CISCO
The bridge to possible

A Journey to Cloud Network Management in Manufacturing

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The evolution of network management in manufacturing

Innovations such as automation, Artificial Intelligence and Machine Learning (AI/ML), Augmented Reality (AR), Virtual Reality (VR), and robotics are diversifying the makeup of devices in manufacturing networks, demanding high speeds and low latency. Organizations are also decentralizing, with 90% of manufacturers in an IDC study [1] saying that they already have or plan to implement a hybrid work model. Secure, remote access to business applications and to production data and equipment is vital for everyone, including executives, plant and operation managers, and supply chain partners. Different networking and security solutions are required.

The transition to advanced technologies and hybrid work put massive stress on the network and the teams that support it, threatening future technology and business innovations.

With hybrid workers, network operations teams must support a remote, mobile, diverse, and data-hungry base of users, devices, and applications. Other IT support challenges and opportunities include AI-driven quality control, supply chain forecasts using AI to improve accuracy, managing as-a-service consumption of technology, deploying IoT for a data-driven smart factory, and pervasive security inside and outside of company facilities. Each factor plays into the others and creates a need for simplicity, resiliency, and agility in the network.

This white paper outlines these trends and presents a scaling IT operating model as a path toward helping manufacturing IT address the opportunities and challenges of hybrid work and advanced digital and networking technologies.

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[1] Workplace Transformation in Manufacturing: Driving Competitive Advantage, IDC, 2022.

The trends guiding networking

Cisco sees several factors facing IT organizations in manufacturing that are building out the network for the future. These highlight how IT organizations are working differently to deliver applications faster and support new devices, without compromising security.

Automation and analytics

The company-wide manufacturing network is increasingly complicated, with a diverse set of devices, ways of connecting, and locations to connect from. It's no longer just laptops and cell phones; everything is connected, from lights and machines on the factory floor to parts and finished products in warehouses. As such, network operations teams are starting to rely on automation and AI/ML to simplify network operations.

Automation replaces repetitive, manual tasks with software, reducing time and labor, for faster production and lower operational costs. One example of automation is the use of analytics to help manufacturers implement predictive maintenance solutions. IoT sensors embedded in machines and equipment can collect real-time data on performance. This data can be analyzed to proactively provide maintenance, prevent costly breakdowns, and optimize maintenance schedules.

IoT sensors can track inventory levels, helping manufacturers maintain optimal stock levels, reduce waste, and avoid production interruptions caused by material shortages.

Both automation and analytics require a network that is agile, flexible, and ubiquitous.

As-a-service consumption

IT has traditionally centered on installing and managing infrastructure as a reaction to business demands, with a focus on managing infrastructure costs. With the rise of as-a-service consumption, IT organizations in manufacturing have an opportunity to change that dynamic.

The cost structure of as-a-service technology, and the ability to scale services based on outcomes and more easily add new capabilities, helps shift IT efforts away from cost reduction toward activities that effectively contribute to profit.

Internet of Things (IoT)

The proliferation of remotely accessed devices, assets, and sensors in factories, warehouses, vehicles, and offices is speeding up. Manufacturing organizations are looking at IoT as the answer to a wide range of problems, covering everything from predictive maintenance on machines to quality control for products and energy efficiency. Manufacturers can improve employee safety by monitoring air quality in factories, warehouses, and office environments and to track warehouse efficiency by monitoring the movement of assets and equipment.

Such an influx of devices on the network will drive further convergence between IT and Operational Technology (OT) teams. With OT relying heavily on the network, both IT and OT teams will need to collaborate and share intelligence on network and device health, frequency band usage, security, policy, and maintenance efforts. IT will need a more data-driven and mobile network to do this effectively.

Security

The complexity of mobility, a heterogeneous device base, and IoT means IT is thinking differently about security. IT teams in manufacturing environments have recognized that security cannot be a guarded perimeter around the network and instead needs to be pervasive through the network. From the office to the coffee shop, and from the laptop to the connected security camera, security must permeate everything in the network.

Network access is available 24 hours a day, seven days a week, globally. Network operations teams need to be able to react to security threats at any point in the day or night, wherever they are. Immediate network access, whether an admin is on-premises or at home, is imperative.

Each of these trends play into one another, creating a renewed need for simplicity, resiliency, and agility in how network operations teams manage the network.

