Application-oriented Stateful PCE Architecture and Use-cases for Transport Networks

<draft-lee-pce-app-oriented-arch-00.txt>

Young Lee, Xian Zhang, Haomian Zhang, Dhruv Dhody (Huawei),
Guoying Zhang (CATR),
Oscar Gonzalez de Dios (Telefonica)

PCE WG
IETF 88 Vancouver

Background & Motivation

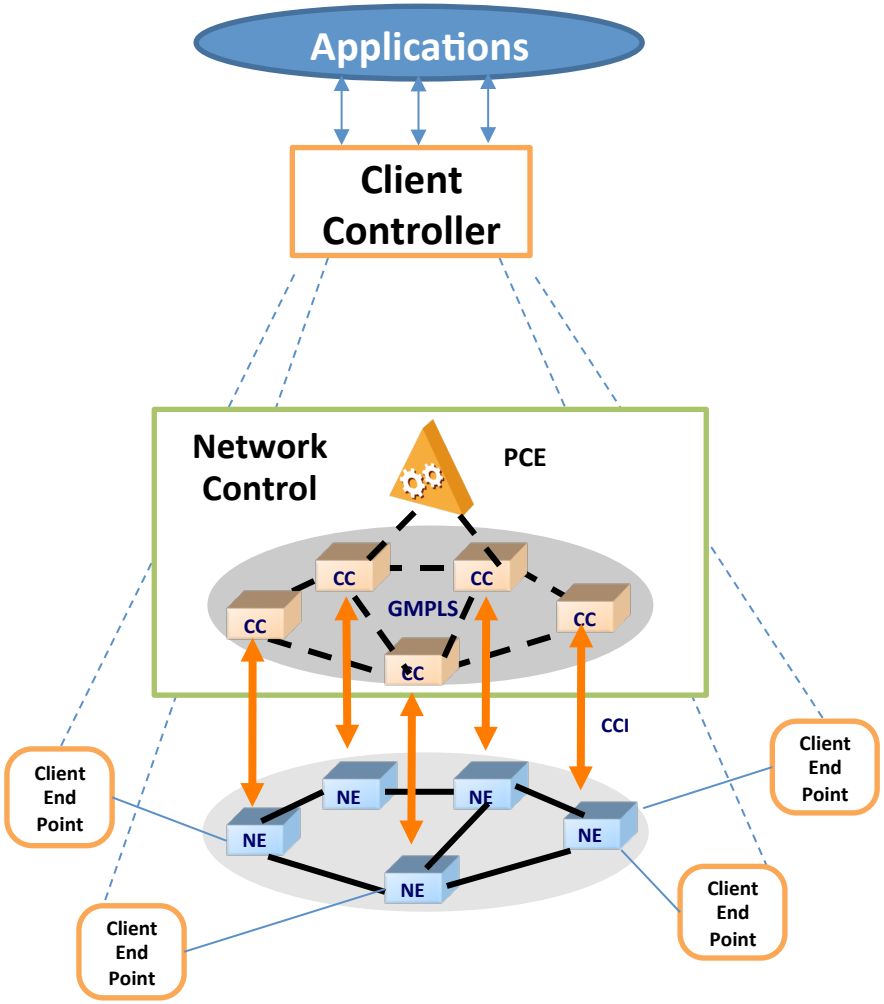
- Can PCE support open programmable interfaces that it might support SDN network virtualization for transport networks?
- Currently, it is out of scope.
- Related work:
  - CSO: http://datatracker.ietf.org/doc/draft-dhody-pce-cso-enabled-path-computation/
  - ABNO: http://datatracker.ietf.org/doc/draft-farrkingel-pce-abno-architecture/
  - NCFV: http://www.ietf.org/id/draft-lee-network-control-function-virtualization-01.txt

Transport Network Control

- SDN concept has been applied for transport networks.
  - Separation of control plane functions from data planes by GMPLS/ASON control plane technology
    - Link Discovery (LMP)
    - Dissemination of Link/Resource Information (OSPF-TE)
    - Connection/Provisioning (RSVP-TE)
  - Global view of a network
    - TEDB, LSDB give the global domain view of a network
  - Logically centralized control
    - PCE for path computation; Stateful PCE for initiation of path provisioning (in cooperation with GMPLS signaling)
- Can PCE architecture support network virtualization?

