Application-Based Network Operations (ABNO)

http://tools.ietf.org/html/draft-farrkingel-pce-abno-architecture-06

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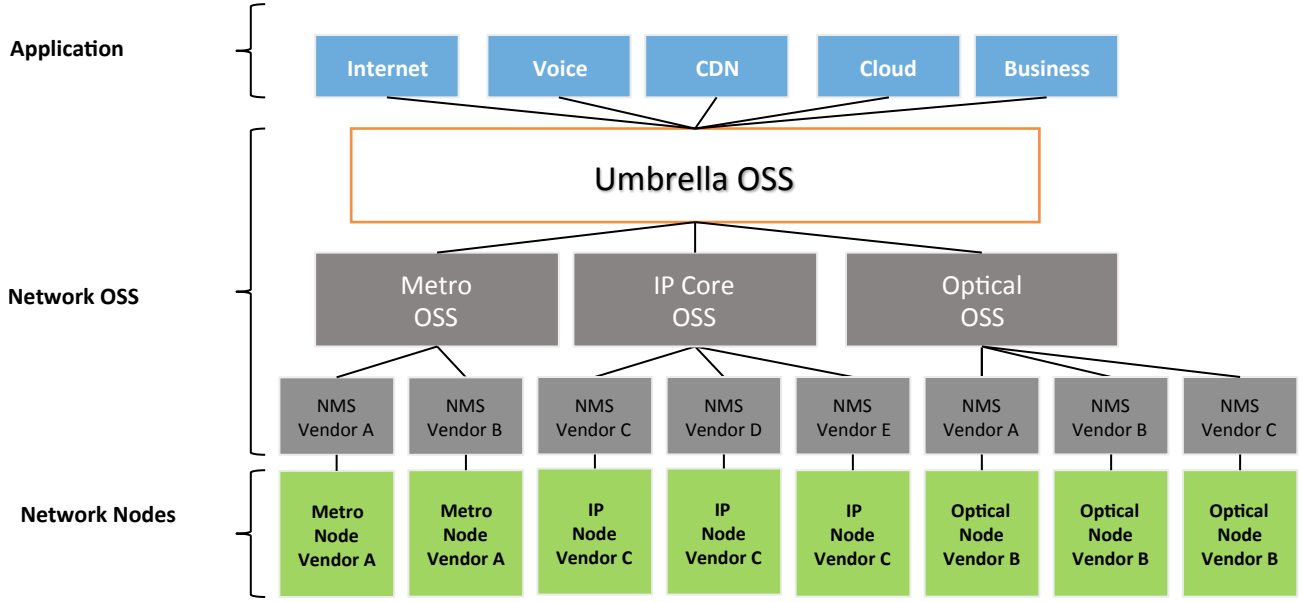
Control of Today's Networks

- Current network operation is not adapted to flexible networking
- Multiple manual configuration actions are needed for network nodes
- Network solutions from different vendors typically use specific OSS/NMS implementations
- Very long provisioning times
- Lack of network bandwidth flexibility and inefficient use of inherent function



