

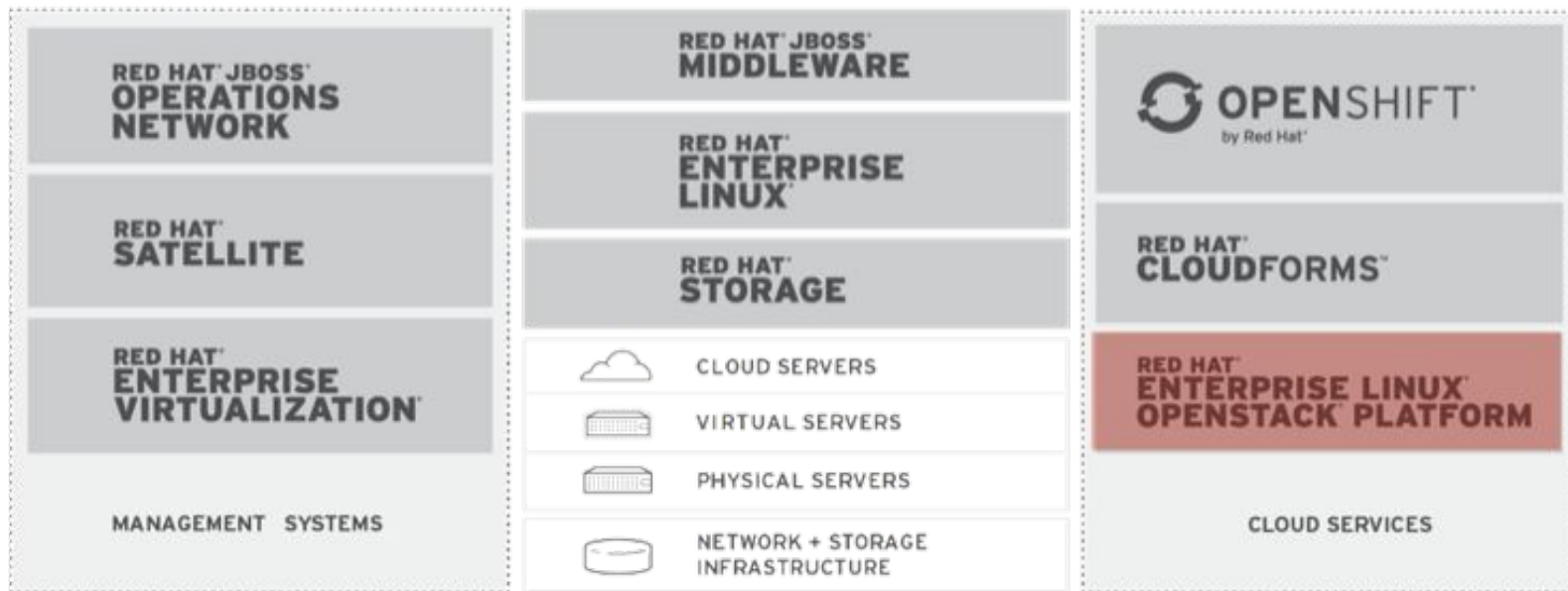


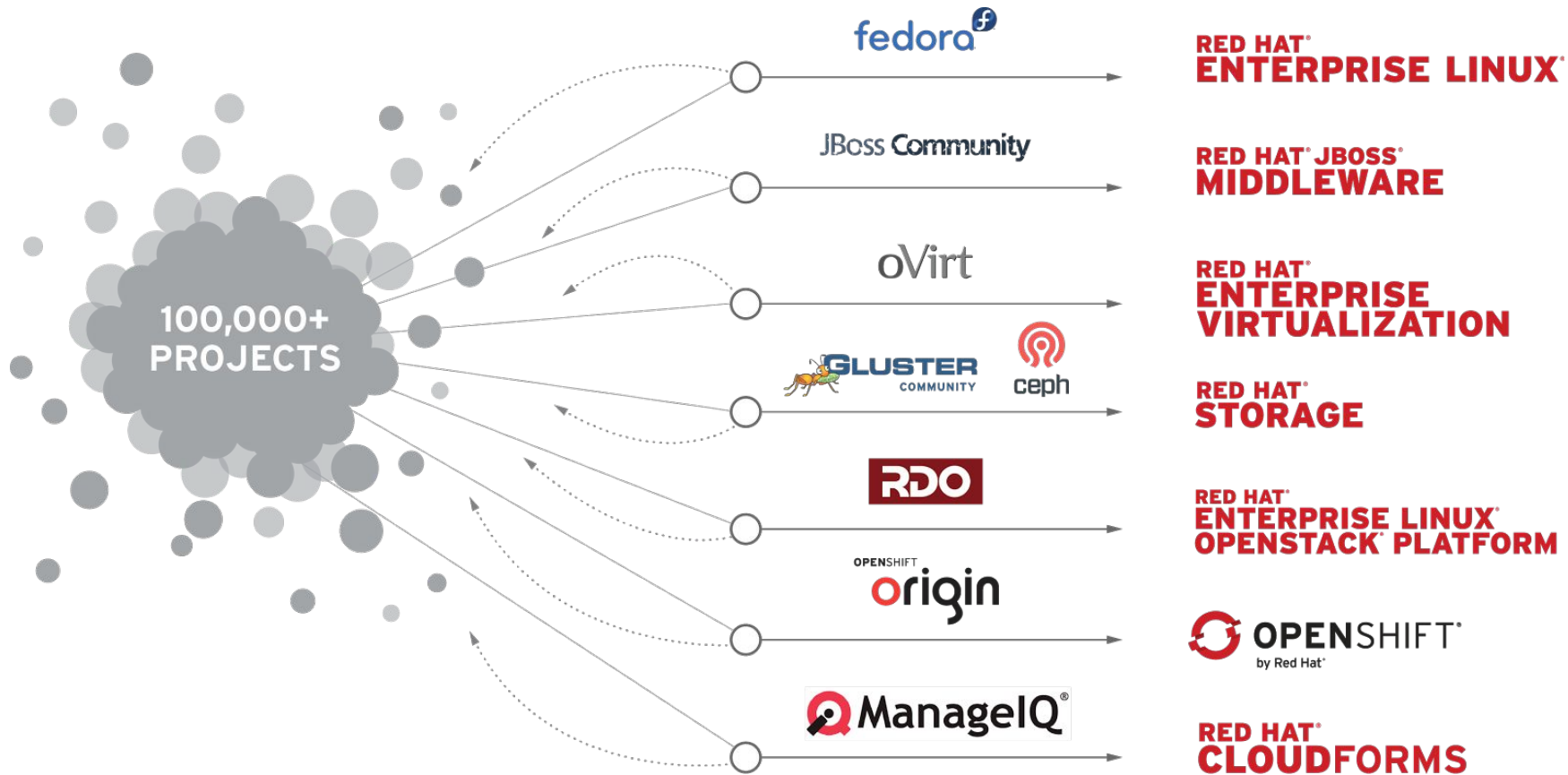
# NFV and Open Networking

Red Hat Enterprise Linux OpenStack Platform

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# Red Hat Product Portfolio





RH0055

# Upstream First

- Red Hat is heavily focused on “upstream first”
- All patches are contributed to the community
- Red Hat will not fragment their OpenStack distribution (or any other product) or support forks

**Connection** multiplies  
possibility

# NFV and OpenStack

GROW

# What is OpenStack?

- Fully open-source cloud “operating system”
- Comprised of several open source sub-projects
- Provides building blocks to create an IaaS cloud
- Governed by the vendor agnostic OpenStack Foundation
- Enormous market momentum

