IPAM for Enterprise Environment

Introducing FusionLayer NameSurfer

White Paper by FusionLayer,Inc.

October 2018

IPAM for Enterprise Environment – Introducing FusionLayer NameSurfer

by FusionLayer, October 2018

Any comments relating to the material contained in this document may be submitted to:

        FusionLayer, Inc.
        Keilaranta 1, FI-02150
        Espoo, Finland.

or by email to:

        info@fusionlayer.com

IPAM for ENTERPRISE ENVIRONMENT

1. Introduction

The average number of IP addresses per user is growing rapidly in enterprise networks. This trend is expected to accelerate further due to increased popularity of IP-based mobile devices, the introduction of IPv6 and extensive use of virtualized computing environments. While networks are becoming more dynamic and difficult to manage manually by the day, most organizations still continue to rely on static Excel spreadsheets as the primary tool facilitating their IP Address Management (IPAM) process.

A typical justification for using spreadsheet for IPAM is that it is free. However, from the Operating Expense (OPEX) perspective, nothing could be further from the truth.

A typical justification for using spreadsheets for IPAM is that it is free. However, from the Operating Expense (OPEX) perspective, nothing could be further from the truth. As IPAM spreadsheets are updated manually, the chances are that they are not in synch with the production network environment; making the daily Excel exercises a waste of both time and money. This inefficient practice also results in prolonged lead-times when assigning IP addresses and names to new devices, virtual machines and other pieces of equipment entering the network. To eliminate these inefficiencies, organizations should view IPAM solutions as productivity tools offering tangible Return on Investment (ROI).

Shortcomings of Using Excel Spreadsheets for IPAM
- Based on manual updates of IP data
- Prone to human error leading to discrepancies
- Cumbersome when managing large amounts of data
- Lack of access restrictions causing privacy, security and usability concerns
- Difficult to distribute across sites and teams
- No integration between DNS and DHCP services
- No information about dynamically issued DHCP leases
- No visibility into production network
- Inability to automate IPAM processes
- No validation of entered data

Organizations should view IPAM solutions as productivity tools offering tangible Return on Investment (ROI).

When assessing the ROI of productized IPAM solutions, finance and IT departments often struggle with accurate estimates of the existing operating expense, overheads and opportunity costs. During these economically uncertain times, some technical specialists may also have a vested interest in maintaining the status quo for job security reasons, leading to underestimates of the associated workload and complete disregard for the business continuity risks associated with the manual management process only they can handle. This is problematic from the organizational perspective, because it leads to productivity losses in terms of higher operating expense and business continuity threats.

IPAM for ENTERPRISE ENVIRONMENT

To address these issues, we recommend that organizations perform an objective analysis of their existing IPAM workflow and associated cost.

Manual IPAM process does come at a cost that is usually much higher than most enterprises estimate.

Have you calculated the cost of your IPAM?
- How long does it take for your team to add a static host to DNS?
- How about adding hosts to your DHCP with fixed IP addresses or using MAC authentication?
- How long does it take to find out which IP addresses your DHCP server has assigned from dynamic range at any one time?
- After making changes to DNS and DHCP, how long does it take to make related changes to your spreadsheets?
- Before you added the IP to the network:
  - How long did it take to find the free IP address?
  - How long did it take to find the correct subnets/blocks or bitmasks?
  - Did you confirm that the information was correct?
  - Did you confirm that there were no double IP entries? How long did that take?
- If something went wrong and your experienced network problems as a result, how will that impact your operations and what would be the cost?
- When you need to find a specific client in your network:
  - How long does it take to find their physical location?
  - How can you be sure that the information is up to date?
  - Do you really know which clients are connected to your network at any given time?
- Once you start experimenting with IPv6, how will you cope with the complex syntax of IPv6 addresses

---

*By supporting **multi-vendor environments** and adhering the **open networking standards**, FusionLayer NameSurfer is the IPAM solution of choice for any enterprise.*

2. Overview of Nixu NameSurfer® Suite

FusionLayer NameSurfer is a virtualization-ready IPAM solution that integrates DNS, DHCP and IPAM (DDI) processes into a unified management overlay. Not only does it support multi-vendor environments, including Microsoft AD networks, but it also adheres to open networking standards. This makes FusionLayerNameSurferthe IPAM management overlay of choice for enterprises running mixed networks with Microsoft AD and ISC-based DNS and DHCP services.

FusionLayer NameSurfer reduces the workload associated with DDI management by automating and simplifying the related routines and processes. Its intuitive, web-based user-interface and newly designed global toolset facilitate quick, simple and reliable DDI management. Thanks to streamlined management processes, it allows organizations to decrease the DDI and IPAM Operating Expenses (OPEX), leading to a Return on Investment (ROI) that is typically more than 100%.