Client Control

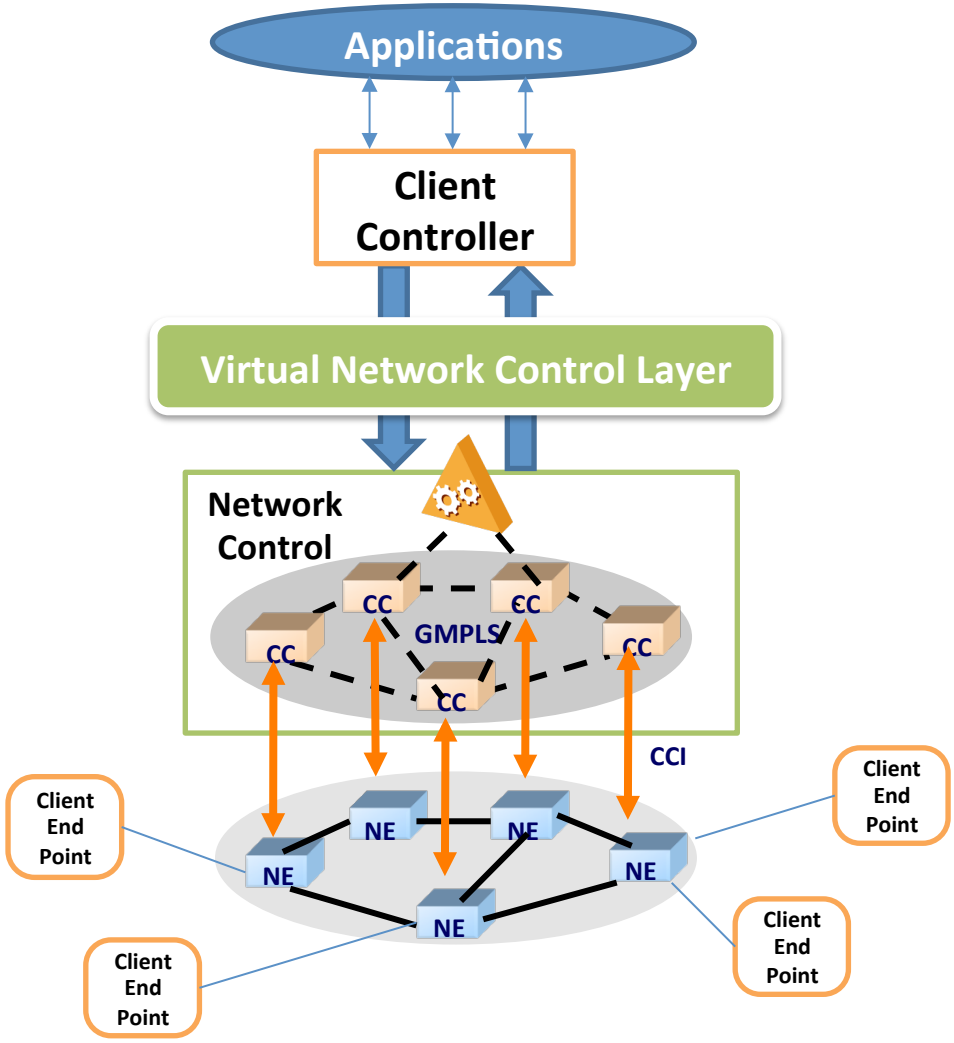
- Supports various applications via various NB APIs (e.g., OpenStack, etc.)
- Various types of client to network
  - Data Center Operators
  - Virtual Network Providers
  - Contents Providers
  - Carriers of carrier
- Primary source for application service/connectivity requirements and location information (client end points).