Network Operation Requirements

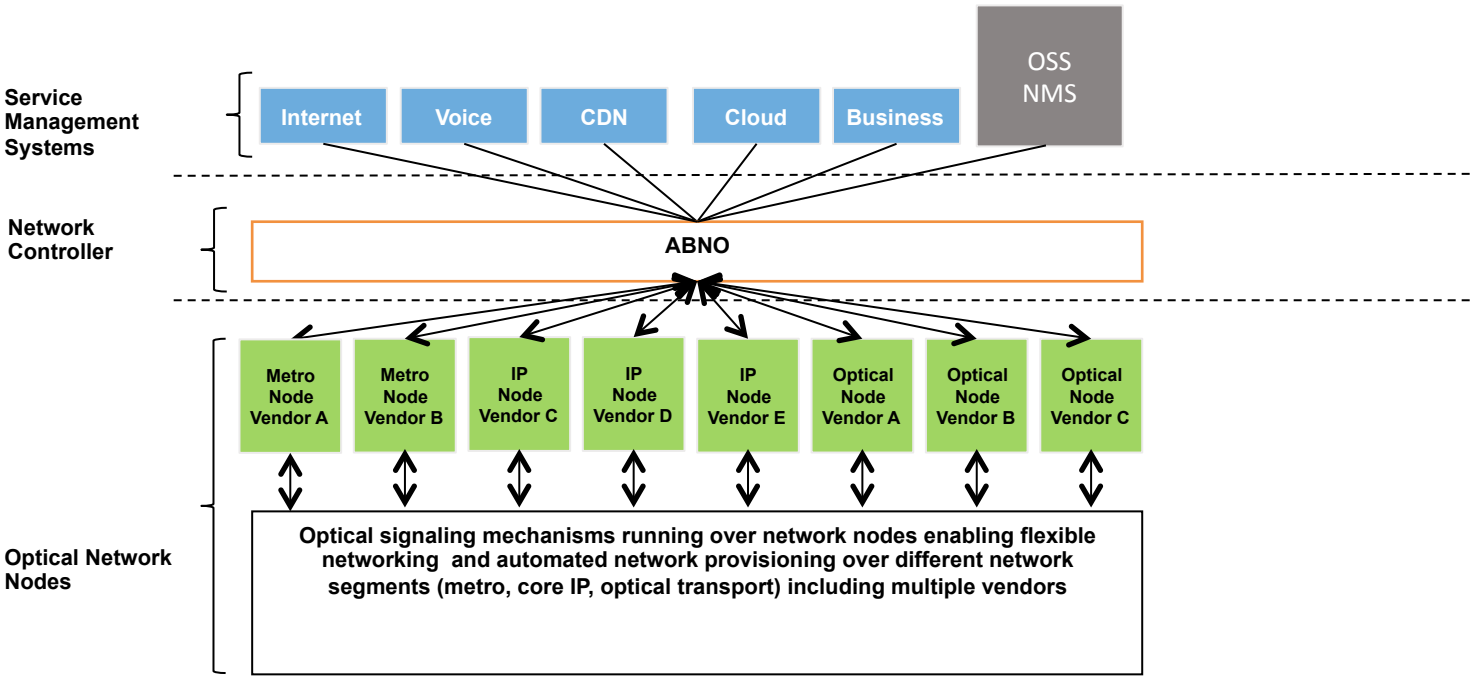
- The network does not need to be seen any longer as a composition of individual elements
- Applications need to be capable of interaction with the network
- Support of the next generation of variable and dynamic transport characteristics
- Automated deployment and operation of services.
  - “Create a new transport connection for me”
  - “Reoptimize my network after restoration switching”
  - “Respond to how my network is being used”
  - “Schedule these services”
  - “Resize tunnels”

Network Operation Framework Building Blocks

- Avoiding the mistake of a single “controller” architecture
  - As it encourages the expansion and use of specific protocols
- Discovery of network resources
- Network resource abstraction, and presentation
- Routing and path computation
- Multi-layer coordination and interworking
  - Multi-domain & multi-vendor network resources provisioning through different control mechanisms (e.g., Optical, OpenFlow, GMPLS, MPLS)
- Policy Control
- OAM and performance monitoring
- Leveraging existing technologies
  - What is currently available?
  - Must integrate with existing and developing standards

Application-Based Network Operations (ABNO)

- Application-Based Network Operation (ABNO) framework.
- "A PCE-based Architecture for Application-based Network Operations"
  - draft-farrkingel-pce-abno-architecture



Application-Based Network Operation (ABNO)

- "Standardized" components and co-operation.
- Policy Management
- Network Topology
  - LSP-DB
  - TED
  - Inventory Management
- Path Computation and Traffic Engineering
  - PCE, PCC
  - Stateful & Stateless
  - Online & Offline
  - P2P, P2MP, MP2MP
- Multi-layer Coordination
  - Virtual Network Topology Manager
- Network Signaling & Programming
  - RSVP-TE
  - ForCES and OpenFlow
  - Interface to the Routing System (I2RS)

