Optical Control Plane Deployment – Lessons Learned

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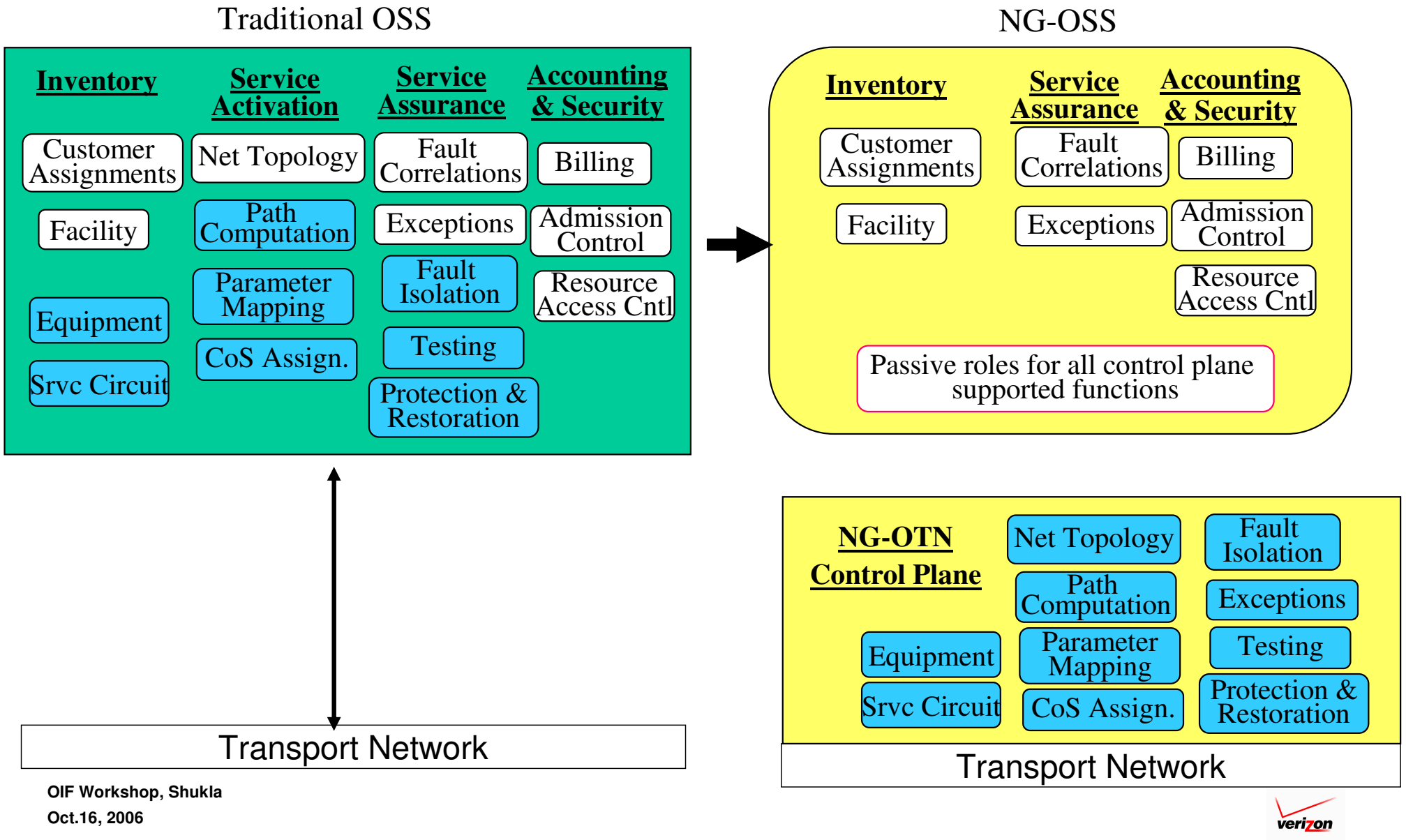
OTN Control Plane (CP) Outline

- **Field Trial – Key Objectives**
  - Evaluate maturity of technology
  - Develop operation experience
- **Key Capabilities**
- **OTN Platforms with CP capabilities**
- **CP and BoD Provisioning**
- **Gaps**
- **Summary**

