# Accelerating NetDevOps Network Automation with NTC's Prebuilt Fast Track Solution Catalog

>>> network .toCode()
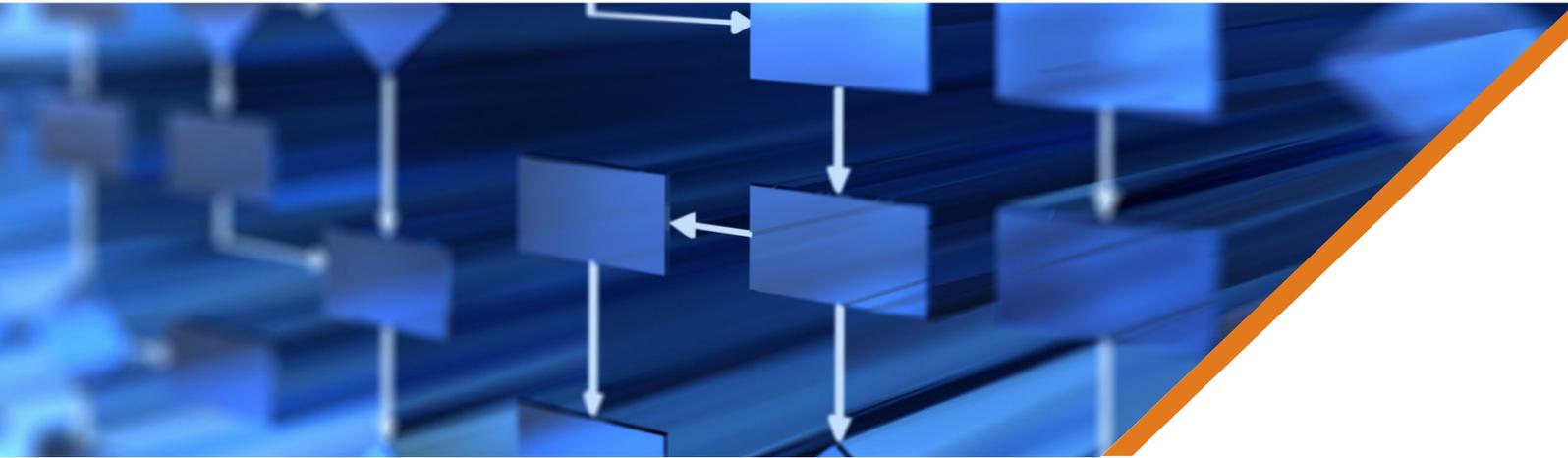
Chapter One:
Challenges of Modern Networking

The complexity, scale, and rapid evolution of modern networks has created a demanding environment in which administrators are expected to provide a highly available network that sustains core business operations. Consider for a moment a network outage that affects a hospital's ability to monitor patients or a major retailer's ability to manage their distribution chain. These ramifications could affect patient outcomes or cost millions of dollars in revenue. The stakes have never been higher and the tolerance for error has never been smaller. The obligation is on all of us to meet these expectations because the world now relies on us to sustain our interconnected planet. Let's add some context to those challenges.

Enterprise networks consist of thousands of infrastructure devices from dozens of vendors and multiple clouds. The evolution of device types and vendors requires organizations to continually train and retrain the network team on new operational techniques and models (while also demanding that they track the lifecycle of these devices and systems along with the vulnerabilities and bugs announced by the manufacturers). Networks are spread across large geographic areas, forcing contention with dissimilar maintenance schedules, natural disasters, and remote dispatches. They're also supporting a wider array of devices than ever before, creating interoperability challenges and forcing them to extend trust boundaries. Furthermore, networks rely on external vendors and providers for WAN and Cloud connectivity. This necessitates regular coordination on maintenance activities, performance monitoring, and circuit failures. Resources are deployed in a variety of environments, from data centers and distributed architectures to the cloud, which entails ensuring that the communications with these resources are secure and highly available. These resources and the networks they utilize must provide adequate performance information to effectively remediate issues when they arise.

Support teams are often geographically dispersed, requiring them to maintain the availability of experts in every field across these locations. Supervising staff can be difficult due to conflicting schedules, language divides, and cultural distinctions. This often leads to substantial variance in outcomes creating unpredictability and unsatisfactory results.

