Ultra M Overview

Ultra M is a pre-packaged and validated virtualized mobile packet core solution designed to simplify the deployment of virtual network functions (VNFs).

The solution combines the Cisco Ultra Service Platform (USP) architecture, Cisco Validated OpenStack infrastructure, and Cisco networking and computing hardware platforms into a fully integrated and scalable stack. As such, Ultra M provides the tools to instantiate and provide basic lifecycle management for VNF components on a complete OpenStack virtual infrastructure manager.

VNF Support

In this release, Ultra M supports the Ultra Gateway Platform (UGP) VNF.

The UGP currently provides virtualized instances of the various 3G and 4G mobile packet core (MPC) gateways that enable mobile operators to offer enhanced mobile data services to their subscribers. The UGP addresses the scaling and redundancy limitations of VPC-SI (Single Instance) by extending the StarOS boundaries beyond a single VM. UGP allows multiple VMs to act as a single StarOS instance with shared interfaces, shared service addresses, load balancing, redundancy, and a single point of management.

Ultra M Model(s)

The Ultra M Extra Small (XS) model is currently available. It is based on OpenStack 10 and implements a Hyper-Converged architecture that combines the Ceph Storage and Compute node. The converged node is referred to as an OSD compute node.

This model includes 6 Active Service Functions (SFs) per VNF and is supported in deployments from 1 to 4 VNFs.

Functional Components

As described in Hardware Specifications, the Ultra M solution consists of multiple hardware components including multiple servers that function as controller, compute, and storage nodes. The various functional components that comprise the Ultra M are deployed on this hardware:

- **OpenStack Controller**: Serves as the Virtual Infrastructure Manager (VIM).

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  > **Important**   In this release, all VNFs in a multi-VNF Ultra M are deployed as a single "site" leveraging a single VIM.

- **Ultra Automation Services (UAS)**: A suite of tools provided to simplify the deployment process:

  - **AutoIT**: Automates the VIM Orchestrator and VIM installation processes and provides storage and management for system ISOs.

  - **AutoDeploy**: Initiates the deployment of the VNFM and VNF components through a single deployment script.

  - **AutoVNF**: Initiated by AutoDeploy, AutoVNF is directly responsible for deploying the VNFM and VNF components based on inputs received from AutoDeploy.

  - **Ultra Web Service (UWS)**: The Ultra Web Service (UWS) provides a web-based graphical user interface (GUI) and a set of functional modules that enable users to manage and interact with the USP VNF.

- **Cisco Elastic Services Controller (ESC)**: Serves as the Virtual Network Function Manager (VNFM).

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  > **Important**   ESC is the only VNFM supported in this release.

- **VNF Components**: USP-based VNFs are comprised of multiple components providing different functions:

  - **Ultra Element Manager (UEM)**: Serves as the Element Management System (EMS, also known as the VNF-EM); it manages all of the major components of the USP-based VNF architecture.

  - **Control Function (CF)**: A central sub-system of the UGP VNF, the CF works with the UEM to perform lifecycle events and monitoring for the UGP VNF.

  - **Service Function (SF)**: Provides service context (user I/O ports), handles protocol signaling, session processing tasks, and flow control (demux).

Figure 1: Ultra M Components
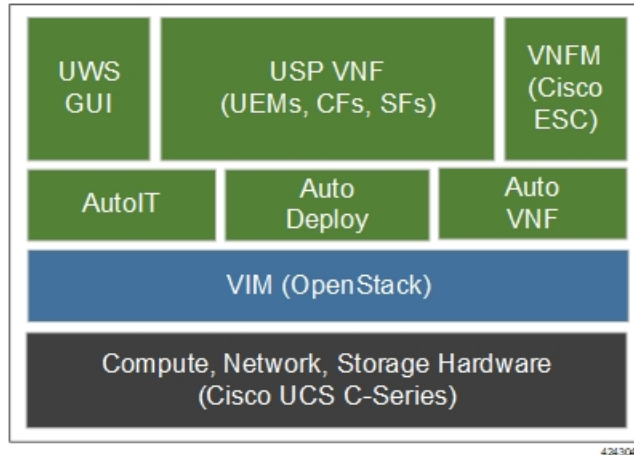
Virtual Machine Allocations

Each of the Ultra M functional components are deployed on one or more virtual machines (VMs) based on their redundancy requirements as identified in Table 1: Function VM Requirements per Ultra M Model, on page 3. Some of these component VMs are deployed on a single compute node as described in VM Deployment per Node Type. All deployment models use three OpenStack controllers to provide VIM layer redundancy and upgradability.

Table 1: Function VM Requirements per Ultra M Model

	Hyper-Converged	
Function(s)	**XS Single VNF**	**XS Multi VNF**
OSP-D*	1	1
AutoIT**	2	2
AutoDeploy**	2	2
AutoVNF	2	2
ESC (VNFM)	2	2 per NSD
UEM***	3	3 per VNF
CF	2	2 per VNF
SF	8	8 per VNF
* OSP-D is deployed as a VM for Hyper-Converged Ultra M models.		
** AutoIT and AutoDeploy each require 2 VMs when deployed in HA mode (recommeded).		

VM Resource Requirements

The CF, SF, UEM, and ESC VMs require the resource allocations identified in Table 2: VM Resource Allocation, on page 4. The host resources are included in these numbers.

Table 2: VM Resource Allocation

Virtual Machine	vCPU	RAM (GB)	Root Disk (GB)
OSP-D*	16	32	200
AutoIT**	2	8	80
AutoDeploy**	2	8	80
AutoVNF	2	4	40
ESC	2	4	40
UEM	2	4	40
CF	8	16	6
SF	24	96	4

Note   4 vCPUs, 2 GB RAM, and 54 GB root disks are reserved for host reservation.

* OSP-D is deployed as a VM for Hyper-Converged Ultra M models. Though the recommended root disk size is 200GB, additional space can be allocated if available.

** AutoIT is used to deploy the VIM Orchestrator (Undercloud) and VIM (Overcloud) for Hyper-Converged Ultra M models. AutoIT, AutoDeploy, and OSP-D are installed as VMs on the same physical server in this scenario.