blueplanet

NETWORK VIRTUALIZATION

Related Acronyms, Terms, and Definitions

Agent: Computer program acting for a user or other program in a relationship of agency to act on one's behalf

API (Application Programming Interface): Expresses a software component in terms of its inputs, outputs, and operations for programmatically manipulating and controlling a software component

App (Application): Computer software program performing one or more functions

Bare Metal: New compute platform that does not contain a preinstalled operating system or any other software

Boot Loader: Software program that loads an operating system when a compute platform is first turned on

BP (Blue Planet): Blue Planet is a Ciena software platform purpose-built for intelligent service automation and network operations through orchestration, policy, and control

BPM (Business Process Modeling): A way of expressing a business process or workflow in a human-readable graphical form

BPMN (Business Process Modeling Notation): A graphical notation, similar to a flowchart, for business process modeling

Brite Box (Branded White Box): Represents the disaggregation of network switching hardware and software and describes either a scenario where a network switching vendor's software is running on generic, or Commercial-Off-the-Shelf (COTS), white box hardware, or where a vendor (or open source) software is running on a network switching vendor's in-house hardware

BSS (Business Support System): Set of software used by a telecommunications service provider to run its business operations. Typically, BSS deals with the taking of orders, payment issues, revenues, etc., and supports product, order, revenue, and customer management

CE (Carrier Ethernet): Represents a standard set of Ethernet services, covering point-to-point and multipoint Ethernet connectivity services. CE standards have come into being over the past 10+ years. Today, the global CE market exceeds $50B

CE 2.0 (Carrier Ethernet [CE] 2.0): Represents the latest CE certification standard from the MEF. Ciena packet products are CE 2.0-certified

CECP (Carrier Ethernet Certified Professional): A certification demonstrating expertise, skills, and knowledge of Carrier Ethernet technologies, standards, services, and applications

CLI (Command Line Interface): A means of interacting with a computer program or networking device whereby the user issues commands in the form of successive lines of text

Container: Everything needed to run an application (such as code, runtime binaries, libraries, configuration files, and dependencies), bundled into a single package (container), allowing for an easy and consistent installation, regardless of the running environment

Controller: Application in SDN that manages flow control to enable intelligent networking, such as allowing servers to instruct switches where to send their packets

CORD (Central Office Re-architected as a Data Center): A different way of building central offices that leverages open source software, commodity white box hardware, and SDN and NFV technologies in lieu of specialized and vendor-proprietary devices. CORD combines these open building blocks to bring economies of scale and the agility of the cloud to service providers. CORD began as a proof of concept sponsored by ON.Lab and AT&T. Now companies like Ciena are helping to bring CORD into production

Core: Unit of compute, often more than one Central Processing Unit (CPU) on a compute Application Specific Integrated Circuit (ASIC)

COTS (Commercial Off-the-Shelf): Products and/or components that are commercially available and can be readily purchased, and are not proprietary, custom-made, or one-offs

DC (Data Center): A facility used to house computer systems and associated components. Includes servers, storage, networking, power, air-conditioning, and security

DCI (Data Center Interconnect): Refers to the networking, either packet or optical, that connects data centers

DevOps (Development and Operations): The culture and methodology whereby development (engineering) and operations (Information Technology [IT]) collaborate and communicate in the process of automating service delivery and driving infrastructure changes

Disaggregation: The separation of an aggregate system into its component parts, such as the separation of a networking appliance into its hardware and software components

D-NFV (Distributed Network Functions Virtualization): NFV architecture where the NFVI software, VNFs, and associated hardware resources are optimized for distribution at the network edge at the customer premises

D-NFVI (Distributed Network Functions Virtualization Infrastructure): The compute, storage, networking, and associated software infrastructure that together are optimized to support Distributed NFV deployments

Docker: An open-source software program that enables applications to be built using isolated, service-specific software containers known as microservices, instead of using a large monolith of code. Docker and microservices are now largely viewed as the best ways to deploy large-scale distributed applications

Domain: Portion of a network (such as 'subnetwork,' although not necessarily in the traditional IP-oriented sense) being managed by a particular controller

Domain Controller: A software application used to manage and/or control a specific technology or vendor domain. Examples of domain controllers include underlay or overlay SDN Controllers, Network or Element Management Systems (NMS/EMS), Cloud Management Platforms, Virtual Infrastructure Managers (VIMs), and Virtual Network Function Managers (VNFMs)

DPDK (Data Plane Development Kit): Set of data plane libraries and network interface controller drivers for fast packet processing, providing a programming framework for Intel® x86 processors to enable faster development of high-speed data packet networking applications. Intel® is the author of this open source initiative