All of this might seem manageable if the network teams weren't also contending with the explosive growth of network connected devices. Every year, the number of internet connected devices expands by 15 to 20 percent, a trend that is unlikely to abate given the criticality of these devices.

Often, network teams find themselves turning to legacy processes to meet these challenges. After all, they've gotten us here.

In the next few chapters, we are going to explore the benefits of network automation more broadly, followed by a deeper dive into some of those legacy processes that are widespread across every network.

Chapter Two:
A New Era in Network Management Provides Organizational Benefits

» Before we analyze specific processes and how network automation can help, let's review the benefits of network automation more generally. These are the macro-benefits that senior leaders are interested in exploring.

Lower Operating Costs

—

With a data-driven NetDevOps approach to managing and automating networks, costs fall expeditiously. By simplifying operations and programmatically executing tasks, engineers can be more focused on project work and strategic business priorities, fully leveraging their creativity and ingenuity to do what they do best: imagine and revolutionize the way things are done with game-changing ideas.

Enhanced Stability

—

Automated networks are more reliable, period. The leading cause of network outages is human error. Whether that's due to a misconfigured technology or an improperly applied maintenance window, these problems are completely avoidable with programmatic execution. NetDevOps solutions not only execute predictably and layer fail-safes throughout, they also catch the mistakes humans make. Take, for example, the challenge of configuration drift. As engineering teams work on equipment, there are naturally deviations in execution, no matter how well- intentioned they are. Data-driven configuration management catches these deviations before they have an opportunity to cause a problem. Disaster recovery is also enhanced by having a historical record of configurations and a Source of Truth informed network design. This gives administrators the ability to return service quickly should a disaster destroy equipment.

Business Agility

—

The ability to deploy services and operationalize plans quickly is key to maintaining a competitive edge. NetDevOps solutions condense the timelines and reduce the capital requirements of new projects, extending their functional life. An example of how automation can help is when a new service is needed to improve sales operations. Automation can speed up the implementation of the service, which allows the benefits of the service to be realized much sooner, potentially weeks or months in advance.

Hardened Security

—

With cyberattacks expected to rise sharply in coming years, it's absolutely critical that organizations harden their security posture. Luckily, automation excels in this space, assisting organizations throughout the world to maintain security best practices. Leveraging automated solutions means that your infrastructure is always running the recommended software version; that firewall rules are created and updated accurately and quickly; that your configurations are maintained and monitored to ensure they conform to a standard. Automation also provides a framework that enables organizations to isolate security threats more quickly by programmatically retrieving information for administrators.

Greater Insight and Control

—

Understanding the current state of the network is crucial for effective management. Administrators of NetDevOps-inspired networks enjoy a nuanced, dynamic and detailed view of the network, augmented by Source of Truth data. By enriching the collection process with the latest technologies, they enjoy access to a larger data lake. Quality solutions temper the consumption of that data by leveraging rich processing mechanics that eliminate noise and deliver signals. Rich dashboards are intelligently designed to present the information you need, where you need it; enabling organizations to make business decisions informed by empirical data. Broad perspectives are obtained with global views, with data becoming increasingly detailed as one navigates down to the smallest components. While filtering technologies pull pertinent information from logs and metrics, combining them into a single view which enhances consumption.

Chapter Three:
Exploring Legacy Processes Ripe for Network Automation

» Now that we've looked at some of the general benefits of networks, we are going to take a look at four common processes that have been around for decades and are ripe for network automation.

Incident Management

Resolving network faults is one of the most common network management tasks. Historically, organizations have overcome this challenge by creating teams of highly specialized engineers, a solution that introduces many challenges. First, they must train engineers on the technical and business processes of ticket handling. On the technical side, engineers must understand the technologies that are in use and the nuances that are applicable to a particular solution. On the business side, engineers must understand proper ticket handling, which includes training on the types of information that should be included in ticket notes and customer communications, along with closure and failure cause code selection. Due to turnover rates and process changes, regular training is required to foster adherence. Additionally, hiring new engineers is difficult due to the limited availability of talent.

Demand far exceeds supply and this is unlikely to change given that the US Bureau of Labor Statistics forecasts a mere 3 percent growth in headcount over the next decade. The engineers that organizations are able to find are usually experts in a single area of purview, which further restricts the availability of new hires. For this reason, they must position these engineers to have the greatest impact. Additionally, they must also create reliable repositories of technical and process documentation that personnel can reference. This documentation must be maintained and pertinent or it risks falling out of use or worse, being counterproductive. Lastly, the integrity of the performance reports they're generating is highly reliant on data quality and uniformity, a difficult task when coordinating large teams.