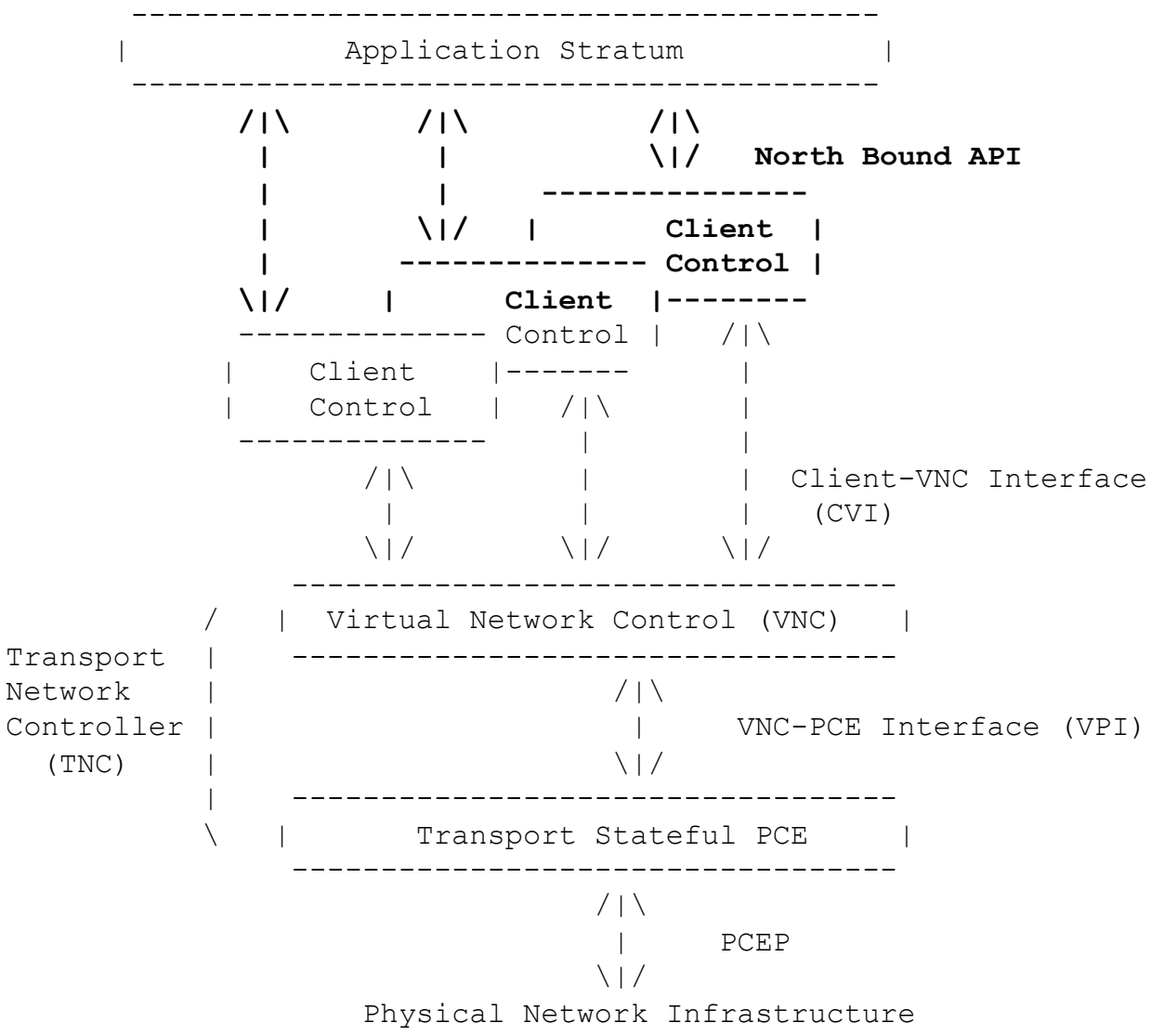
But current GMPLS/PCE architecture does not support programmable interfaces for network virtualization

