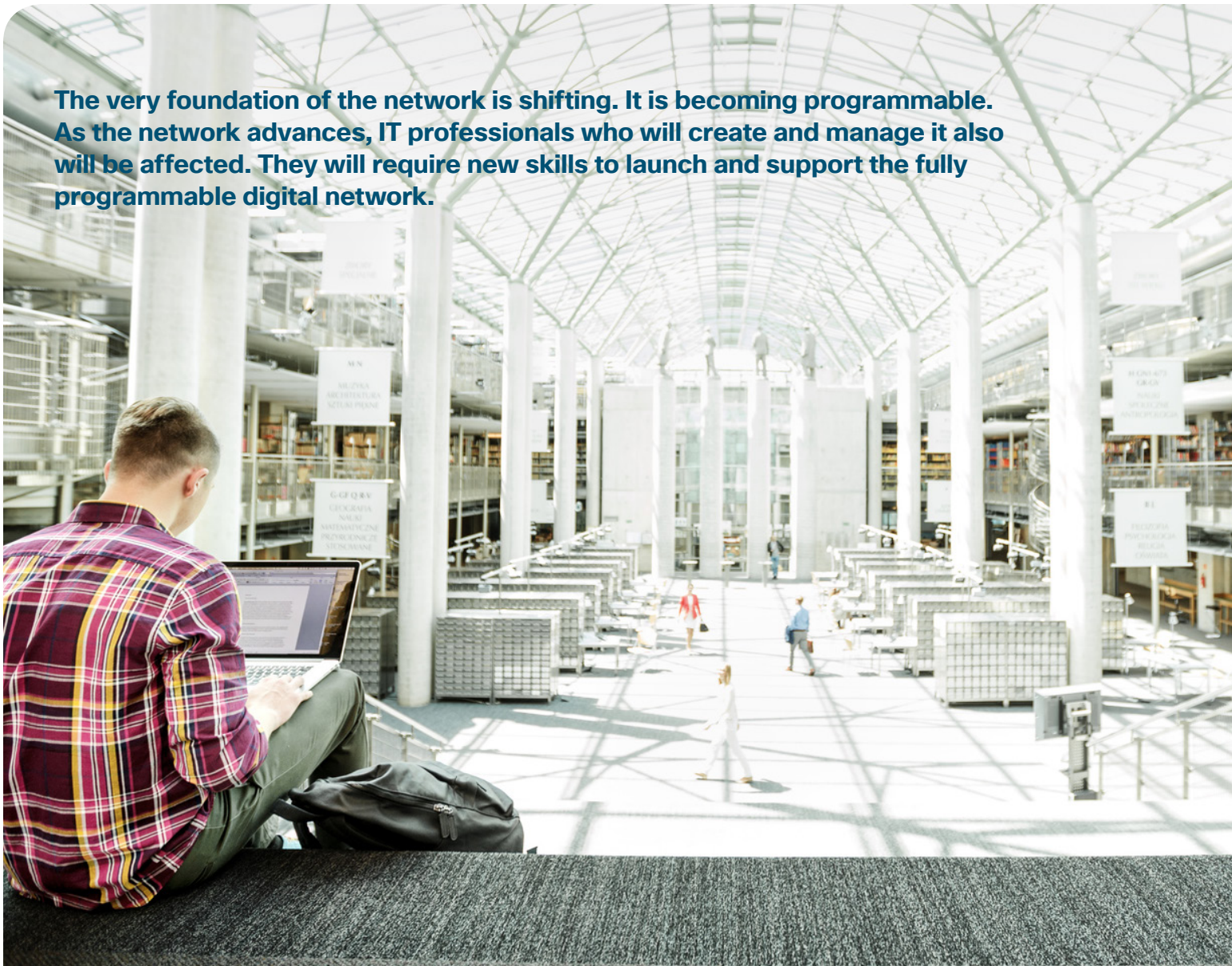


Cisco DNA: Impact and Import

The very foundation of the network is shifting. It is becoming programmable. As the network advances, IT professionals who will create and manage it also will be affected. They will require new skills to launch and support the fully programmable digital network.



