

Oracle Communications Policy Management

Virtualized Software Bundle
(Oracle Communications Policy Management and
Oracle Communications User Data Repository)

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Table of Contents

Disclaimer	1
Glossary	3
Introduction	4
Policy Management as a Network Function	4
Oracle Communications User Data Repository as a Network Function	5
Oracle Communications Policy Management & Oracle Communications User Data Repository Virtualized Bundle	6
Oracle Communications Policy Management & Oracle Communications User Data Repository Virtualized Bundle Benchmark	8
Summary	8
Appendix A: Hardware Validation	9

Glossary

This section lists terms and acronyms specific to this document.

Acronym/Term	Definition
CMP	Configuration Management Platform
Guest	The VM running on the Host server.
HA	High Availability
HDD	Hard Disk Drive
Host	The server on which the VM (Guest) is running.
KPI	Key Performance Indicator
MPE	Multimedia Policy Engine
NFA	Network Function Agent
NFV	Network Function Virtualization
NO/NOAMP	Network Operations
OAM	Operations, Administration and Management
PCRF	Policy and Charging Rules Function
PDP	Packet Data Protocol
PFE	Policy Front End
RAM	Random Access Memory
SO/SOAMP	Services Operations
vCPU	Virtual CPU
VM	Virtual Machine
VNF	Virtual Network Function
VNFC	Virtual Network Function Component (MPE, PFE, VMs)



Introduction

Oracle Communications Policy Management (Oracle Communications Policy Management) is a highly scalable and robust 3GPP PCRF system that supports 3G, 4G, IMS, VoLTE, VoWiFi, and Fixed Mobile Convergence. Oracle Communications Policy Management is the leading independent policy vendor and interoperates with commonly deployed GGSNs, PGWs, DPIs, TDFs, P-CSCFs, SDPs, Application Servers, OTT Gateways, OCSs, UDRs and HSSs.

The Oracle Communications User Data Repository (Oracle Communications User Data Repository) provides a highly-scalable, consolidated database for Oracle Communications Policy Management that provides subscriber profile, entitlement, quota, and state data information to use for policy evaluation. The combination of Oracle Communications Policy Management and Oracle Communications User Data Repository allows service providers to offer a wide range of subscriber services including Fair Use, QoS Tiering, individual and family quota plans, quota and use case passes, roaming, and others.

When deployed on bare metal servers, Oracle Communications Policy Management components (MPE, PFE and CMP) and Oracle Communications User Data Repository components (NO, SO and MP) are available on a well-defined set of servers. In addition, each component can be deployed as a Virtual Network Function Component (VNFC). This enables Oracle Communications Policy Management and Oracle Communications User Data Repository to run in bare metal and virtualized deployment models.

This paper outlines the Oracle Communications Policy Management and Oracle Communications User Data Repository virtualized software bundle with details pertaining to profiles, performance benchmarking details.

Policy Management as a Network Function

Oracle Communications Policy Management solution consists of several distinct components and has several points of manageability to the network. These components can operate (lifecycle – deploy, scale update, deploy) independently.

Policy Management as a network function provides benefits such as

- Centralized policy critical for service agility and an easy introduction of new services
- Standards based solution offering industry leading interoperability
- Virtualization deployment on industry standard hardware with leading hypervisor
- Intelligent and flexibility built into the software requiring less customization and in support of orchestration

Oracle Communications Policy Management consists of essential network components:

- Policy Front End (PFE) / Multipart Routing Agent(MRA)
- Multiprotocol Policy Engine (MPE)
- Configuration Management Platform (CMP)

Policy system configuration allows for policy components running in high availability cluster configuration. This means that for each component there is an active and standby cluster. This system consists of a CMP cluster, one or more PFE cluster, and one or more MPE cluster associated with the PFE cluster. Oracle Communications Policy Management also supports configurations involving geo diverse multi geographical locations and multiple virtual infrastructure. Figure 1 depicts a 3GPP based PCRF systems in a virtualized fashion.