EMS (Element Management System): Software application for managing systems of network elements. Functional areas typically fall under these categories: Fault, Configuration, Accounting, Performance, and Security (FCAPS)

ETSI (European Telecommunications Standards Institute): An independent, not-for-profit standardization organization in the telecommunications industry (equipment makers and network operators) based in Europe. The ETSI NFV ISG produced the original white paper defining NFV and defined the architecture for deploying NFV

FCAPS (Fault, Configuration, Accounting, Performance, and Security): FCAPS is a framework describing the major elements of network management—fault, configuration, accounting, performance, and security

GUI (Graphical User Interface): A graphical way of interacting with a computer program or networking device. Visualization is graphical and commands are typically controlled with a mouse

HAL (Hardware Abstraction Layer): Software routines emulating platform-specific details, giving programs direct access to the hardware resources allowing programmers to write agnostic, device-independent applications

Hyperthread: Technology used by some Intel® microprocessors allowing one CPU to act like two separate CPUs to the operating system and the applications that use it

Hypervisor: Software, firmware, and/or hardware that enables virtualizing compute, storage, and networking (NIC resources on a server) to run as virtual machines

IaaS (Infrastructure as a Service): Form of cloud computing where end-users receive compute infrastructure—compute and/or storage—as a cloud-based service

IP (Internet Protocol): The principal communications protocol in the Internet protocol suite for carrying datagrams across a network

JSON (JavaScript Object Notation): A formatting method that avoids the complexity of traditional programming languages by representing data in a way that both humans and machines can easily comprehend

LINUX: A cross-platform operating system modeled on UNIX that is the de facto operating system at the heart of almost all of today's applications, servers, and devices

LSO (Lifecycle Service Orchestration): MEF-defined specifications enabling standardized service orchestration based on lifecycles of end-to-end connectivity services across one or more network service domains

MANO (Management and Orchestration): Describes the management and orchestration of NFV, including VNFs, management of the VNFs, and the underlying compute, storage, network, and VM infrastructure. MANO can also include the management and orchestration (service chaining) of multiple VNFs. The framework is defined by ETSI

MDSO (Multi-Domain Service Orchestration): End-to-end management and control of services over physical and virtual networking functionality, and across one or more management domains (such as WAN, NFV, and cloud)

Merchant Silicon: Foundation of open switches (such as bare metal, white box, or brite box), in that they are built upon merchant or 'off-the-shelf' silicon from a variety of chip companies (such as Broadcom®, Mellanox®, Intel®)

Microservices: Software architecture for building distributed systems where a large application is built from distinct, loosely coupled components that interact through formal, well-defined APIs. The associated benefits include scale, availability, and flexibility, allowing for rapid innovation and frequent incremental changes

MPLS (Multi-Protocol Label Switching): A data encapsulation methodology used to carry different types of telecommunications data across a packet network. Uses labels to steer traffic from one network node to the next rather than long network addresses, making it more efficient than routing

NaaS (Network as a Service): Form of cloud computing where networking and connectivity are provided to an end-user as a service

NE (Network Element): Individual networking devices being managed

NETCONF (Network Configuration Protocol): Network management protocol used to configure network devices

NFV (Network Functions Virtualization): Architecture using COTS technologies, including storage and compute, to virtualize entire classes of network node functions used to create communication services

NFVI (Network Functions Virtualization Infrastructure): The set of resources used to host and connect virtual functions such as compute, storage, network, and Virtual Machines (VMs)

NFVO (Network Functions Virtualization Orchestration): Software component that can orchestrate the lifecycle of VNFs, including the creation and chaining of VNFs

NIC (Network Interface Controller): Hardware component allowing a compute platform to connect to a network

NMS (Network Management System): An application for managing services end to end across a network. Can manage devices directly or manage one or more EMSs. An example could be Nokia/Alcatel-Lucent's Service Aware Manager (SAM), which manages services across an Alcatel IP network

OCP (Open Compute Project): Open, collaborative organization focused on sharing hardware designs to efficiently support the growing demands on compute infrastructure

ONF (Open Networking Foundation): Organization aimed at improving networking through SDN, the OpenFlow protocol and related technologies

ONIE (Open Network Install Environment): OCP open source initiative that defines an open 'install environment' for bare metal network switches

ON.Lab (Open Networking Lab): An organization dedicated to developing tools and platforms and building open source communities to realize the full potential of SDN

ONOS (Open Network Operating System): Open source SDN controller optimized for service providers; offers scalability, high availability, high performance, and abstractions, making it easy to create applications and services