Configuration Compliance

—

The benefits of configuration standardization and maintenance are well understood. Unfortunately, for many reasons it is difficult to achieve in a highly complex and dynamic network. Unauthorized network changes often go unnoticed for months or years. This can happen when NOC personnel deviate from process or "bandaid" a failure for the sake of business continuity. Even intentional changes to the network are fraught with risk. They may seem successful, but upon further inspection it is often discovered that at least some implementations have failed. Perhaps the new configuration wasn't saved correctly or was erroneously rolled back to a date that precedes the change. Additionally, many changes apply to only a subset of the network. As time progresses these "subset" changes cause confusing incongruencies that leave administrators scratching their heads and wondering why a particular configuration exists and whether it's safe to alter.

It is possible to imagine a scenario where an organization might try to achieve standardization manually. This effort would require dozens of engineers who are solely dedicated to reviewing and adjusting network configurations. Although, any corrected devices would be in danger of falling out of compliance again. The cost of this strategy is extremely high and the benefits are temporary, making it an unsustainable option.

Circuit Maintenance Management

—

Managing communications with circuit providers is pervasive in the networking industry. Those providers give notice when maintenance activities occur and customers are tasked with preparing the infrastructure accordingly. When scaled to hundreds or thousands of circuits, dozens of notifications must be processed each day.

There is significant risk in processing these notification emails from providers. To begin with, the end-to-end operation is moderately complex and requires substantial effort on the part of the operations team. This pulls them away from higher-value tasks. When an email is sent by a provider, organizations expect the network team to act. Luckily, they usually do. But sometimes an email is missed due to an oversight or a critical matter competing for their attention. Once acknowledged, engineers are expected to suspend monitoring for the duration of maintenance to avoid unnecessary failure notifications. This multistep process involves logging into the monitoring platform, locating the devices and components which would be affected, and suspending monitoring. If a mistake is made, time will be wasted servicing false positives. Then, there's the highly technical process of managing redundancy during a planned outage to consider. This process involves logging into multiple devices, interpreting complex outputs, and issuing syntactically delicate commands. If this is done incorrectly, it's likely that business operations will be impacted. Additionally, given that the maintenance date is typically days or weeks out, administrators must remember to perform this work. Furthermore, when mistakes happen, there is an efficiency loss because engineers will spend time fielding calls and emails from impacted users.

Circuit providers are bound by SLA agreements. These agreements guarantee a certain level of performance that customers can expect from a provider. When these obligations are not met, service credits are issued by the provider. However, the onus is on the customer to identify when these SLAs are not met. Without proper recording of maintenance activities, it's difficult to determine the difference between genuine failures and maintenance activities.

Operating System Upgrades

—

Ensuring that the recommended software release is running on network hardware is essential to providing a stable, secure, and efficient network. Unfortunately, most devices in production today are running out-of-date software. The largest network vendor, Cisco, reports that 80 percent of customer-managed equipment is out-of-date.

Often, organizations avoid upgrades in an effort to minimize costs. This is understandable, given the high operational costs incurred when upgrading equipment at scale. Especially so given that a prudent upgrade involves prechecks to qualify the device, an upgrade procedure, and a postcheck to verify functionality. Upgrades also involve long deployment timelines, long maintenance windows, and exhausted engineers.