OTN Control Plane
Key Capabilities

- **Auto-Discovery & Self-Inventory**
  - High quality DBs for attributes on nodes/links/ports, network topology, and services across the network
- **Dynamic Provisioning and Service Activation**
  - Fast end-to-end circuit design based on real-time resource map
  - Fast circuit provisioning and service activation via user-network signaling or customer service portals
  - Broad range of bandwidths from VT1.5, STS1 and above
- **Traffic Engineering**
  - Improved routing efficiency and resource utilization
  - Rapid service configuration adjustment
- **Protection & Restoration (P&R) for Mesh**
  - Improving network resilience and supporting COS (class of service)
  - Offering additional P&R options besides traditional UPSR and BLSR rings

OTN Control Plane Component
OSS Simplification



Vendor Roadmap (example)

Platforms **Control Plane**										
I-NNI (GA date)	Proxy	☆	Unknown	2Q07	Unknown	☆	Unknown	☆	☆	Proxy
E-NNI (GA date)	Proxy	Unknown	Unknown	2Q07	Unknown	Nov 06	Unknown	2007	Unknown	Proxy
UNI (GA date)	Proxy	Unknown	☆	2Q07	Unknown	☆	Unknown	2007	Unknown	Proxy

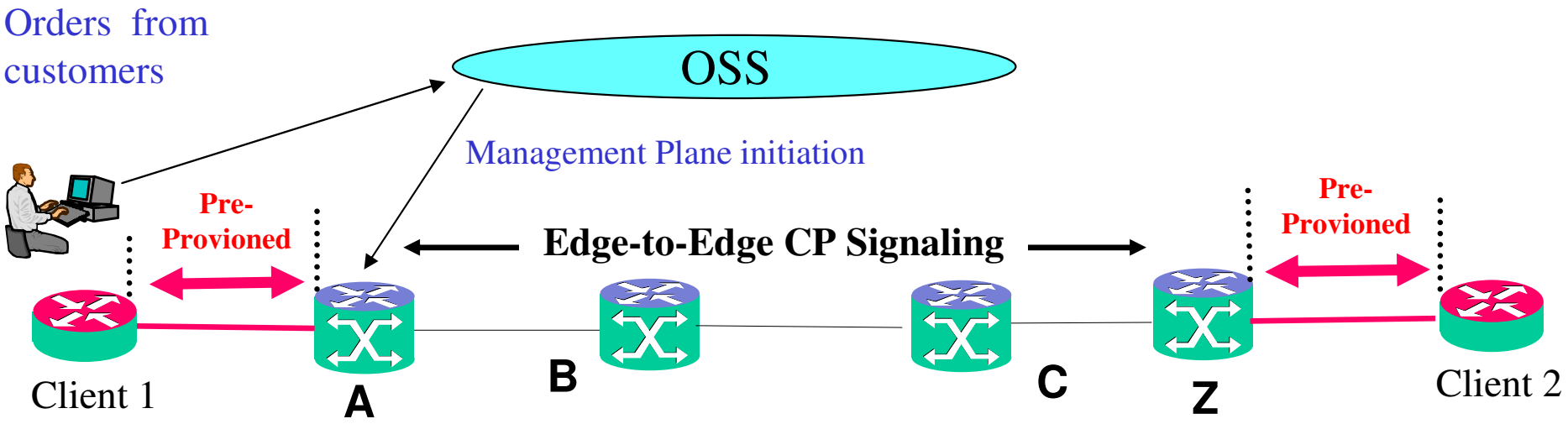
☆ GA: Now

OTN Control Plane Application
BoD Provisioning

- DS-3, OC-n and Ethernet private line services
  - Standard Access Request (SAR) process for new services, changes and removals
  - Within a selected MSA
- Objectives
  - Reduced provisioning intervals (Minutes)
  - Leverage OTN control plane intelligence
    - Simplified provisioning process
    - Distributed processing by NEs

