

# **“BGP based Auto-Discovery Mechanism for Optical VPNs”**

<draft-fedyk-bgpvpon-auto-00.txt>

Don Fedyk

Hamid Ould-Brahim

Peter Ashwood-Smith

(Nortel Networks)

Yakov Rekhter

(Juniper Networks)

Eric C. Rosen

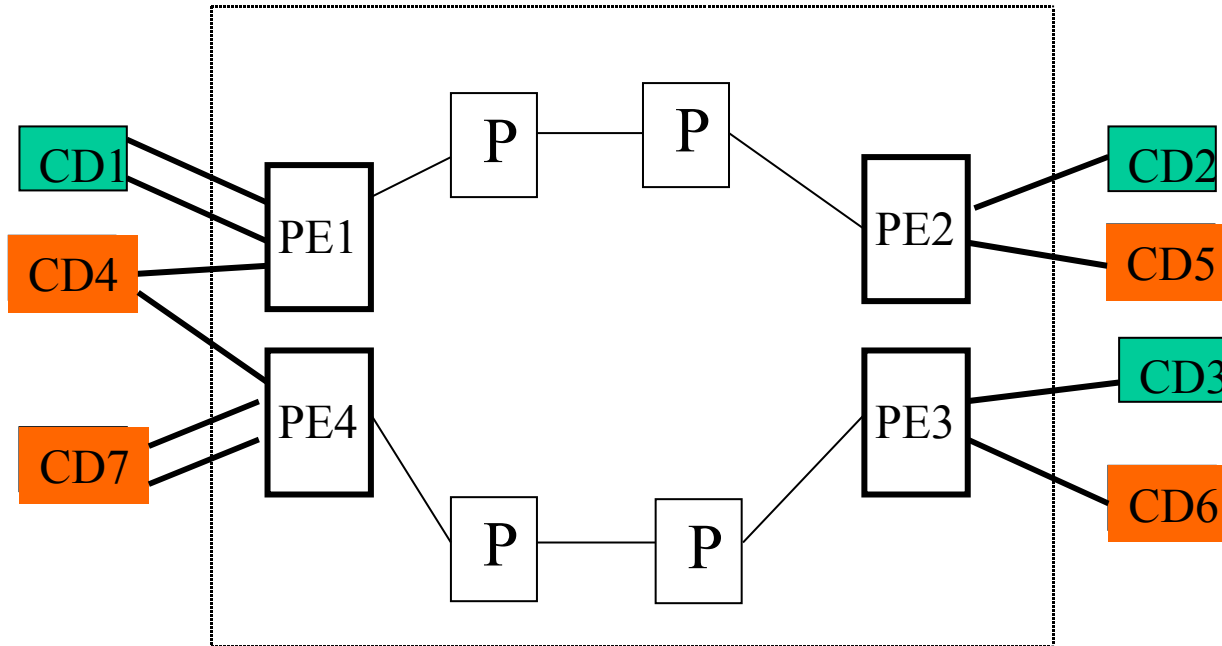
(Cisco Systems)

# Motivations/Requirements

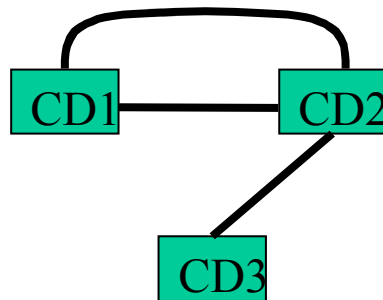
- Define a BGP based auto-discovery mechanism which allows client devices (CDs), members of the same VPN to discover themselves and to request CD-to-CD optical connections across a service provider optical infrastructure.
- Optical VPN (OVPN) is defined as a collection of ports that connect the CDs owned by the same organization to the service provider network.
- A given service provider network could support multiple OVPNs.

- A port is actually a collection of channels (e.g., lightpath, SDH/SONET circuit).
- Not all ports on a given provider edge optical network element (PE-ONE) that connect that PE ONE to CDs must belong to the same OVPN.
- One important goal of the mechanism is to support single ended provisioning.
- It should be possible to reconfigure OVPN (e.g when CD request to setup a new optical channel trail to another CD within the same VPN) without requiring configuration changes in any of the provider's ONEs.

