Abstraction and control of TE-Networks (ACTN) and network slicing

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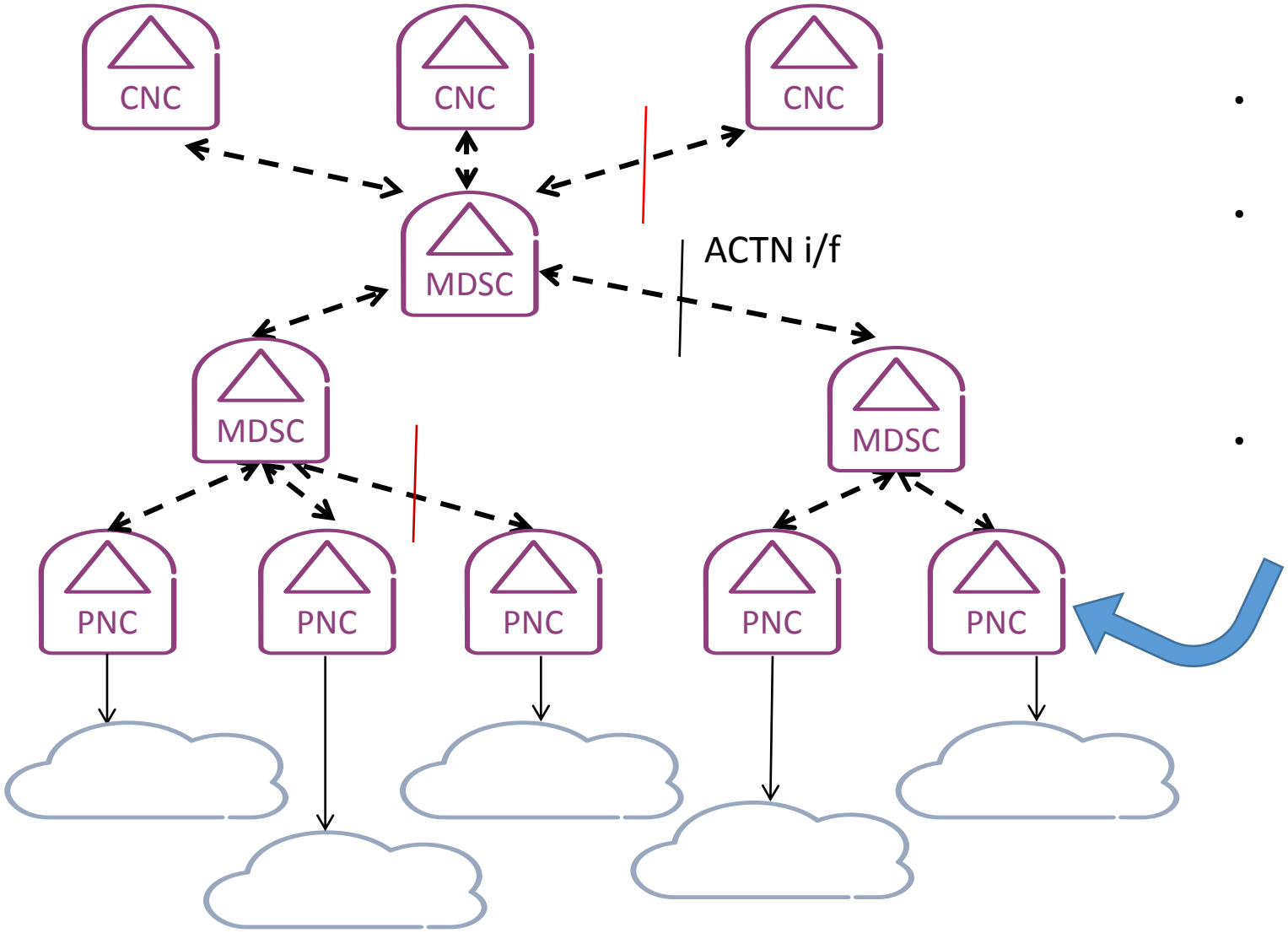
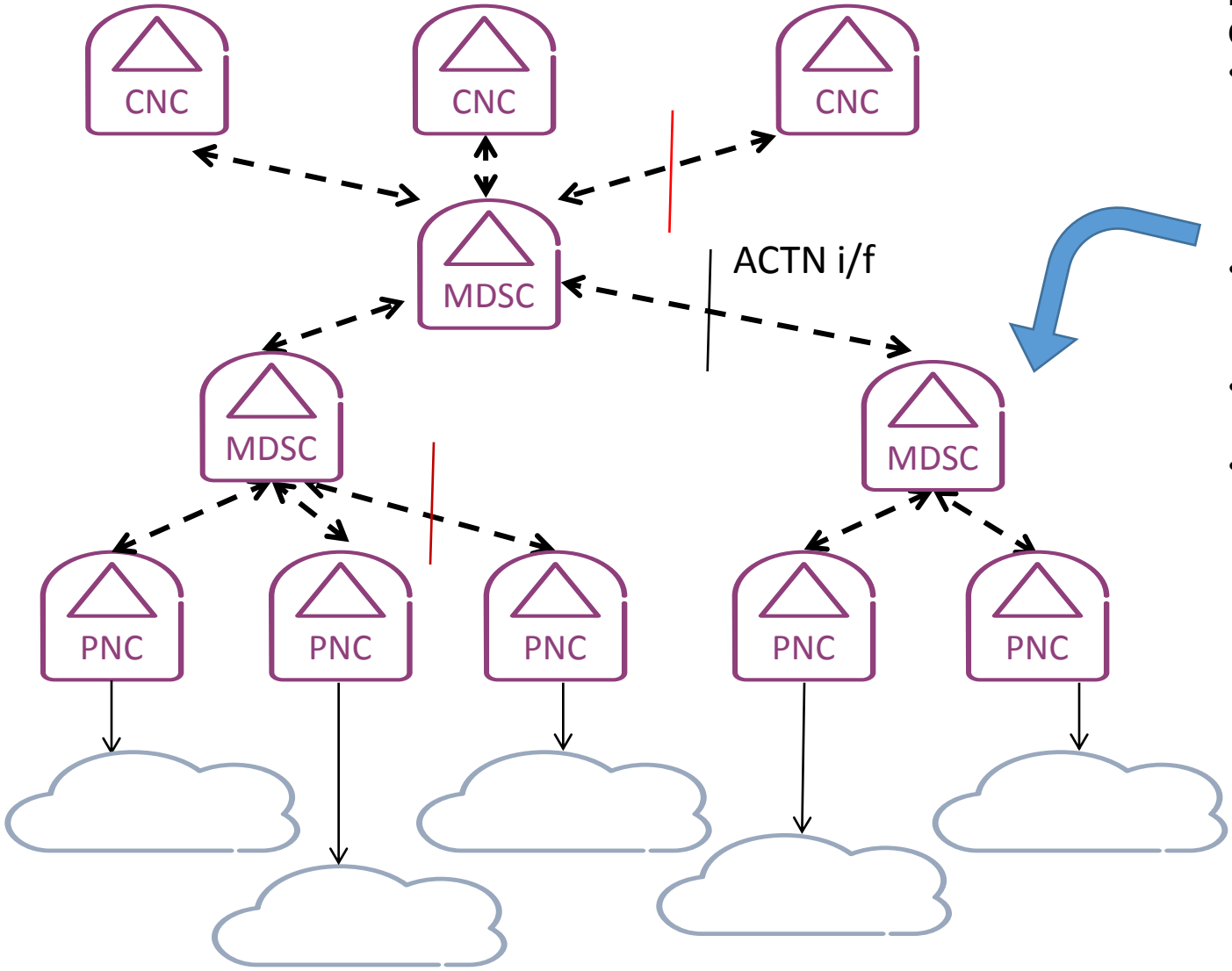
Architecture