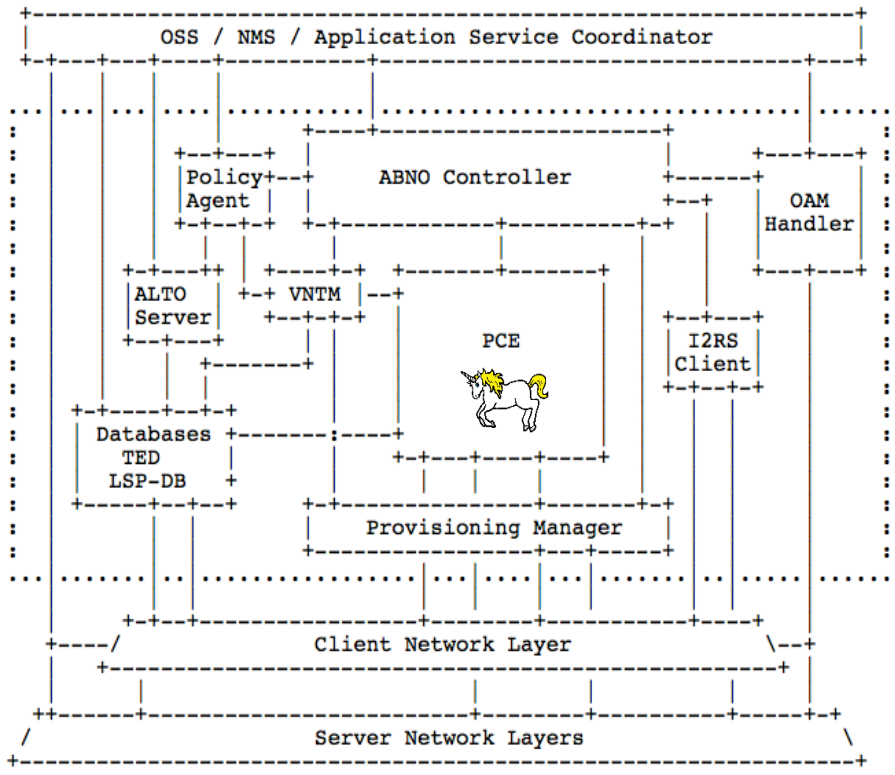
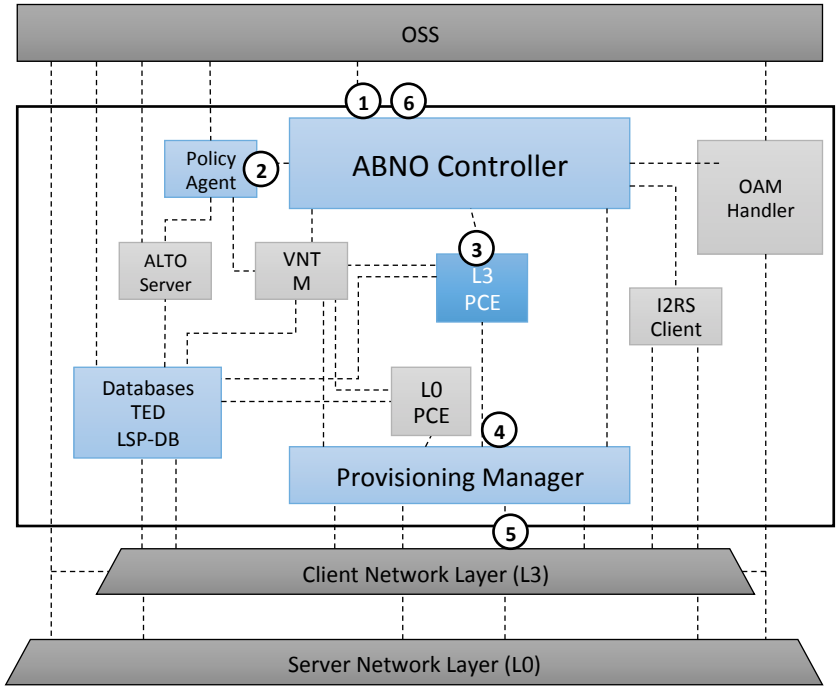


