ACTN Proposed Protocol Work

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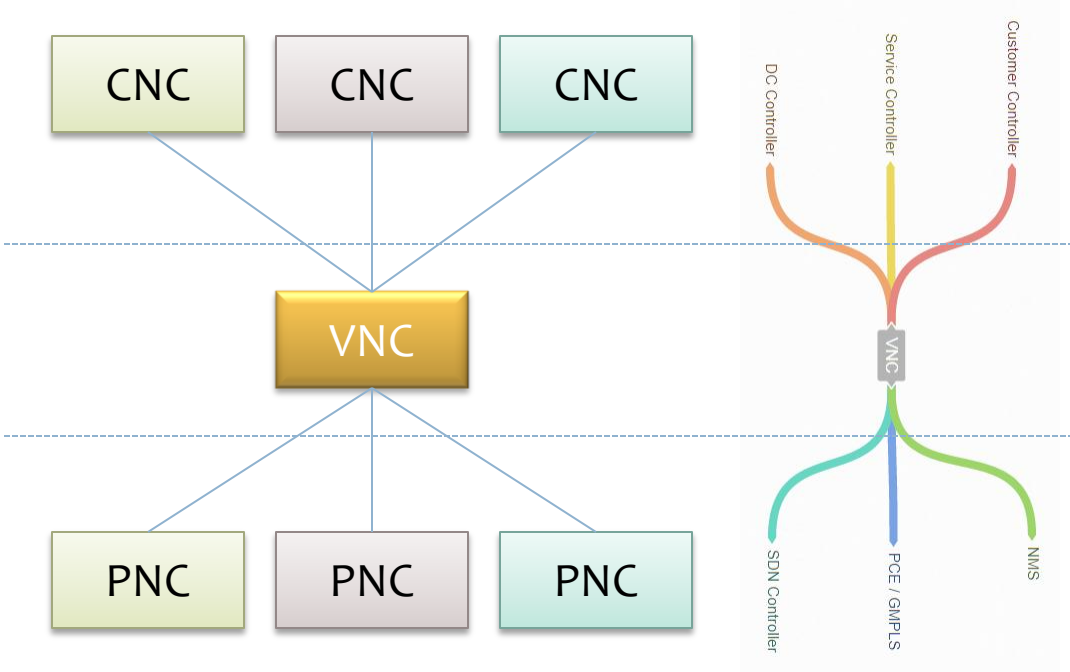
Motivation

The aim is to get an idea of the kind of protocol work that will be generated from ACTN.

The actual protocol work would follow the requirement collection, gap analysis of the existing work etc.

Slides are based on the framework set by draft-ceccarelli-actn-framework-04.

Controllers

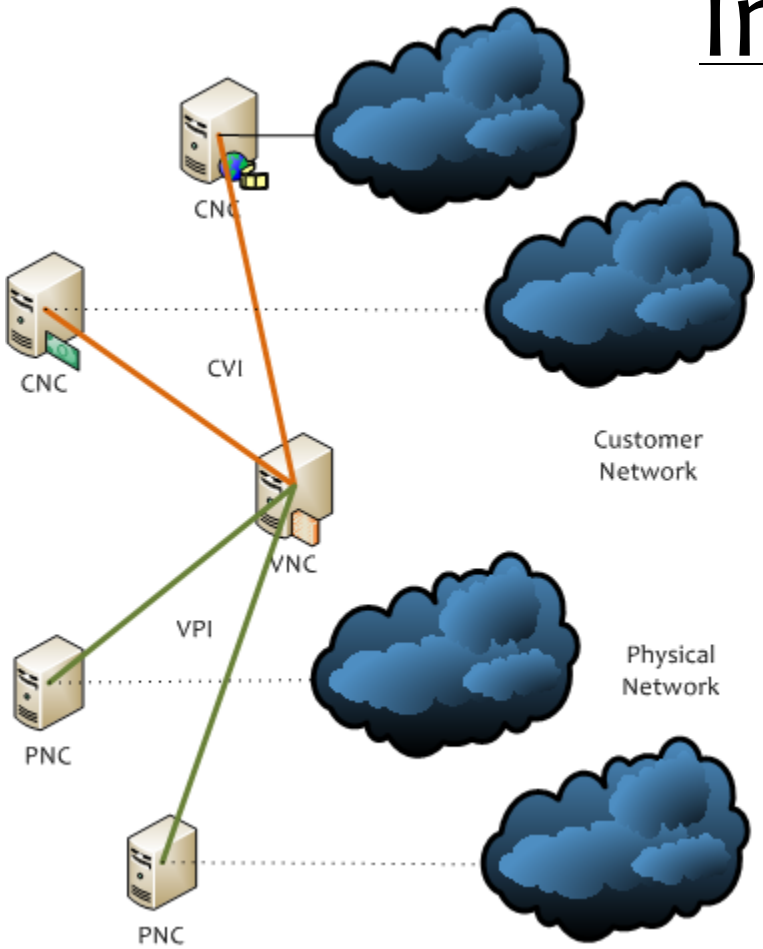


Customer Network Controllers: Understands Applications and handle tenant's Virtual networks requirements.

