



The Importance of DDI within SDDC Ecosystem

For provisioning IP resources at scale across complex hybrid cloud environments, enabling instant, error-free, mass rollout of new services and apps, an efficient IPAM/DNS solution becomes a compulsory foundation.

Outline:

Software Defined Data Centers

DDI at the core of the provisioning process

DDI Orchestration within SDDC

The important role of DHCP and DNS

Your competitive edge for SDDC deployments

This document aims at describing EfficientIP's vision regarding the role that a DDI (DNS-DHCP-IPAM) solution will play in the implementation of Software Defined Data Centers (SDDCs). We will firstly recall the common understanding of SDDC, then discuss the reasons that put IPAM at the very core of the provisioning process and describe how it brings value to the deployment workflow. Finally we will consider how it interacts with every component of the complex, interdependent SDDC ecosystem.

Software Defined Data Centers

The concept of SDDC was born from the success of workload virtualization in the context of IT industrialization. The idea behind SDDC is to push further the current effort to automate and simplify IT deployments. It's a concept that brings together several different flavors of the virtualization of the entire IT infrastructure such as :

- Software Based Workload
 - Virtual Machines (VM)
 - Containers and their orchestrator (e.g. Kubernetes)
 - Network Functions Virtualization (NFV)
- Software Defined Network (SDN)
- Software Defined Storage (SDS)

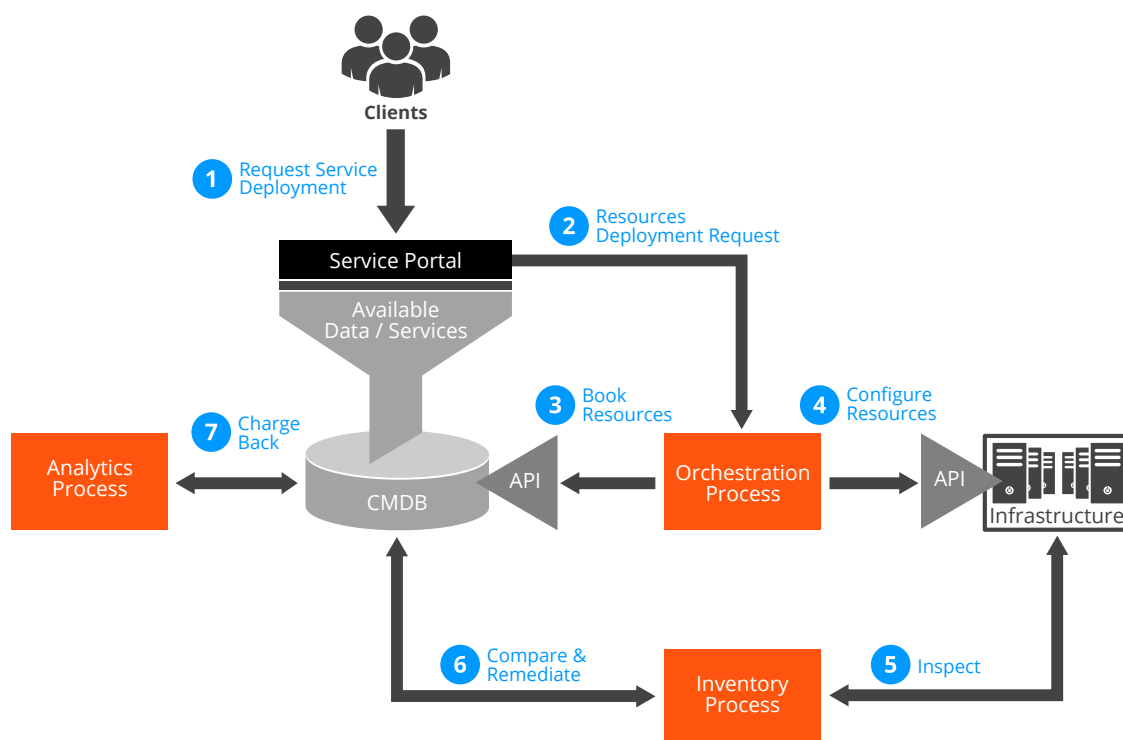
The main idea behind all this software based everything trend is simple: since workload virtualization has greatly improved server deployment agility, it's expected that relying on software based infrastructure components will bring the same level of agility to any service deployment workflow.