OTN Control Plane for BoD
Soft Permanent Connection

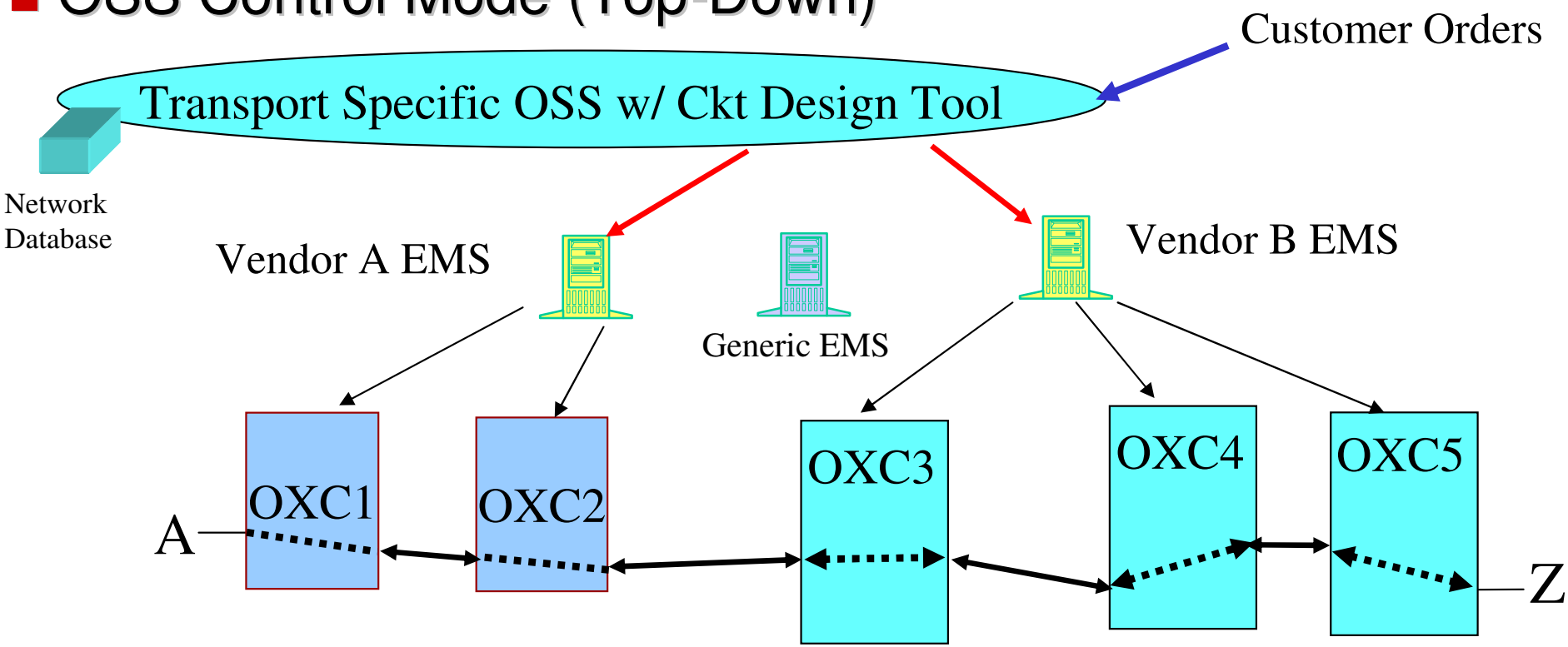
Soft Permanent Connection (SPC) – Initiated by management plane action



