WHITEPAPER

# Private DNS - A Next-Generation DNS for Digital Transformation.

NS1.

# Executive Summary

Since the dawn of the digital age in the 1960's, the impact of "creative destruction" on large enterprises has accelerated as new competitors replace companies that fail to adapt. In 1965 the average tenure of companies in the Fortune 500 was 33 years. Today it is under 20 years and is forecasted to decline to 14 years by 2026.[1] It is also a fact that most business and IT modernization initiatives are unsuccessful. As reported in FierceCIO, overall success rates vary from 24% to 39%.[2] These issues are not unrelated. Maintaining competitive edge requires not only vision and strategy, it also requires the ability to execute. Again, from FierceCIO regarding modernization failures: "It's about the utter lack of infrastructure readiness, and the impact on a company's ability to execute successfully on even its best ideas."

DNS is a crucial element of the infrastructure. On the internet it plays a vital role in connecting enterprise customers, suppliers and partners to online services. On the intranet, behind the firewall, DNS plays an equally crucial role. The backend systems that support internet facing online services as well as all internal business processes are dependent on an intranet DNS service that is 100% available, performant and adaptive.

The incumbent DNS platforms used in enterprise networks were not designed to meet the needs of modern infrastructure and application delivery. More recently, point solutions for DNS services in cloud environments have emerged to address specific use cases, but the result of having disparate DNS systems adds complexity when the need is for greater efficiency. Enterprises need to maintain legacy environments as they modernize. A unified DNS solution that supports a diverse infrastructure is needed.

NS1 is well known as a DNS innovator. It's modern DNS platform powers one of the most widely used DNS services on the internet, supporting more than twice the domains of Oracle/Dyn and ten times more domains than UltraDNS/Neustar. This carrier grade DNS platform is now available for self-hosted deployments in enterprise intranets, virtual private clouds and on the DMZ. Enterprises now can deploy a unified DNS solution that improves application delivery, performance and reliability while simplifying and streamlining Infrastructure and Operations.

## DNS Has to Move Faster

As enterprises change application delivery methodology from traditional waterfall processes to DevOps, the supporting systems need to keep pace, including the processes for introducing required updates to DNS. A new application service or update is of no use if the DNS is not ready to direct users to it. Traditional waterfall processes operate at a timescale of weeks. Manual, ticketing process for making the required DNS changes worked fine in the past because the deployment system it supported operated at a similar cadence. With new application architectures and cloud infrastructure, DevOps processes are driving automated deployments that take place in seconds (see Figure 1 and ref 3). As a result, DNS needs to move much faster, supporting automated software driven updates that have compressed deployment timescales from weeks to seconds.

