Cisco Q-vBN

Quantum Virtual Broadband Network

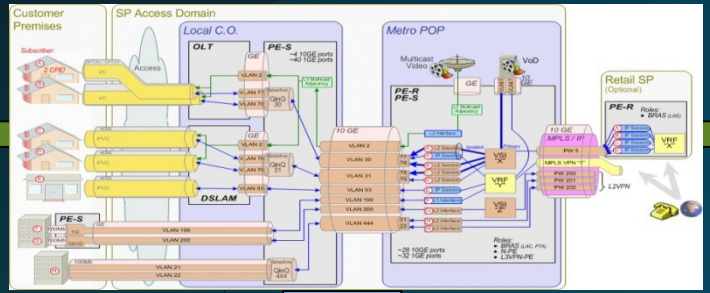
Flexible, Programmable, Application Aware

January 24, 2014

Q-vBN Introduction

Broadband Today

Services



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Virtualize Services

Virtualize Network

API Exposure

Broadband Tomorrow

Services

Q-vBN: What is it?

A low cost software based virtualization system that runs standard broadband CPE code in the cloud

Q-vBN: What can it do?

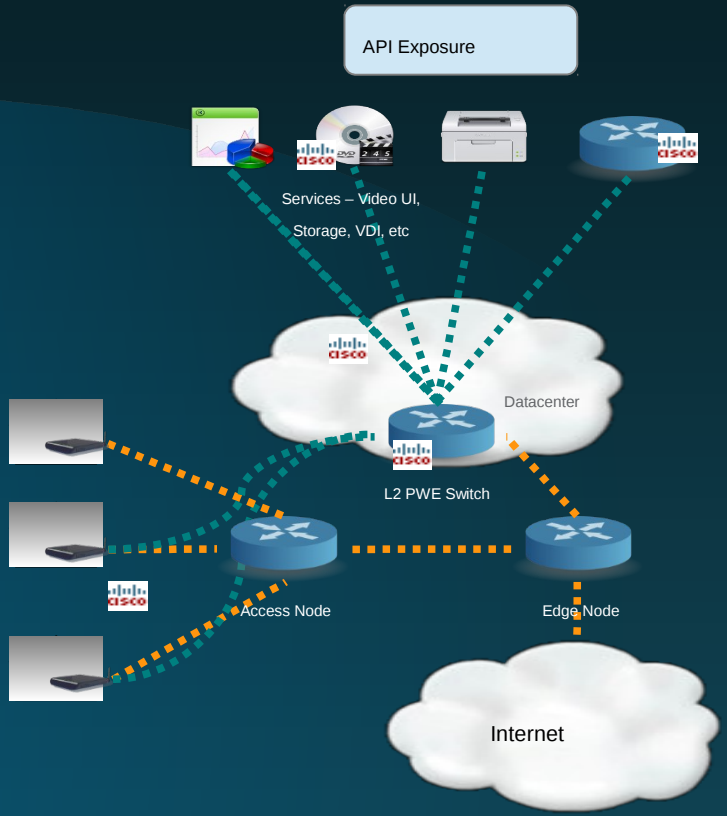
- Allows for services to be written and run in the cloud
- Allows SPs to sell an inexpensive cloud based computing platform directly connected in the home
- Extends the life of the physical CPE in the home
- Allows for per device management in the home
- Allows for test environments for companies to quickly trial new services

