DCB for Network Virtualization Overlays

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What is SDN? ⇈

- **"Stanford-Defined Networking"**
- **"Software-Defined Networking"**
- **"Sexy-Defined Networking – Networking is cool again"**
- **"Isn't it OpenFlow? Or is it Network Virtualization Overlay Network e.g. VxLAN and NvGRE?"**
- **"Oh Yeah we're building an SDN Chip"**
- **"Hmm… Still Don't Know!"**

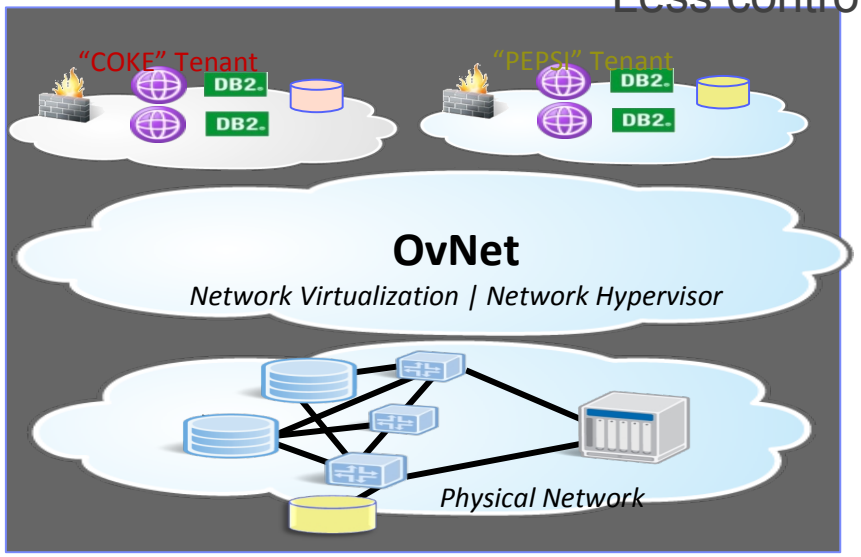
Reference: Adapted from: Jayshree Ullal of Arista's Chart….

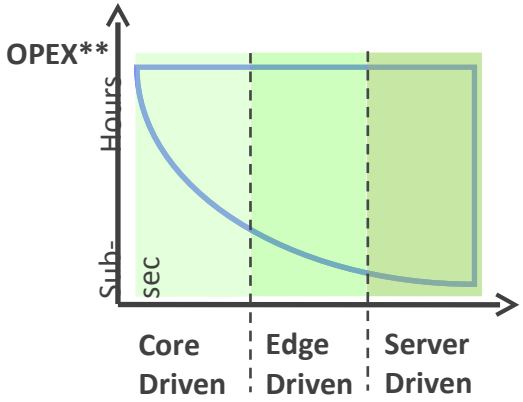
Summary of OvNet Value

- **Wire-once / Configure-once physical network within & across DCs**
  - Server Software virtualizes physical network
  - Physical network becomes simple interconnect

Extreme scale (Lower CAPEX)

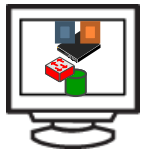
- Server computing is cheaper
- Cheaper physical network (smaller tables)
- Less control load on network





