Capgemini engineering

BUILDING TOMORROW'S VIRTUALIZED NETWORKS

SDN-Enabled Virtualized Access Solution (SDvAS)

A shift in the networking landscape

Enterprise and broadband access networks are evolving from application-specific purpose-built equipment, to disaggregated systems built on general purpose, common-of-the-shelf (COTS) or white box platforms. Disaggregation, along with software define networking (SDN) and virtualized network functions (VNFs) enables independent selection of different platforms and sub-functions without being locked into single vendor solutions.

There is a massive software-based shift in the thought process and implementation of broadband access networks by communication service providers (CSPs). Initiatives from the Open Networking Forum (ONF), Broadband Forum (BBF), Open Compute (OCP) Telco Project and the Telecom Infrastructure Project (TIP) have helped defin disaggregated architectures, enabled by SDN and virtualization.

The next generation broadband access network is envisioned using a collection of physical network functions (PNFs) and virtualized network functions (VNFs), such as

- Universal CPEs using general purpose CPU based hardware for the software defined WAN (SD-WAN)

- Broadband access nodes using white box optical line terminals (OLTs) and white box aggregation switches

- General purpose compute nodes in the distributed central offices, hosting the virtualized access network and network management functionality, such as the virtual OLT (vOLT), virtual BNG (vBNG), Virtual Element Management System (vEMS) as VNFs

The Capgemini Engineering approach to software Defined, virtualized access

Capgemini Engineering is uniquely positioned to enable OEMs and eco-system partners to address this shift to SDN enabled, virtualized networks. Capgemini Engineering's networking and wireless software frameworks have powered numerous OEM products in large carrier networks, data centers and enterprise networks.

Capgemini Engineering's SDN-enabled virtualized Access Solution, SDvAS, is built upon the trusted Capgemini Engineering Intelligent Switch Solution (ISS) and provides a portfolio of software frameworks optimized for software define enterprise access and broadband access.

For software de ned enterprise access:

- Universal CPE (uCPE) - uCPE OS optimized for smaller footprint to orchestrate multiple VNFs

- SD-WAN VNF, providing the control plane with an x86 based data plane

- Virtual router, virtual firewall

- Software-defined broadband (SD-Broadband) applications for web-based service provisioning and SD-WAN orchestration

For software de ned broadband access:

- Virtual OLT (vOLT) control plane and virtual EMS for man aging the OLT

- Virtual OLT hardware adaptation (vOLT-HA), that is hardware optimized

- Virtual BNG (vBNG) control plane and data plane on white box switches or smart NICs,

Along with the MANO Edge Compute, and intent-based NetAnticipate frameworks, the Capgemini Engineering SDvAS portfolio offers a comprehensive, end-to-end solution to realize software defined and vi tualized broadband access networks.

Capgemini Engineering SD vAS FRAMEWORK
(SDN enabled Virtualized Access Solution)

Software defined enterprise access
(Enterprise Users - High speed and Programmatic Access)

SD-WAN VNF
(Control Plane & x86 Data Plane)

Enterprise – **vRouter** & Accelerated OVS

Universal CPE

SD-WAN Orchestrator

Software defined broadband access
(Residential Users – HSI, IPTV, VoD, VoIP)