PNC (Physical Network Controller)

- Is a domain control/management entity (e.g., GMPLS CP, PCE, OF controller, NMS/EMS)
- It sits at the bottom of the hierarchy of controllers and directly speaks to the nodes.
- It is responsible for domain-specific network control operations such as configuring network elements, provisioning, monitoring, protection and recovery of the networks in charge.
- It provides the MDSC with an abstract view of its domain topology and services

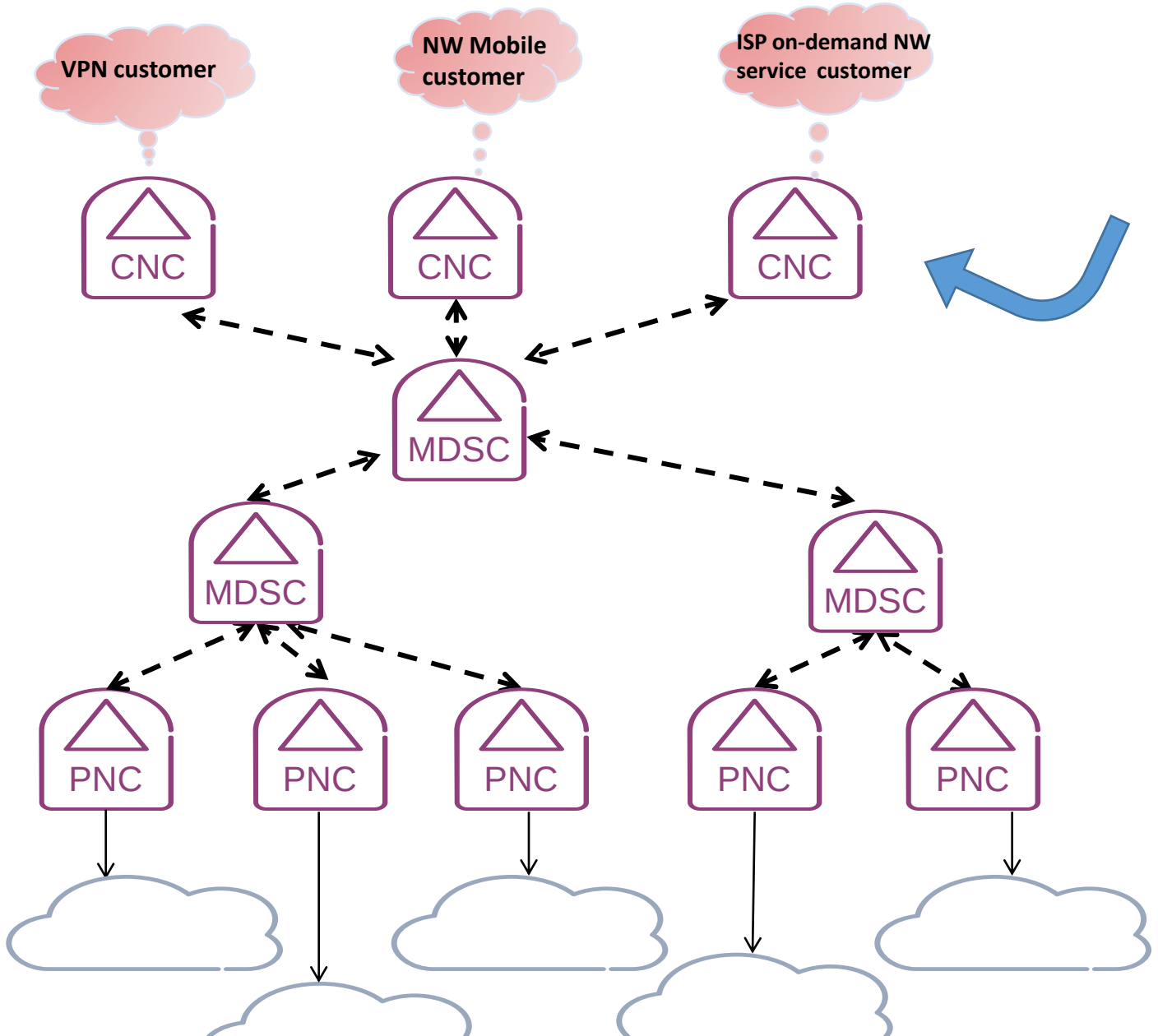
Architecture



MDSC (Multi Domain Service Controller)

