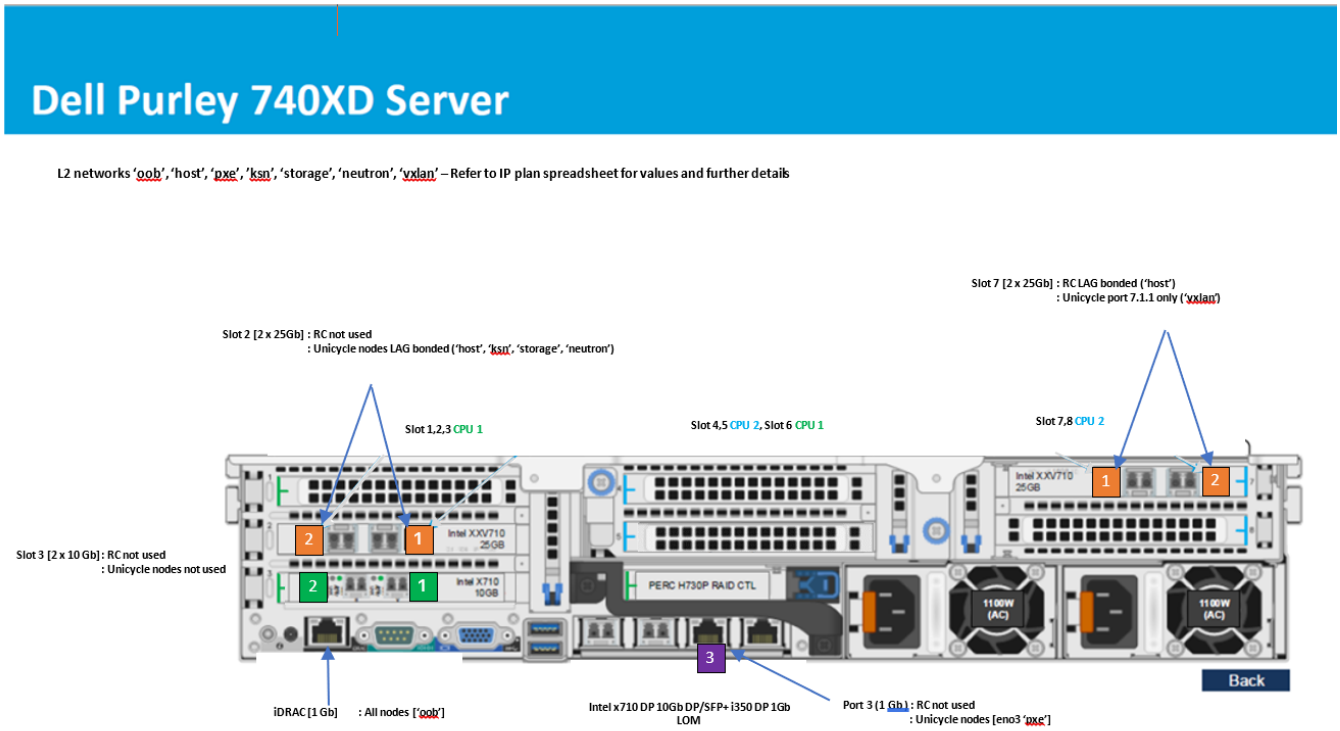
# Ericsson Unicycle OVS-DPDK Validation HW, Networking and IP plan



## Unicycle OVS-DPDK Validation Servers

Verification was based on a Build Server VM and four identical Dell 740XD servers for the Regional Controller and three Unicycle nodes.