Virtual Network Control Layer

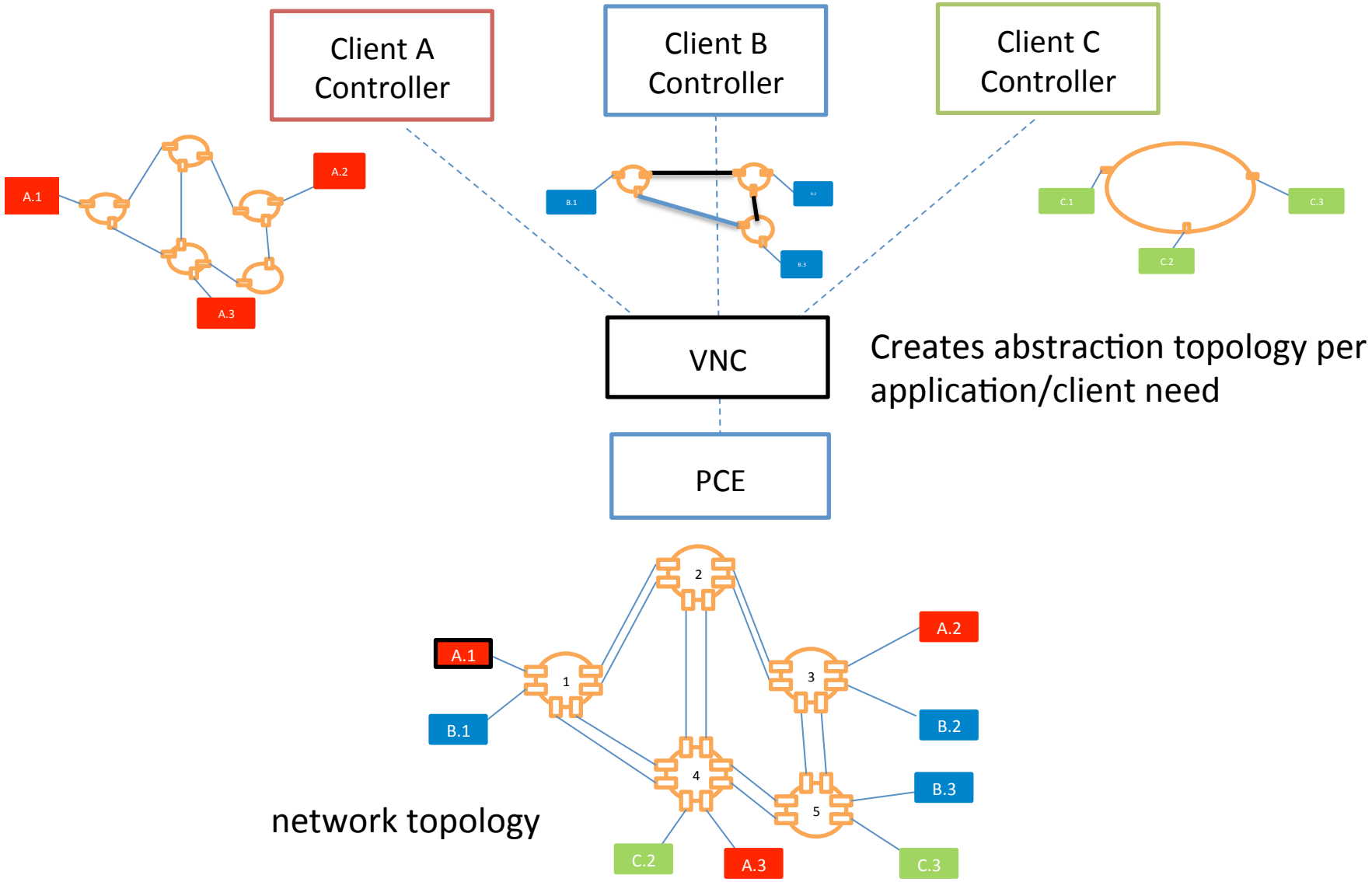
- Virtual Network Control separated from Physical network control
  - Open interfaces creation
  - Third party developer can develop VNC layer
- Virtual Network Control Layer provides virtual network control functions:
  - Virtual Service Creation
  - Virtual Path Computation
  - Virtual Topology Database Creation
  - Virtual Network Discovery
  - Topology Abstraction for Virtual Service
  - Virtual connection setup



