

Configuring Oracle SDN Virtual Network Services on Netra Modular System

ORACLE WHITE PAPER | SEPTEMBER 2015





Introduction	1
Netra Modular System	2
Oracle SDN Virtual Network Services	3
Configuration Details	3
Deployment with Netra Modular System	5
Conclusion	7
References	7



Introduction

This white paper outlines the configuration of Oracle SDN Virtual Network Services on Oracle's Netra Modular System. It assumes that the reader has prior understanding of Oracle SDN and Netra Modular System.

Netra Modular System is a converged, preintegrated, and tested platform that delivers unique benefits. Its innovative architecture uses plug-and-play blade system type management, allowing faster time to bring up and scale up new services. Netra Modular System takes today's traditional bladed and rackmount architectures and merges them to create a new innovative best-of-breed next-generation platform. This integrated system is designed to handle compute, networking, and storage evolution without forklift upgrades. Netra Modular System provides the service and business agility required in today's fast-paced market.

Oracle SDN (Software Defined Networking) boosts application performance and management flexibility by dynamically connecting virtual machines (VMs) and servers to any resource in a data center fabric. With it, customers can gain the performance benefits of up to 80 Gb/sec server-to-server throughput and realize up to 19 times faster live migration, 12 times faster database queries, and 30 times faster backups than with legacy systems. Oracle SDN provides virtual networking flexibility that costs 50 percent less than legacy networking systems. Virtual Network Services, a feature of Oracle SDN, now extends Oracle SDN and allows for the on-demand deployment of firewall, load-balancer, routing, and other network functions. Virtual Network Services makes network and security services easy to deploy, configure, and manage.

For simplicity, only a single tenant with a three-tier architecture (web, application, and database tiers) is depicted in this paper. The following sections delve into the technical details of Netra Modular System and the deployment model for Virtual Network Services.

Netra Modular System

Netra Modular System is a transformative platform for customers looking to modernize their data centers. With extreme agility and scale in a platform that can be completely virtualized, customers benefit from accelerated development, rapid bring up, and low-cost maintenance. Its innovative architecture uses plug-and-play blade system type management, allowing faster time to bring up and scale up new services.

Netra Modular System takes the best features of the blade architecture—including ease of use with centralized management, simplified cabling, and plug-and-play servers—yet addresses many of its shortcomings, including form-factor constraints and the use of proprietary hardware. The rack comprises compute, network, and management elements and comes precabled from the factory. No cable management required by the customer. When a server (compute node) is slid into the rack, it connects to the frame power, network, and management capability automatically. The servers are automatically verified and connected to the rack management for bring up. The design ensures support for multiple generations and types of rackmount servers. Major components include those listed below and shown in Figure 1:

- » An alarm panel showing the overall alarm state of the rack and its components
- » 1U 10/40 GbE switches, 1 pass-through patch panel
- » 1U compute nodes
- » Frame monitoring module

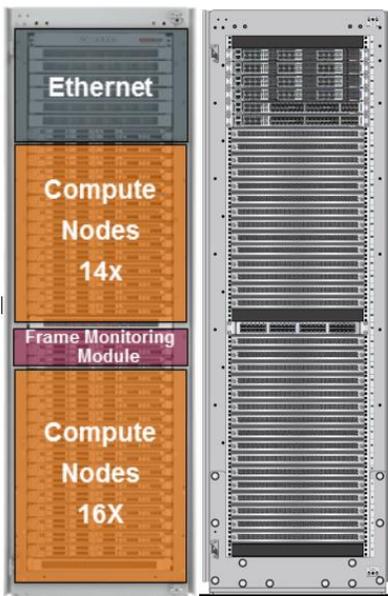


Figure 1: Netra Modular System hardware overview

Netra Modular System can be scaled incrementally with the addition of up to 30 compute nodes. The rack currently supports up to six 40 GbE Ethernet switches from Oracle. These next-generation 1RU 10/40 Gb/sec Ethernet switches come with industry-standard Layer 2 and Layer 3 features and virtualization technologies such as network overlay. The switches enable high-speed low-latency networking between all components and interoperate with external Ethernet and storage networks. Netra Modular System can support up to six physically separate networks.



