WHITEPAPER

Infoblox NIOS™ Software
Powering Nonstop Network Services
Overview

Infoblox solves a growing, critical problem in enterprise networking: keeping core network services infrastructure—the protocols and services that store and deliver information about users, devices, and policies for all IP applications—running nonstop. Core network services (like DNS, DNSSEC, DHCP, IPAM, etc.) are the foundation of all IP-based applications, including new security initiatives, pervasive mobile networking, convergence applications like VoIP, and growing compliance reporting requirements.

Infoblox NIOS™ software is at the heart of Infoblox solutions. Deployed on Infoblox’s high-performance core network services appliances, this software overcomes the service delivery problems and management deficiencies of current solutions. Today’s core network services tend to reside on vulnerable, general-purpose operating systems and servers managed by disparate entities throughout an organization, making services difficult to update, manage, and secure both at the local level and system-wide. This situation is now reaching a crisis point, due in part to the following trends:

- An explosion in the number and diversity of network users, devices, and policies;
- An increasing number of network attacks specifically targeting the network services infrastructure, such as DNS cache poisoning;
- The deployment of real-time IP applications, such as voice over IP (VoIP), which cannot tolerate delays in data updates;
- New regulations, such as Sarbanes-Oxley, which require more integrated core network services to enable the creation of audit trails and more sophisticated reporting;

Infoblox solutions provide the essential platform for delivering reliable, scalable, and secure core network services including DNS, DNSSEC, DHCP, and IPAM.

A FLEXIBLE, MODULAR TECHNOLOGY ARCHITECTURE

Infoblox NIOS software is the security-hardened system software that comes bundled with all Infoblox core network services appliances. It provides all core services and also provides an integrating framework for all other components of the modular Infoblox solution. Specifically, the Infoblox NIOS platform architecture delivers service and application modules (such as DNS and DHCP); provides a Grid module which allows distributed enterprises to link collections of appliances into unified Infoblox grids; offers an API for the extension of capabilities; and contains core technologies that make Infoblox solutions possible.

INFOBLOX NIOS MODULES AND SOFTWARE PACKAGES

Infoblox NIOS software is delivered in modules to allow customers the flexibility to purchase and deploy only the core network services they need today and also allow customers to upgrade to additional services in the future. The modules available today include DNS, DNSSEC, DHCP, IPAM, TFTP, NTP, and Grid. These modules are combined into software packages to provide bundled functionality and solutions. The Keystone upgrade adds Grid functionality to existing systems.
INFOBLOX NIOS CORE TECHNOLOGIES

Infoblox NIOS core technologies form the foundation of every Infoblox network services appliance. Infoblox NIOS software contains a security-hardened operating system that exposes no extraneous open ports, no general user log-in, no unneeded OS services, and no root access. This makes the OS very difficult to penetrate by hackers, particularly compared with general-purpose operating systems containing known, exploitable vulnerabilities. In addition, the software modules (such as DNS and DHCP) are kept up-to-date and, therefore, free of vulnerabilities. The easy, one-button software upgrades supported by the Infoblox NIOS platform encourage administrators to apply software updates and keep Infoblox customers immune to attacks.

bloxHA™ and bloxSYNC™ Technologies Deliver High Availability

Infoblox NIOS software supports local high availability (HA) both at the device and database levels via bloxHA device failover and bloxSYNC database synchronization. For failover between appliances, the bloxHA engine uses industry-standard Virtual Router Redundancy Protocol (VRRP). Two appliances are connected into an HA pair. They share a virtual IP address, with one appliance designated as active and the other as the standby, and continually synchronize changes to configuration and state. Should the active fail or be taken offline for maintenance or upgrade, the standby assumes the virtual IP address and simply continues responding to requests for network services information with no interruption.

All packages are available on all Infoblox appliances.

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Figure 1: bloxHA™ and bloxSYNC™ technologies deliver device and data failover.
The active device in an HA pair sends periodic VRRP advertisements via the HA port to the standby, which listens for them but remains in a passive state unless it fails to receive an advertisement for a period of three seconds. Once that three-second threshold has been reached with no VRRP advertisement received, the standby takes over.

The bloxSYNC engine ensures that the database of host names, IP addresses, zones, leases, etc. are also continually synchronized between the active device and the standby. As a result, when the backup unit assumes operation it does so with no loss of data or network state.

**bloxSDB™ Database Integrates Data Views**

A key foundational component of Infoblox NIOS software is the purpose-built bloxSDB database. The built-in, zero-admin database allows for true collaboration among independent data stores, such as directory services and distributed enforcement points. Such integration is crucial for delivering current and next-generation core network services that will increasingly require coordination among authentication, addressing, naming, and policy information.

bloxSDB technology allows the key components required for collaboration to be shared while resolving any conflicts that exists between disparate views. Its unique semantic architecture allows performance-driven data layouts to coexist with rich management abstractions without compromising data integrity and transactional consistency. As a result, protocol engines requiring high-performance data access (such as DNS, DHCP, and DNSSEC) and the management tools requiring rich data abstraction (such as IP address management) can, for the first time, use a common database technology. Doing so enables enterprises to meet the challenging mix of requirements for data performance, usability, distribution, and integrity required for modern networks.

By contrast, conventional network services database technologies require each application to duplicate functionality, reducing the performance of each application and increasing the complexity of application development.
GRID MODULE: THE FOUNDATION FOR INFOBLOX GRID DEPLOYMENT

The revolutionary Grid module is an optional software component that can be enabled in an Infoblox network services appliance to allow the appliance to join an Infoblox Grid, which unifies distributed appliances into a single, consolidated system. This lets companies distribute services while retaining centralized management, ensuring the accuracy and integrity of data, and delivering nonstop services.

The bloxSDB databases in an Infoblox Grid are networked together, enabling system-wide synchronization of all data objects, including IP addresses, host names, devices addresses, firmware images, etc. Changes to the data that occur on any appliance are reflected across the Grid, securely, in real time and with full transactional integrity. This prevents data loss, eliminates possible inconsistencies and errors, and ensures that usage reports, address assignments, and network access decisions are based on accurate data. Because they do not require a separate, external database for device configurations and reporting data, Infoblox Grids provide inherent reliability advantages, data integrity, faster and easier disaster recovery, and are easier to manage compared with legacy or second-generation appliance approaches.

Figure 3: The grid module links distributed appliances into Infoblox grids.
Summary

Conventional core network services infrastructure provides disconnected islands of data and services, which can be costly to manage, jeopardize security, and hinder an enterprise's ability to support advanced applications and meet emerging regulatory compliance requirements. They are also not designed to deliver the nonstop availability, data integrity, and real-time information required by emerging mobile computing and VoIP applications, which demand that changes to a user’s IP address and access rights are available immediately and continuously.

The Infoblox appliance-based approach to core network services management is powered by fundamental software components that deliver high availability, real-time data updates, and centralized management to meet these emerging requirements.

Infoblox NIOS software, including its modules and core technologies, are the foundation of Infoblox appliance-based solutions and enable the first core network services solution to combine the power of nonstop appliance-based local service delivery with the benefits of consolidated management and control via its patented Infoblox grid architecture.

The Infoblox NIOS platform also includes a powerful object-oriented API that eases data migration from legacy environments and enables customers to provide custom front-ends and interfaces to legacy applications.

The optional Grid module extends Infoblox solution capabilities enterprise-wide, across geographically distributed appliances into consolidated Grids. A cohesively managed and synchronized set of core network services is quickly becoming a fundamental criterion for large and growing distributed enterprises as IP networks grow larger and more dynamic in nature.
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