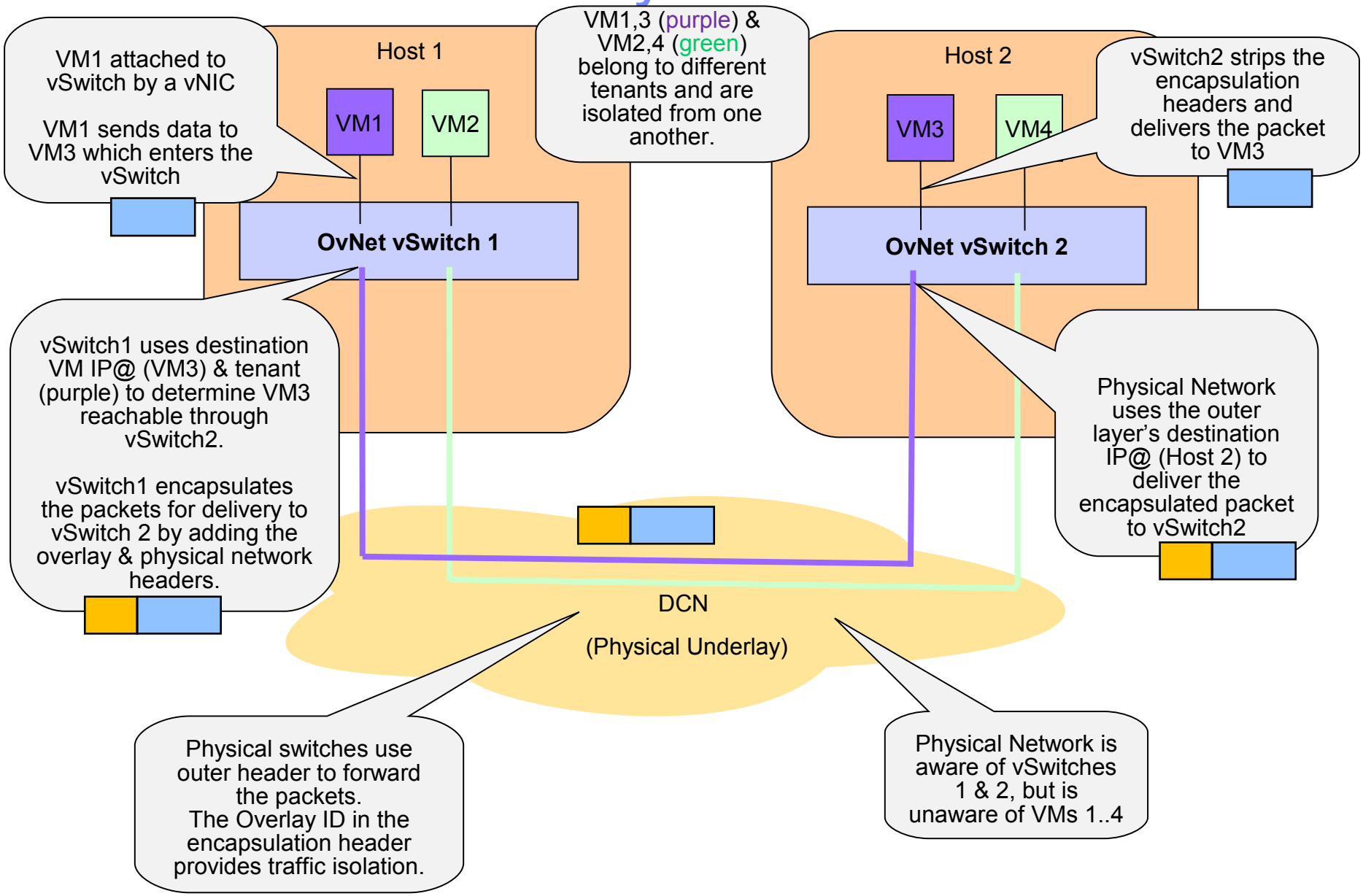
*** Effort & Time to configure a network based on workload changes*

- **Dynamic provisioning (Lower OPEX)**
  - Multi-tenant, layer-3 network all the way to the VM
  - Easy sharing of network resources
  - Distributed network & security applications above overlay