Organizations may also avoid software upgrades in an effort to minimize downtime. However, this is counterproductive because of the high risks associated with running obsolete code. Remember, vendors regularly publish software vulnerabilities publicly. Which informs attackers that the obsolete software that an organization is running is vulnerable. Shortly thereafter, the attack vector becomes common knowledge in black hat communities, which opens stagnant operators to attack. Additionally, the bug fixes and reliability improvements contained in these upgrades go unrealized. All of these factors act as a drag on reliability and can ultimately result in a very costly outage.
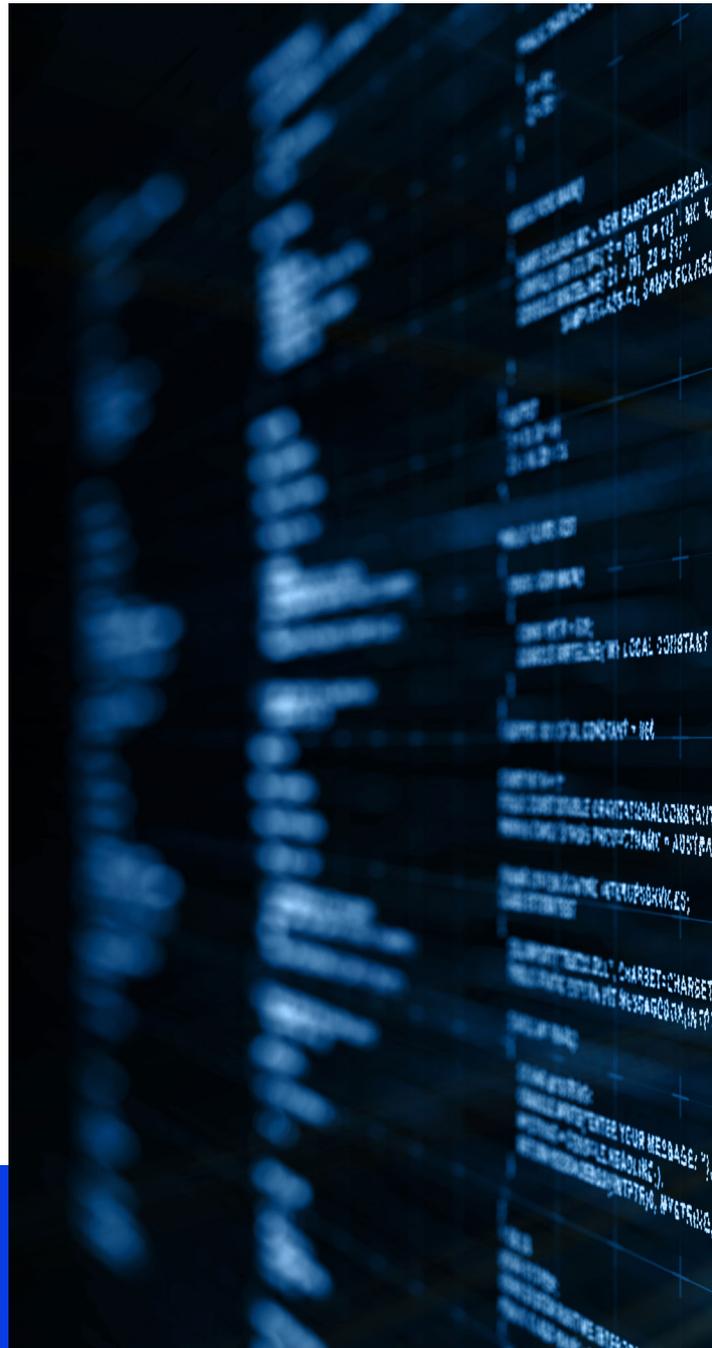
Chapter Four:
Understanding the Value of Network Automation

>> We've explored a few legacy processes, from Incident Management to OS Upgrades. Automating these processes and workflows can provide transformational value. In this chapter, we are going to explore that value. Imagine an alternative where your engineers are free of monotonous and repetitive tasks. They could instead spend their time advancing critical business priorities and engaging in project-based work. NetDevOps practices enable this vision of the future. Maintaining operations comes with significantly less costs and produces greater results.

Incident Management

—

Imagine an automated incident management solution. It is a solution that performs the ticket handling, troubleshooting, and resolution (when possible) of incident tickets yielding substantial benefits. Chief among them is the dramatic reduction in the effort required to process tickets. Best of all, this benefit extends to all tiers of support, enabling operators to shift engineering hours for greater impact. Simultaneously, the customer experience is enhanced. Tickets are resolved automatically with guaranteed adherence to process, usually only a dream for most Enterprise support organizations.

In this type of automated solution, automations begin working on a ticket as soon as it's generated. The metadata of the incident ticket is analyzed to determine whether a corresponding automation workflow exists for that incident. Within seconds, the workflow initializes and begins updating the ticket informing the customer that the NOC is aware of the fault and an investigation has begun. Shortly thereafter, the history of the device is analyzed and a battery of diagnostic tests is performed. The results are used by the workflow to determine the most probable cause of the failure. Then the workflow attempts to resolve the fault by carrying out a plan of action. Upon completion, the automation reiterates over the device's performance data to ensure that the root cause has been properly addressed. Ticket updates are provided at every step to keep interested parties informed about the progress of the ticket and any actions taken by the automation.