What is to be noticed is that beyond virtualization, the main challenges are all about orchestrating and automating the IT operational processes while lowering the operational costs, reducing the human workforce, ensuring policy enforcement, eliminating errors and, eventually, reducing the TCO using cheaper, standardized hardware.

In every way, the IP network remains the glue that keeps the whole thing together, ensuring secured connectivity between every component of the SDDC/Cloud infrastructure and, on top of that, allowing users to reach the deployed services. This makes DDI a pre-requisite to any successful SDDC/Cloud (public, private or hybrid) implementation.

DDI at the core of the provisioning process

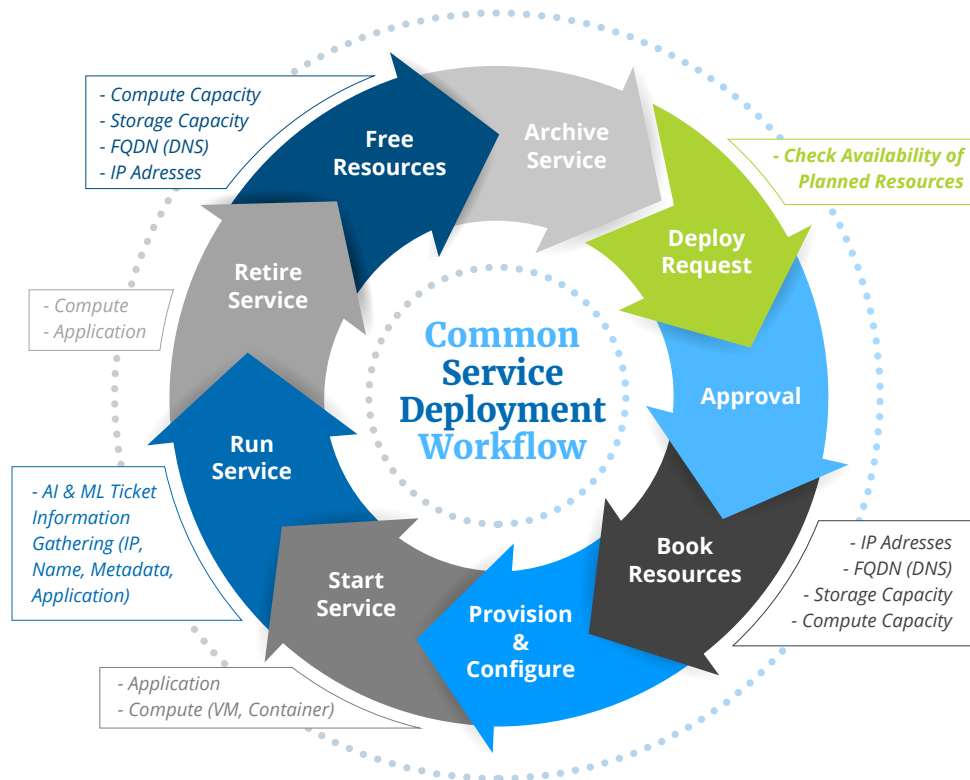
Managing an infrastructure that scales requires strong processes wisely orchestrated. These automates ensure proper configuration of the infrastructure, policies enforcement and the correct synchronization of the various repositories such as the infamous CMDB (Configuration Management Database) of which an IPAM is a primary component. This allows to maintain accurate knowledge of both an infrastructure's current and expected states, which become a requirement for efficient resource management and correct charge back.



Generic Orchestration Model

From this abstract orchestration model, it's important to note that most of the infrastructure's components rely on the network to behave correctly, and so on the IP addressing plan, for proper deployment. Therefore, the IP address management process has to be considered as critical within the lifecycle of most of these components and should occur at the early stage of any orchestrated workflow :