Virtual Network Controllers: Multi-domain coordinator; Maps customer's virtual network requirements to something a single domain PNC can understand!

Physical Network Controllers: Deals with the physical networks concerns.

Interfaces



CVI : CNC-VNC Interface

- It requests the creation of the virtual network per customers requirement for the service or application.
- The VNC may report potential network topology when queried.
- Allow programmability to create, modify and delete virtual network service instances.

VPI : VNC-PNC Interface

- It communicates the creation request of new connectivity in the physical network.
- Facilitate the VNC in Multi-domain coordination function (E2E path computation and connection setup)
- Allow programmability to facilitate path computation, connection provisioning and restoration.
- Seamless mapping and translation between physical resources and virtual resources.

Requirement for Interfaces

Requirements	CVI (Interface B)	VPI (Interface C)
Security / Features Negotiation	External / Internal; Push v/s Pull; Parameter Negotiations – features supported etc	Security key exchange; Push v/s Pull; Preference, Support for abstraction etc
Policy	Representation/ Managing/ Sharing of Policies including Policy Based Path, Policy Based Domain selections, Policy Based Constraints etc	
Query/ Response/ Update (Push)	**VN Topology Level:** VN Endpoints / Constraints / Diversity etc VN response with setup/available paths in a tunnels or graph – VN abstract topology as per the customer needs.	**Physical / Abstract Topology Level:** Topology abstraction level; Supported metrics; Topology as response Topology changes maybe pushed to the VNC **Path Level:** Path computation related information mapped to a VN; All paths belonging to a VN.
Instantiation Request/ Response/ Update	**VN Topology Level:** VN Endpoints / Topology requirements / Constraints / Diversity / Policy etc VN abstract topology as per the customer needs	**Connection Level:** Connection setup and Multi-domain signaling coordination among PNCs. Connection/Path changes as requested
Lifecycle management/ operation/ Monitoring	**VN Topology Level:** VN topology query / Request modifications in VN topology / monitor / raise alarms	**Connection Level:** LSP create/modify/delete and service degradation monitoring, alarms etc

Proposed Protocol Work

Path/ Connection

- Stateful PCE with instantiation as base
- Grouping of Path request / response / instantiation along VN
- Extension for PCE-Yang to support LSP instantiation
- Path/connection Monitoring and alarm generation.
- PCEP **and** (Modeling - UML info model / Yang data model)

Physical/ Abstract Topology

- Physical or abstract topology – TED (not per customer)
- Update to a topology (push)
- (Modeling - UML info model / Yang data model) / PCEP / BGP-LS

VN Topology (Multi-tenant)

- Per tenant VN topology (Path or Graph; Potential and reserved)
- Request creation/ modification/ deletion/ query of VN topology
- Update to a VN topology (push)
- VN Monitoring and alarm generation
- Rest API / (Modeling - UML info model / Yang data model) / PCEP / ALTO (JSON Model)

VPI

CVI

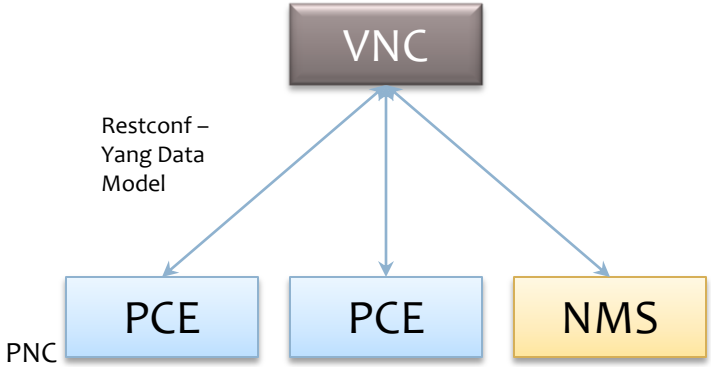
VPI

Read-Write

Path/Connection

Models	PCEP

• Examine existing IM work for applicability, map to YANG
• Yang model for path instantiation (connection)
• PCE-Yang augmented for stateful PCE based LSP instantiation
	• [H-PCE]: Parent PCE at VNC; Child PCE at PNC
	• Path computation requests using PCEP
	  • Ext to group path computation request for VN/Customer
	• Multi-domain coordination via PCEP
	  • LSP instantiation (connections) requests from parent to child PCE
	  • State synchronization (LSP-DB) with child PCEs