If the automation cannot resolve the issue or encounters the unexpected, the case is escalated for further investigation. The receiving personnel are then able to quickly acquaint themselves with the fault by reviewing the ticket enrichments provided by the automation, which includes diagnostic data and attempted remediations.

When this process is scaled to an Enterprise level, several thousand tickets are closed each month without human intervention. Additionally, ticket enrichments provide rich contextual data to several thousand more tickets.

Configuration Compliance

—

Automated configuration compliance solutions make the network more secure, cost-efficient, and reliable. Imagine having absolute confidence that every device in the network is configured exactly how it should be. It is possible with an automated solution.

This feat is accomplished by defining and modeling the network in a source of truth and measuring deviations from that standard. Live configurations are captured daily and compared against the standard. Deviations are brought to the attention of administrators, providing notice before it's a problem. A robust source of truth permits configuration nuances, which means that every device in the network, no matter its location, role, or platform can have a fully tailored configuration that's automatically generated.

Circuit Maintenance Management

—

Having a solution that dynamically manages circuit notifications and maintenance windows would lift a huge burden from the operations team. As we discussed previously, managing those notifications is time-consuming and error-prone. Automated solutions take care of processing maintenance notifications with zero human intervention. Engineering hours are not spent processing those requests or fielding the impact of mistakes.

A well-designed solution would initialize when an email is received. It would then update the circuit database or source of truth's maintenance record. Then, it would suspend monitoring and handle the circuit failover when maintenance starts and again when it's complete, eliminating the potential for mistakes.

Operating System Upgrades

—

Maintaining network operating systems with an automated solution requires an order of magnitude less effort; it is also safer. Picture reducing deployment timelines by 75 percent and accomplishing this feat with 80 percent fewer engineers, all while ensuring that every precaution has been taken. Automated solutions do not tire and they execute quickly, which means several hundred devices can be upgraded each day.

By automating the qualification, execution, and verification process, you'll reap benefits of having up-to-date software and a reliable and efficient network that is hardened to attack. Furthermore, your engineering team will thank you. After all, they're no longer executing upgrades ad nauseam in the middle of the night. They're free to engage in more productive work that requires their expertise, which further benefits your organization.

Does this sound impossible? Does this sound great? Well, it is definitely possible; and, yes, it is great! The next chapter introduces Network to Code's catalog of Fast Track Solutions that tackle these problems and many more.

Chapter Five:
The Right Approach — NTC Fast Track Solutions

» Network to Code approaches every engagement with the customer's interest in mind. Our primary goal is to help our customers realize the benefits of automation and prepare them for the future by facilitating the adoption and production deployment of network automation. We use a pragmatic approach which integrates preexisting commercial, open source, and custom software. This allows our customers to retain any investments they've already made.

We believe the proper approach to network automation starts with data. It is data which defines the intended state of the network. This is called the Network Source of Truth and is the foundation for data-driven network automation. Without this foundation pillar, it's significantly more challenging to produce completely automated end-to-end solutions. This allows networks to ensure intent is driving their network. This strategy enables network teams to realize the benefits of automation quickly. Beyond that, we enable our customers by facilitating the adoption of NetDevOps practices, which goes beyond coding and tools and extends to culture and organizational shifts.

We are excited to announce Network to Code Fast Track Solutions (FTS). These are solutions that are tried-and-true, have been deployed numerous times into production environments, and are rooted in a NetDevOps and data-driven approach to network automation. Fast Track Solutions represent the most common use cases and challenges network organizations are facing today.

The NTC FTS Catalog has been broken down into five (5) major solution categories. They are **Configuration Management, Network Planning & Design, Network Operations, Cloud Networking, and Security & Compliance.** Within each of these categories, there are numerous specific Fast Track Solutions that can be deployed individually to solve one use case, or together to create real transformation through network automation. Whether you're on a deployment or support team or on a dedicated technology team (such as Security), there are FTSs that can accelerate your network automation journey.

Let's review the NTC FTS Solution categories while also highlighting the solutions that can help you solve the processes and value statements reviewed in Chapters 3 and 4.