Today's digital networks require a different approach. Multimedia voice-data networks must be faster, with better ways to build, manage, and improve them.

Network engineers must adapt to rapidly evolving technologies in many areas. These include networking, mobility, enhanced security, flexible access, and virtualization, all while taking full advantage of cloud services. Network programmability makes all of this possible by automating network management. It's a big leap forward from managing networks manually using physical equipment.

To make network programmability work, organizations must build their network engineers' key programming skills. They will require new skills that help them tap into network intelligence, use application programming interfaces (APIs), and handle software-defined networking (SDN) controllers and network orchestration.

This white paper explores the importance and impact of programmable networking and how it affects you. It covers the following:

- The history of programmable network technologies and their predicted adoption
- The advantages of programmable networking vs. traditional networking, especially with the introduction of Cisco's Digital Network Architecture (DNA)
- New programmable networking skills that IT professionals will need
- How Cisco is helping to update IT professionals' skills with recently released network programmability training and certification programs

Network programmability is a more advanced approach

Networks have always been complex. The traditional network consisted of a broad variety of equipment, starting with routers and switches. Add to that middleboxes such as firewalls, along with network address translators, server load balancers, and intrusion-detection systems.

Routers and switches used to run complex, distributed control software that was closed and exclusive. Parts of the control software came from different makers of the various network components. It took years of standardization and interoperability testing to make it all work well together.

Today's digital networks require a different approach. Multimedia voice-data networks must be faster, with better ways to build, manage, and improve them.

Cisco DNA makes it easier for organizations to bring their networks into digital readiness.¹ It also offers many significant advantages:

- **Built-in automation**—reduces the costs, time, and effort to set up and manage networks and services
- **Pervasive analytics**—delivers insight into network operations, IT infrastructure, and the organization itself

1. [Cisco Digital Network Architecture](#)

What worked for network security in the past is becoming increasingly harder to do effectively without advanced security on every port to see and control all activity on the network.

- **Virtualization**—provides services anywhere—independent of a platform—which can be physical, virtual, on premises, or in the cloud
- **Open, extensible and programmable layers**—combines Cisco and third-party technology, open APIs, and a developer platform
- **Security advances**—turns the network into a source of security strength

That last advantage deserves more discussion. One of the few arguments against SDN is the central controller that is also one of its main advantages. If that controller is hacked or attacked, the entire network crumbles because that one controller contains the entire network intelligence.

It all goes back to the network, where strong security begins. Without a resilient network, tough security is not possible. In the past, security has been built on firewalls, intrusion detection, virtual private networks, and access control. But today's networks have billions more devices attached, and these devices are much more varied in function. This situation significantly increases the level and scope of vulnerabilities and possible network entry points.

What worked for network security in the past is becoming increasingly harder to do effectively without advanced security on every port to see and control all activity on the network. Cisco DNA uses the NetFlow data from network devices to boost the ability to view everything running across the network. Cisco DNA also provides several ways to analyze, detect, and stop threats by using the network itself as a sensor to instantly identify, respond to, and mitigate threats, and deliver automated network enforcement.

Cisco DNA gives organizations an open platform that is driven by software. It provides a roadmap to a digital-ready network so organizations can innovate faster while slashing costs and risks.

Cisco DNA has a broader perspective

Cisco DNA's technical advances absolutely affect the way IT/networking professionals approach the network—and their overall careers. With networks becoming programmable, we cannot think of them as purely hardware any longer. We must step back and take a more holistic view. What business purpose is the network intended to support or even make possible? To answer that question, we must look beyond hardware and purely technical concerns.

With DNA, we can gain far more insight about the network and how it is affecting—and revealing—the organization than we ever thought possible. Moreover, we can see it as it happens. That is why analytics plays such a key role in DNA. Analytics reveals rich contextual insights about users, applications, devices, and threats. All of this helps organizations make more informed and accurate decisions.

Organizations must do two things to make this possible, however. First, they must liberate IT time and resources by automating daily networking tasks.