This is a general-purpose integrated system that uses standard platform components, open hardware and software interfaces, and plug-and-play blade-system type management. The system supports a choice of operating systems and virtualization technologies. Netra Modular System capitalizes on Oracle's ability to engineer hardware and software together to deliver an infrastructure with a preintegrated and managed hardware and virtualization layer.

Oracle SDN Virtual Network Services

The Virtual Network Services feature of Oracle SDN provides the ability to deploy on-demand network services such as firewall, router, load-balancer, virtual private network (VPN), and network address translation (NAT) services in a single virtual machine. This virtually eliminates the need for proprietary fixed functions that create bottlenecks in a data center today. These network services can be configured and managed in a single pane using Oracle Fabric Manager. Oracle SDN Virtual Network Services is hardware-agnostic and works seamlessly in both Oracle Virtual Networking and Ethernet switch deployments.

The network services are daisy-chained within the Virtual Network Services instance while providing the flexibility to configure either all the services or a subset of services per tenant. Furthermore, for high availability, two Virtual Network Services instances can be provisioned in an active/standby role with the configuration synced to the standby instance. The high-availability feature of Virtual Network Services detects the failure of an active instance and enables the standby instance to take over as the new active instance.

Oracle SDN Virtual Network Services comprises two components:

- » Virtual Network Services application software
- » A plugin for Oracle Fabric Manager

For information on how to install the Oracle SDN Virtual Network Services package, please refer to the [product documentation](#).

Configuration Details

This section outlines the general steps for configuring Virtual Network Services for a single tenant using a three-tier architecture. These guidelines can then be extrapolated to multiple tenants. In a typical three-tier architecture, a tenant's applications are organized in three distinct tiers: the web tier (user interface), the application/middleware tier, and the database tier.

Each tier could comprise several servers, and these servers could be either physical servers or virtual machines. The servers handling the user interface are generally referred to as the web tier, which handles queries of and access to the applications. The application/middleware servers together represent the application tier and run the distributed application software. Finally, the database servers that host back-end databases for the applications collectively form the database tier.

Figure 2 depicts an Oracle SDN Virtual Network Services deployment in a three-tier architecture for a particular tenant.

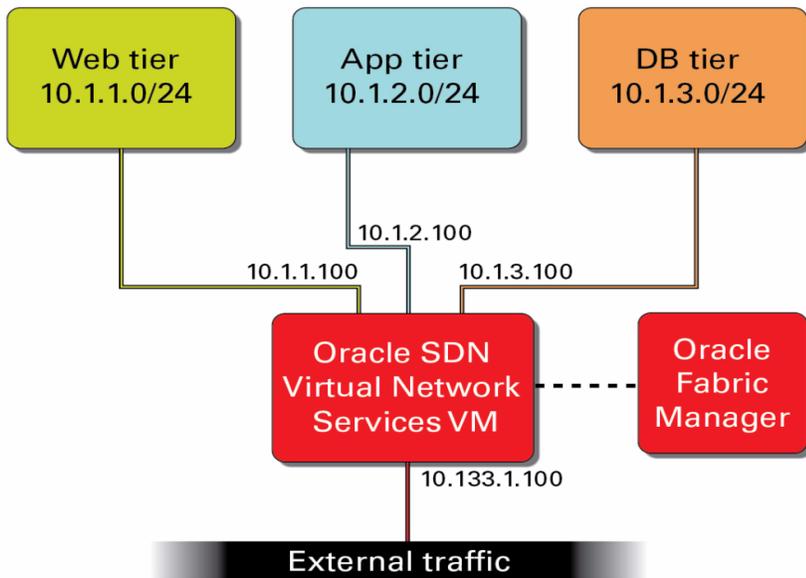


Figure 2: Virtual Network Services in a three-tier architecture for a tenant

An Oracle SDN Virtual Network Services installation has the following system requirements, and these requirements have to be satisfied prior to configuring the network services:

- » Oracle VM 3.2 or above hypervisor: This is on the physical host where the Oracle SDN Virtual Network Services virtual machine will be instantiated.
- » Oracle Fabric Manager 4.3.0: This is the unified management pane for network services deployment and configuration. This software could be installed on either a physical server or a virtual machine. For details on installing Oracle Fabric Manager, please refer to the [product documentation](#).
- » Oracle Linux 6 Update 5 (64-bit): This is on the guest virtual machine where the Virtual Network Services application is installed. This guest machine is referred to as an Oracle SDN Virtual Network Services virtual instance. If high availability (HA) is desired, the Oracle SDN Virtual Network Services application is deployed on two virtual instances with one instance as the HA master and the other as the HA backup.