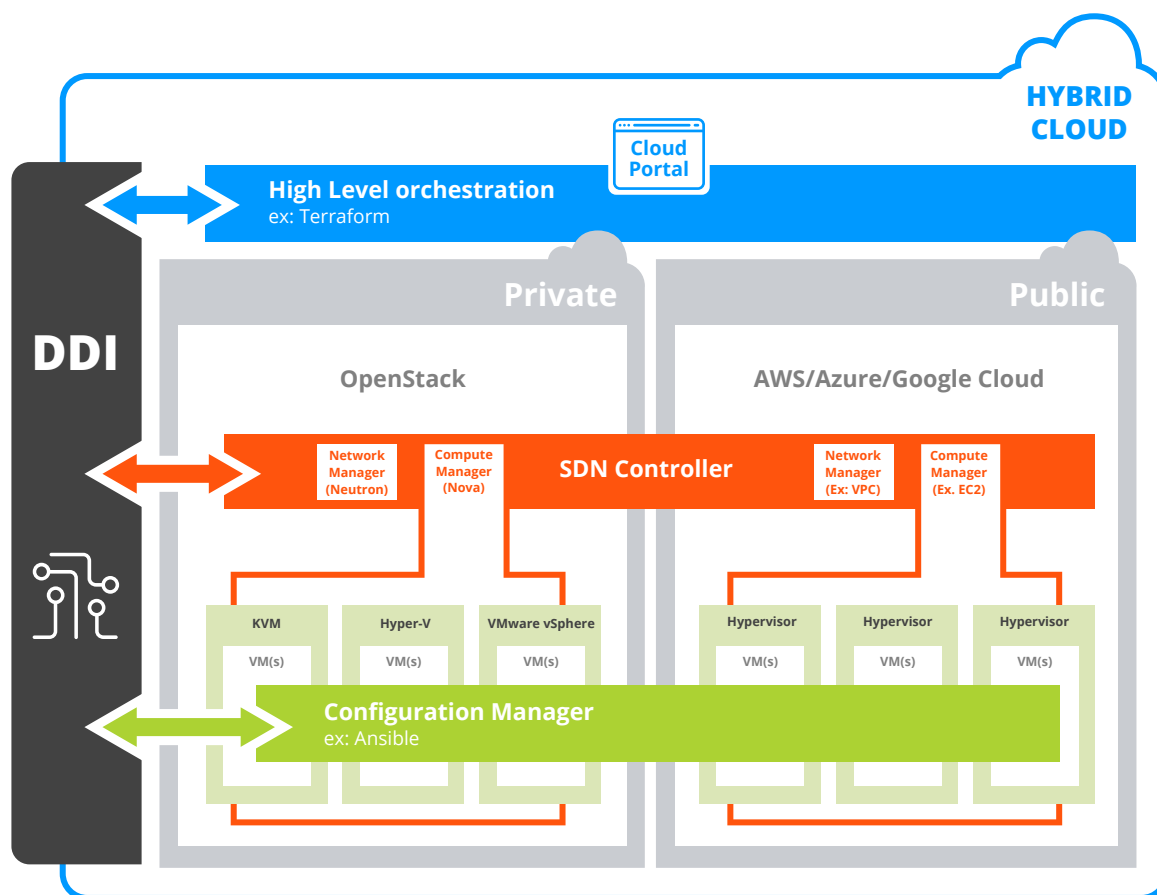
DDI offers complete integration of the IP management process through the IPAM's unique API. Related DHCP and DNS configuration is managed through internal, purpose built, sub-orchestrations that can be configured in the GUI thanks to the IPAM's metadata.



DDI Orchestration within SDDC

To efficiently handle orchestration and automation in cloud environments, DDI solutions need to be able to easily integrate to any schema, combining API's with any of the below tools:

- Top market orchestrators (plugins and API)
 - BMC Helix Control-M
 - Cisco - CloudCenter
 - Microsoft - System Center
 - VMware vRealize & vCloud
 - Red Hat - CloudForms
 - OpenStack - Neutron
 - Cloudify
 - Morpheus
 - CloudBolt
 - HashiCorp Terraform & Scalr
 - Ericsson Orchestrator
- Common configuration management/enforcement tools (API)
 - Progress Chef
 - Puppet & Bolt
 - Redhat Ansible
 - VMware Saltstack
- Custom orchestration workflow developed internally (API)



External Centralized IPAM/DDI: The foundation for efficient hybrid cloud platform deployment

Leveraging high level orchestration integration, you are provided with a centralized and resilient solution to drive the various controllers that are part of the SDDC infrastructure: compute, network and security controllers.