Configuration Management

—

The solutions we've built around configuration management are designed to ensure networks operate in a highly predictable, scalable, and reliable manner. From defining the intended state and remediating non-compliance, to ensuring the successful deployment of mass configuration changes and extending self-service functionality to non-technical personnel with user-friendly portals, our solutions empower our customers to exert full control over their networks thereby averting outages large and small due to faulty configurations. Some of the Fast Track Solutions in Configuration Management include Golden Configuration Compliance, Configuration Remediation, Pre/Post Change State Validation, Mass Config Changes, and Network CI/CD.

Network Planning & Design

—

Historically, network planning and design has required highly specialized engineers every step of the way. From inception to implementation, we've relied on them to manage and execute. Our solutions enable those same engineers to design the network once and then pass the instantiation and implementation of networks to others. This new operational paradigm reduces the time and training requirements while condensing deployment timelines. Some of the Fast Track Solutions in Network Planning & Design include Source of Truth Deployments and Integrations, Intent-Based Configuration Generation, Device Lifecycle Management, Greenfield Builder, and Tech Refresh Accelerator.

Network Operations

—

Our Network Operations solutions are like having your most reliable and efficient engineers available around the clock without interruption. Our workflow-based approach ensures that technical and business processes are flawlessly executed each and every time it's necessary. We believe that the best systems execute seamlessly and ideally without human intervention, which delivers enhanced results without additional effort. These measures dramatically reduce costs, often providing rapid capital recovery in under a year. Some of the Fast Track Solutions in Network Operations include Automated Incident Resolution, OS upgrades, Circuit Maintenance notification processing, and interactive chatbots.

Cloud Networking

—

Cloud Networks continue to grow and there are often new operational models to manage networks across clouds. Independent of location, from on-prem to cloud, we believe that the Source of Truth is a foundational pillar to network management and automation. Some of the Fast Track Solutions in Cloud Networking include Multi-Cloud Network Source of Truth, Infrastructure as Code and CI for Cloud Operations, and Automated Provisioning & Configuration Management.

Security & Compliance

—

Our security and compliance portfolio has been designed to exceed expectations and deliver a posture which is simply unattainable with conventional methods. With our solutions, it's possible to guarantee compliance with industry standards and best practices. That guarantee extends beyond the date of audit to the entire life of the network. Additionally, when adjustments to the posture are made, you can be sure that they've been implemented in a consistent manner that conforms to process. Our solutions are also able to track, maintain, and address vulnerabilities, patches, and software versions on all managed devices. Some of the Fast Track Solutions in Security & Compliance include Firewall Policy Automation, Network & Security Verification with Batfish, Config Audit & Compliance, and Vulnerability & Patch Management.

Wrapping Up

Through this eBook we covered four common issues that nearly every network team is looking to tackle and then introduced Network to Code Fast Track Solutions. Network to Code has a specific Fast Track Solution that solves each of these problems head-on with NetDevOps and a data-driven approach to network automation.

With our network automation value calculators, we estimate between $2.5M+ and $10M+ can be realized from implementing only four (4) NTC Fast Track Solutions. Just imagine if you deploy every FTS! Here is a snapshot of the value we project.

Fast Track Solution	Company A	Company B
	Fortune 500 Healthcare Provider with 4,500 network devices and 400 locations.	Fortune 100 Retail Company with 15,000 network devices and 1,144 locations.
INCIDENT MANAGEMENT	$1M+	$3M+
CONFIGURATION COMPLIANCE	$500K+	$4M+
CIRCUIT MAINTENANCE MGMT	$500K+	$1M+
OS UPGRADES	$500K+	$2M+
Total Value	**$2.5M+**	**$10M+**

If you're interested in exploring these calculations, please reach out to us.

Get Started Today!

Our Fast Track Solutions are built to help you and your network teams adopt NetDevOps and a data-driven approach to network automation with confidence. We architect, deploy, and support FTSs from start to finish and offer Day 2 FTS support services too. If you're looking for a way to jump-start your network automation journey, then you should definitely consider and learn more about NTC Fast Track Solutions.

Our team stands ready to assist your organization in building and managing the networks of tomorrow.

GET STARTED

Reach out to us today to learn more about why NetDevOps and data-driven Fast Track Solutions can be the foundation of your network automation journey.

(844) NET-AUTO
(844) 638-2886

500 7th Ave. Suite 8A
New York, NY 10018

info@networktocode.com