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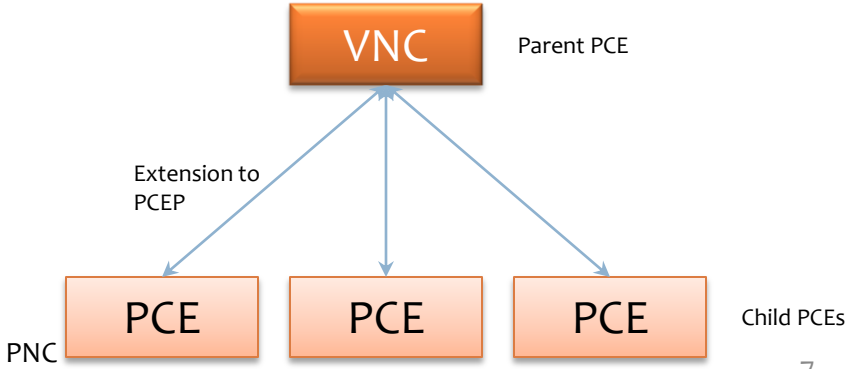


VPI

Read-Only

Physical/ Abstract Topology

Models	PCEP	BGP-LS
• Examine existing IM work for applicability, map to YANG • Some initial work - *draft-liu-netmod-yang-abstract-topo*	• Encoding TED in PCEP • Idea that can be extended - *draft-dhodylee-pce-pcep-te-data-extn* • Support for abstraction needed	• Northbound distribution of Network Topology via BGP • Base *-draft-ietf-idr-ls-distribution* • Support for abstraction needed

Choice Dependent on the type of PNC!

CVI

Read-Write

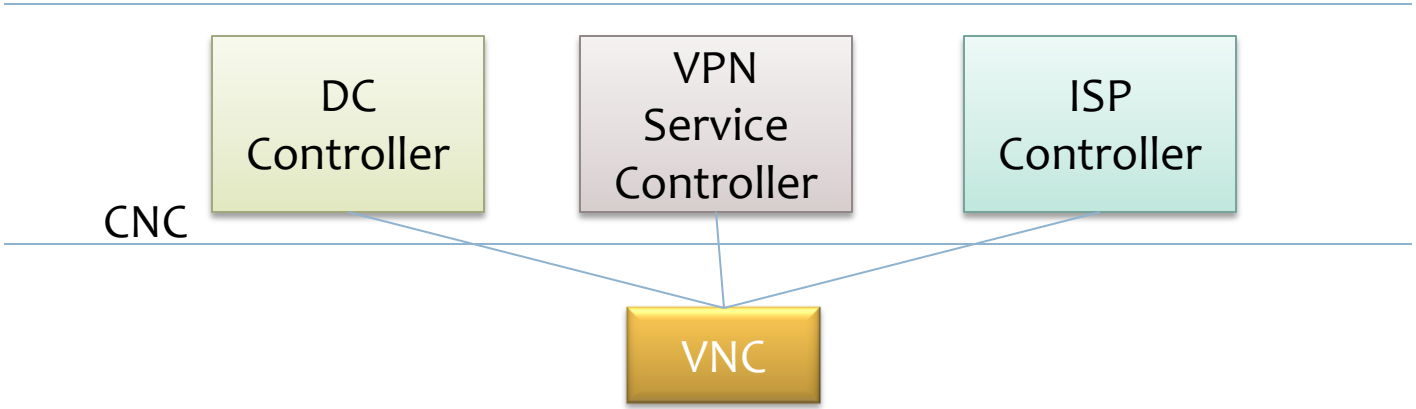
Virtual Network (VN) Topology

Rest API
- Incremental
- Asynchronous

Models
- Examine existing IM work for applicability, map to YANG
- VN topology query
- Request modification to VN topology
- Notifications and alarms

PCEP extensions
- Suitable during Carriers of Carrier / Multi-layer deployments
- Extension needed for VN semantics

JSON/ALTO
- ALTO extension for abstract topology
- Some initial work - *draft-yang-alto-topology;*



Choice Dependent on the type of Customer!

Question & Comments!