- Coordinator/orchestrator responsible for supporting customers' virtual networks creation, modification and deletion
- Allows for Multi-domain coordination/orchestration among PNCs
- Creates end-to-end paths and services
- Allows for a hierarchy of MDSCs for administrative and scalability issues.

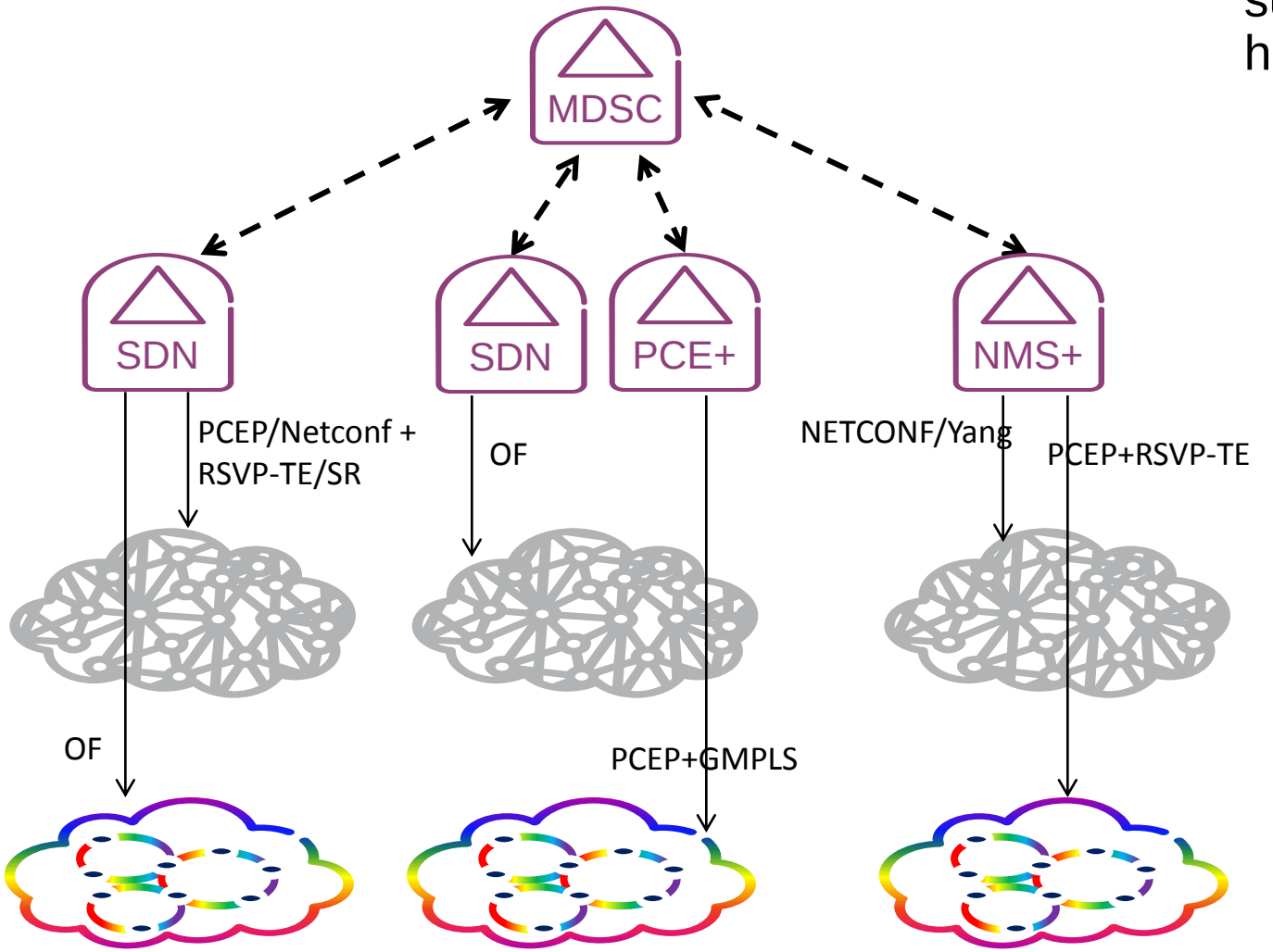
Architecture



CNC (Customer Network Controller)

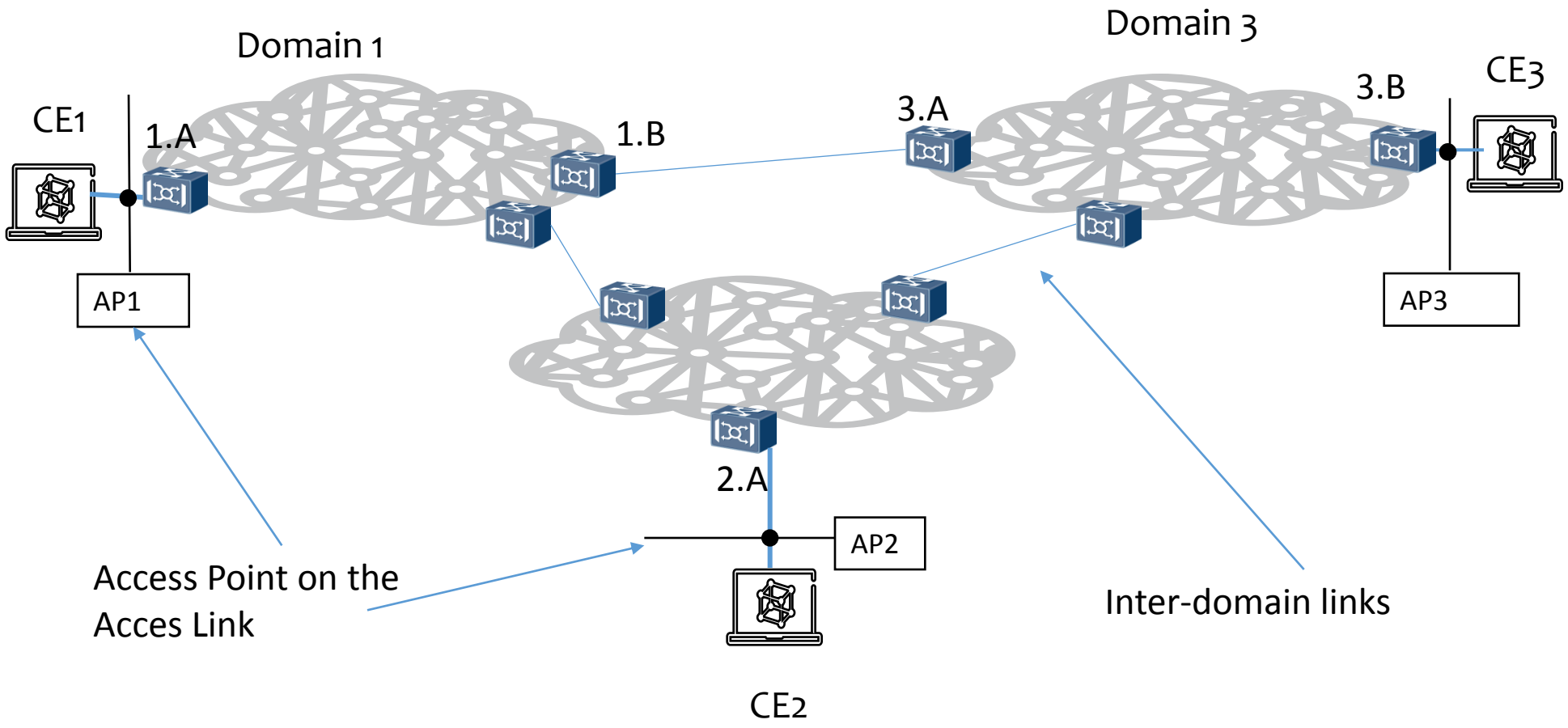
- is responsible for creating VN service instantiation
- providing service/application requirement including endpoint information to network operators.
- Examples of Customers are VPNs, MVNO, ISP, etc.