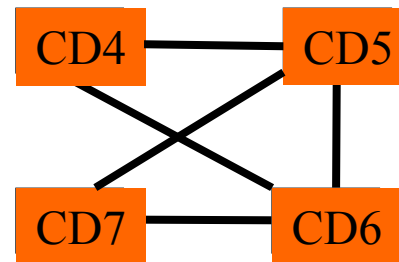
# Reference Model



**VPON A**



**VPON B**



# Mode of Operations

- Within a given OVPN, each port has an identifier unique only within that OVPN called the Customer Port Identifier (CPI).
- Within a service provider network, each port on a PE ONE has an identifier that is unique within that service provider network. We refer to this identifier as Provider Port Identifier (PPI).
- Each PE ONE maintains a Port Information Table (PIT) for each OVPN that has at least one port on that PE ONE. A PIT contains a list of  $\langle \text{CPI}, \text{PPI} \rangle$  tuples for all the ports within its OVPN.

CPI= <interface index, CD IP address>



Unique number  
within the CD

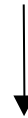


Unique address  
within the OVPN

PPI= <interface index, IP address>



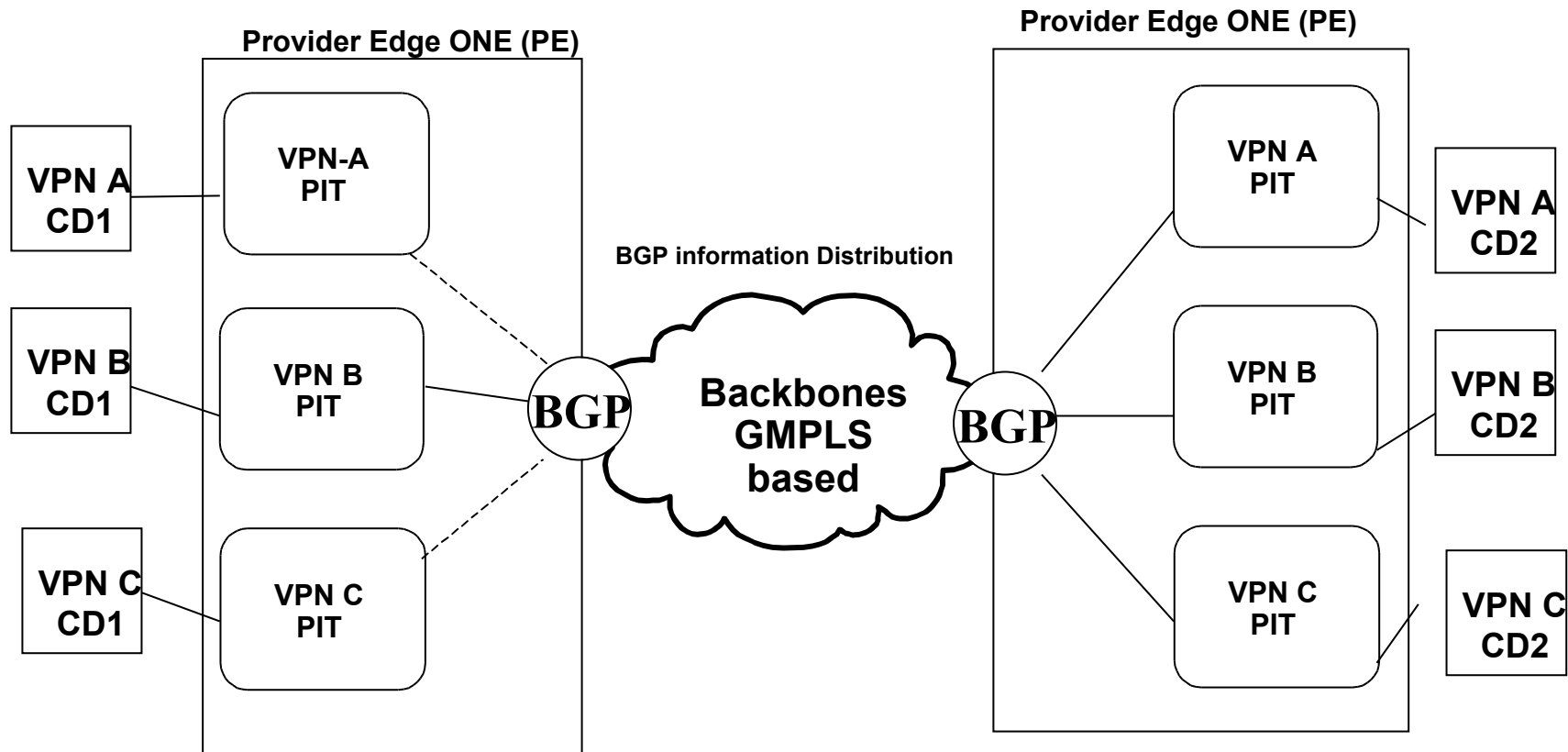
Unique number  
within the PE  
(per port)