On the virtual machine where the Virtual Network Services package will be installed, all the virtual network interfaces (vNICs) for east-west traffic within and between the different tiers, as well as the north-south traffic coming from the internet, need to be created. However, in an Oracle Ethernet Switch ES2 environment, vNICs in different subnets are created for handling both east-west and north-south traffic.

Once the vNICs are created, set the public/management network on the north-south vNIC and Oracle SDN Virtual Network Services virtual machine as the default gateway for all clients accessing the tenant's applications. In addition, all the servers that are in the web, application, and database tiers need to set the Oracle SDN Virtual Network Services virtual machine as the default gateway.

Figure 3 depicts Oracle SDN Virtual Network Services in a three-tier architecture for a particular tenant with firewall, load-balancer, network address translation (NAT), VPN, and routing services deployed.

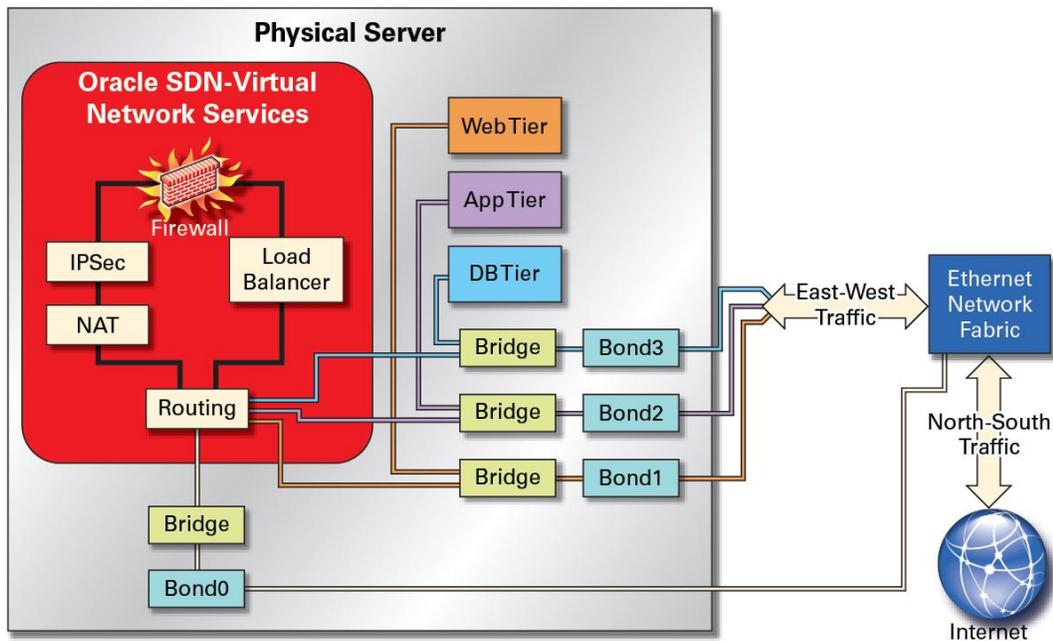


Figure 3: Virtual Network Services deployed per tenant

Deployment with Netra Modular System

This section discusses how to deploy Virtual Network Services in a Netra Modular System environment. Consider the setup shown in Figure 4. For simplicity, only three hosts are shown connected to each other via an Oracle Ethernet Switch ES2-64 or ES2-72 switch, which is uplinked to the data center's core network.