Not just SDN

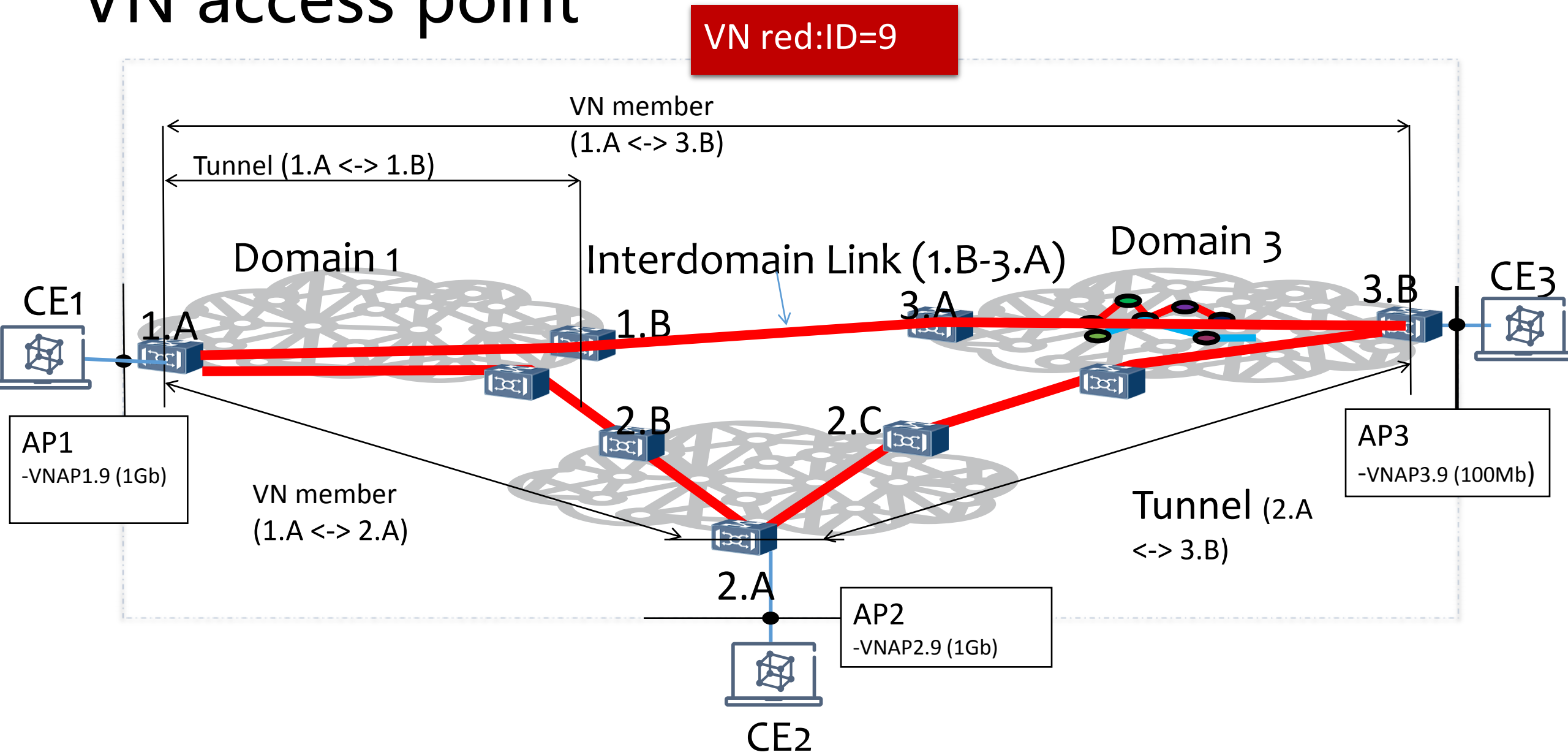


- The ACTN hierarchy is suitable for non homogeneous networks
  - Different SDN control methods for packet and optical domains (e.g. SR or OF)
  - Different control methods for packet and optical SDN and non-SDN (e.g. SR, GMPLS, RSVP-TE, NMS)