vBNG – Control Plane & Data plane

vOLT – Control Plane

vCPE – Control Plane & Data plane

vOLTHA – Hardware Optimized

SDvAS also provides a suite of SDN applications portable to ONOS controller, delivering seamless network orchestration, VPN services and MEF Services
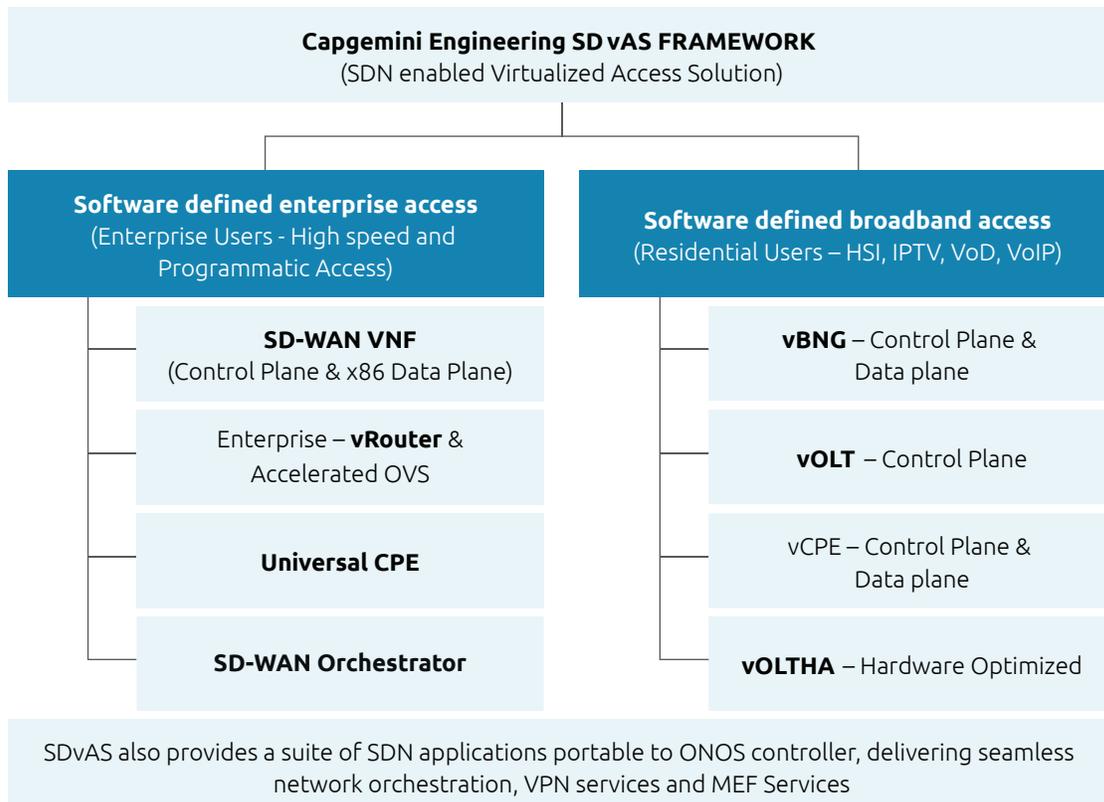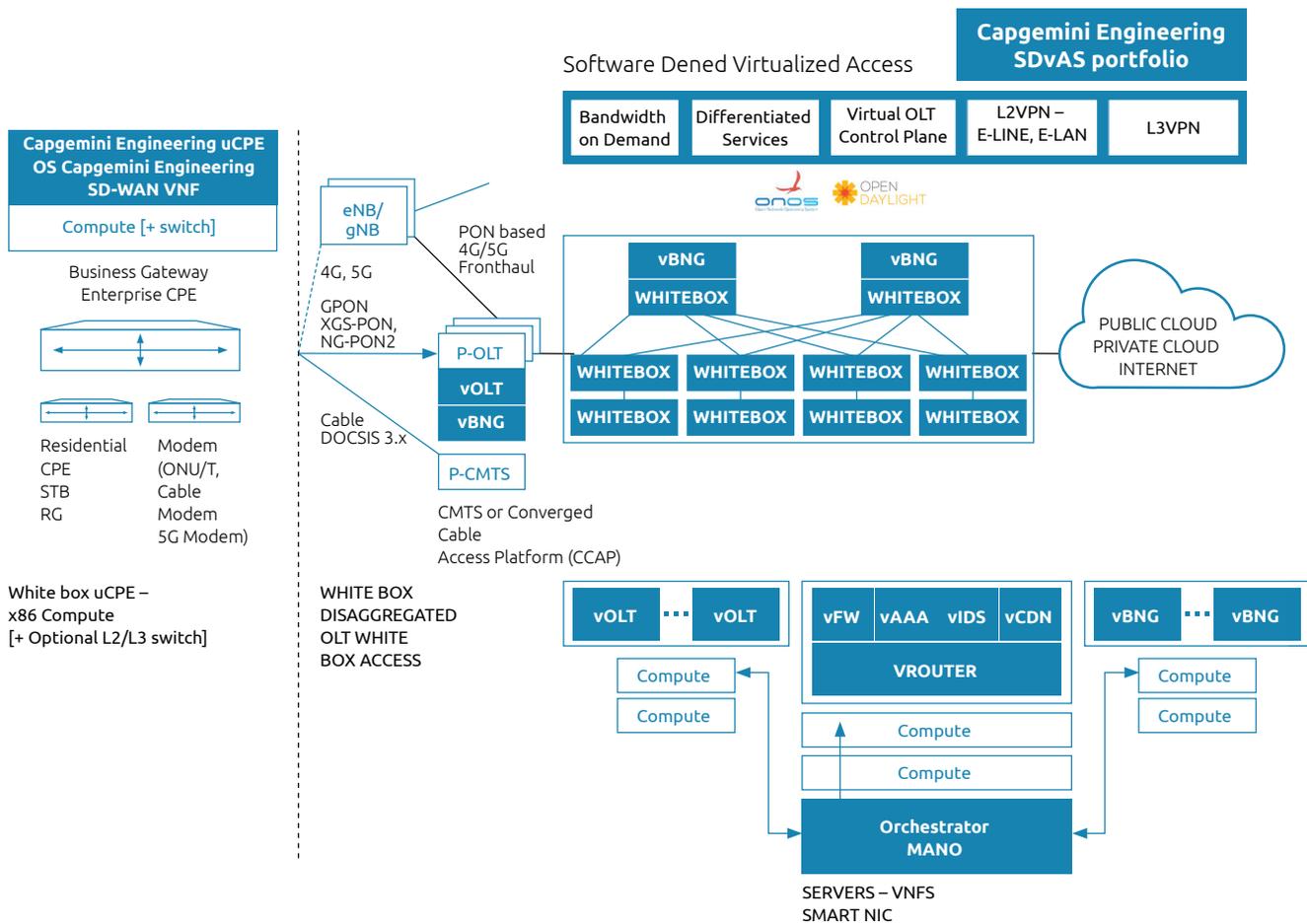
Figure 1: Capgemini Engineering SDvAS Framework