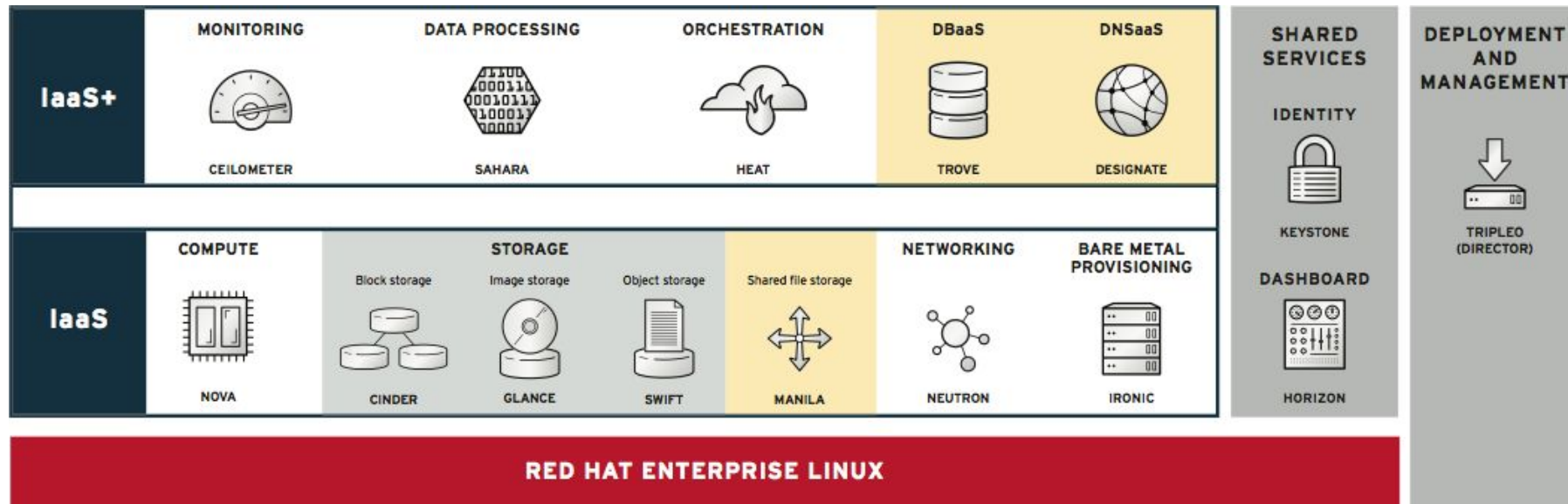


# RHEL OpenStack Platform

- Red Hat's officially supported OpenStack distribution
- Tightly integrated with Red Hat Enterprise Linux
- Released every six months; Two-three months after upstream
- Focus on:
  - Code maturity, stability and security
  - Backports of important patches through lifecycle
  - 3rd party ecosystem of certified platforms
  - Product documentation and reference architectures



# RHEL OpenStack Platform 7 (Kilo)



Technology preview



# NFV loves OpenStack

- OpenStack is the de-facto choice for VIM on early NFV deployments
- OpenStack's pluggable architecture - a key for NFV
  - e.g storage, networking
- Open standards and multi-vendor
- Many NEPs and the large operators are already involved in the community

# Does OpenStack love NFV?

- OpenStack was designed for cloud-based applications
  - Scaling out versus scaling up
  - Cloud = hide the technical details from the user
- Most of the VNFs today - not cloud enabled
  - Rely on the infrastructure for HA
- NFV requires tight control over hardware resources
  - e.g scheduling, QoS
- VNF - a super privileged VM
  - e.g VLAN trunking, security-groups



**Connection** multiplies  
possibility

# Red Hat approach to NFV

# NFV Infrastructure

OpenStack

libvirt

DPDK

Open vSwitch

QEMU/KVM

Linux

# Red Hat Product Focus

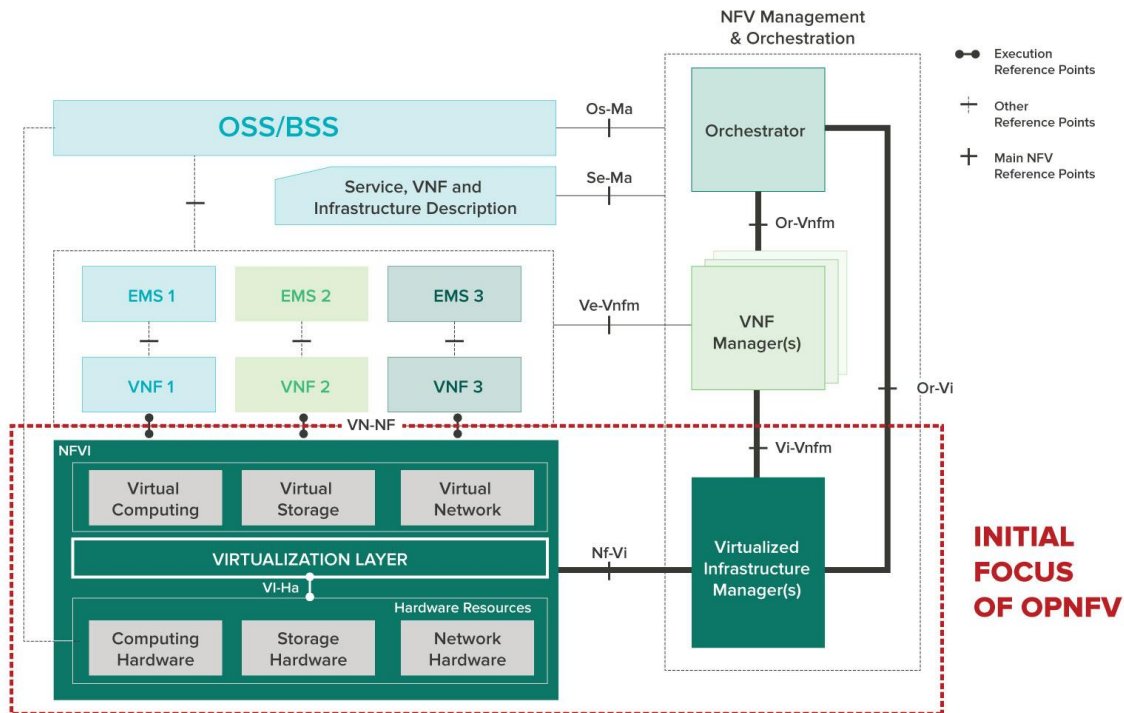
- Our focus is on the infrastructure:
  - NFVI
  - VIM
  - Enablement for VNFs
- Partner with ISVs for MANO
- Partner with hardware providers (compute, storage, network)
- No separate product for NFV
  - We don't make an OpenStack version for NFV, but rather make NFV features available in RHEL OpenStack Platform