Architecture Design Considerations

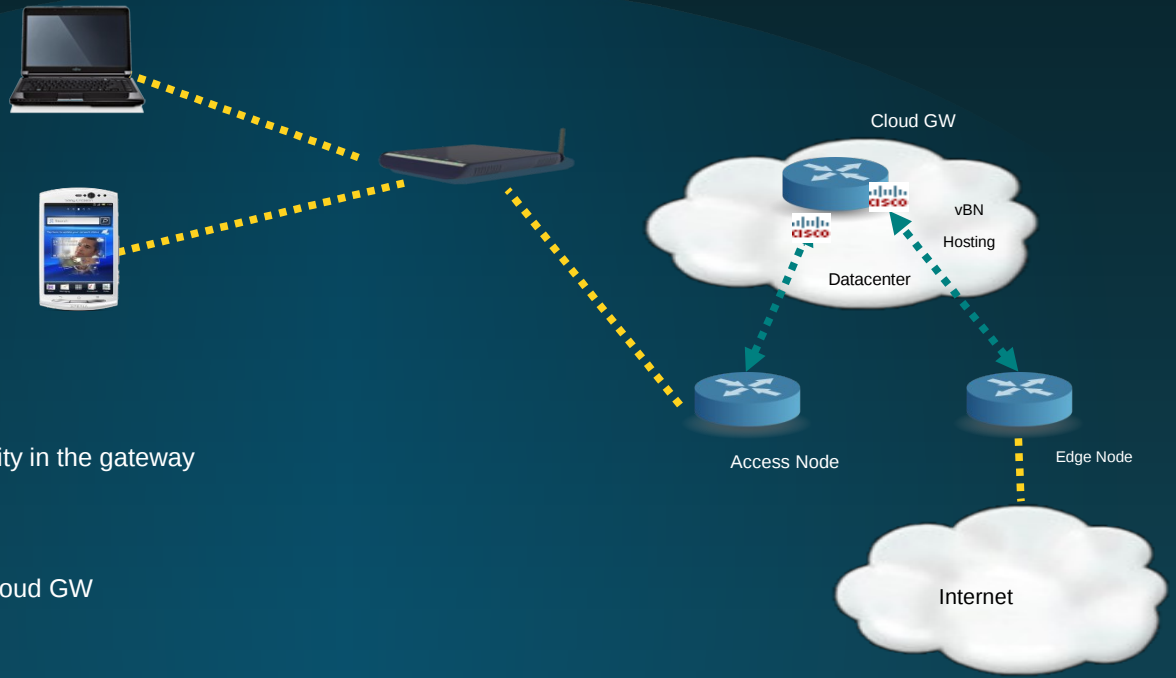
- Low cost to effectively compete with established CPE pricing and lifecycle
- Initial scalability to millions of instances
- Enable rapid service deployment without network changes
- Standards based API programmatic interface to every part of the system
- Standard network protocols
- Run on off the shelf x86 hardware
- Reduce OPEX and related expenses for broadband CPE

Q-vBN Home Environment

- Network Overlay
  - CPE tunnel to Data Center where services are located
  - EoL2TPv3 or EoGRE
- Services on Virtualization Infrastructure
  - CPE Lifecycle can be extended as the services move to the cloud
  - Rapid development and deployment of services
- Agile Service Orchestration
  - API driven service control plane
  - Integrated control of vCPE overlay and services via APIs