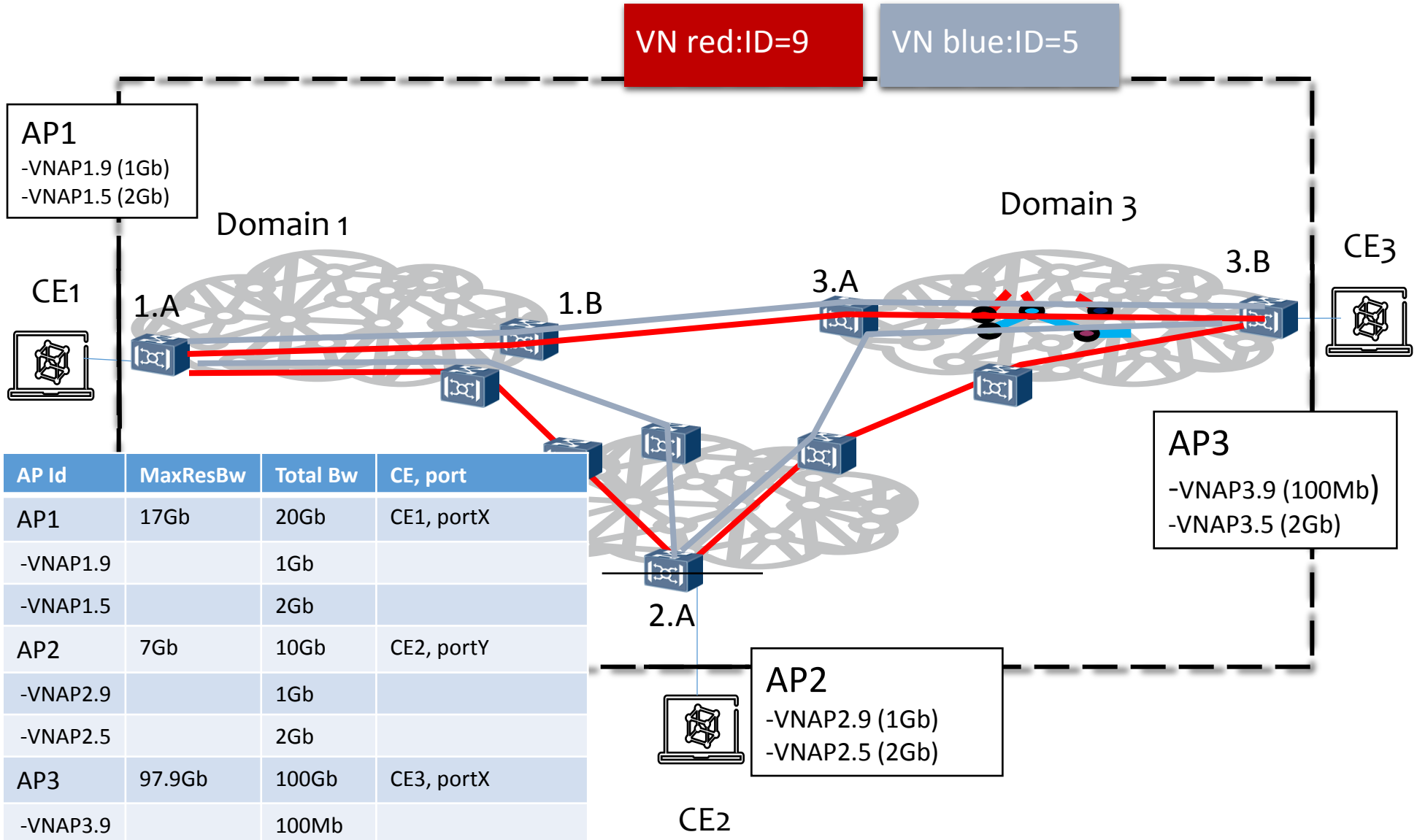
Access points



Definition of Virtual Network (VN) and VN access point



Multiple slices…multiple VNs



AP Id	MaxResBw	Total Bw	CE, port
AP1	17Gb	20Gb	CE1, portX
-VNAP1.9		1Gb	
-VNAP1.5		2Gb	
AP2	7Gb	10Gb	CE2, portY
-VNAP2.9		1Gb	
-VNAP2.5		2Gb	
AP3	97.9Gb	100Gb	CE3, portX
-VNAP3.9		100Mb	
-VNAP3.5		2Gb	

Slicing in the context of ACTN

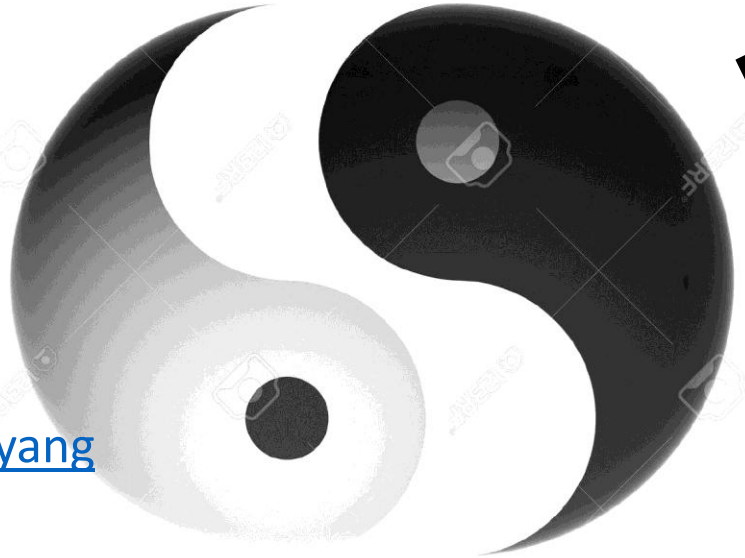
(https://tools.ietf.org/html/draft-leeking-actn-problem-statement-01#page-11)

- It should be possible for transport network infrastructure to be partitioned into multiple independent virtual networks known as "slicing", based on provider service types, customers and application requirements.
- Each customer or application should be able to use arbitrary network topology, routing, or forwarding functions as well as customized control mechanisms independent of the underlying physical network and other coexisting virtual networks.
- It must also be possible for many virtual networks to share the underlying infrastructure, without significantly impacting the performance of applications utilizing the virtual networks.

ACTN STANDARDIZATION STATUS

- Requirements: draft-ietf-teas-actn-requirements-03
- Framework: draft-ietf-teas-actn-framework-00
- Information model: draft-leebelotti-teas-actn-info
- Hierarchical Stateful PCE: draft-dhodylee-pce-stateful-hpce

YANG



PCEP

› YANG model app: draft-zhang-teas-actn-yang
  – TE tunnel & i/f: draft-ietf-teas-yang-te
  – TE topology: draft-ietf-teas-yang-te-topo
  – Path Computation API: draft-busibel-ccamp-path-computation-api
  – ...plus CMI models still missing

› PCE app: draft-dhody-pce-applicability-actn
› PCEP provisioning: draft-ietf-pce-pce-initiated-lsp
› VN association: draft-leedhody-pce-vn-association
› PCEP-LS: draft-dhodylee-pce-pcep-ls