## PowerEdge R740XD Server

### Components

| | |
|---|---|
| 1 | PowerEdge R740/R740XD Motherboard |
| 1 | Intel Xeon Gold 6152 2.1G, 22C/44T, 10.4GT/s , 30M Cache, Turbo, HT (140W) DDR4-2666 |
| 1 | iDRAC Group Manager, Enabled |
| 1 | iDRAC,Legacy Password |
| 1 | Chassis with Up to 24 x 2.5 Hard Drives for 2CPU, GPU Capable Configuration |
| 1 | Riser Config 6, 5 x8, 3 x16 slots |
| 1 | PowerEdge R740 Shipping Material |
| 1 | No Quick Sync |
| 1 | Performance Optimized |
| 1 | 2666MT/s RDIMMs |
| 12 | 32GB RDIMM 2666MT/s Dual Rank |
| 1 | Intel Xeon Gold 6152 2.1G, 22C/44T, 10.4GT/s , 30M Cache, Turbo, HT (140W) DDR4-2666 |
| 1 | iDRAC9,Enterprise |
| 4 | 480GB SSD SATA Read Intensive 6Gbps 512 2.5in Hot-plug AG Drive, 1 DWPD, 876 TBW |
| 6 | 2.4TB 10K RPM SAS 12Gbps 512e 2.5in Hot-plug Hard Drive |
| 1 | PERC H730P RAID Controller, 2GB NV Cache, Adapter, Low Profile |
| 2 | C13 to C14, PDU Style, 10 AMP, 6.5 Feet (2m), Power Cord |
| 1 | Dual, Hot-plug, Redundant Power Supply (1+1), 1100W |
| 1 | No Trusted Platform Module |
| 1 | Order Configuration Shipbox Label (Ship Date, Model, Processor Speed, HDD Size, RAM) |
| 1 | GPU Ready Configuration Cable Install Kit |
| 1 | PE R740XD Luggage Tag |
| 1 | Intel X710 Dual Port 10Gb Direct Attach, SFP+, Converged Network Adapter |
| 2 | Intel XXV710 Dual Port 25GbE SFP28 PCIe Adapter, Full Height |
| 1 | Intel X710 DP 10Gb DA/SFP+, + I350 DP 1Gb Ethernet, Network Daughter Card |
| 1 | HS Install Kit,GPU Config,No cable |
| 1 | ReadyRails Sliding Rails Without Cable Management Arm |
| 1 | Unconfigured RAID |
| 1 | OME Server Configuration Management |