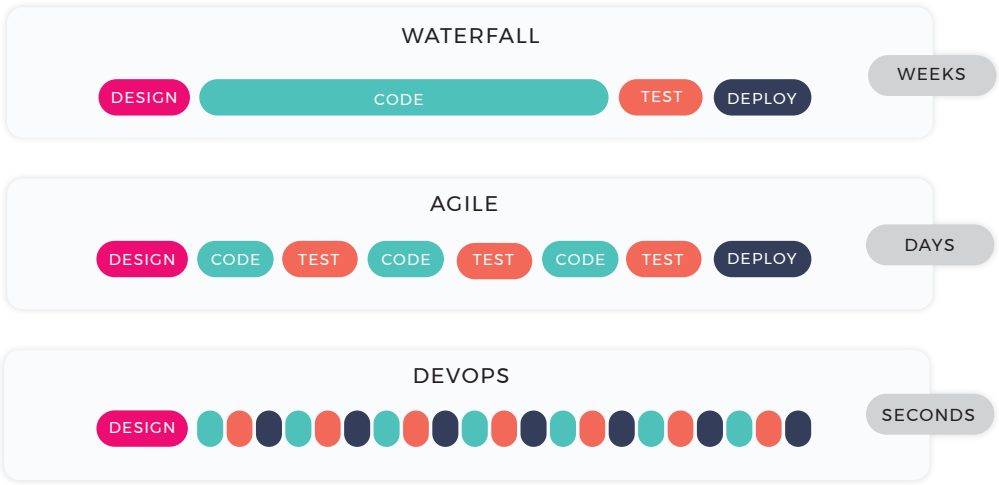


Figure 1: DevOps and Cloud Technology have accelerated deployments

## DNS Needs to Adapt

Enterprise infrastructure has grown more complex over time. Traditional infrastructures typically comprise a headquarters and data center connected to branch offices in hub and spoke configuration. DNS services primarily support device discovery (such as network printers) and employee access to applications and intranet websites.

Modern infrastructures often comprise this traditional model but also includes cloud data centers and VPCs running on 3rd party infrastructure such as AWS, Google, and Azure. Software deployments may be supported by Github, and data base services may be hosted in Amazon S3.

Traditional DNS solutions such as Microsoft DNS, self hosted BIND servers and DNS appliances are often ill-suited to support this extended infrastructure. They lack the API's and integrations that enable native support for elastic, cloud services. As a result, enterprises can find themselves maintaining several different DNS solutions to accommodate the needs of hybrid and diverse infrastructure.

## DNS Service Discovery

Cloud native applications and containerization have literally enabled an order of magnitude reduction in the time needed to instantiate new or updated services and the time needed to respond to changing demand. DNS is emerging as the protocol of choice to support service discovery in these environments, on the strength of its proven robustness, ubiquity and versatility.

There is no shortage of cloud DNS solutions – the cloud providers each have their own offering and there are several cloud native DNS software projects such as SkyDNS, Consol, MesosDNS and KubeDNS. The vendor solutions are point solutions for their own clouds. The open source projects are often experimental in nature, have uncertain roadmaps and lack mission critical support. They also can place a significant maintenance burden on IT teams. What has been lacking is a cloud native, full featured DNS solution that supports multiple cloud environments.

## Traffic Management

DNS traffic management in support of public, internet facing online services is now a basic "table stakes" attribute of managed DNS services. Most DNS services support basic geo routing (leverage DNS to send users to the closest data center). Over the past 5 years, the hyper sensitivity of end users to application performance has become well known, leading to increased adoption of advanced DNS traffic management techniques. These include more effective and accurate georouting, performance based DNS traffic routing, global load balancing and multi-cloud, multi-CDN traffic management.

As enterprises move internal applications and back-end processes into distributed cloud services, the need for those same DNS based traffic management capabilities that improve application performance on the internet is emerging on the intranet.  These advanced capabilities are simply not available from the traditional DNS appliances or self-hosted DNS software such as BIND or PowerDNS.

## Scaling and Performance

DNS scaling is more than a question of zones, records and queries per second. Those are important, but in a highly dynamic infrastructure the scale and performance limitations of traditional platforms are evident in their ability to process DNS updates (the number of API calls/minute) and the speed at which changes are propagated to DNS serving nodes across the infrastructure. These metrics are becoming more important because a failure to keep pace creates bottlenecks in application and service delivery. Traditional DNS platforms typically perform poorly from the API rate perspective because they do not have API first architectures. The API's are not native to the platforms. Instead, they typically they connect via CLI or other command middleware resulting in slow performance. In terms of propagation performance, the traditional systems rely on standard, RFC DNS protocols to propagate changes, using AXFR or IXFR transfer protocols over a master – secondary DNS architecture. This approach was adequate 20 years ago when DNS updates were largely manual. But today, it fails to keep pace with the scale and speed of modern enterprise application delivery.

## DevOps

A core attribute of DevOps is the creation of small, application centric teams that have end to end responsibility for development, test and deployment. This replaces the old ticketing processes where application owners would submit change requests to infrastructure teams to implement the required changes (e.g. stand-up new servers, establish network connectivity, update firewall rules, update DNS). The ability of DevOps teams to take end to end ownership is dependent on the ability to use software defined processes to implement the changes that at one time required specialized device administration. One of the main bottleneck is DevOps is manual processes.[4] To integrate DNS into a DevOps process, the DNS platform needs to support the following:

- Permissioned access at the zone level, under key based API control
- Comprehensive API support with high speed processing
- Security controls, such as public/private key based access, restricted access based on source IP and comprehensive logging.
- Native integrations with infrastructure as code tools and orchestration systems.