VPCRF system includes CMP clusters in VMs, PFE clusters in VMs act as a front end enabling communication from Policy Control & Enforcement function (PCEF), Traffic Detection Function (TDF) and Application Function (AF) towards the PCRF. MPEs running in VMs performs policy decisions based on the interaction with User Data Repository (UDR) / Subscriber Profile Repository (SPR) and Online Charging System (OCS). Configuration Management Platform (CMP) allows for provisioning the PFE and MPE.

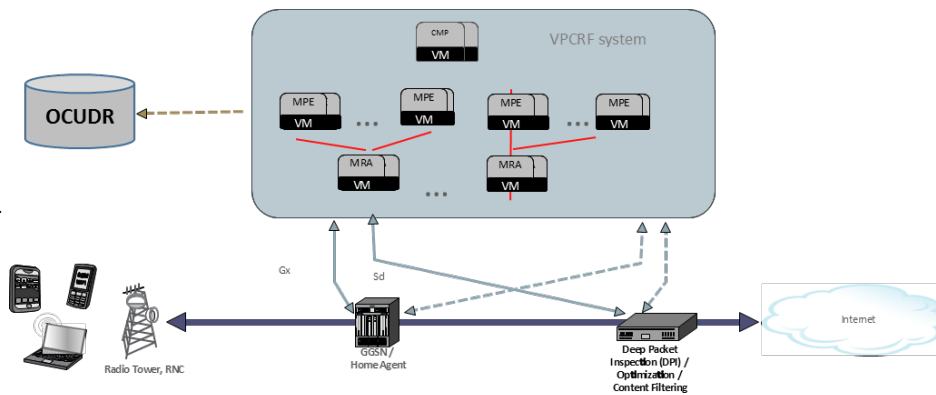


Figure 1: Oracle Communications Policy Management as a Network Function

Oracle Communications User Data Repository as a Network Function

Oracle Communications User Data Repository solution consists of several distinct components and has several points of manageability to the network. These components can operate (lifecycle – deploy, scale update, deploy) independently

The system is comprised of several components:

- Network Operation, Administration, Maintenance, & Provisioning Server (NOAMP)
- System Operation, Administration, and Maintenance Server (SOAM)
- Media Processor (MP)

Oracle Communications User Data Repository system configuration allows for UDR components running in high availability cluster configuration. This system consists of a NO/SO with an active and standby node at one site and another NO/SO active and standby node at a different site providing georedundant capabilities. Message processor functions as active node across two different sites, communication across sites is made possible as depicted in Figure 2. This system works in a virtualized fashion providing Oracle Communications Policy Management with subscriber specific tier information, entitlement and quota management information.

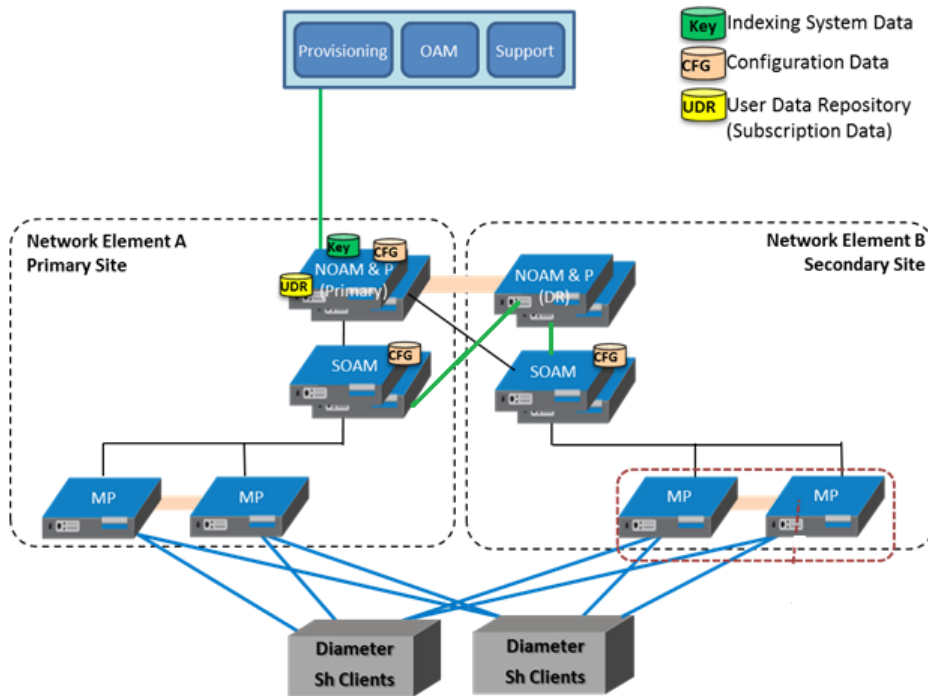


Figure 2: Oracle Communications User Data Repository Components

Oracle Communications Policy Management & Oracle Communications User Data Repository Virtualized Bundle

