netboxlabs

Unlocking NetDevOps with NetBox

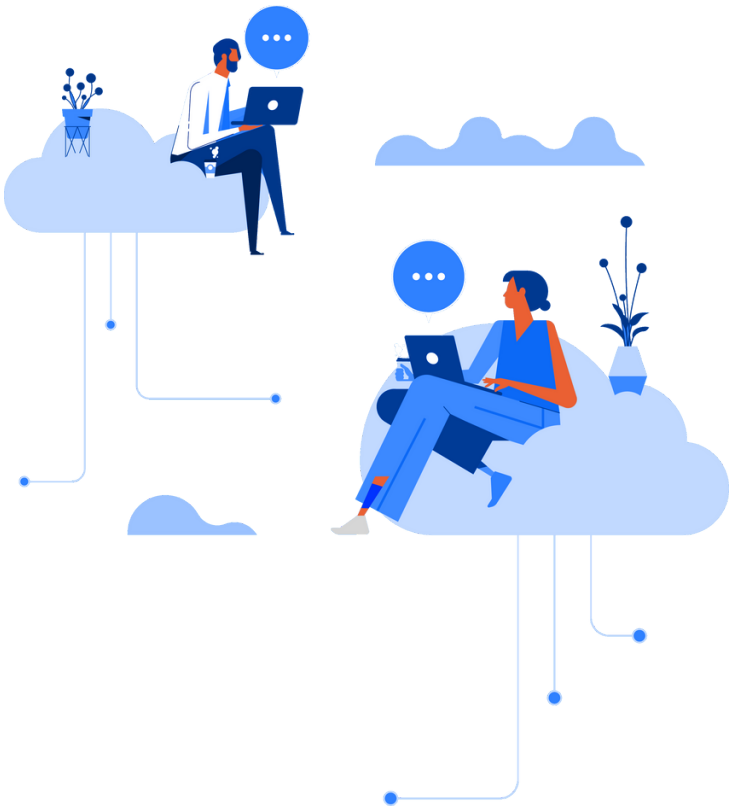
How Network Teams Are Learning from Their DevOps Colleagues

Up to now, the concept of network automation has been reserved for only the most forward-looking technology teams. That is beginning to change.

We've all heard of DevOps - the set of methods and practices that allow development and operations teams to work together harmoniously. But the idea that these fast-moving DevOps processes would apply to the conservative, static world of networking? Not so much.

Now, the ubiquity of hybrid, multi-cloud deployments and the growing importance of the network edge is bringing the idea of NetDevOps into the mainstream. As networks become more dynamic, they're also becoming more complex. Managing that complexity requires a new approach to how networks are run, as well as a new generation of tools to bring that approach to life.

NetDevOps bridges the gap between agile development principles and the world of network management. Just as DevOps brought software development teams and their colleagues in operations into line with each other, NetDevOps promises to do the same for networking teams and their colleagues. As networking teams are driven towards shorter change cycles, they need a network that is flexible enough to support constantly changing demands. That requires network teams to adopt a similar short-cycle release strategy for network capabilities.



Most network teams are being dragged into the world of NetDevOps.

The technology stack they've built up over the years was designed to deliver consistent results, not support the whims of a particular moment in time. Safety and control were prioritized over speed and adaptability, and that was fine as long as the demands on networks remained consistent. Hybrid, multi-cloud deployments and edge computing broke the control-oriented systems which served network teams well for years. The persistent demand for new services coupled with an explosive increase in network traffic pushed the old technology stack to the brink of failure.

After years of trying to adapt existing systems, forward looking network teams are now going "all in" on automation to cope with the rapid pace of change. Gartner estimates less than 35% of network activities are automated today, but the pace of adoption is increasing dramatically. The reality of NetDevOps demands it.

Most network tools aren't designed for the world of NetDevOps.

They prioritize safety over speed. They tend to add more layers of process and control to help mitigate human error, but in doing so they introduce additional delay and complicate workflows. Over time, these tools turn network teams into monitors and enforcers of rules instead of the drivers of change.

Building the Framework for NetDevOps

Automation and monitoring are key enablers of NetDevOps.