OpenDaylight: Open source SDN controller

OpenFlow: Open protocol that allows a server/controller to tell network switches where to send their packets. Closely aligned with SDN

OPEN-O (Open Orchestrator Project): New (announced in February 2016) collaborative effort to bring the industry together to develop an open source software framework and orchestrator to enable agile SDN and NFV operations

OpenStack: Free and open source software platform for cloud computing deployed as an IaaS, consisting of interrelated components controlling hardware pools of processing, storage, and networking resources throughout a data center

Open Switch: Network switches where hardware and software are separate entities that can be changed independently of one another

OPNFV (Open Platform for NFV): OPNFV is a collaborative open platform intended to accelerate the deployment of NFV. OPNFV is mainly focused on building NFVI and VIM

Orchestrator: Software component used to provide end-to-end control of processes across a network for service creation and delivery. Generally considered to provide higher-level perspective than a controller. For example, it may provide end-to-end service abstraction, where a controller might focus on packet forwarding and control

OS (Operating System): Software supporting a computer platform's basic functions, such as scheduling tasks, executing applications, and controlling access to peripherals and interfaces

OSM (Open Source MANO): OSM is an ETSI-hosted project to develop an open source NFV MANO software stack aligned with ETSI NFV

OSS (Operating System Support): Software systems used by service providers to manage their networks that support such management functions as inventory, service provisioning, configuration, and fault management. Orchestrators increasingly perform a subset of these functions via automation

PaaS (Platform as a Service): A category of cloud computing services that provides a platform allowing customers to develop, run, and manage applications without the complexity of building and maintaining the infrastructure typically associated with developing and launching an app

PCE (Path Computation Element): System component, application, or network node used to determine and find a suitable route for connecting between a source and destination end-points

PCI (Peripheral Connect Interface): Industry standard for connecting computers and their peripherals

PCIe (Peripheral Connect Interface Express): Industry standard for connecting computers and their peripherals that provides lower latency and higher data transfer rates than parallel buses, such as PCI

PCI Pass-Through: Technique allowing for the control of physical devices by guests that can be used to assign a PCI device (for example, NIC, disk controller, USB controller, FireWire controller) to a VM guest, thereby giving it full and direct access to said PCI device

PNF (Physical Network Function): Physical appliance or hardware device that provides network functions

Pod: Self-contained unit that includes compute and storage; refers to an independent x86-based component dedicated to running VNFs

PS (Professional Services): Consulting services provided by a vendor to customize or tune an application or installation to suit a particular customer's needs

PXE (Pre-boot Execution Environment): Industry standard client/server interface allowing networked devices not yet loaded with an operating system to be configured and booted remotely by administrators

Python: High-level, general-purpose, open source programming language that provides constructs intended to facilitate readability and enable clear programs on both a small and large scale; widely used for SDN and NFV use cases

RA (Resource Adapter): Allow Ciena's Blue Planet to communicate with, control, and/or manage a wide array of multi-vendor network elements using a variety of protocols and interfaces including CLI, TL-1, NETCONF/YANG, and others. Provides a formal model for the underlying networking function and implements the controls to manipulate that functionality

Resource: Any entity that provides a well-defined set of network functionality that can be modeled and controlled through an API. May be an individual device or network function, or an entire network or network domain

REST (Representational State Transfer [usage: RESTful API]): Architectural style and approach to communications often used in the development of Web services. A stateless, client-server, cacheable communications protocol that uses the HTTP protocol in virtually all cases. In modern, open SDN and NFV architectures, REST APIs are the common interface between software applications such as OSSs, orchestrators, and domain controllers

SaaS (Software as a Service): Software licensing and on-demand delivery model in which software is licensed on a subscription basis and centrally hosted

SAI (Switch Abstraction Interface): Co-authored by system and silicon vendors, lists the API to drive most common functionality Ethernet switch ASICs (for example, initialization flow, port management, data forwarding, switching and routing, forwarding rules). As every ASIC is different, SAI supports vendor-specific functionality

Service Template: Used to define and automate the end-to-end orchestration of a service. Blue Planet leverages TOSCA-based service templates to model and understand relationships between the individual resources that comprise a service, and the sequencing of how to create and/or delete resources

SDN (Software-Defined Network): Networking approach that allows network administrators to manage network services' higher-layer abstracted functionality by decoupling the control and data planes, with the control plane logically centralized and the data plane remaining with forwarding devices

SD-WAN (Software-Defined Wide Area Network): An approach to designing and deploying enterprise WANs that uses SDN techniques to determine the most effective way to route traffic to remote locations