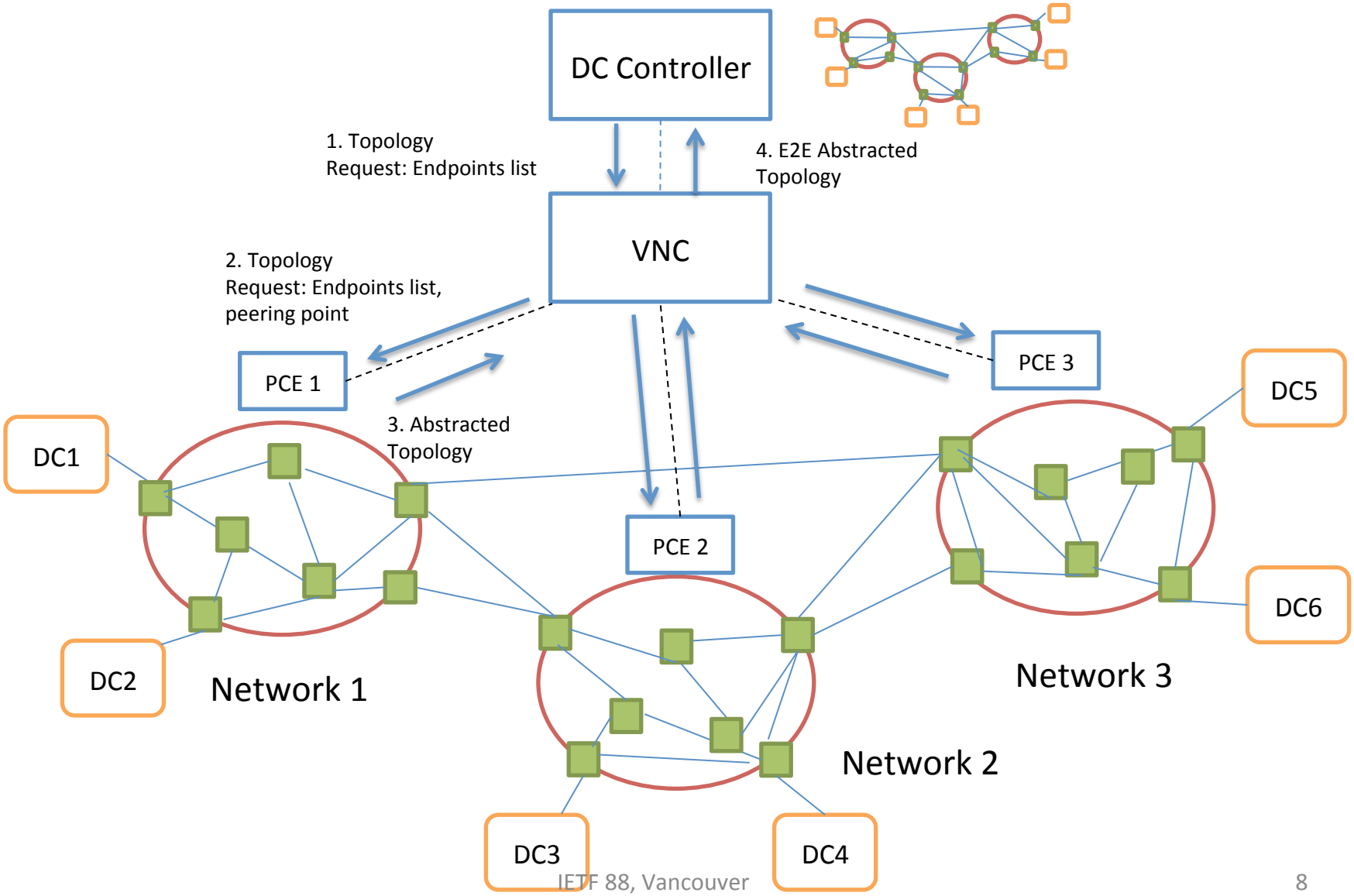
Application-oriented Stateful PCE Architecture