# OPNFV

- Open source NFV reference implementation
  - Open, transparent
  - Upstream first
  - Integration and validation
- Move from SDO to Open Source
- Red Hat is a Platinum Founding member



# OPNFV



Source: <https://www.opnfv.org/software>



# NFV with RHEL OpenStack Platform

**Disruptive** is productive



# Use Cases

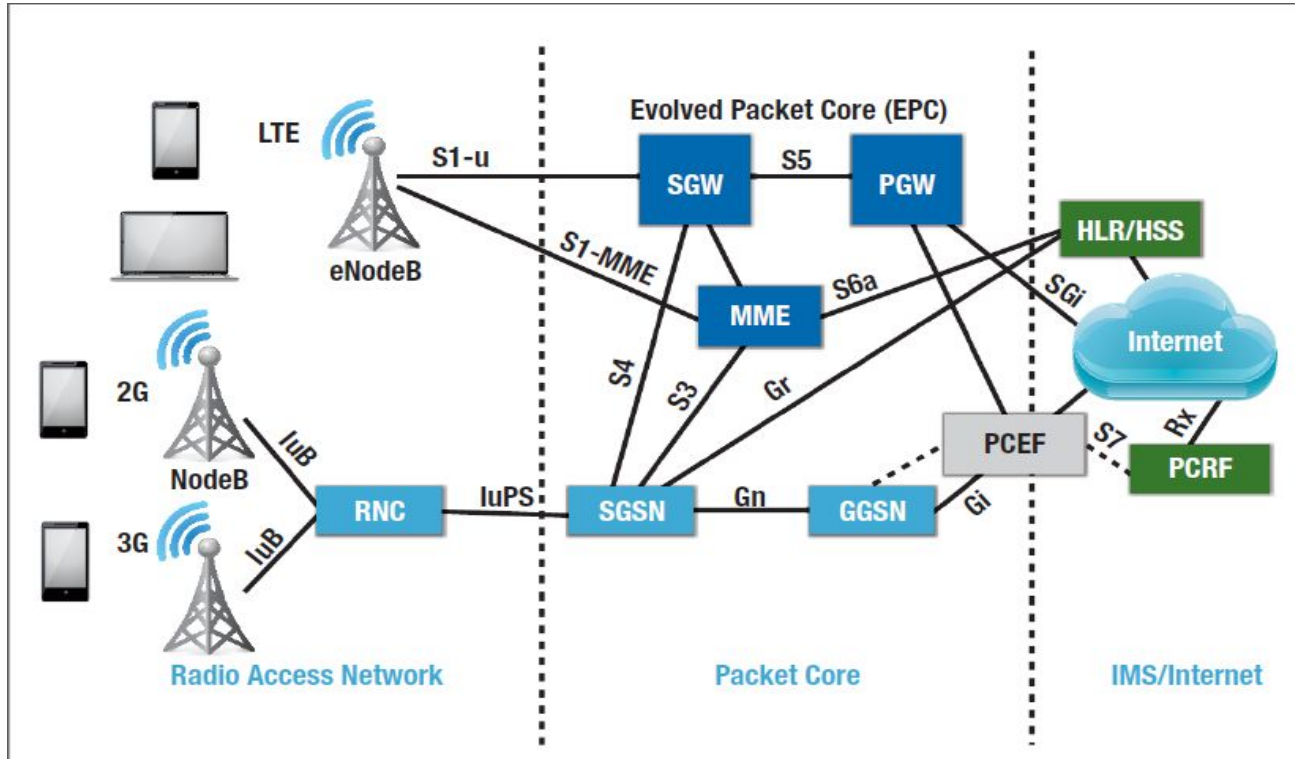
- Atomic VNFs
- Enterprise WAN services (vCPE, vPE)
- Evolved Packet Core (vEPC)
- Cloud RAN