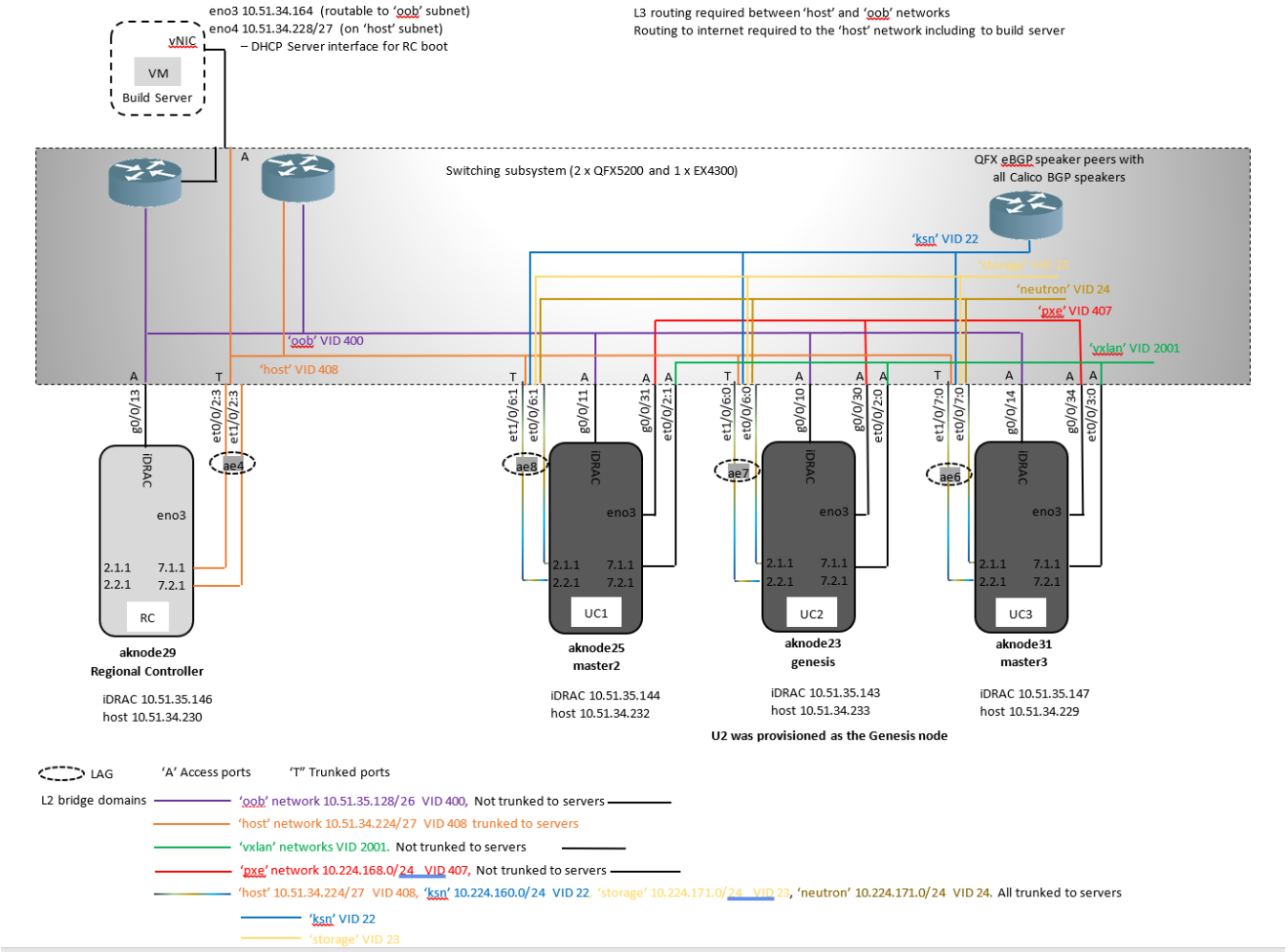
### Software

| | |
|---|---|
| 1 | 6 Performance Fans forR740/740XD |
| 1 | Performance BIOS Settings |
| 1 | No Operating System |
| 1 | No Systems Documentation, No OpenManage DVD Kit |

# Unicycle OVS-DPDK Validation Networking

The diagram below shows an example physical and L2 connectivity, the IP subnet plan, host and iDRAC addressing scheme similar to that used in the validation.

The Unicycle deployment does not configure the networking subsystem thus the choice of switch subsystem components is not restricted to those shown and they can be replaced with devices offering equivalent functionality.




# Unicycle OVS-DPDK Validation IP/VLAN Plan

Below is an example of a detailed network and IP address plan similar to that used during validation.

NOTE: LAG groups always created on 2 ports of the SAME NIC card on compute. LAG not split across NIC card slots.
2 x 100 NIC card not used
NOTE: *Build Server is only used to create the Regional Controller. Once the RC is built the build server has no further role in the deployment of the Rover or Unicycle pods and can be removed.
Note: ** The RC uses the LAG bonded interface on 7.1.1 and 7.2.1 to send Redfish API calls to the Rover and Unicycle nodes connected to the 'oob' network thus routing between the 'host' and 'oob' networks is required.