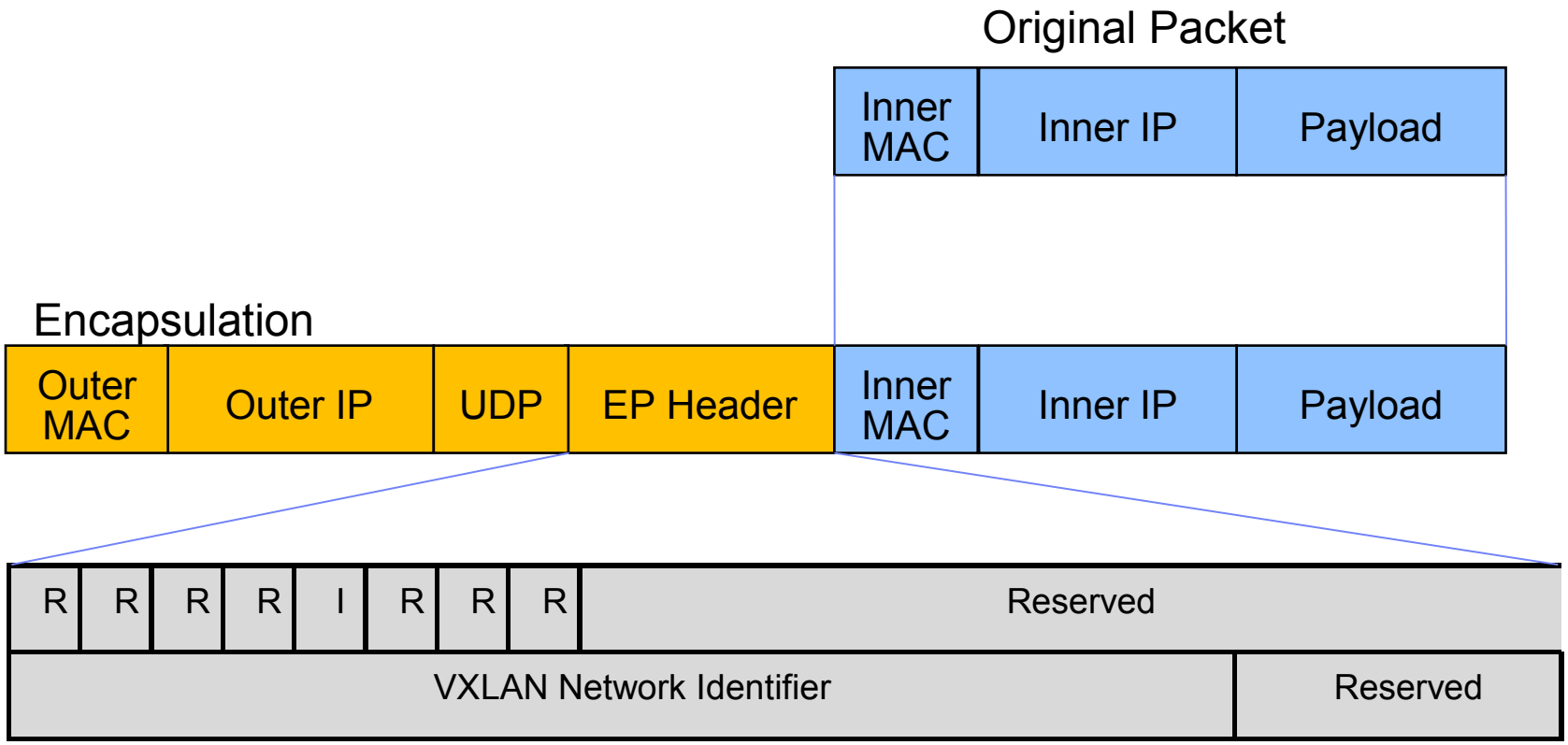


- **Single dashboard view across all tenants (Lower OpEx)**
  - Comprehensive monitoring
  - Easier reporting and billing
- **Aligns roles and work in the data center (Lower OpEx)**