The onset of programmable networking is moving IT job functions away from simply handling devices and platforms. Instead, jobs are heading toward services that are secure and policy-based with business-focused analytics capabilities.

This ability is all part of the growing eagerness to take up DNA. Automating daily networking jobs makes room to focus on business innovation—the entire point of DNA.

Second, to remain competitive, IT professionals must have key programming skills. These new skills will enable them to tap into network intelligence. They also will be able to devise powerful new network-enabled applications through open APIs. In dealing with networks that are programmable and virtual, IT pros must understand and make use of DNA controllers and network orchestration systems.

The onset of programmable networking is moving IT job functions away from simply handling devices and platforms. Instead, jobs are heading toward services that are secure and policy-based with business-focused analytics capabilities. These services are made possible thanks to abstraction and automation within controller-based frameworks. It's all more outcome-focused, which delivers more value for the organization.

There is another key aspect to the skills necessary for programmable networks. It is the ability to connect data, processes, people, and “things” securely. To do this, organizations require trained and certified personnel to design and build secure frameworks. They also require IT professionals who can detect and respond to ever more devious cybersecurity attacks.

DNA will have a positive impact on IT careers

Where does the shift to programmable networks leave current and potential network professionals? As businesses take up programmable networking, they are requiring automation and programming skills in their network engineers. They will require IT professionals who are trained and certified in a new skills context to make the most of DNA's flexibility and operational cost-cutting benefits.

We may think of DNA as fascinating new technology in and of itself—a new challenge to master. But organizations have a different, wider perspective. They will ultimately regard DNA as a means to reach their desired business outcomes and remain competitive. The smart organizations will hire and promote IT professionals who understand the relationship between technology and business. The parts of IT most relevant to business involve creativity, vision, and architectural savvy. (Is that you?)

Still, foundational skills are essential for both network engineers and programmers. Now that networking and IT are merging, these two professions are also merging into one known as the network programmer. Only those network engineers, programmers, or other IT professionals who gain these blended skills will be in a position to collect the rewards of the digital era. You can be one of them if you acquire the right Cisco training and certifications.

Career opportunities have never been greater, provided you are willing to acquire the skills that make you significantly more valuable to employers.

For programmable networks, basic scripting is a good skill for every IT professional because it forms the basis of automating any task. And there will be many tasks that will be automated in programmable networks. If you are a network engineer, consider adding programming to your skill set. Python is a good language choice because it helps switch your thinking between procedural programming and object-oriented programming. Procedural programming derives programs from a sequence of statements. Object-oriented programming abstracts the programming model to resemble real-world objects that can be moved around in a modular way.

From these essentials, you can move into infrastructure programming. Consider learning about common automation protocols. Like network configuration protocol (NETCONF) or representational state transfer (REST). It's also helpful to know how both relate to YANG data models. Learning about SDN controllers is useful, such as Cisco Application Policy Infrastructure Controller (APIC), Cisco Application Policy Infrastructure Controller–Enterprise Module (APIC-EM), or Cisco Open SDN Controller. The focus will shift to an understanding of APIs and how they can provide new automation capabilities.

In programming, networking basics like automating infrastructure and using APIs and toolkits to interface with SDN controllers and individual devices can be useful. You might also want to investigate other basics such as IPv4 and IPv6 addressing and subnetting. In addition, anyone planning to advance in the space should be proficient in virtualization because programmable networks are largely virtualized and highly fluid.

Cisco's Network Programmability certification is key

Career opportunities have never been greater, provided you are willing to acquire the skills that make you significantly more valuable to employers.

Cisco is doing its part by continually updating and expanding training in programmable networking. The goal is to develop your talent and skills to an entirely new level of excellence. This will help you and your colleagues grow into stronger, more strategic business resources in your organizations.

No longer will you be standing on the sidelines watching everyone else move ahead. As a more highly trained IT professional, you will be at the center of the action in an era of programmable digital networks.