| Network name | Server | Network name | Compute HW | Present | NIC slot/port | Port rate | LAG | VID | Subnet | Host address | Network name | Note | Compute |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Build Server* | oob | (vm) | (vm) | vm vNIC | Any | No | native | Any | 10.51.34.164 | | Initially build server issues Redfish calls to setup RC. Subsequently RC issues Redfish commands to Rover and Unicycle nodes. Build server VM's eno3 interface assigned 10.51.34.164/27 and eno4 10.51.34.228/27 for DHCP server | Build Server |
| | Regional controller | oob | aknode29 | Yes | BMC | 1G | No | native | | 10.51.35.146 | | Switch port configured as access port bridged to VLAN 400 in switch network | Regional controller |
| 'oob' | Unicycle [master2] | oob | aknode25 | Yes | BMC | 1G | No | native | 10.51.35.128/27 | 10.51.35.144 | 'oob' | Switch port configured as access port bridged to VLAN 400 in switch network | Unicycle [master2] |
| | Unicycle [genesis] | oob | aknode23 | Yes | BMC | 1G | No | native | | 10.51.35.143 | | Switch port configured as access port bridged to VLAN 400 in switch network | Unicycle [genesis] |
| | Unicycle [master3] | oob | aknode31 | Yes | BMC | 1G | No | native | | 10.51.35.147 | | Switch port configured as access port bridged to VLAN 400 in switch network | Unicycle [master3] |
| Network name | Server | Network name | Compute HW | Present | NIC slot/port | Port rate | LAG | VID | Subnet | Host address | Network name | Note | Compute |
| | Build Server* | host | (vm) | Yes | (vm) | | No | native | | same L2 domain | | When Regional Controller iff first booted its DHCP Request is served by Build Server's DHCP server on eno4 | Build Server |
| | Regional controller | host | aknode29 | Yes | 7.1.1 & 7.2.1 | 2x25G | Yes | 408 | | 10.51.34.230 | | Rover/Unicycle1's [genesis node] DHCP Requests are served by Regional Controller's DHCP servers. The RC also uses this phy interface for iDRAC management of the Rover and Unicycle nodes | Regional controller |
| 'host' (maybe seen as 'oam') | Unicycle [master2] | host | aknode25 | Yes | 2.1.1 & 2.2.1 | 2x25G | Yes | 408 | 10.51.34.224/27 | 10.51.34.232 | 'host' (maybe seen as 'oam') | | Unicycle [master2] |
| | Unicycle [genesis] | host | aknode23 | Yes | 2.1.1 & 2.2.1 | 2x25G | Yes | 408 | | 10.51.34.233 | | The genesis node sends its initial DHCP Req via this interface to the RC | Unicycle [genesis] |
| | Unicycle [master3] | host | aknode31 | Yes | 2.1.1 & 2.2.1 | 2x25G | Yes | 408 | | 10.51.34.229 | | | Unicycle [master3] |
| Network name | Server | Network name | Compute HW | Present | NIC slot/port | Port rate | LAG | VID | Subnet | Host address | Network name | Note | Compute |
| | Regional controller | Network not present | NA | No | NA | NA | NA | NA | | | | No 'pxe' network on RC. RC node pxe boots over 'host' network from Build Server | Regional controller |
| 'pxe' | Unicycle [master2] | pxe | aknode25 | Yes | eno3 | first 1G port on integrated card | No | native | | 10.224.168.11 | | Unicycle [genesis] boots from RC over 'host' network over 'host' L2 network (over WAN). After setup Unicycle1 node support a MAAS server to boot other loca Unicycle nodes | Unicycle [master2] |
| | Unicycle [genesis] | pxe | aknode23 | Yes | eno3 | first 1G port on integrated card | No | native | 10.224.168.0/24 | 10.224.168.12 | 'pxe' | Unicycle [master2] boots from local MAAS server on Unicycle1 node over 'pxe' L2 physical site local network | Unicycle [genesis] |
| | Unicycle [master3] | pxe | aknode31 | Yes | eno3 | first 1G port on integrated card | No | native | | 10.224.168.13 | | Unicycle [master3] boots from local MAAS server on Unicycle1 node over 'pxe' L2 physical site local network | Unicycle [master3] |
| Network name | Server | Network name | Compute HW | Present | NIC slot/port | Port rate | LAG | VID | Subnet | Host address | Network name | Note | Compute |
| | | Regional controller | Network not present | NA | No | NA | NA | NA | NA | | | | Regional controller |
| 'ksn' (maybe seen as 'calico') | Unicycle [master2] | ksn | aknode25 | Yes | 2.1.1 & 2.2.1 | 2x25G | Yes | 22 | | 10.224.160.134 | 'ksn' (maybe seen as 'calico') | Calico is used as the k8s CNI | Unicycle [master2] |
| | Unicycle [genesis] | ksn | aknode23 | Yes | 2.1.1 & 2.2.1 | 2x25G | Yes | 22 | 10.224.160.0/24 | 10.224.160.135 | | Calico's BGP pod peering is to the TOR router based on eBGP peering | Unicycle [genesis] |
| | Unicycle [master3] | ksn | aknode31 | Yes | 2.1.1 & 2.2.1 | 2x25G | Yes | 22 | | 10.224.160.136 | | TOR router requires dynamic BGP peering configuration to accept each calico BGP speaker's BGP peering request. | Unicycle [master3] |
| Network name | Server | Network name | Compute HW | Present | NIC slot/port | Port rate | LAG | VID | Subnet | Host address | Network name | Note | Compute |
| | Regional controller | Network not present | NA | No | NA | NA | NA | NA | | | | | Regional controller |
| 'storage' | Unicycle [master2] | storage | aknode25 | Yes | 2.1.1 & 2.2.1 | 2x25G | Yes | 23 | | 10.224.174.11 | 'storage' | | Unicycle [master2] |
| | Unicycle [genesis] | storage | aknode23 | Yes | 2.1.1 & 2.2.1 | 2x25G | Yes | 23 | 10.224.174.0/24 | 10.224.174.12 | | This is the OpenStack storage network | Unicycle [genesis] |
| | Unicycle [master3] | storage | aknode31 | Yes | 2.1.1 & 2.2.1 | 2x25G | Yes | 23 | | 10.224.174.13 | | | Unicycle [master3] |
| Network name | Server | Network name | Compute HW | Present | NIC slot/port | Port rate | LAG | VID | Subnet | Host address | Network name | Note | Compute |
| | Regional controller | Network not present | NA | No | NA | NA | NA | NA | | | | | Regional controller |
| 'neutron' (maybe seen as 'overlay') | Unicycle [master2] | neutron | aknode25 | Yes | 2.1.1 & 2.2.1 | 2x25G | Yes | 24 | | 10.224.171.11 | 'neutron' (maybe seen as 'overlay') | | Unicycle [master2] |
| | Unicycle [genesis] | neutron | aknode23 | Yes | 2.1.1 & 2.2.1 | 2x25G | Yes | 24 | 10.224.171.0/24 | 10.224.171.12 | | This is the OpenStack neutron network | Unicycle [genesis] |
| | Unicycle [master3] | neutron | aknode31 | Yes | 2.1.1 & 2.2.1 | 2x25G | Yes | 24 | | 10.224.171.13 | | | Unicycle [master3] |
| Network name | Server | Network name | Compute HW | Present | NIC slot/port | Port rate | LAG | VID | Subnet | Host address | Network name | Note | Compute |
| | Regional controller | Network not present | NA | No | NA | NA | NA | NA | | | | | Regional controller |
| 'vxlan' | Unicycle [master2] | datapath [ovs-dpdk] | aknode25 | Yes | 7.1.1 | 1x25G | No | 2001 | | 10.224.169.11 | 'vxlan' | If OVS-DPDK Unicycle BP is deployed these three lines apply. Initially LAG will not be implemented but will be subsequently such that the same switch config can be used for Unicycle SR-IOV and OVS-DPDK BPs | Unicycle [master2] |
| | Unicycle [genesis] | datapath [ovs-dpdk] | aknode23 | Yes | 7.1.1 | 1x25G | No | 2001 | 10.224.169.0/24 | 10.224.169.12 | | Neutron networks will be based on VXLAN encapsulation | Unicycle [genesis] |
| | Unicycle [master3] | datapath [ovs-dpdk] | aknode31 | Yes | 7.1.1 | 1x25G | No | 2001 | | 10.224.169.13 | | Initially tenant VMs are deployed on the master/genesis nodes. | Unicycle [master3] |

