENode-MACs or All-PT2PT-ENode-MACs

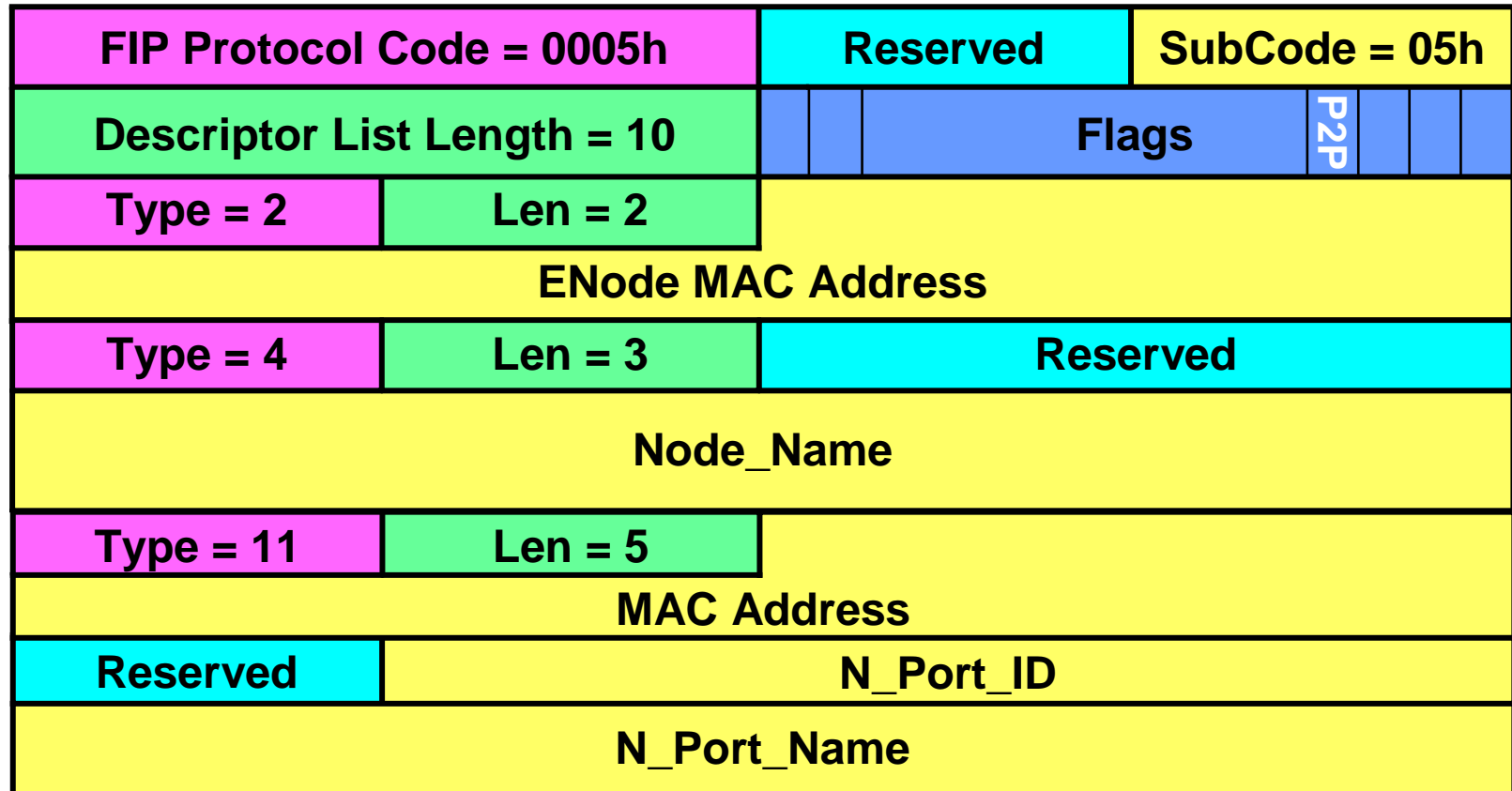
FIP Protocol Code = 0005h		Reserved	SubCode = 03h	
Descriptor List Length = 52		Flags		P2P
Type = 2	Len = 2	ENode MAC Address		
Type = 4	Len = 3	Reserved		
Node_Name				
Type = 11	Len = 5	VN Port MAC Address		
Reserved	N_Port_ID			
N_Port_Name				
Type = 15	Len = 41	Reserved		
FC-4 Types				
FC-4 Features				
Type = 6	Len = 1	Max FCoE Size		

N_Port_ID Claim Response

SA = Source ENode MAC Address
 DA = Destination ENode MAC Address

FIP Protocol Code = 0005h		Reserved	SubCode = 04h	
Descriptor List Length = 52		Flags		P2P
Type = 2	Len = 2	ENode MAC Address		
Type = 4	Len = 3	Reserved		
Node_Name				
Type = 11	Len = 5	VN_Port MAC Address		
Reserved	N_Port_ID			
N_Port_Name				
Type = 15	Len = 41	Reserved		
FC-4 Types				
FC-4 Features				
Type = 6	Len = 1	Max FCoE Size		
FIP Pad to Max FCoE Size				

N_Port_ID Beacon



- SA = VN_Port MAC Address (i.e., VN2VN-FC-MAP || LUID)
- DA = All-VN2VN-ENode-MACs or All-PT2PT-ENode-MACs