As depicted in Figure 1, FusionLayer NameSurferallows organizations to consolidate their DNS, DHCP and administrative IP address information into

IPAM for ENTERPRISE ENVIRONMENT

Figure 1:
FusionLayer NameSurfer as the centralized IPAM overlay in enterprise network.
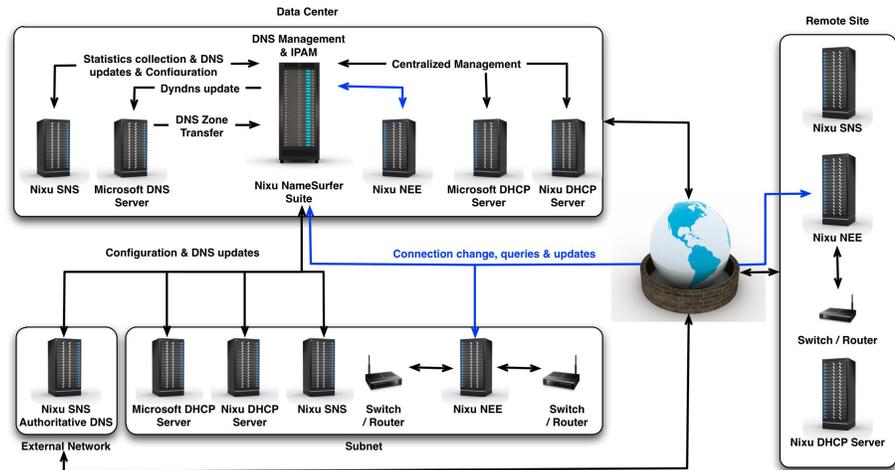
a unified management overlay. It provides a centralized point of access for managing the entire network without built-in limitations in the number of integrated servers or administrators. As also shown in this figure, FusionLayer NameSurfer supports multi-vendor environments, awarding enterprises with the freedom to maintain and centrally manage mixed environments without having to forklift existing networks.

2.1 Business Benefits

In addition to slashing the Operating Expense, FusionLayer NameSurfer also solves several other problems associated with traditional IPAM and DDI approaches, making network managers' life easier. Listed below are some of the most important business benefits of FusionLayer NameSurfer.

Simplified Management

With its powerful collection of tools and automations that streamline the IPAM process, FusionLayer NameSurfer simplifies DDI management. These tools include the following features:

- Automated synchronization of live DNS, DHCP and IPAM data

- Automated DNS management in IPv4 and IPv6 networks

- Automated DNSSEC signing with key roll-overs

- Centralized management of networks and subnetworks, supporting DHCP server bindings, dynamic range configuration and one-click Add Host functionality for static and dynamic clients

- A dashboard that can be used to perform global searches and view favourite domains, networks, and performance of integrated DNS and DHCP servers at a single glance

Business Benefits:

1. Simplified management

2. Improved quality of service

3. Business continuity

4. AAA

5. Increased security

6. Outstanding scalability

7. Automated maintenance

3

IPAM for ENTERPRISE ENVIRONMENT

- Seamless integration with DNS and/or DHCP servers such as FusionLayer DNS and /DHCP, Microsoft DNS and DHCP, BIND, NSD, Nominum ANS and Vantio and Secure64 DNS.

- Possibility to perform bulk data changes

- Ability to monitor pool allocation levels and DNS/DHCP service levels centrally

Improved Quality of Service

FusionLayer NameSurfer helps organizations in analysing and enhancing the quality of DNS and DHCP services through functionalities such as:

- Automated data and syntax validation prior to execution

- Advanced set of warnings before making server configuration changes

- Centralized real-time monitoring of the status and performance of integrated DNS and DHCP servers

- Monitoring allocation levels of dynamic IP address pools and

- A Service-guard monitoring the performance of the IPAM overlay

Business Continuity

To ensure that the IPAM management overlay is always up and running, FusionLayer NameSurfer supports two highly available deployment strategies:

- When deployed as a virtual machine (VM), FusionLayer NameSurfer supports the tools that allow the VM to be migrated inside the virtual computing environment for continued service.

- When deployed on native x86-based hardware, FusionLayer NameSurfer supports deployment as highly available, hot-standby replicated server pair. In the event that the active server fails, the hot-standby replica is automatically appointed as the new active server.

- FusionLayer NameSurfer also supports timed online back-ups of its embedded PostgreSQL database, allowing the restoration of a new identical server instances in less than 15 minutes.

AAA (Authentication, Authorization & Accounting)

In order to meet various security and compliance requirements, FusionLayer NameSurferprovides:

- **User Access Control:** granular control over individual user accounts and their access rights to specific IP address areas, tasks and modules

- **Audit Trails**: transaction logs of changes to the DNS environment, with simple undo/redo capabilities.