Figure 1: Generic ABNO Architecture

ABNO Use Cases

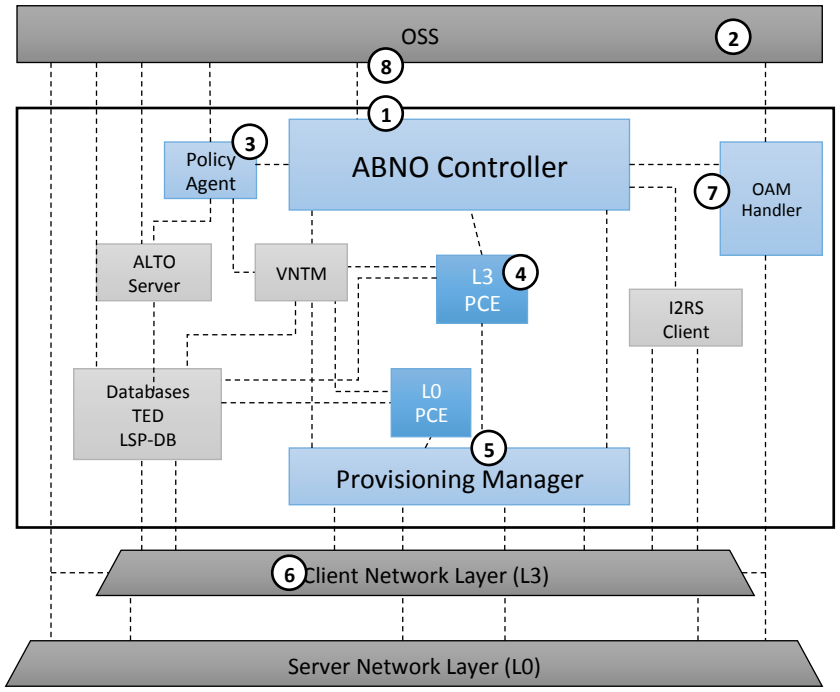
- The following slides present various use cases shaping the development of ABNO:
  - Multi-layer Path Provisioning
  - Multi-layer Restoration
  - Network Optimization after Restoration

ABNO - Multi-layer Path Provisioning (Path)



1. OSS requests for a path between two L3 nodes.
2. ABNO controller verifies OSS user rights using the Policy Manager.
3. ABNO controller requests to L3-PCE (active) for a path between both locations.
4. As L3-PCE finds a path, it configures L3 nodes using Provisioning Manager.
5. Provisioning manager configures L3 nodes using the required interface (RSVP-TE, OpenFlow, etc.).
6. OSS is notified that the connection has been set-up.

ABNO - Multi-Layer Restoration



1. Upon network failure, the OSS notifies the ABNO controller of all failed E-2-E connection and possible root cause.
2. NMS requests a new E-2-E connection.
3. ABNO controller verifies request via the Policy Manager.
4. ABNO controller requests to L3-PCE (active) for a path between both locations.
5. As L3-PCE finds a path, it configures L3 nodes using Provisioning Manager.
6. Provisioning Manager configures L3 nodes using the required interface (RSVP-TE, OpenFlow, etc.)
7. OAM Handler verifies new connectivity.
8. OSS is notified that the new IP links are up and tested (SNMP, etc.).

Next Steps for ABNO

- Further discussion on key components
  - Policy
  - Capability discovery and registration
  - Resilience
  - North-bound Interfaces
  - Use of Common Network Models
- Continued development and polishing of Use Cases
- Prototyping
  - European Commission Project FP7 IDEALIST