Oracle provides Oracle's approach to addressing the entry level market is to provide a virtualized software bundle including both Oracle Communications Policy Management and Oracle Communications User Data Repository. The Policy Management Virtualized Software Bundle allows operators to optimize their network resources to quickly and easily introduce new services with a smaller footprint. This fully-virtualized solution provides a cost-effective entry point with shorter introduction times to introduce new policy services and capabilities as depicted in Figure 3.

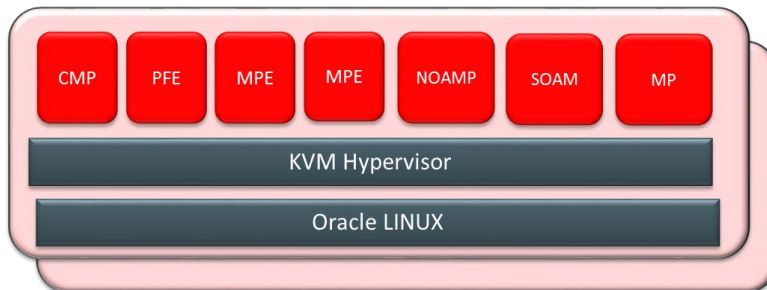


Figure 3: Oracle Communications Policy Management & Oracle Communications User Data Repository Virtualized Software Bundle

Oracle has engineered VM resource profiles such that Oracle Communications Policy Management & Oracle Communications User Data Repository can co-exist on a variety on a variety of rack mount server platforms, including both Oracle and 3rd party hardware options. This bundle leverages KVM and Oracle Linux to provide operators with full functional capabilities of Oracle Communications Policy Management and Oracle Communications User Data Repository to perform the required use cases for their network deployments. Engineered VM resource profiles are tabulated in Table 1.

Product	Component	Host Name	vCPUs	Memory (GB)	Hard Disk (GB)
Oracle Communications User Data Repository	UDR: NO	NO-A	4	16	220
	UDR: SO	SO-A	2	4	60
	UDR: MP	MP-1	4	16	60
Oracle Communications Policy Management	CMP	CMP-1	4	10	108
	PFE	PFE-1	10	32	108
	MPE	MPE-1	10	32	108
	MPE1	MPE-2	10	32	108
PlatMgmt	KVM		2	2	154
Required Resource Count			46	144	926

Table 1: Resource Allocation for Virtualized software Bundle

Virtualized software bundle allows Oracle Communications Policy Management and Oracle Communications User Data Repository components to be deployed in a HA configuration as depicted in Figure 4. In addition to HA, Oracle Communications User Data Repository components can also be configured in a georedundant configuration.

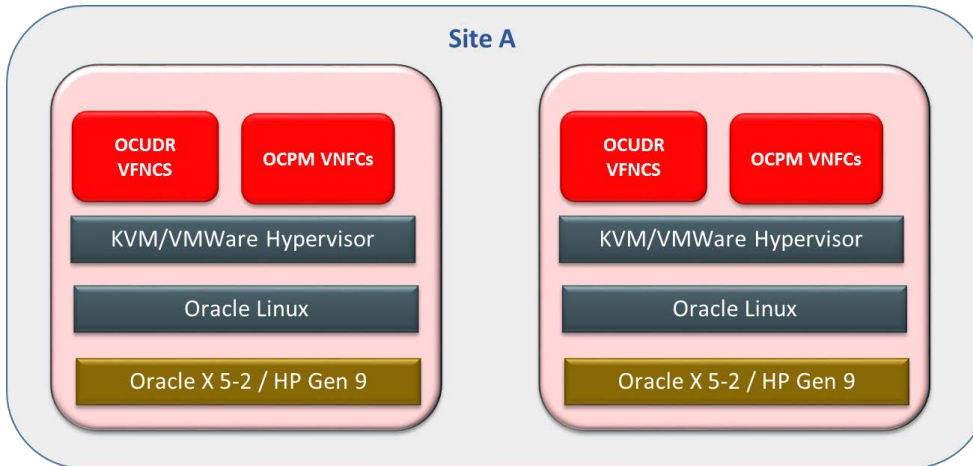


Figure 4: Oracle Communications Policy Management & Oracle Communications User Data Repository HA configuration