Two Oracle SDN Virtual Network Services instances are created for high availability, with the instance on host A as master and that on host B as backup. These instances resolve their roles using the Virtual Route Redundancy Protocol (VRRP), and they exchange configuration information periodically. When the active instance is detected as being down, the backup instance takes over as the active instance. Because the Virtual Network Services instances are set up as active and backup, a high availability IP address will have to be set for this VRRP group. For more information on how to configure Virtual Network Services instances for high availability, please refer to the [Oracle SDN Virtual Network Services Administration Guide](#).

In this deployment example, on each of the hosts, a bonded interface called Bond 0 is created, which receives all the external traffic coming from the data center's core network. Given that there is a three-tier architecture, a separate subnet for each tier is created with Bond 1 for the web tier, Bond 2 for the application tier, and Bond 3 for the database tier. Note that it is not absolutely necessary to create separate "Bond" interfaces for different subnets; different vLANs on Bond 0 could be created to segregate traffic for each tier.

The virtual machines that belong to a particular subnet can talk only to all the other virtual machines in that same subnet. For example, in Figure 4, virtual machines in the web tier, which are shown in green, can send traffic to any other virtual machines in the web tier on any of the hosts, but they can't send traffic to virtual machines in either the application or the database tier. All the virtual machines in the web, application, and database tiers will set their default gateway to point to the HA IP address of the Virtual Network Services instances, which was set earlier. And then any time a virtual machine in the web tier has to send traffic to a virtual machine in the application tier, all the traffic will be sent to the default gateway, which goes to the active Virtual Network Services instance.