# NS1's Private DNS – A Modern DNS Platform for the Modern Enterprise

In 2013, NS1 introduced Managed DNS – a global, independent cloud based DNS service for internet facing online services. This was highly unusual in the industry because there had not been any significant new offerings of a managed DNS service in several years. The incumbent providers appeared well entrenched. However, in a short span of time this service grew to become the DNS of choice for many of the most recognized brands on the internet, including companies such as Yelp, Salesforce, LinkedIn, Pandora and Squarespace. Today, the NS1 DNS platform supports millions of domains - more than Oracle/Dyn, Neustar and Akamai combined.

The reason NS1's service has become so widely used is based on several attributes – some of which are shared by other providers but more importantly, several others which NS1 uniquely offers. They are:

- Scale, performance and reliability.
- API first platform
- Advanced DNS traffic management
- Infrastructure and cloud agnostic
- DevOps integrated
- Fast propagation of DNS updates

These same platform attributes are exactly what is needed within enterprise networks. As a result, NS1 has adapted its core DNS platform for self-hosted deployment within enterprise intranets. Private DNS is a cloud native, container ready DNS platform that enterprises can deploy across a diverse and distributed environment. It uses the same carrier grade DNS software that powers the most demanding online services on the internet today, giving enterprises the assurance of a proven and trusted platform that delivers the world's most advanced DNS capabilities.

## PRIVATE DNS AT A GLANCE

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|---|---|
| **Containerized, cloud native** | Easy to deploy, modular software |
| **Unified solution** | One DNS platform HQ, branch and cloud |
| **Integrated and automated** | API first architecture, DevOps ready |
| **Data driven, advanced DNS traffic management** | Improves application performance and availability |
| **Scale and performance** | Carrier grade platform supports millions of zones, records. DNS changes propagate in seconds |
| **Multi-cloud, multi-vendor** | GSLB, DR and application migration support across hybrid infrastructure |
| **Zone and Record level reporting** | Gain insights into application usage and traffic patterns |

## Conclusion – DNS is a Tool for Modernization

DNS fills a critical role in the delivery of online services. Infrastructure and Operations teams are well aware that if DNS goes down, then online services go down as well. However, the view that DNS is a simply a service that has to be available is short sighted. DNS can do much more. DNS is the first decision point in the process of establishing an online connection. As application architectures become more distributed, an advanced DNS can make that first decision a much more intelligent one. It can be a data driven decision improves application availability and performance. A DNS platform designed for a modern application delivery infrastructure can smooth the path to infrastructure modernization and improve the returns on modernization investments.

## References:


[1] Why Half the S&P 500 Companies will be replaced over the next decade https://www.inc.com/ilan-mochari/innosight-sp-500-new-companies.html

[2] Reducing Legacy Modernization Projects Failures https://www.gizmoxts.com/item/72-reducing-legacy-modernization-projects-failures

[3] The Making of a Cloud Native Application Platform - Sam Ramji Keynote, OSCON 2015

[4] 11 Common DevOps Bottlenecks, Forbes https://www.forbes.com/sites/mikekavis/2014/12/18/11-common-devops-bottlenecks/#662725117737


### ABOUT NS1

NS1 is the leader in next generation DNS solutions that orchestrate the delivery of the world's most critical internet and enterprise applications. Only NS1's purpose-built platform, which is built on a modern API-first architecture, transforms DNS into an intelligent, efficient and automated system, driving dramatic gains in reliability, resiliency, security and performance of application delivery infrastructure. Many of the highest-trafficked sites and largest global enterprises trust NS1, including Salesforce, LinkedIn, Dropbox, Nielsen, Squarespace, Pandora and The Guardian.