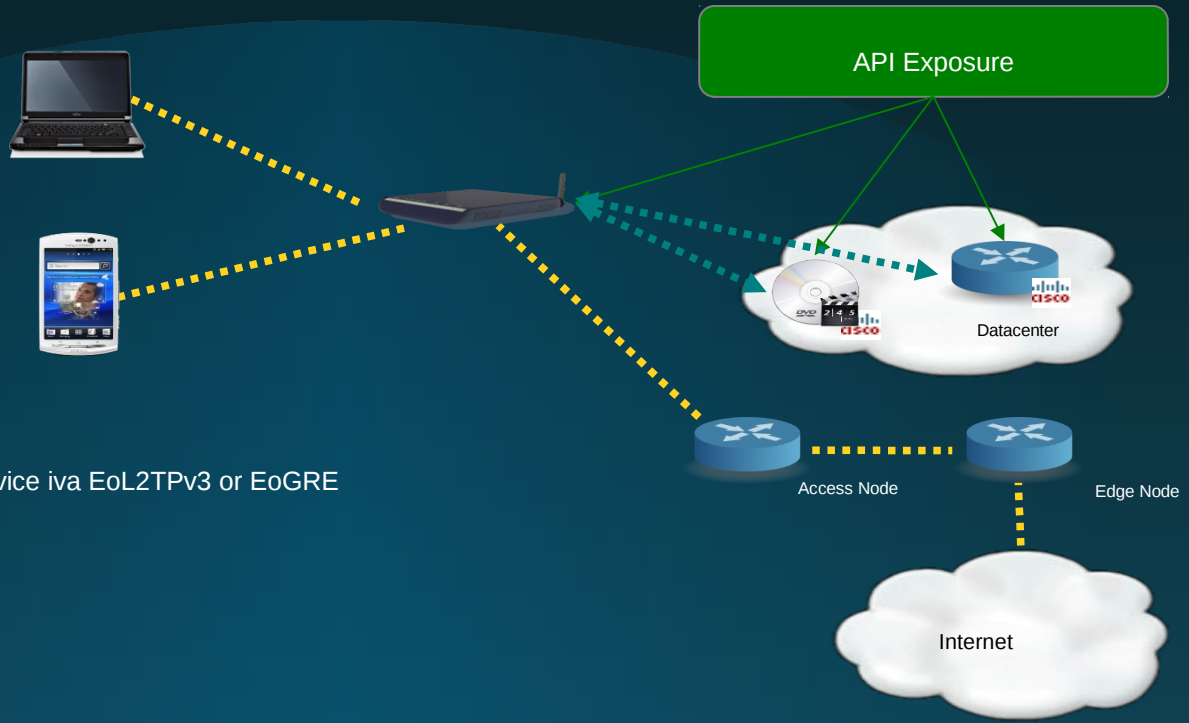


Q-vBN for Minimal Virtual CPE Application



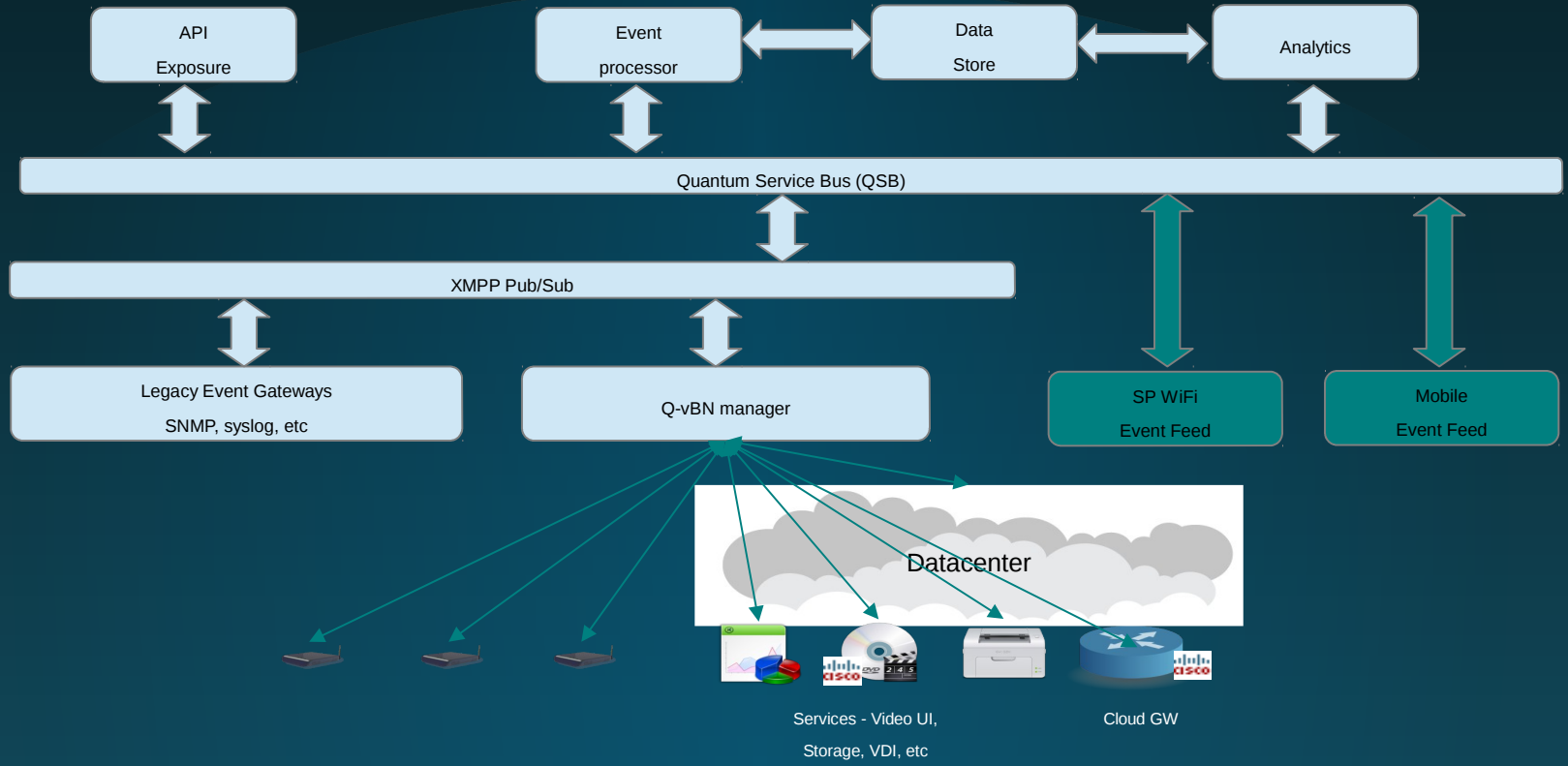
- vCPE “as we know it” - No L3 functionality in the gateway
- All L3 functionality in a “cloud gateway”
- Home broadcast domain extended to Cloud GW
- Setup demonstrated at CES
- Trials under way

Q-vBN: LAN Extension to the Cloud



- Network design unchanged – no forklift
- Home LAN (or WiFi) extended to a Service iva EoL2TPv3 or EoGRE
- Example service and use cases
  - Storage (NAS) Backup
  - IPv6 as a service/v4
  - Individual device management
  - M2M