A Soft Permanent Connection

JiT Provisioning
Approach 1 – Traditional Flow-Thru

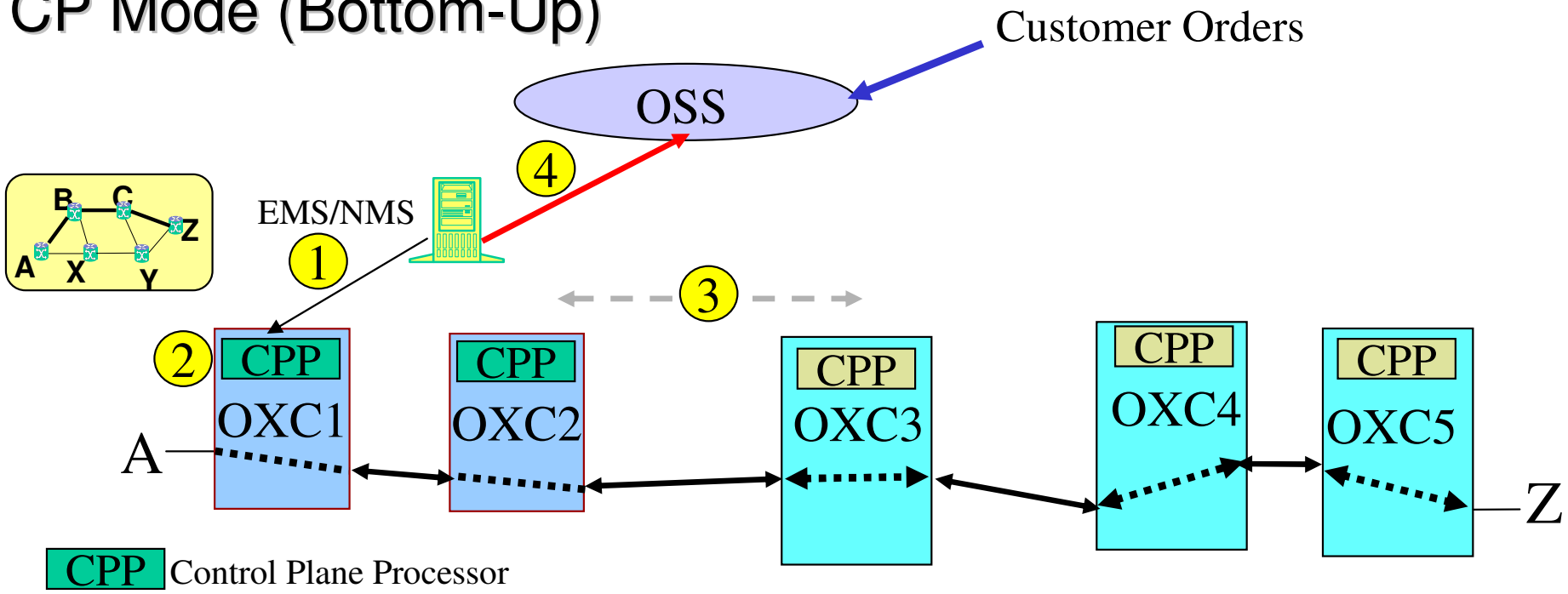
- OSS Control Mode (Top-Down)



- Create network-wide databases at OSS
- Provisioning staffs provide end points A and Z to OSS.
- OSS design tool consults databases and comes up with a circuit design.
- OSS passes the design to the vendors' EMS to provision the circuit A-Z by configuring each NE individually.

JiT Provisioning
Approach 2 – Control Plane Based

- CP Mode (Bottom-Up)



(1) Either OSS or EMS/NMS sends a service request to A's access node(OXC1) with point A and point Z address info.

(2) The CPP in OXC1 designs the A-Z circuit (i.e., an explicit route) using the network topology and resource databases.

(3) The CPP in OXC1 triggers a signaling process to downstream nodes according to the circuit design

(4) Upon completion of circuit setup, EMS/NMS report status and path info to OSS.

Some JiT Trial Specifics

- Trial is in NY city, multiple nodes, node at customer pop location
- Type of service is private line DS3, OC-N, GE including fractional rate (GFP/VCAT), IOF application
- Trial duration 6-8 months
- Uses current ordering system and suites of Telcordia OSS system for CP
- Goal is to look at
  - OSS, process
  - operational experience to provide BoD service
- Multi-vendor solution
- SPC, I-NNI
- Waiting for E-NNI
- Service launch targeted for 2007
- Multi-phase deployment

Gaps

- **Vendor roadmap plans**
- **Status of standards and industry**
- **OSS strategy and systems solutions**
- **Paradigm shift**
  - Process change
  - Change in network design philosophy
- **Training and education**

Summary

- **CP simplifies and automates many OSS process**
- **Enables Verizon to provide new bandwidth services expeditiously**
- **CP Technology is available from many vendors**