SFF (Service Function Forwarding): Creates the chain between VNFs, which is addressed by the virtual Switch (vSwitch)

SMB (Small and Medium Size Business): Business whose personnel numbers fall below certain limits

SME (Small and Medium Size Enterprise): Business whose personnel numbers fall below certain limits

SNMP (Simple Network Management Protocol): Protocol for collecting and organizing information about managed devices on IP networks and modifying that information to change device behavior. Devices that typically support SNMP include routers, switches, servers, workstations, printers, modem racks, and more

SOAP (Simple Object Access Protocol): Protocol specification for exchanging structured information in the implementation of Web services in computer networks. Uses XML Information Set for its message format and relies on application layer protocols, most notably HTTP or SMTP, for message negotiation and transmission

Sockets: One endpoint in a communication flow between two programs running over a network, created and used with a set of programming requests or function calls. An alternative meaning is on a PCB, in which a compute ASIC is installed. A socket will support multiple cores, depending on the ASIC installed

SR-IOV: Specification allowing a PCIe device to appear to be multiple separate physical PCIe devices

SSH (Secure Shell): Encrypted shell allowing remote login and commands to be sent securely over an unsecured network

SSL (Secure Sockets Layer): Encryption protocol designed to provide communications security over a computer network. Several versions of the protocols are in widespread use in applications such as Web browsing, email, instant messaging, and VoIP

Swagger: An interactive API documentation framework for describing, producing, consuming, and visualizing REST APIs

Template: Standardized non-executable file type used by software as a preformatted example on which to base other files

Threads: An ordered sequence of instructions telling the compute platform what to do

TOSCA (Topology and Orchestration Specification for Cloud Applications): TOSCA provides a standard language to define virtualized services and applications, including their components, relationships, dependencies, requirements, and the processes that manage them. This makes it much easier to design and manage services from end to end, regardless of the underlying platform or infrastructure

vBCPE (virtual Business Customer Premises Device): Distributed use cases of vCPE, similar to a vECPE

vCPE (virtual Customer Premises Equipment): Virtualized version of customer premises equipment functionality (for example, 3906mvi, COTS server with NFVI software, and VNFs) that can be centralized, distributed, or hybrid

vCPU (virtual Central Processing Unit): Also referred to as a virtual processor, a physical CPU assigned to a VM

vECPE (virtual Enterprise Customer Premises Device): Distributed use cases of vCPE, similar to a vBCPE

vFW (Virtual Firewall): Virtualized version of firewall functionality

VIM (Virtual Infrastructure Manager): Management software that provides centralized administration of physical and virtual compute resources. For NFV, VIM administers the cloud resources used to run VNFs

VM (Virtual Machine): Software computer that, like a physical computer, runs an OS and applications

VNF (Virtual Network Function): Specific network function that has been virtualized in software

VNFI (VNF Infrastructure): VNFI is the compute infrastructure on which a VNF is run

VNF Lifecycle Manager: Internal Ciena term used for the VIM

VNF Manager: Supported via Ciena's Blue Planet NFVO management solution

vNID (virtual Network Interface Device): Software-only (virtual) version of a physical network interface device

VNPaaS (Virtual Network Platform as a Service): Opportunity whereby the enterprise hosts and introduces VNFs instances on its own, without being provider by a network operator

vOAM, vSAT, vTWAMP: Ciena VNFs to be created that provide specific functions

vRouter (Virtual Router): Virtualized version of router functionality

vSwitch (virtual Switch): Software allowing communication between VMs that forwards packets and intelligently directs network communication by checking data packets before moving them to a given destination

WAN (Wide Area Network): Telecommunications network or computer network extending over a large geographical distance—global, regional, national, or metro

White Box Switch: Generic off-the-shelf switching/routing hardware that requires an OS, typically Linux-based, that depends on higher-level software, typically purchased from a software vendor. Often used in an SDN environment where the white box device is controlled through the OpenFlow protocol

X86: Refers to the family of backward-compatible architectures based on Intel® 8086 CPU family commonly referring to commodity, COTS-based compute platforms

XML (Extensible Markup Language): A human-readable markup language intended to be simple and useable to describe documents and arbitrary data structures. Some network management products use XML as the protocol on the management interface

XaaS (Anything as a Service): XaaS describes any cloud computing services, including IaaS, PaaS, SaaS, and anything else that can be offered as a service. A characteristic of XaaS is that the service is available on demand, and typically consumed on a per-usage or pay-as-you-go model

YANG (Yet Another Next Generation): Data modeling language originally created to support the NETCONF network configuration protocol. More recently used as data modeling language for a few other protocols. Sometimes used to model services