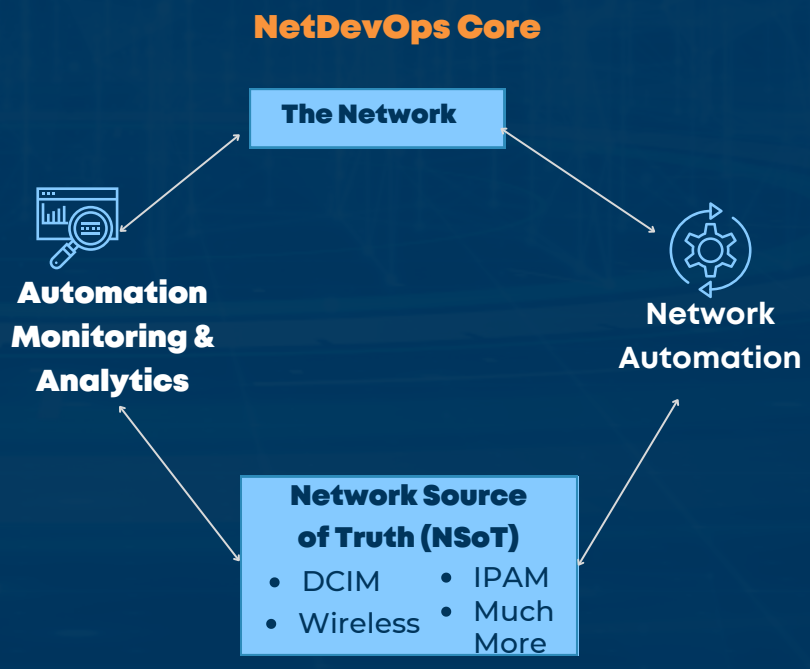
If network teams used to be in the business of delivering consistent business outcomes, they're increasingly in the business of delivering consistent operational frameworks. Responsibility for outcomes has largely shifted to agile development teams. The network team's role is being abstracted into the automation and monitoring frameworks which make the work of agile development possible.

Here's the challenge: Effective automation and monitoring systems don't simply appear out of thin air. They're actually the end result of a long process of NetDevOps adoption. It's that adoption process that's so painful for network teams. The need to strip away all the process layers that have built up over the years, the need to rethink architectures to support new requirements - these things take time if they're to be done correctly.

This is where network teams tend to throw up their hands. Where to start? It seems like a ton of up front effort, with so many interlocking pieces to consider.With all the dependencies involved, the knee jerk reaction from network engineers accustomed to control-oriented systems is usually to simply not move on anything.

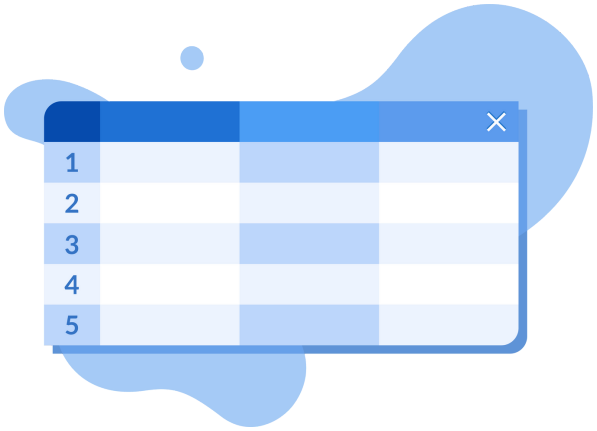
Simply documenting dependencies and interlocking systems is the first step on the road to meaningful NetDevOps.

A basic inventory of what's on the network and how all the pieces fit together is a crucial foundation of any drive toward automation and orchestration. Once you have a source of truth for a network, you can find ways to make it more efficient through further NetDevOps practices.



In this case, a “network source of truth” has to go beyond a simple list of network devices. Automation and orchestration require knowledge of how pieces of a network fit together. Some of those pieces are physical, like devices, sites, and servers. Others are virtual, like IP prefixes, VLANs, and VRFs.By documenting these different types of dependencies and connections, you’re laying the groundwork for driving change across a network.

Flexible, accountable inventory systems are a baseline requirement for NetDevOps. In order to keep up with the pace of agile development, a source of truth needs to be open enough to take in whatever the network team throws at it. Keeping track of changes - what happened and who made it happen - is critical for the security and stability of any future automation program.



Are spreadsheets the answer?

It’s simple enough to document network components in a spreadsheet. Yet as networks become more complex and dynamic, spreadsheets really don’t have the kind of functionality you’re going to need. For example:

Spreadsheets can’t show the relationships between items. Turning an inventory into an automation blueprint requires some sense of the follow-on impact of a change on related systems. Spreadsheets simply can’t do this.

Spreadsheets aren’t very good at documenting changes over time. Digging back through changes is a pain in the neck, and there’s no real way to get a strategic sense of who’s making what changes.