Oracle Communications Policy Management & Oracle Communications User Data Repository Virtualized Bundle Benchmark

Oracle Communications Policy Management and Oracle Communications User Data Repository component capacity is depends on CPU, memory and storage of a virtual machine. Oracle Communications Policy Management performance and capacity is characterized by Transaction per Second (TPS) Concurrent Session and Session Bindings whereas Oracle Communications User Data Repository VNFC performance is characterized by Transaction per Second (TPS on Sh interface).

Characterization was performed with Oracle X 5-2 and HP BL 460 Gen9 servers (refer Appendix for Hardware information) using KVM & VMWare hypervisors in a typical deployment configuration. As part of these process, performance and capacity testing is done applying a representative traffic flows with a call model derived from customer experience. The performance and capacity per VNFC obtained as a result of these test is captured in Table 2. Profile used for Oracle Communications Policy Management and Oracle Communications User Data Repository VNFCs follow the information depicted in Table 1.

Component	Performance and Capacity*
MRA/PFE	18,000 TPS; 12M bindings
MPE	6,000 MPE TPS total, divided across two MPEs; 3M sessions
Oracle Communications User Data Repository	2,000 Sh TPS, 15M subscribers
Note: + Performance and capacity is tested with KVM Hypervisor (qemu-kvm-1.5.3-105.el7_2.4) and also with VMWare ESXi 5.5 hypervisor	

Table 2 : Virtualized Bundle Performance and Capacity.

Summary

Oracle Communications Policy Management and Oracle Communications User Data Repository can be deployed in virtualized environments using KVM, OVM and VMware, hypervisors as well as on specific bare metal servers. Oracle provides a virtualized software bundle for Oracle Communications Policy Management and Oracle Communications User Data Repository to be made available for supporting emerging service providers or service providers that may want to begin with an entry level virtualized system so they can gain some experience and knowledge working with virtualized deployments. This solution provides cost effective Oracle Communications Policy Management and Oracle Communications User Data Repository capabilities in a HA configuration to solve operator use cases. Current Oracle validates the performance for this virtualized software bundle is performed with a combination of Oracle X5-2 hardware and KVM In addition to this, operators can run Oracle Communications Policy Management/Oracle Communications User Data Repository on other hardware platforms using the specified hypervisors. In this case the service provider should validate the performance of the virtualized system in their labs and production environments or can optionally use the Oracle Consulting Services team.



Appendix A: Hardware Validation

Oracle Communications Policy Management operates on bare metal or as a VM guest. VNF performance shown in this paper reflects testing performed using the VNF reference profile on the following servers:





- Oracle Server X5-2 rack-mounted server
 - CPU: 72x Intel® Xeon® CPU E5-2699 v3 @ 2.30GHz
 - Number of hyperthreaded vCPU: 72
 - RAM: 256 GB
 - HDD: 2x HGST (1.2 TB each)
 - NICs: 10GbE SFP+ NIC with minimum of 2 ports, or 10GbE RJ45 NIC with minimum of 2 ports
- HP BL460C (Gen 9) blade server
 - CPU: Two 14-core E5-2600v3-series Intel® Xeon® Processors
 - Number of hyperthreaded vCPUs: 56
 - RAM: 256 GB
 - HDD: 2x EG0900FCSPN (900 GB each)
 - NICs:
 - Two 10G ports (on motherboard)
 - Two additional 10G ports via mezzanine slot corresponding to I/O bays 3-4
 - One of the following:
 - Four additional 1000BASE-T ports corresponding to I/O bays 5-8
 - Two additional 10G ports corresponding to I/O bays 5-6



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