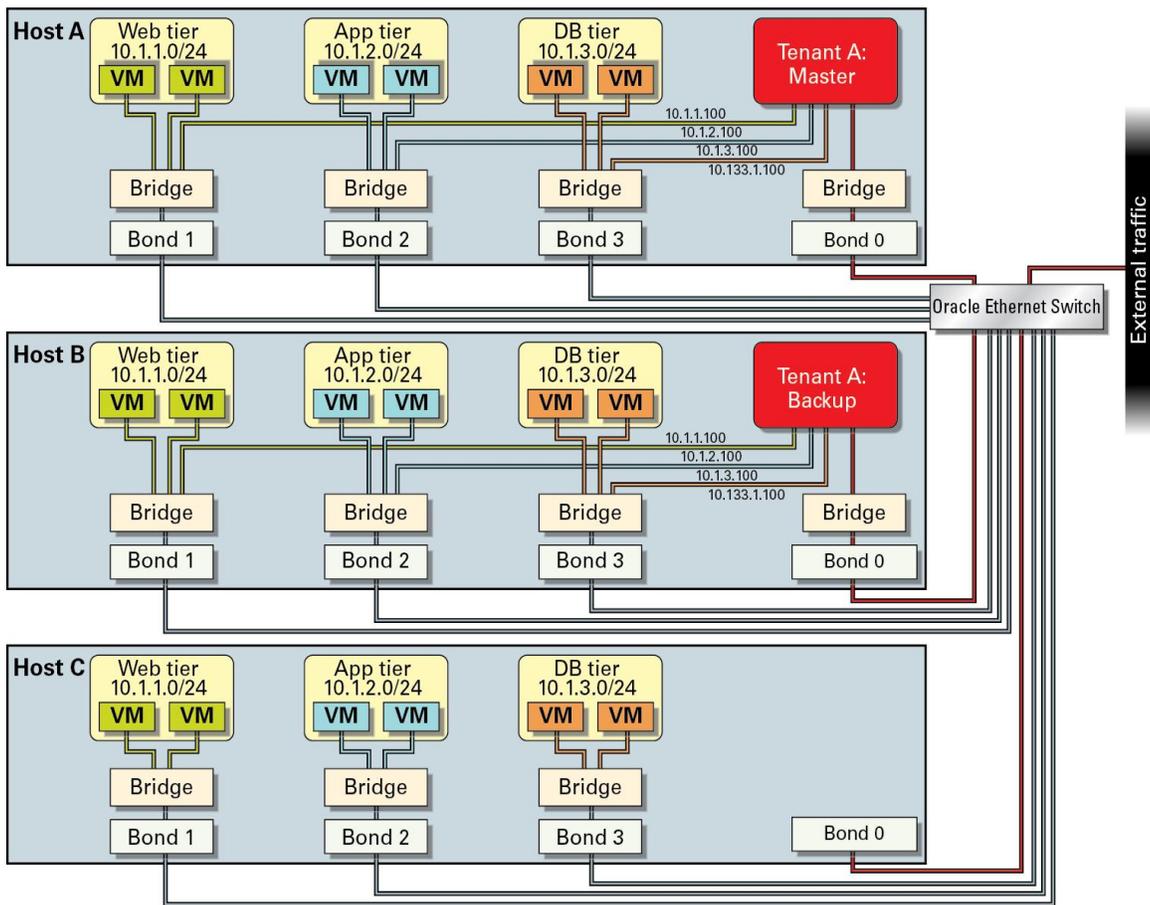


Figure 4: Virtual Network Services deployed with Oracle Ethernet Switch ES2-64 or ES2-72

Once Virtual Network Services instances are created, high availability is set up and the datapath over the vNICs are established, network services—such as firewall, load balancer, and so on—can be configured from the Oracle Fabric Manager dashboard. The routing feature on Oracle SDN Virtual Network Services is enabled by default.

Here is a detailed explanation of the datapath and packet flow for a sample scenario. Suppose a tenant wants to block all traffic that has a source IP address of 10.129.1.100 on the Bond 2 subnet, and this firewall policy has been set up from Oracle Fabric Manager. Then, when a packet with a source IP address of 10.129.1.100 and a destination IP address of a virtual machine in the web tier is received by the active Virtual Network Services instance, the instance forwards the packet to the web tier virtual machine. The web tier virtual machine processes the packet and then has to send it to the virtual machine in the application tier, so it sends the packet to the active Virtual Network Services instance. Before the Virtual Network Services instance routes the packet over the Bond 2 bridge to the application tier, it applies the firewall policies that are set on the Bond 2 subnet and takes action to drop the packet.

For detailed information on how to configure the different network services, please refer to the [Oracle SDN Virtual Network Services documentation](#).

Conclusion

There are many variables when configuring and deploying Oracle SDN Virtual Network Services. This document is an attempt to simplify the configuration process and reduce risk for Oracle customers by providing information for how to use the Oracle SDN Virtual Network Services feature with Oracle's Netra Modular System.

References

For more information, visit the web resources listed in Table 1.

TABLE 1: WEB RESOURCES FOR FURTHER INFORMATION

Web Resource Description	Web Resource URL
Netra Modular System	https://www.oracle.com/servers/netra/netra-modular-system/index.html
Oracle Ethernet Switch ES2-64	https://www.oracle.com/networking/switch-es2-64/index.html
Oracle Ethernet Switch ES2-72	https://www.oracle.com/networking/switch-es2-72/index.html
Oracle SDN Virtual Network Services	http://www.oracle.com/us/products/networking/virtual-networking/sdn/overview/index.html
<i>Ethernet Fabric Operating System CLI Base Reference Manual</i>	http://docs.oracle.com/cd/E19934-01/html/E26513/



CONNECT WITH US

-  blogs.oracle.com/oracle
-  facebook.com/oracle
-  twitter.com/oracle
-  oracle.com

Oracle Corporation, World Headquarters

500 Oracle Parkway
Redwood Shores, CA 94065, USA

Worldwide Inquiries

Phone: +1.650.506.7000
Fax: +1.650.506.7200

Integrated Cloud Applications & Platform Services

Copyright © 2015, Oracle and/or its affiliates. All rights reserved. This document is provided for information purposes only, and the contents hereof are subject to change without notice. This document is not warranted to be error-free, nor subject to any other warranties or conditions, whether expressed orally or implied in law, including implied warranties and conditions of merchantability or fitness for a particular purpose. We specifically disclaim any liability with respect to this document, and no contractual obligations are formed either directly or indirectly by this document. This document may not be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without our prior written permission.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.0615

Configuring Oracle SDN Virtual Network Services on Netra Modular System
September 2015, Version 1.0
Author: Savithri Venkatachalapathy