Control Plane

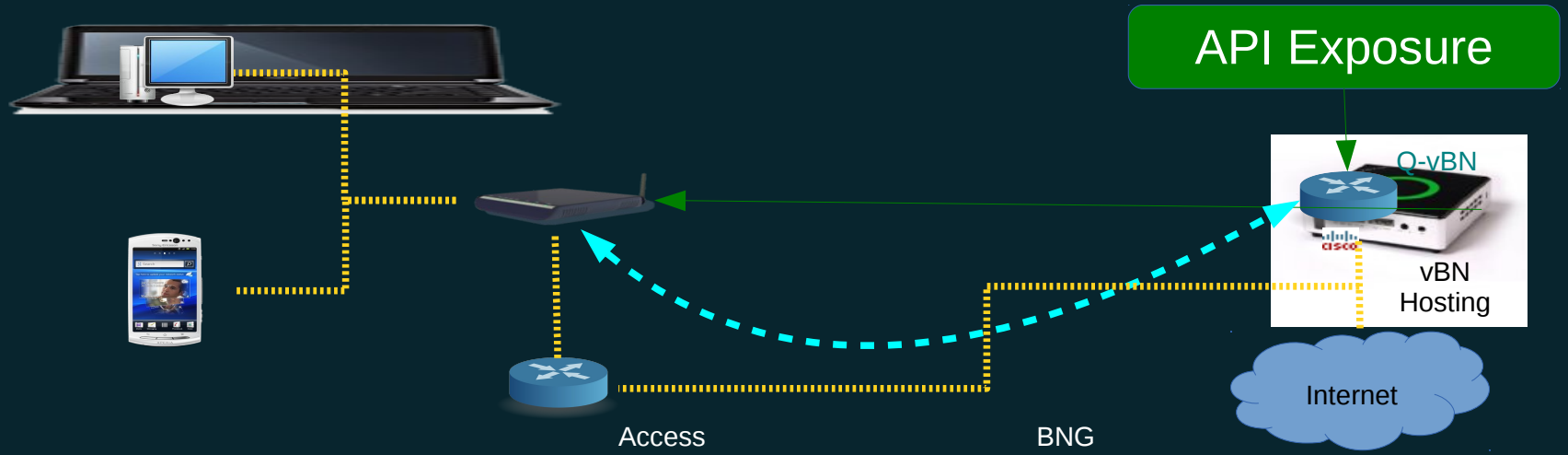


Summary

- Unique vCPE/vService approach - anything from full vCPE to single vService
- Control plane to match – leverages all aspects of CPE under virtualization including services
- No lock in – key network protocols and components standards compliant
- No “all or nothing” migrations
- No “global service rollouts” - service can be rolled out to individual customers
- Increase lifespan of physical CPE