The technology industry is rapidly adopting Cisco DNA. To support that, we are rolling out new certifications and updating the well-known versions to keep them current for programmable networks. Cisco is delivering the necessary skills to design and implement the programmable networks that are becoming much more essential to rapidly evolving digital innovation.

Cisco DNA makes it easier for organizations to bring their networks into digital readiness.

Cisco offers Specialist certifications with training for network engineers and programmers. These include the following:

- [Network Programmability Design and Implementation Specialist certification](#)
- [Programming for Network Engineers \(PRNE\)](#), designed to be immediately valuable to network engineers moving into programming
- [Digital Network Architecture Implementation Essentials \(DNAIE\) boot camp](#) for professionals who are already using Cisco DNA

Here are additional details on each of these offerings:

Network Programmability Design and Implementation—Designed for network engineers with some experience, this Cisco Specialist certification is for those who hold an active CCNP or CCDP certification. At this point, it is appropriate to learn crucial programmable network skills. Passing the [300-550 NPDESI exam](#) automatically renews any existing CCNA or CCNP certifications.

This program provides a soup-to-nuts course to develop and validate automation and programming skills. It covers the role of network engineers as this role shifts toward programmability, automation, and orchestration.

The training explains network programming basics, including Linux and Python, along with common automation protocols such as NETCONF and REST, explaining how they relate to YANG data models. It also covers DevOps, agile software development, and automation tools such as Ansible, Chef, and Puppet. The course includes instruction on a variety of SDN controllers, emphasizing hands-on learning via lab exercises.

Training for the NPDESI exam is offered as an instructor-led workshop by way of Cisco Learning Partners. It also comes in the form of self-paced interactive training replete with videos, integrated labs, and assessments.

PRNE—PRNE is self-paced training with immediate value for network engineers planning to use network programming to simplify or automate tasks. PRNE is recommended before undertaking the Cisco Network Programmability Design and Implementation Specialist certification course and exam. It covers the basics of Python programming within the context of performing tasks that pertain to network engineers.

New DNAIE for engineers using DNA now—The new DNAIE course supports networking professionals who are setting up Cisco DNA today. It consists of five days of DNAIE training that teaches general concepts. These include the role of orchestration and automation enabled by controllers in DNA, integration with other technologies, and security setup.

Cisco DNA and programmable networking are transforming IT. Are you ready to become even more relevant?

The DNAIE program aims to provide you with these skills:

- Describe the DNA vision, strategy, and general concepts, including the role of orchestration and automation that controllers make possible in DNA
- Identify use cases of DNA controllers and the role of various applications in the APIC-EM controller
- Explain how security is implemented in DNA using DNA secure access and pervasive security features and their benefits
- Identify how DNA blends technologies such as advanced analytics and Connected Mobile Experiences (CMX) Cloud

This course is available as an instructor-led workshop from Cisco Learning Partners. It also may be taken as self-paced interactive training with videos, integrated labs, and assessments.

Become even more relevant with updated skills

Cisco DNA and programmable networking are transforming IT. Are you ready to become even more relevant? Are you ready to become a programmable network master by learning new skills and new technologies? If your answer is yes, then Cisco can deliver the greatest possible advantage from all the advancement opportunities that programmable digital networks open up to IT professionals.

Cisco has been leading the way in learning for decades, and we continue to deliver. We are helping to mold talent that is truly capable of transforming businesses in the digital age. We will continue to evolve our portfolio with an increasingly interdisciplinary approach.

We have been continuously expanding our portfolio of digital skills training to cover the latest technology and in-demand job roles. This includes DNA fundamentals, data analytics, network programmability, cybersecurity, the Internet of Things (IoT), the cloud, and business skills. All of these are necessary to help IT professionals advance in their careers and become even more valuable to their employers.

Cisco is continually updating its list of certifications to help your skills stay relevant as the industry evolves and new technologies emerge. Recent additions such as the Network Programmability Design and Implementation Specialist certification can help you gain the IT skills essential to ensuring your success today and into the future.

For additional details, please visit the [network programmability page](#) on the Cisco Learning Network.