# RHEL OpenStack Platform 7 (Kilo)

- Enhanced Platform Awareness (EPA)
  - vCPU pinning
  - Large Pages
  - Scheduler NUMA awareness (CPU, RAM)
  - I/O based NUMA scheduling
- Single root I/O virtualization (SR-IOV)
- Neutron IPv6 support
- ML2 port-security extension
- DPDK (RHEL 7 Guest OS)

} Red Hat and Intel  
upstream contribution

# Mobile Packet Core (vEPC)



# Example - vPGW

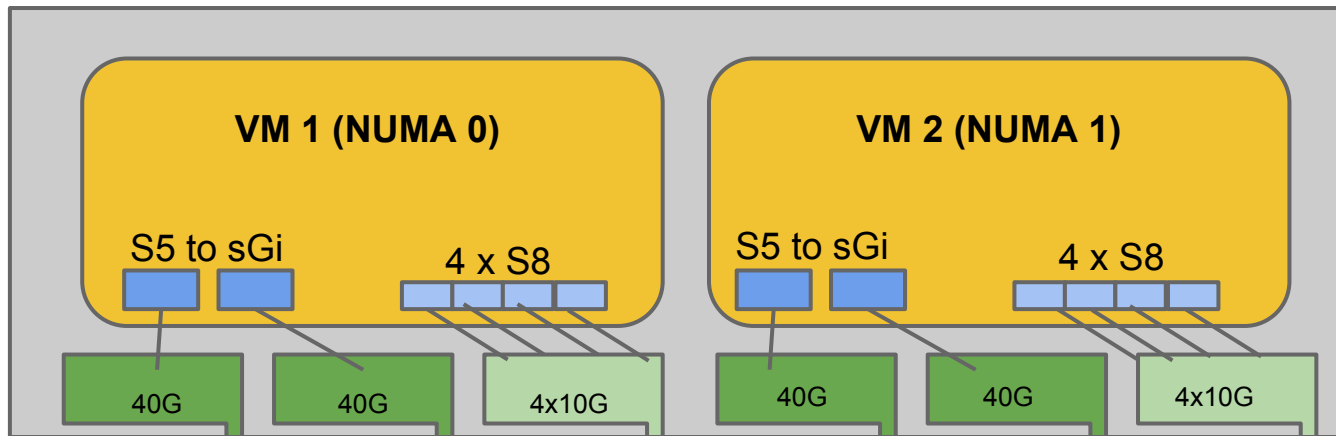
- Sits between SGW (S5) and sGi-LAN interface
  - Last hop in the EPC network before going to the Internet
  - Edge router
- Connected with the PCRF (S8)
  - Policy Control and Charging functions

# Example - Design for vPGW

- Data plane (S5-sGi)
  - Non-blocking high performance traffic
  - Focus on highly scalable data connectivity and QoS enforcement
  - Integrated DPI
- Control plane (S8)
  - Medium performance network traffic
  - Mobility management and connection management
  - Detection, gating, QoS and flow-based charging

# Example - Design for vPGW

- Data plane interfaces: 40 Gbps PCI-Passthrough
- Control plane interfaces: 4 x 10 Gbps using SR-IOV





# RHEL OpenStack Platform 8 (Liberty)\*

- RT-KVM (Technology Preview)
- DPDK accelerated Open vSwitch (Technology Preview)
- VirtIO networking multi-queue support
- Neutron QoS

\*Roadmap, subject to change

# Data Plane Options

- DPDK accelerated Open vSwitch\*
  - Best for: signaling, processing of small packets (~64 bytes)
  - Losing kernel functionality
- DPDK within the guest
- SR-IOV
  - Best for: deterministic, high-bandwidth connections
  - Physical Function (PF) or Virtual Function (VF) pass-through
  - No live migration, no attach/detach, static configuration

\*Roadmap, planned as a Technology Preview in OpenStack Platform 8

# Resources

- Are you ready for OpenStack?
  - [redhat.com/openstack](https://redhat.com/openstack)
- Learn more about Red Hat Telco solutions
  - [redhat.com/en/technologies/industries/telecommunications](https://redhat.com/en/technologies/industries/telecommunications)
- Red Hat OpenStack blog
  - <http://redhatstackblog.redhat.com>

# Resources

- [SR-IOV – Part I: Understanding the Basics](#)
- [SR-IOV – Part II: Walking Through the Implementation](#)
- [Driving in the Fast Lane: CPU Pinning and NUMA Topology](#)
- [Driving in the Fast Lane: Huge Pages](#)
- [Scaling NFV to 213 Million Packets per Second with Red Hat Enterprise Linux, OpenStack, and DPDK](#)

# Thank You

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