OvNet Overlay Network

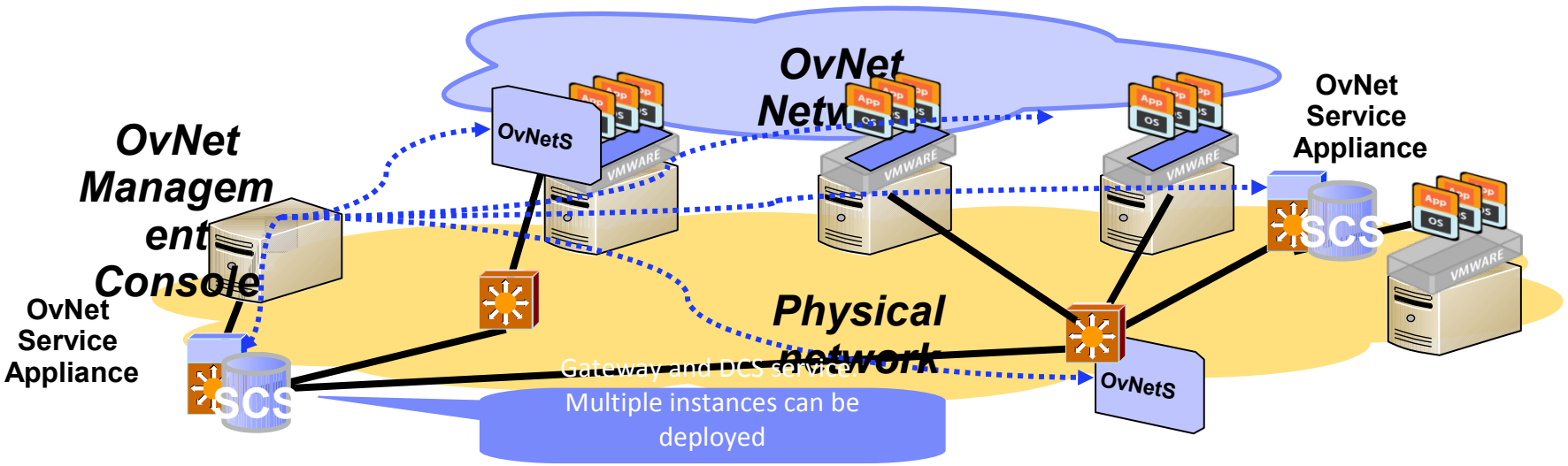


OvNet Encapsulation - VXLAN based Example



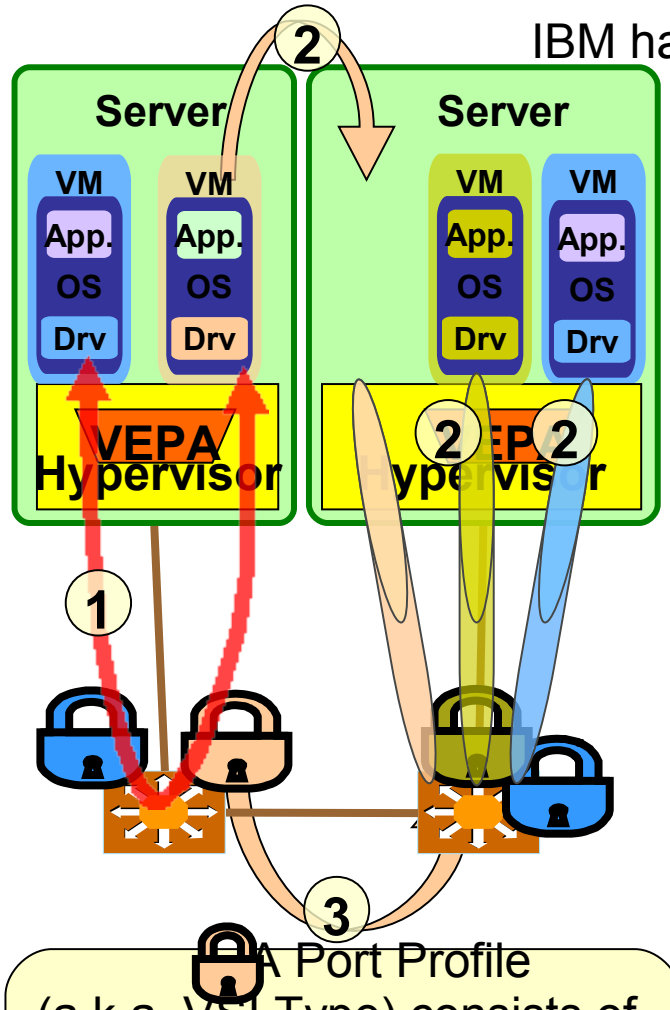
Encapsulation Protocol (EP) Header (e.g. VXLAN based)

OvNet Network Technology Components



- OvNet Management Console
  - Provides GUI and APIs for management of OvNet network, groups and policies
- OvNet Switches (OvNetS)
  - Provides UDP based overlay (header format same as VXLAN)
  - Performs data and some control plane functions
  - Embedded in Servers (as vSwitch) or in Access Switches or EOR/Aggregation switchs.
- OvNet Service Appliance
  - Distributed Connectivity Service (DCS):
    - discovers & disseminates VM location (physical server)
    - maintains policy (e.g. allow, deny, insert service appliance) and works with OvNet switches to apply policy
  - Gateway Service: Connectivity to non-OvNet networks

Ethernet EVB Standards (IEEE 802.1Qbg)



A Port Profile
(a.k.a. VSI Type) consists of
twork state associated with the VM,
g. Access, QoS & Security Controls).
Note: VDP also associates
a VLAN ID with the VM.

IBM has driven automated network state migration standards:

1. Ethernet Virtual Bridging (EVB) Protocol
   - Defines where VM-VM communication is performed:
     - Within server through Virtual Ethernet Bridge (VEB); or
     - By external switch, through Virtual Ethernet Port Aggregator (VEPA).

2. Multi-channel Protocol
   (e.g. IBM's pre-standard Virtual Fabric)
   - Allows a mix of internal (VEB) and external (VEPA) based switching approaches on the same server physical port.

3. Virtual Station Interface (VSI) Discovery Protocol (VDP)
   - Automates creation, migration and removal of network state that is associated with a Virtual Machine.
   - Enables port profiles to dynamically migrate with a VM when that VM migrates.

IEEE 802.1Qbg/BR Enhancement Proposal

- Motivation
  - SDN Overlay Networking has tremendous value proposition.
  - OvNet has large mindshare, customer attractiveness and industry momentum
  - IEEE 802.1Qbg and IEEE 802.1BR standardize EVB, multi-channel and VDP.
  - IEEE 802.1Qbg and IEEE 802.1BR currently unaware of OvNet
  - IEEE 802.1Qbg and IEEE 802.1BR will bring number of advantages to OvNet
    - Configuration Automation of adjacent bridges
    - Exploit Adjacent Bridge capabilities (ACLs, QoS, Traffic Monitoring, Shaping etc.)

- Proposal
  - Small updates to IEEE 802.1Qbg/IEEE 802.1BR to accommodate Overlays
  - These updates should support:
    - When OvNet enacapsulation/de-encapsulation is occurring in the stantion embedded EVB and
    - When OvNet enacapsulation/de-encapsulation is occurring in the adjacent bridge.
  - Update EVB TLVs to support OvNet capable vSwitches.
  - Update VDP TLVs to support VN (Virtual Network) Identification and Encapsulation Type.
  - Others