Spreadsheets can’t tell you when you’re wrong.A spreadsheet doesn’t know what a switch looks like. It can’t tell you that you’re assigning five ports to a four port device.

Spreadsheets don’t scale well. If you’re using spreadsheets for things like IP address management, keeping everything up to date across complex and overlapping team structures can involve a lot of risk.

Spreadsheets can't be consumed programmatically. It's very difficult, if not impossible, to integrate spreadsheet data with the myriad tools used to manage and monitor the network.

NetBox: The Foundation of NetDevOps

The goal of every network engineer remains the same: **visibility and control across the enterprise.**

That seems simple. Yet as any network team knows, building a dynamic source of truth that can meet the complex (and ever-evolving) needs of NetDevOps is a difficult challenge.Keeping track of all those dependencies and connections between network components, documenting changes to the network over time, and showing the consequences of a change - no single tool brings all of this together.

There are plenty of tools which address pieces of the NetDevOps puzzle. For example:

Data center inventory management (DCIM) solutions give you a view of the hardware and other components that power your network. The best solutions go as far as providing some control over that hardware.

IP address management (IPAM) solutions provide a view into how IP addresses are assigned to devices and network objects across the network.Cloud asset management solutions provide a view of the virtual machines and clusters deployed in a single cloud or multiple clouds. NetBox brings these smaller pieces into a single network source of truth, providing a complete strategic picture across multiple aspects of network management. That strategic layer then acts as the backbone for layers of network automation and monitoring tools.

It's worth noting that NetBox is designed to show the desired state of a network, not its operational state. As a source of truth for that desired state, NetBox is what network monitoring tools use as the basis of comparison to the current reality. NetBox can also instruct automation tools to configure the network to conform with the way things should be.

Can we make it work with other tools?

Network teams are always trying to do more with the tools they've got. They'd rather bend an existing solution to address new requirements - or build a new tool themselves - than admit that there's another, better way.

ServiceNow is a good example of a widely used solution which theoretically can act as a source of truth. The challenge comes in building out all of the connections between network elements and creating a common framework for action which can work with a wide variety of third party tools. There is a way to cobble it together, but not easily or cheaply. And even that Rube Goldberg solution isn't going to have the robust functionality NetBox already has.

Infoblox and BlueCat each offer a solid source of truth for network automation, but one that's limited to DNS, DHCP, and IPAM assets only. Even then, getting control of this narrow slice of the network requires a risky, resource-intensive re-architecture of the entire network to fit the constraints of Infoblox and BlueCat's solutions. NetBox provides a far broader baseline for network management without the need to re-architect anything.

Homegrown sources of truth are always an option, but one that requires a huge lift of resources and time.The effort required to build out and maintain a tool that delivers functionality comparable to even a fraction of what NetBox offers simply isn't worth it for most enterprise teams.

Pathways to NetDevOps with NetBox

NetBox is a place for network management tools to compare information, forming the basis for automated actions. NetBox will always require interfaces and integrations with other tools which are better positioned to implement change directly in the network. The advantage of NetBox is its strategic position, providing data for network automation and monitoring across multiple network management use cases.

The architecture of NetBox provides multiple options for third-party tools to draw from it as a source of truth:

A wide range of **community plug-ins** support automation with the most common network management platforms. These will continue to evolve and expand as the user base for NetBox grows. Among the most relevant of these community plug-ins are the **Ansible and Terraform integrations** which are already used to make network automation easier at scale using NetBox as a source of truth.

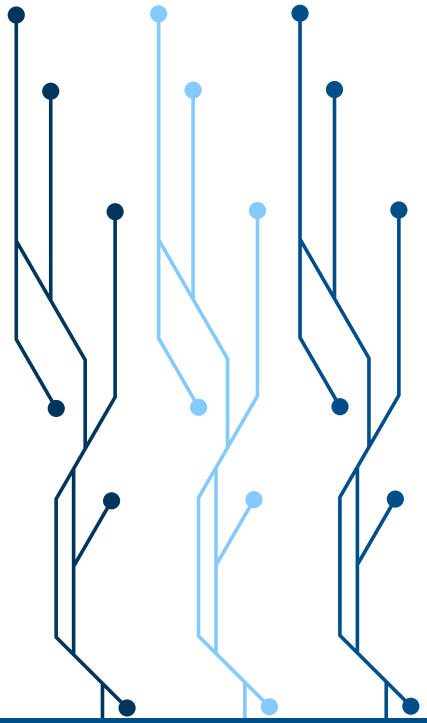
Supported plug-ins are in the works for high-profile network tools which require greater attention to detail, version controls, and specific functionality which demand a higher level of development effort. The NetBox team is currently building relationships with a variety of players which will form the basis for supported plug-ins going forward.