Orchestrating IT services in multi-tenant environments is made easier with DDI - and when it comes to managing such complex environments across hybrid cloud and multicloud providers, DDI simply becomes the compulsory foundation. Through a unique IP management process, part of the overall orchestration workflow, a DDI solution allows the provisioning of IP resources (IP address(es), IP subnet(s), vlan(s), vxlan(s), etc.) on demand, in the appropriate tenant environment, optimizing the fragmentation of the address space while ensuring the accessibility of the applications.

In addition, it avoids having to develop advanced orchestration schemas. Embedded DDI sub-orchestration processes are easily tunable through GUI, permitting the configuration of custom object's behavior using templates, inheritance and internal triggers allowing for the enforcement of various policies. For instance, each tenant might expect different naming conventions and DHCP properties. The inner complexity of driving multi-vendor/multi-tenant DNS-DHCP environments is therefore hidden. The product takes care of registering the necessary static DHCP reservations while creating the appropriate DNS and reverse DNS records allowing users to reach the service.

Integrating an external centralized DDI into orchestration schemas brings global visibility of IP resources and greater traceability of the IT platform's activity, thus enhancing considerably the efficiency and control of the network provisioning process. At the same time, the DDI solution comes with inventory capabilities, offering the ability to easily compare which resources have been provisioned against the real resource usage within the infrastructure. This permits rapid detection of inconsistencies, conflicts and unreleased resources.

The important role of DHCP and DNS

SDDC environments are quite complex as they are composed of several layers. The lowest one is the physical infrastructure that provides all mutualized essential services of the SDDC such as the compute capacity, the storage, the physical network connectivity and all related core network services such as NTP, DHCP and DNS. On top of this physical infrastructure layer, each tenant benefits from its own virtual infrastructure layer where it deploys its own services. In this overall schema, DDI is essential at every layer.

At the lowest SDDC layer

The physical SDDC layer is the supporting one for all upper ones, being composed of hypervisor farms, storage pods, networking devices constituting an IP backbone and, possibly, mutualized high value devices such as firewalls and load balancers. DDI is an important part of this layer for various reasons, including:

- Industrializing and scaling this layer require an efficient IP management process
- All the components of this layer leverage DHCP and DNS to operate:
 - Hypervisors may rely on DHCP to boot using PXE or simply to get their IP configuration
 - Hypervisors need DNS to reach other services required at boot time, such as NTP, NFS accesses or maybe to reach storage pods using iSCSI
 - The components of this layer are likely to be named in a private DNS zone for smooth administration
- DNS and DHCP services deployed at this layer are likely to be mutualized to the upper layers and should offer strong support for multi-tenancy and IP address plan overlapping between these tenants

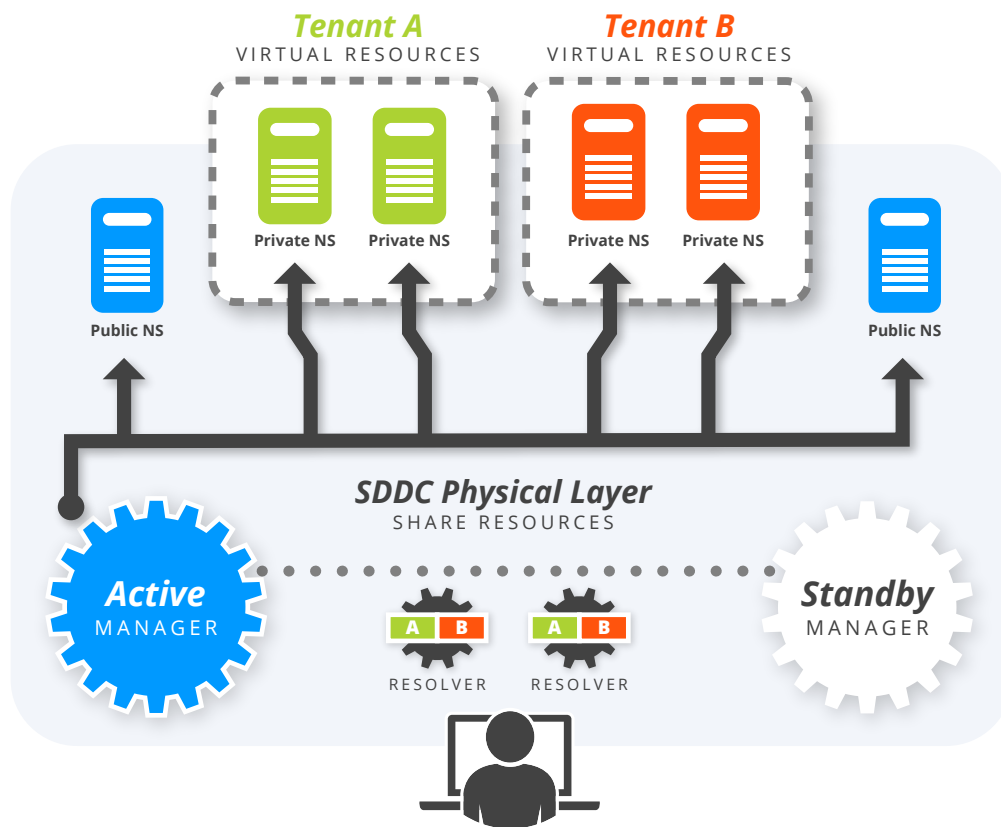
Due to SDDC's fundamental dependency on DNS and DHCP services, we strongly advise the implementation of independent environments to ensure the performance and availability of mutualised DDI services.