A strong partnership relationship

Capgemini Engineering works with strategic partners, including silicon and FPGA vendors, ODM white box vendors, and smart NIC vendors, in creating pre-integrated frameworks for SD-WAN uCPE, Virtual OLT, Virtual BNG, that enable OEM vendors with fast time-to-market solutions. Our frameworks speed development times and decrease costs, resulting in faster, smarter solutions that deliver superior outcomes.

Software Dened Virtualized Access

Capgemini Engineering SDvAS portfolio

Bandwidth on Demand	Differentiated Services	Virtual OLT Control Plane	L2VPN – E-LINE, E-LAN	L3VPN

ONOS OPEN DAYLIGHT

Capgemini Engineering uCPE OS Capgemini Engineering SD-WAN VNF

Compute [+ switch]

Business Gateway Enterprise CPE

Residential CPE STB RG

Modem (ONU/T, Cable Modem 5G Modem)

White box uCPE – x86 Compute [+ Optional L2/L3 switch]

eNB/ gNB

4G, 5G

GPON XGS-PON, NG-PON2

Cable DOCSIS 3.x

PON based 4G/5G Fronthaul

P-OLT
vOLT
vBNG

P-CMTS

CMTS or Converged Cable Access Platform (CCAP)

WHITE BOX DISAGGREGATED OLT WHITE BOX ACCESS

vBNG
WHITEBOX

vBNG
WHITEBOX

WHITEBOX WHITEBOX WHITEBOX WHITEBOX
WHITEBOX WHITEBOX WHITEBOX WHITEBOX

PUBLIC CLOUD PRIVATE CLOUD INTERNET

vOLT ···· vOLT

Compute
Compute

vFW | vAAA | vIDS | vCDN
VROUTER
Compute

vBNG ···· vBNG

Compute
Compute

Compute

Orchestrator MANO

SERVERS – VNFS SMART NIC

About Capgemini Engineering

Capgemini Engineering combines, under one brand, a unique set of strengths from across the Capgemini Group: the world leading engineering and R&D services of Altran — acquired by Capgemini in 2020 - and Capgemini's digital manufacturing expertize. With broad industry knowledge and cutting-edge technologies in digital and software, Capgemini Engineering supports the convergence of the physical and digital worlds. We help clients unleash the potential of R&D, a key component of accelerating their journey towards Intelligent Industry. Capgemini Engineering has more than 52,000 engineer and scientist team members in over 30 countries across sectors including aeronautics, space and defense, automotive, railway, communications, energy, life sciences, semiconductors, software, and internet and consumer products.

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