APIs are a core part of the NetBox design philosophy, and provide an open door to anyone who wants to integrate NetBox into a specific network management tool.API integrations are a common first step toward the creation of a community plug-in.

The Path Forward for NetBox

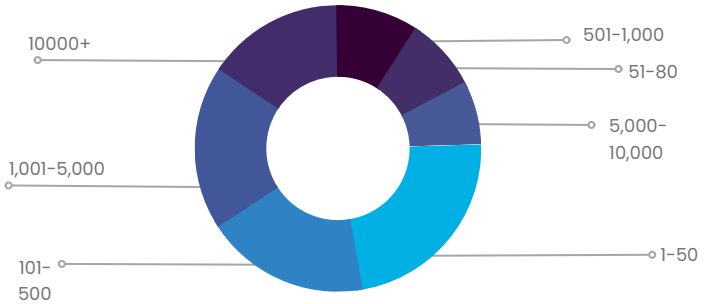
NetBox is thriving as an open source tool, with over 12,000 GitHub stars, 1,800 forks, and a vibrant user community. NetBox is currently deployed on tens of thousands of networks around the world, representing a diverse mix of use cases, market verticals, and places along the automation journey.

Over three quarters of NetBox users have had it running in production for more than a year - a testimony to its stability and growing value for network teams. The user base spans some of the world's largest and most complex telecommunications networks to smaller networks of just a few devices.

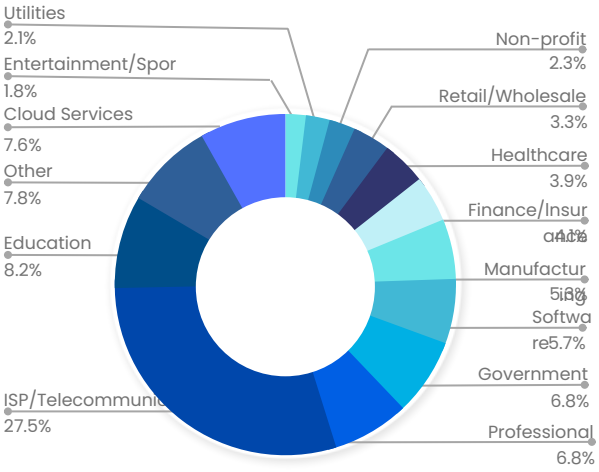


NetBox Community Survey Results

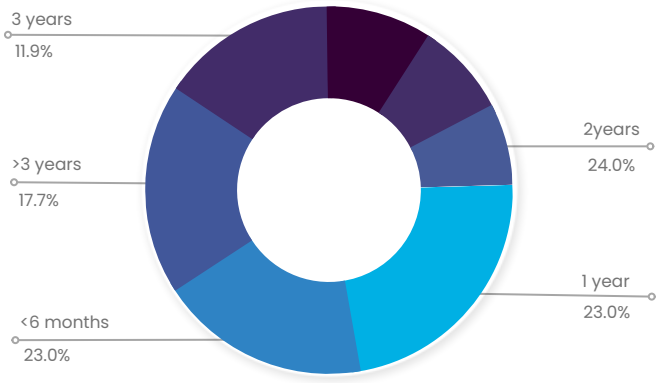
How large is your organization (head count)?



Which best describes your organization's industry?



Roughly how long have you been using NetBox?



Getting Started with NetBox

Until now, all NetBox deployments have been self-hosted. Network teams run the software on their own, using community input for support and troubleshooting.

The consistent feedback from NetBox users is that they'd like a hosted, as-a-service model option as well. The convenience and added support of this model would make it even more compelling for large enterprise users. Network teams that aren't currently willing to spend resources to manage an open source product would happily pay for a version of NetBox which is externally managed.

To meet this growing need, NetBox Labs now offers NetBox Cloud, a fully supported, hosted solution with specific performance SLAs. NetBox Cloud eliminates the administrative overhead associated with hosting and management of a NetBox instance.

NetBox Cloud also adds the operational features and services that enterprise users need to deploy and maintain an authoritative source of truth without the management overhead. Enjoy exclusive access to SSO, support, test environments, and more.

Learn how you can simplify network operations with a hosted, enterprise-grade version of NetBox.