- **Centralized Authentication:** allows users to be authenticated centrally with the possibility to lock individual accounts if need be. Also external

IPAM for ENTERPRISE ENVIRONMENT

authentication sources via LDAP and/or integration with various Single Sign-On (SSO) systems are supported.

Increased Security

FusionLayer NameSurfer provides high level of information security by ensuring that all interactions between the IPAM management overlay and integrated servers, as well as users, are appropriately secured using technologies such as SSL, SSH, SCP, TSIG and API keys. Furthermore, the hidden primary architecture and the embedded SQL backend used in Nixu NameSurfer guarantees that the data managed with the system is only available to users and integrated servers that have been authorized to access the system.

Outstanding Scalability

FusionLayer NameSurferhas no built-in restrictions in terms of scalability, the number of concurrent administrators or integrated DNS and DHCP servers. The more computing resources are allocated to it, the better it performs, scaling up to millions of IP addresses and up to hundreds of administrators.

## Automated DDI Maintenance

By running FusionLayerDNS and FusionLayerDHCP Server products alongside the FusionLayer NameSurfer IPAM overlay, an organization can rest assured that their DNS and DHCP server instances are up to date and always patched up automatically without service downtime.

*FusionLayer NameSurfer has **no restrictions** in terms of **scalability,** concurrent **administrators** or the **number of integrated DNS and DHCP servers**.*

Figure 2: The modular architecture of FusionLayer NameSurfer accommodating numerous versatile deployment scenarios.
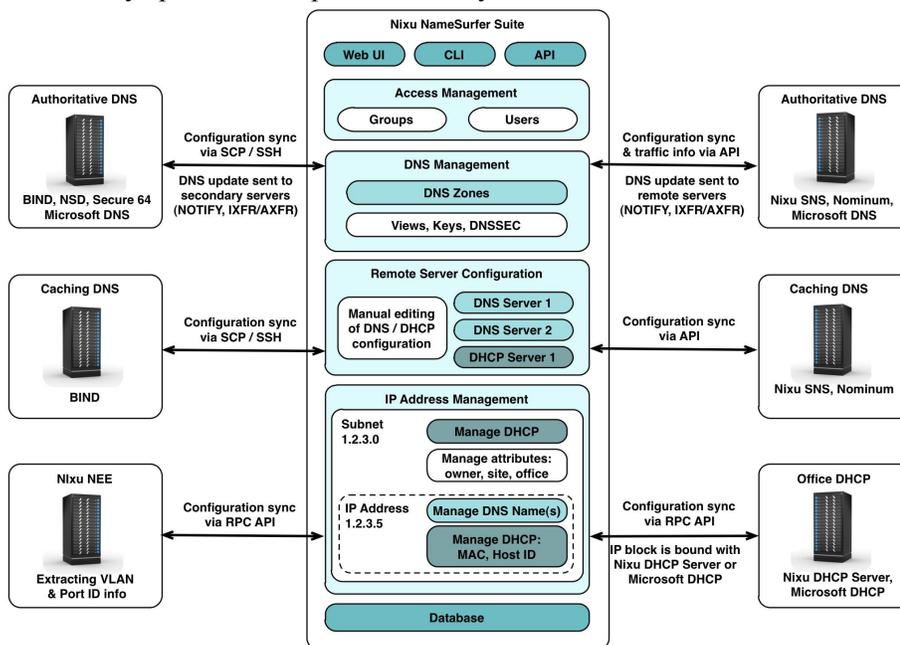
IPAM for Enterprise Environment

Figure 3: Screenshot of the dashboard with its set of convenient management tools.
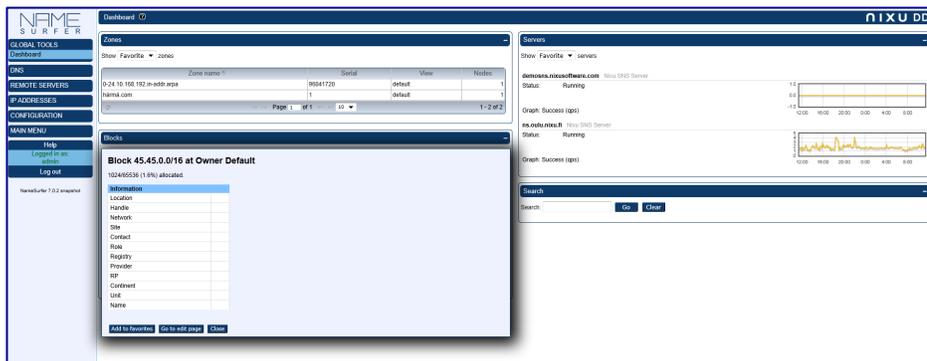
The dashboard provides a unified screen that network admiistrators can use to view all essential aspects of their DNS, DHCP and IPAM enviornment.