This is ultimately driving manufacturing IT toward cloud management for the network, with three in five enterprises already reporting the use of some level of cloud-based platform to manage network infrastructure.[2]

Hybrid work case study

One use case that brings to life the interplay of these trends and the resulting need for cloud network management in manufacturing is the growth of hybrid work.

The pandemic started a significant cloud push at the application level, with 70% of organizations reporting that it accelerated the migration of apps to the cloud.[3] This was a matter of business survival as workers moved to remote work and needed access to collaboration and productivity tools. However, the use of cloud in the application layer has not abated, with a recent Gartner report highlighting that 95% of digital workloads will be deployed on cloud-native platforms by 2025.[4]

To enable these cloud applications to function effectively regardless of location or device, the manufacturing network needs to be more mobile, agile, and optimized for remote access.

Research from Enterprise Management Associates shows that 85% of organizations are experiencing a permanent increase in the number of employees working from home at least part time.[5] What's more, people aren't just working from their laptops anymore, with Cisco data showing a 200% increase in meetings accessed from mobile devices.[6] Contrast that with research in 2021 that showed only 41% of manufacturing employees were working from home and less than half of companies had provided remote monitoring of factory machines.[7]

As people return to the office in a hybrid fashion, employers are grappling with how they can help employees feel safe and how they can manage the costs of a near-empty building. And IT is implementing changes to deliver applications quickly, automate policy management, and secure workers wherever they may be. With network operations employees being largely hybrid themselves, IT organizations have a complicated set of considerations that drive the trends outlined earlier.

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[2] Global Networking Trends Report, Cisco, 2023.

[3] Hybrid Work Requires Network Transformation, Enterprise Management Associates, 2022.

[4] Gartner Says Cloud Will Be the Centerpiece of New Digital Experiences, Gartner, 2021.

[5] Hybrid Work Requires Network Transformation, Enterprise Management Associates, 2022.

[6] Cisco Hybrid Work Index, data from February 2020 to January 2022.

[7] How to make remote work a reality, World Economic Forum, 2021.

95%

95% of new digital workloads will be deployed on cloud-native platforms by 2025.

Source: Gartner

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85% of organizations are experiencing a permanent increase in employees working from home at least part time.

Source: Enterprise Management Associates

70%

70% of enterprises report that the pandemic accelerated the migration of apps to the cloud.

Source: Enterprise Management Associates

Figure 1.
Trends driving migration to the cloud

This is where cloud comes in. Manufacturing IT organizations need the right blend of networking technology, simplicity of management, and operational agility to deliver hybrid work at scale. Networking teams are implementing cloud network management to:

- Enable remote monitoring and/or management.
- Support cross-network automation to provide real-time diagnostics, automated onboarding, and policy management.
- Collect data across the network from user devices and IoT sensors to speed up decision making.

All in all, networks require high levels of adaptability, simplicity, and the ability to securely connect and support users regardless of their location. This circles back to the earlier trends and highlights the need for cloud networking now.

What is cloud network management?

To address these challenges and adapt to the requirements of a more distributed workforce, manufacturing organizations are rapidly adopting network management platforms in the cloud. Cloud network management not only removes the need for a physical network management device on-premises, but it also helps manufacturing IT organizations evolve their operations to meet these new requirements head on.

With cloud management, the manufacturing industry can enhance productivity of workers both on-site and working remotely, reduce operational costs, and improve factory operations. Manufacturers can create more efficient, agile, and sustainable processes. Cloud-based management provides a centralized and accessible platform to store and retrieve data, making it easier to manage and analyze information from many sources. Operations can be scaled up or down as needed by using cloud resources. Advanced data analytics in the cloud gives manufacturers insights to support data-driven decisions.

To better understand how this capability affects the trends guiding networking, it's worth taking a closer look at cloud monitoring and management.

What is cloud monitoring?

Cloud monitoring provides more than just a view of the networking environment in a centralized dashboard. Network operations can use cloud monitoring to inspect networking statistics (such as traffic information) and configurations (such as connected ports) and perform basic troubleshooting from 10 meters or 100 miles away.

One of the first benefits users of cloud monitoring realize is access to network data at scale. Cloud monitoring of networks connects the switching and access infrastructure to a centralized dashboard to which data is funneled, allowing IT organizations to make decisions faster and serve as the backbone for any automation efforts.