Unique address  
within the SP network

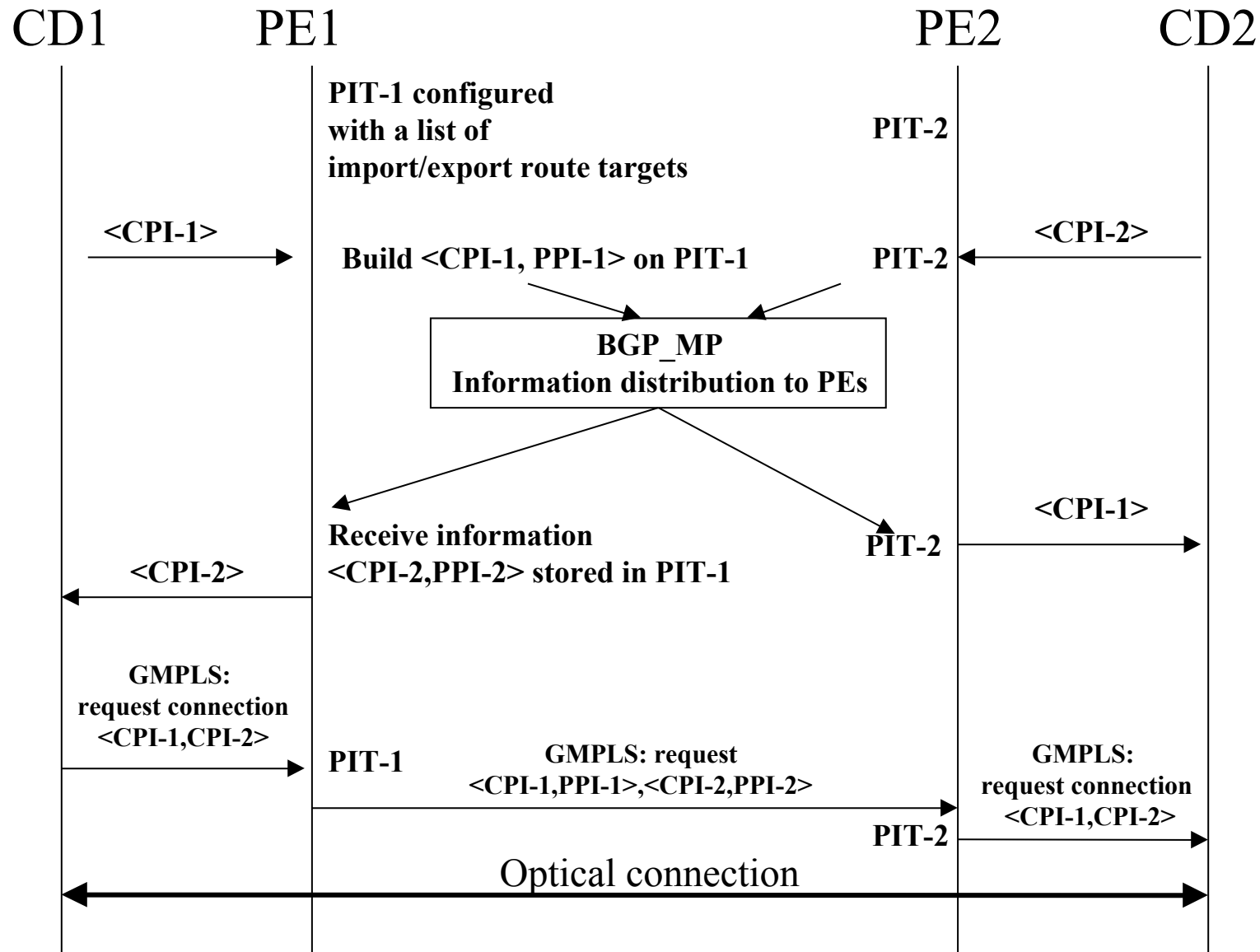
Port Information Table (PIT)
<CPI, PPI>
:

# OVPN Components



A PIT on a given PE ONE is populated from two sources: the information received from the CDs attached to the ports on that PE ONEs, and the information received from other PE ONEs (received through BGP).

# How the mechanism works?





- A CD need not establish an optical connection to every target port that CD knows about. Therefore the VPON topology is controlled by the CDs.
- A port, in addition to its CPI and PPI may also have other information associated with it (e.g., characteristics of the channels within that port like encoding , bandwidth , total unreserved bandwidth within the port, etc).
- The connectivity between CDs is established at the granularity of channels

# Others

- The mechanism applies also to a situation where the service provider network consists of SONET/SDH cross connects and ports are connected via SONET/SDH sub-channels with each other.
- Since the protocol used to populate a PIT with remote information is BGP, and since GMPLS signaling isn't restricted to a single routing domain, it follows that this mechanism could support an environment that consists of multiple routing domains.