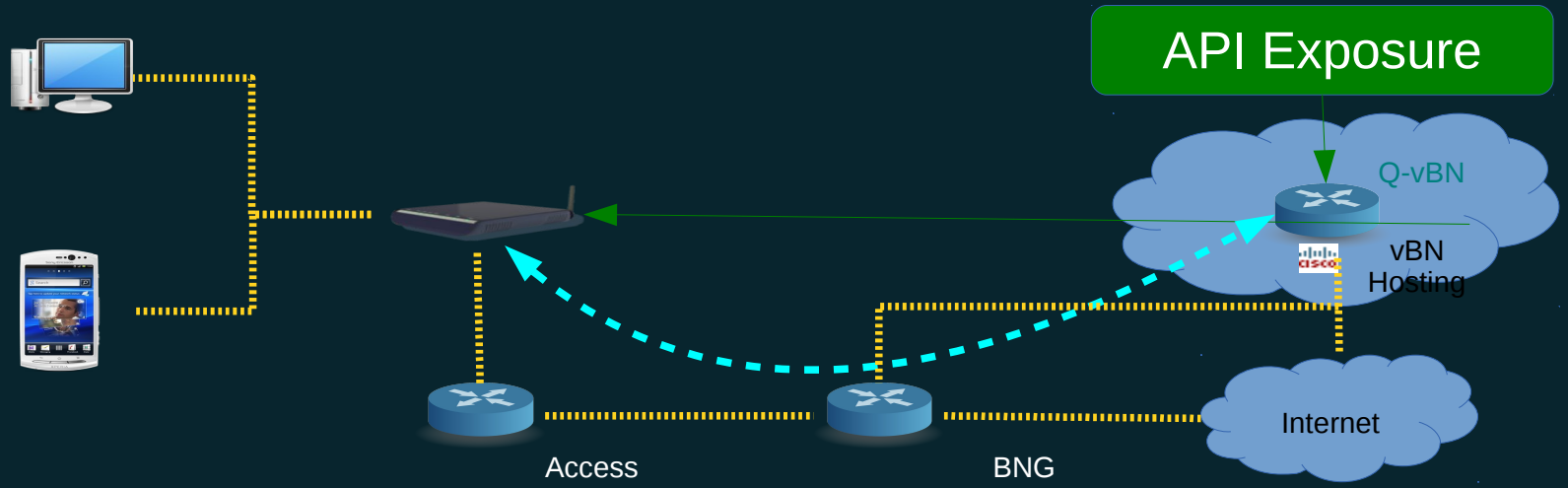
Q-VBN Demo

Demo Setup



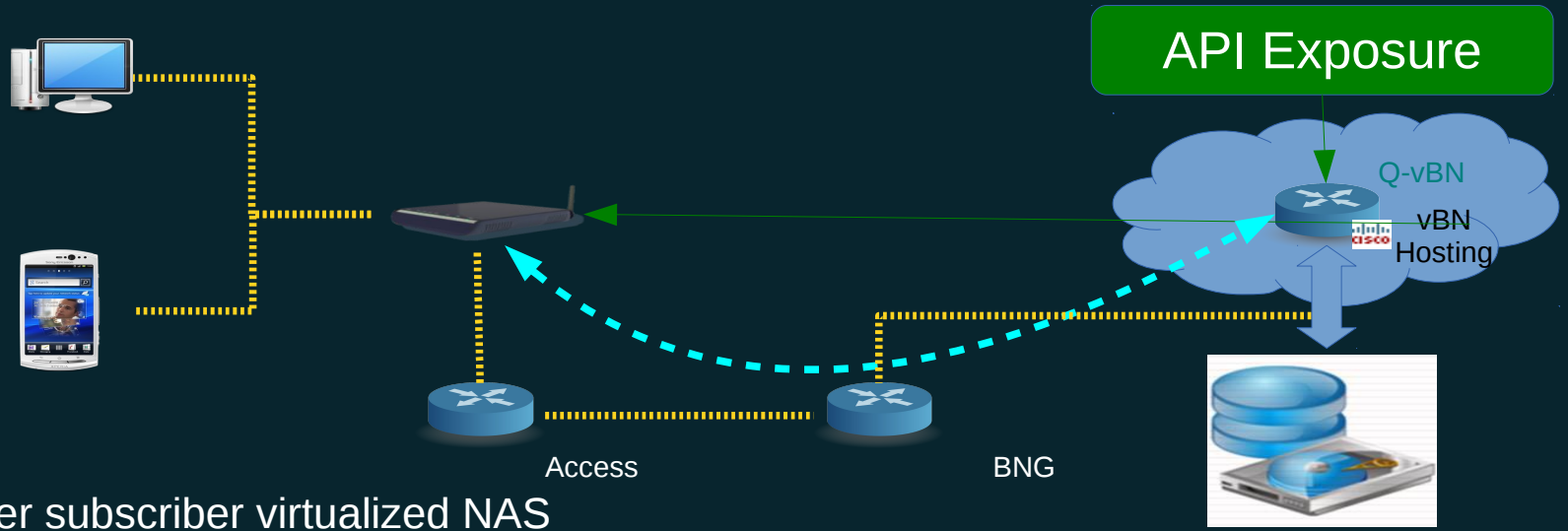
- Simplified Virtual Service Setup
  - QvBNs on 1.3GHz AMD Fusion
  - Ethernet access
- Use cases on VMs

Firewall, Browsing by Time, Bandwidth Control, Application Prioritisation



- Managed firewall – QoS, NAT, ACLs
- Bandwidth control + application prioritisation
- Individual device management
- V6 migration and V4 sunset