This access to data also speeds up issue resolution. A network administrator can identify switch connection troubles and start mitigating the impact from anywhere on the planet. This is increasingly important as more switches are being deployed to support trends such as IoT with Power over Ethernet (PoE) lighting and to pull data from IoT hubs to a centralized dashboard.

Cloud monitoring is often a first step toward full cloud management, as it allows networking operations teams to experience the benefits of cloud without having to replace their existing on-premises management system.

What is cloud management?

Cloud management takes cloud monitoring and adds a high level of flexibility and agility for manufacturing network operations teams. The centralized dashboard can be used to remotely manage onboarding, identity, port configuration for switches, analytics, and security without the cost and complexity of on-premises wireless controllers and overlay management systems. The data collected from the network can also be used to fully automate these processes with automated security alerts and zero-touch provisioning of devices.

The ability to manage large manufacturing networks with tens of thousands of endpoints from a central hub enables IT teams to take full advantage of the networking trends outlined earlier. In fact, almost 700,000 Cisco customers manage their network at least in part from the cloud.

Flexibility in how cloud is consumed is another benefit. Cloud network management (including monitoring) is an as-a-service offering. IT organizations can take advantage of cloud network management without the upfront costs of an on-premises solution. In addition, it can be easily scaled according to the needs of the organization and is always up to date with the latest features and security.

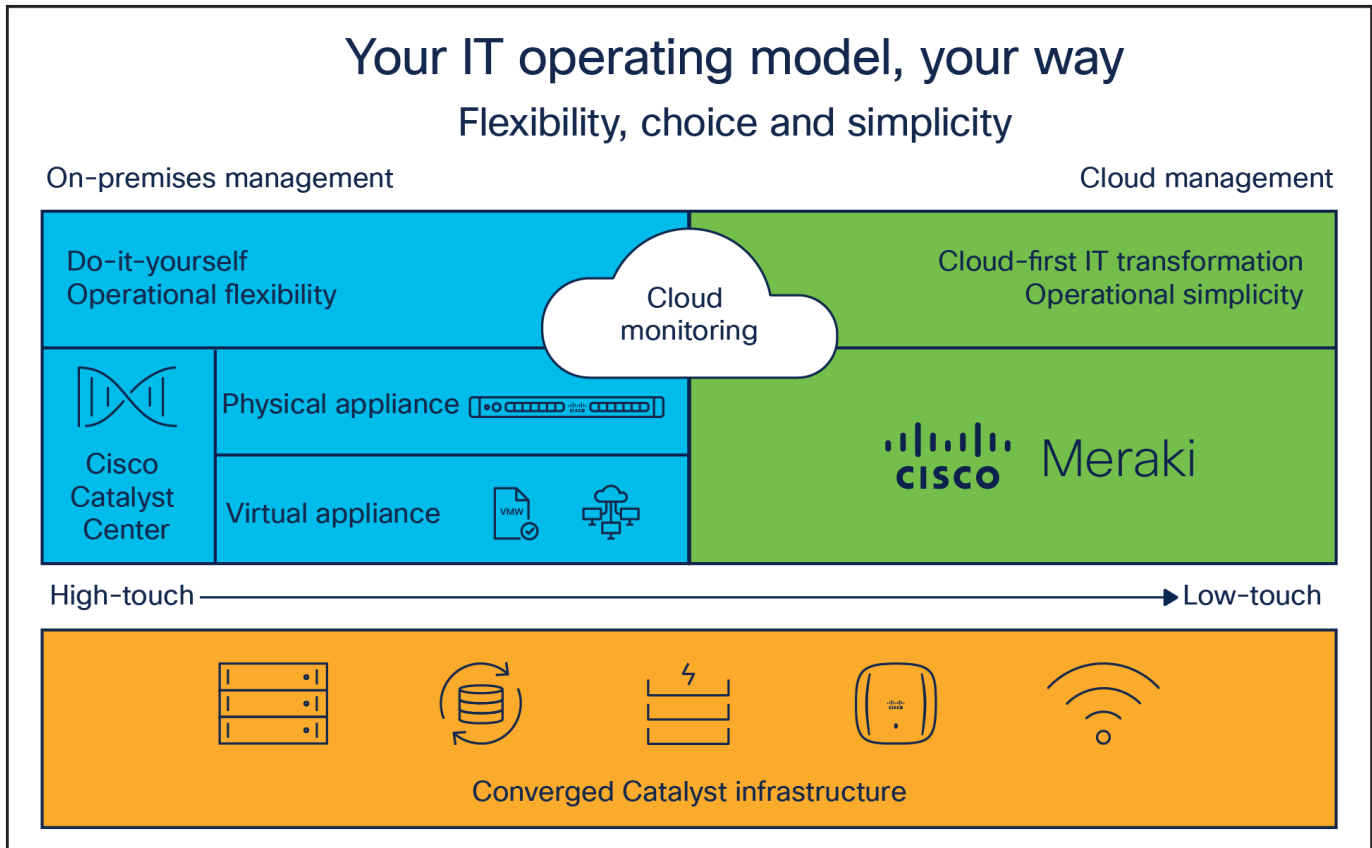## The Cisco full-spectrum IT operating model