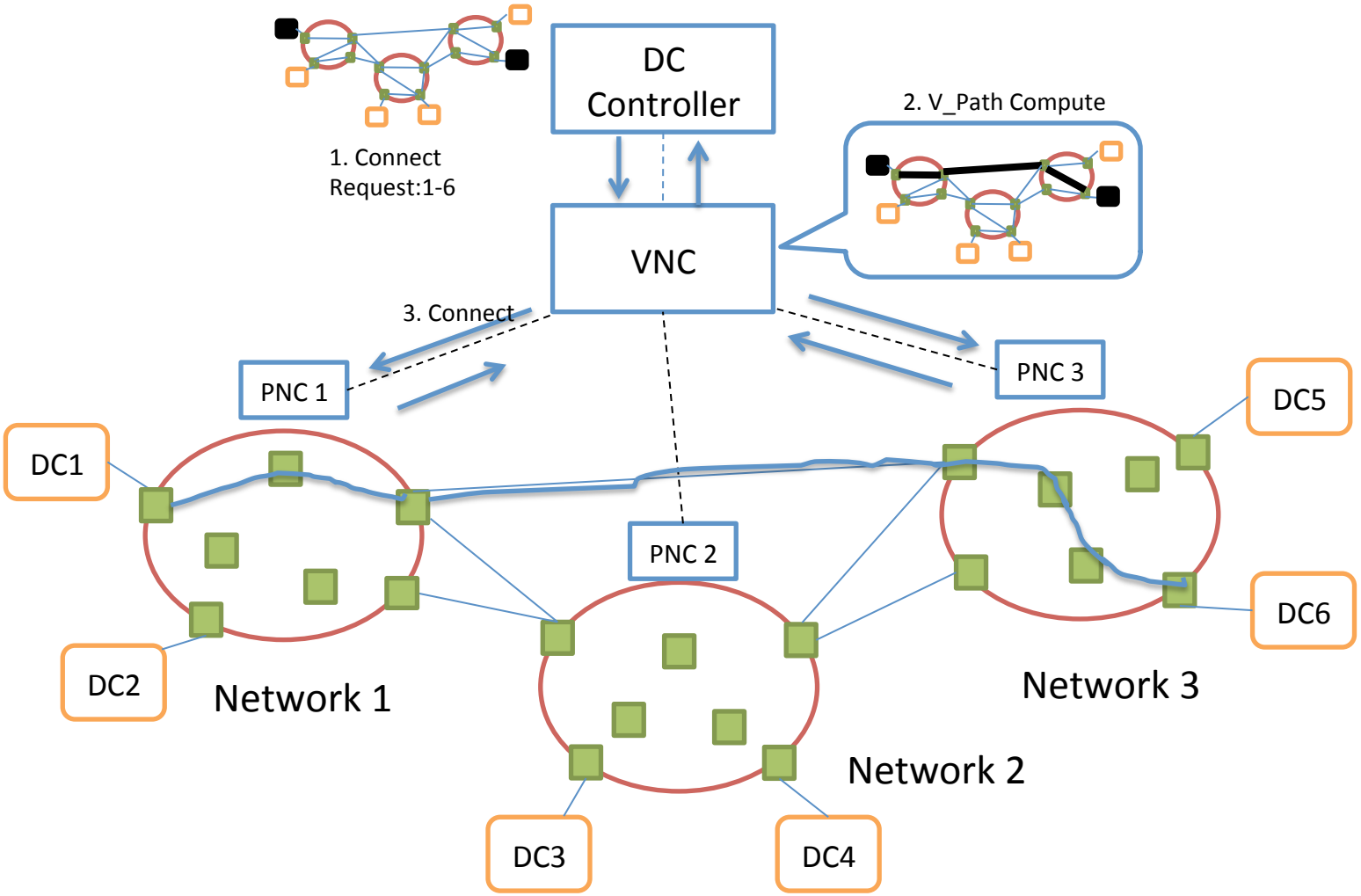
Use-case A: application-specific topology abstraction and virtual control