# Unicycle OVS-DPDK BGP Plan

The three unicycle nodes automatically peer with an external fabric BGP speaker using eBGP. The calico nodes do not peer using an internal iBGP mesh. Below is and example similar to that used in the validation.

| BGP | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **ASN** | **IP adddress/subnet** | **Start IP** | **End IP** | | | |
| Calico ('k8s' network) | 65531 | 10.224.160.0/24 | 10.224.160.134 | 10.224.160.254 | | | |
| external router (maybe QFX or other HW/SW router TBD) | 65001 | 10.224.160.129 | NA | NA | | | Any priavte ASN other than the Calico ASN can be used.<br>The external router must be on the same L2 domain as the 'ksn' network but can be a physical router or a SW based router<br>Dynamic BGP peering to the Calico subnet must be configured on the external peer router to accept BGP peering requests from any k8s Calico BGP speaker<br>The external BGP router must be setup to advertise routes to BGP speakers of the same ASN that they are receievd from. |

In addition to the eBGP approach, limited validation was also performed using a full iBGP mesh between calico nodes without the need for an external BGP router. To change the deployment to BGP peer in this manner follow the notes shown in the example yaml file Example Configuration Input File - Unicycle Pods with OVS-DPDK Dataplane on Dell 740XD Servers.

# Unicycle OVS-DPDK LAG Details

The RC and Unicycle genesis nodes boot via VLAN tagged '*host*' interface which is pre-provisioned on the QFX switches with LAG bonding. Since booting occurs before the linux kernel can bring up its LAC-P signalling the QFX switches must be configured to pass traffic on their primary (first) link before the LAG bundle is up.

Note the Unicycle [master2] and unicycle [master3] nodes do not boot over the '*host*' network but rather over the edge site '*pxe*' network which is a single link to each unicycle server and thus not lag bonded.

| LAG | | | |
|---|---|---|---|
| LAG config on QFX5200 | FORCE UP | DHCP and http pxe boot occurs over interfaces configured for LAG on JPR switches | |