Virual HD or NAS on the Cloud



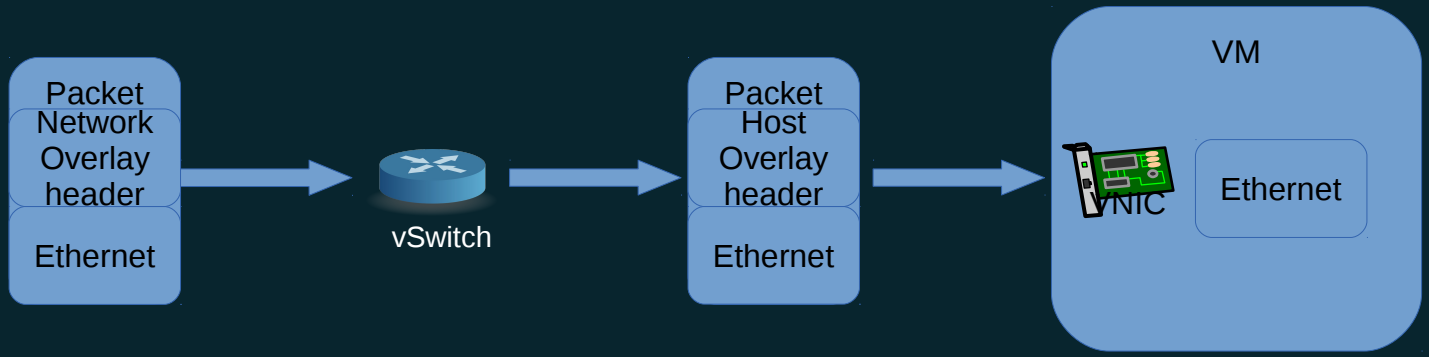
- Per subscriber virtualized NAS
  - Consumer oriented functionality
  - Virtual Storage associated with NAS
  - Add/Remove Storage
- Media integration

What makes it tick – deep dive

Virtualization Improvements

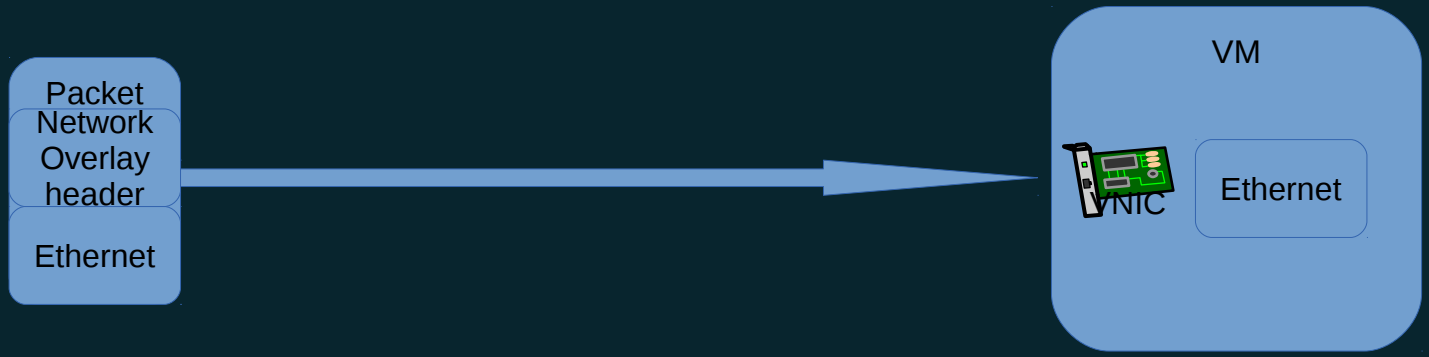
- Why UML?
  - Ease of Development
  - Scalability potential
  - Well suited for network applications
- Improvements – current and next RC
  - New high resolution timer subsystem – working QoS
  - New paravirtual interrupt controller and event loop – 50% + speedup, 256+ interfaces per VM
  - Improved memory management
  - New vnics for tap, raw (vlan), l2tpv3 and gre – ported to kvm
- So far
  - Better vCPE/”vSerice performance compared to kvm, especially with QoS (4x times)
  - 128-256+ instances per core, up to 2000 instances per socket (use case dependent). Log(N) scalability within groups of up to 64.
- Going forward
  - New virtual storage drivers – POC so far 50% faster than kvm
  - Further vNIC improvements
  - Host kernel helper functions

Data Plane – Legacy



- Host transports different from network
- Virtual switching – a mandatory element (example – NVO3 reference architecture)

Data Plane - QvBN



- vNIC Drivers for KVM and UML
  - No more reinventing the “transport” wheel
  - Direct access to overlay network in hypervisor
- Arbitrary mix of physical and virtual components
- Simplified orchestration and direct mapping to APIs