DDI as part of SDDC services - including multi-tenant

IPAM, DHCP and DNS are core services that are also required within the provisioned tenant service layers. Each tenant should be able to deploy any subnet according to its own address plan, implementing its own policies while leveraging DHCP and DNS services for service deployment. As a result, the IP management section of the orchestration will be able to deal with multi-tenancy when interacting with a mutualized IPAM solution. At the same time, this IPAM (one component of a DDI solution), must be capable of driving multi-tenant DNS/DHCP services, providing:

- Authoritative DNS - for both public and private zones
- Recursive DNS - embedding security mechanisms for ensuring service availability
- DNS protection - preventing data exfiltration from the client's environment

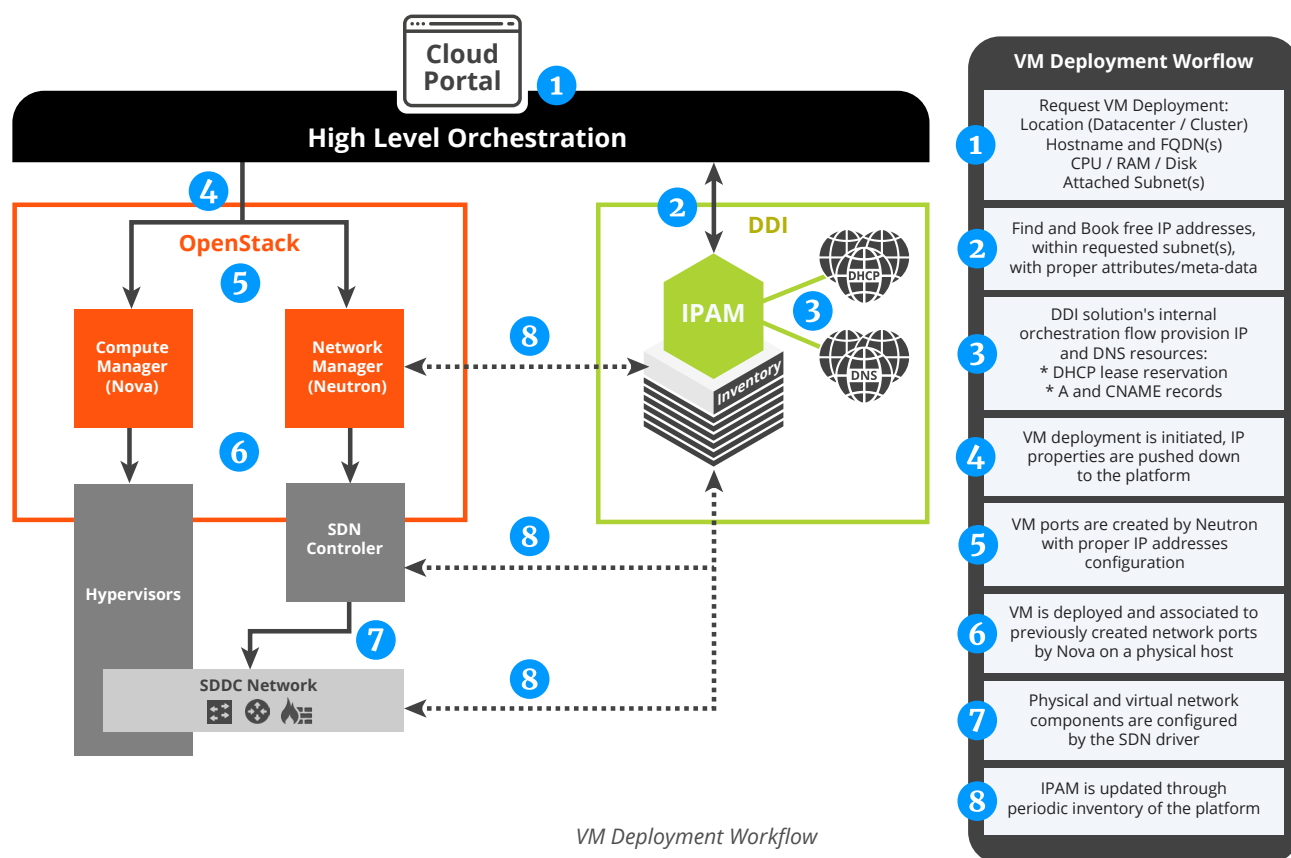
With an IPAM-centric DDI solution, managing these services is achieved through a central mutualized IPAM responsible for orchestrating each tenant's DHCP and DNS services configuration.