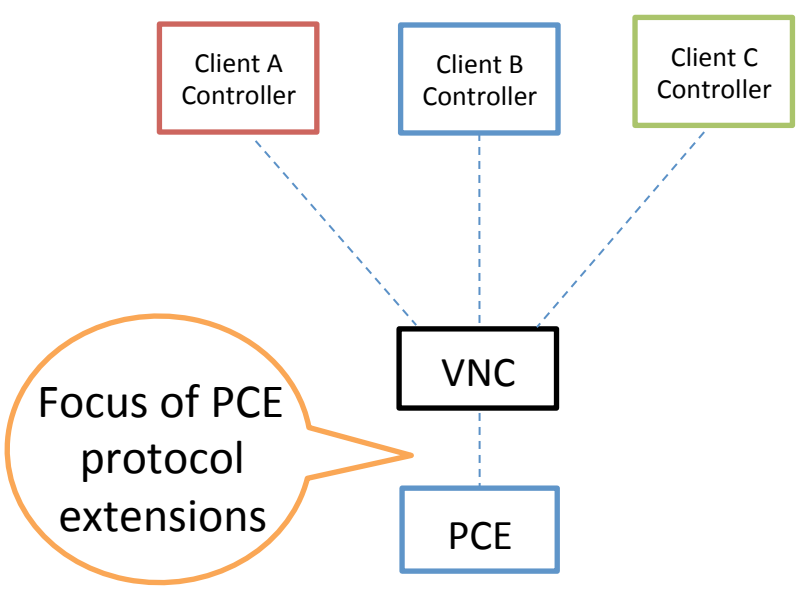
Use-case: Dynamic DCI in multi-domain network (Topology Request)



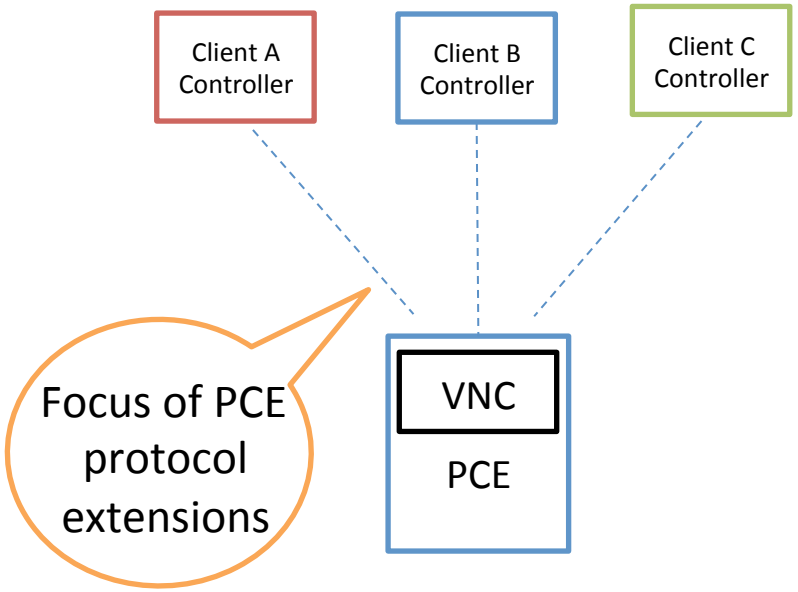
Use-case: Dynamic DCI in multi-domain network (Connection Request)



Implementation Alternatives



Option A:
PCE interacts with VNC



Option B:
PCE interacts with Client/APP directly

Next Steps

- Extend the charter if WG thinks this is a viable PCE direction.
- Explore a new WG formation if WG thinks this is out of scope.