2.2 Architecture Description

FusionLayer NameSurfer has a modular architecture accommodating versatile deployment scenarios as depicted in Figure 2. This section briefly describes each module and the tasks they are designed to perform.

Global Toolset

The Global Toolset, introduced in FusionLayer NameSurfer7 Series, provides a dashboard (Figure 3) where users can define their favourite domains, zones and networks allowing simple access to their content. It also includes a centralized monitoring utility for integrated DNS and DHCP server instances. The dashboard also has a global search tool that allows a given user to instantly search for any data that she/he has access to

IP Address Management (IPAM)

FusionLayer NameSurfer Suite's IPAM module is used for the management of networks and IP addresses, replacing the commonly used spreadsheets. All DNS and DHCP data managed inside the IPAM module is automatically synchronized with the production server. The IPAM module

- Supports customer-configurable information fields and properties that can be used to store administrative information
- Facilitates centralized configuration of dynamic IP address ranges and bindings with integrated DHCP servers
- Comes with an IP sweep tool that can be used to locate clients in the network
- Includes search, bitmask and IP calculators along with a number of graphics on utilisation rate of IP address space and
- Numerous other tools that simplify related management processes.

IPAM for ENTERPRISE ENVIRONMENT

DNS Management

FusionLayer NameSurfer Suite's DNS module has been designed to automate the DNS management processes, including DNSSEC support and automated key rollovers. Thanks to integration with the IPAM module, all hosts in DNS are automatically populated to the corresponding networks in IPAM. Furthermore, users can easily configure default zones for the networks from the IPAM module, allowing them to harness the power of automated DNS management.

Remote Server Management

The Remote Server module included in FusionLayer NameSurfer is used to integrate, manage and monitor the status and performance of the remote integrated DNS and DHCP servers. The Remote Servers module supports FusionLayer DNS and FusionLayer DHCP servers, Nominum, Secure64, Microsoft DNS and DHCP Servers, as well as BIND and DHCPD based servers.

User Management

To facilitate management delegations, FusionLayer NameSurfer's User Management module allows administrators to create individual user profiles and assign them to one or more groups. Access rights for groups can be controlled granularly, including access to specific networks, tasks and modules. Users are authenticated locally or centrally via LDAP, and individual accounts can be locked with a single click.

API and CLI

FusionLayer NameSurfer comes with XML-RPC-based API and CLI that can be used to access DNS, IPAM and User Management modules in the system for the purpose of integrating it with external systems. The API supports role-based access privileges to restrict the access of API clients, and a key generation facility that allows all authentication between API clients and the system.

SQL Back-end Database

FusionLayer NameSurfer uses an embedded SQL-99 compliant database (PostgreSQL) used to store all data. FusionLayer NameSurfer documentation includes full table descriptions of the backend.

High Availability Model

Two instances of FusionLayer NameSurfer can be deployed as a highly available, hot-standby replicated server pair. In the event that the active server fails, the hot-standby replica is automatically appointed as the new active server. While, users are always automatically forwarded to the active server, an embedded watchdog constantly monitors the status of the two

servers. The hot-standby server pair is typically deployed behind a single virtual IP address, making the architecture transparent to external systems.

2.3 Design and Security Principles

Strict security measures have been adopted in the design and development of FusionLayer NameSurfer includings principles of

1. Defence in Depth

2. Least Privilege

3. Default Deny

Similar to other FusionLayer DDI products, FusionLayer NameSurfer has been designed based on the following security principles:

- Encrypted connections

- In-host firewall (can be switched off)

- IPS system (can be switched off)

- ACLs for enabled services

- Secure configurations for active services

- User authentication through web user interface

- Log files of Web-UI activity

- Hardened Operating System

- Use of perimeter network firewall where possible

Principle of Least Privilege

- By default, no service run as root

- Multiple level user accounts for Web-UI and shell access

- Only necessary permissions granted to users

Principle of Default Deny

- All but explicitly allowed connections are blocked by firewall

- Explicit permission required for shell access for

- Disable all but necessary services

- Access disabled by default and needs to be explicitly added

About FusionLayer

FusionLayer, Inc. is Headquartered in Helsinki, Finland, and with regional offices in Europe, Americas and Asia Pacific, our mission is to offer the best value for money within the DNS and IP addressing industry. The execution of our mission is based on our virtualization-ready DNS, DHCP and IPAM solutions and software appliances that set the benchmark for combined security, ease of use and low cost of ownership.

FusionLayer's products have an installed based of roughly 6,000 installations worldwide. Our technology is used by nearly one third of all 4G mobile operators as well as by dozens of Fortune 500 companies that deem available, reliable and efficiently managed network as a strategic asset.