SDDC Layers: Physical Layer & Tenant Layer

What about SDN ?

SDN is about automating network resource management. The SDN controller does not necessarily interact directly with the IPAM nor with the DNS and DHCP engines that are controlled by the DDI solution. The SDN controller aims at deploying the IP resources reserved in the IPAM, according to their referenced properties such as a tagged security level. As an example, consider a subnet dedicated to a highly confidential application and associated VXLAN within the infrastructure (hypervisors, switches, routers, load-balancers, firewalls, etc.). In this context the SDN controller can act on behalf of either a high level orchestration tool or a private cloud network controller such as the Neutron plugin of OpenStack. In both cases, the DDI solution is not initiating the overall provisioning workflow nor the network configuration. The DDI solution integrates to the SDN ecosystem through a plugin or API to focus on specialized IP management sub-orchestration controlling the IP address allocation, the DHCP and the DNS services.



By keeping track of all IP and network changes in its repository, the IPAM is the IP Source of Truth associated with the data centers and Software Defined Networking. All other IT tools can rely on this centralized source to perform their own configurations and orchestrations.

Your competitive edge for SDDC deployments

There's little doubt that the fast-growing trend of moving towards cloud and SDDC deployments is bringing many benefits to companies of all sizes. However, realizing the full potential of enhancements regarding workflow efficiency, cost savings and secured connectivity is largely dependent on having an innovative, flexible DDI solution in place. In the same vein as a house being only as strong as its foundations, DDI should be considered as the foundation of any IP-based network. This becomes even more relevant for efficient deployment of VMs across hybrid cloud and multicloud infrastructures.

EfficientIP is well aware of the challenges of orchestration in industrialized cloud environments. With its powerful API, SOLIDserver™ DDI is able to easily integrate to top market orchestrators, bringing automated, error-free provisioning of IP resources and rapid deployment of new services. This will go a long way towards providing the competitive edge your business deserves.



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As one of the world's fastest growing DDI vendors, EfficientIP helps organizations drive business efficiency through agile, secure and reliable network infrastructures. Our unified management framework for DNS-DHCP-IPAM (DDI) and network configurations ensures end-to-end visibility, consistency control and advanced automation. Additionally, our unique 360° DNS security solution protects data confidentiality and application access from anywhere at any time. Companies rely on us to help control the risks and reduce the complexity of challenges they face with modern key IT initiatives such as cloud applications, virtualization, and mobility. Institutions across a variety of industries and government sectors worldwide rely on our offerings to assure business continuity, reduce operating costs and increase the management efficiency of their network and security teams.

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