Figure 2.
The Cisco full-spectrum operating model

Cisco offers a unified approach to cloud networking management to support everything from air-gapped, on-premises network management to fully cloud-managed networks with solutions that emphasize flexibility, choice, and simplicity. The goal is to meet network operations where they are in their cloud journey.

This approach unlocks a vast expanse of opportunities for IT organizations, all of which are built on trusted, known Cisco platforms that provide a consistent experience regardless of the use case.

Cisco is investing in on-premises and cloud management for today's challenges in manufacturing, with an eye toward what customers will need tomorrow.

A (virtual) on-premises operating model

While cloud enables new use cases and improves simplicity, not all networks can be hosted in the cloud today.

Cisco understands these needs and as such is continuing to invest in its on-premises network management platform, Cisco Catalyst Center. The newest innovation from Cisco in on-premises network management is the Catalyst Center virtual appliance.

Catalyst Center traditionally resides on a physical appliance. The Catalyst Center virtual appliance eliminates the need for this hardware and deploys Catalyst Center in a public cloud service such as AWS or in a VMware ESXi virtual environment. It can be located on-premises or in a colocation facility and provides feature parity with the physical appliance.

The journey to cloud-first IT transformation

As outlined earlier, the cloud-managed network transformation in manufacturing is already underway. IT organizations want to engage in the trends guiding networking, and this can't always be achieved with the existing network infrastructure. Cisco understands this and is building the future of the network today by bringing together the Cisco Meraki cloud platform with Cisco Catalyst hardware. This will be a scalable platform to support IT as they embark on the journey from on-premises to the cloud.

Many manufacturing IT organizations that are Cisco customers are well on their way to the cloud, with high-density Catalyst access points that are available in the Meraki cloud management platform.

Plant managers, engineers, and operations personnel can use cloud-based management to introduce automation, improve process performance and automation, and manage employees. Executives can oversee operational safety, security, and environmental regulations with data and analytics in cloud-managed solutions. Reliability and efficiency can be enhanced in supply chains with cloud-based, data-driven management of supplier inventories and logistics. Industrial system integrators can use the cloud to design, build, and implement advanced manufacturing methods to decrease time to market and trim inefficiencies.

The journey to cloud management allows manufacturing IT to engage in the trends described at the outset of this white paper in a scalable way. Today, with minimal disruption, IT organizations can deploy cloud monitoring from Cisco Meraki for the Cisco Catalyst 9000 switching family, bringing access to real-time network data and enabling remote troubleshooting of network issues.

IT can take this journey one step further by enabling cloud management for the Cisco Catalyst 9162, 9164, and 9166 Series Access Points with the Cisco Meraki cloud management platform.

This solution migrates the Catalyst hardware from Catalyst Center to the Meraki cloud management platform. With this migration, an on-premises network management system is no longer needed to support the network.

The IT operating model from Cisco is scalable, from on-premises to cloud network management, and brings converged hardware that works regardless of the management platform. From optimized warehouse operations to assembly line automation, there are a variety of compelling use cases that will spur IT teams in manufacturing companies to transition to the cloud when they are ready and to protect their technology investments by not having to rip and replace hardware.

Summary

Networking is changing fast, and the Cisco IT operating model can help manufacturing IT teams to do a variety of things. It helps companies support hybrid workers, enhance cybersecurity, deploy AI-driven quality control, enable real-time data sharing to support smart factories and supply chain optimization, and support the adoption of eco-friendly and sustainable materials, processes, and strategies.

With cloud network monitoring and management from Cisco, IT organizations can be more flexible and more responsive, worry less about how the network is managed, and have more time to focus on projects to drive business success.

The journey to the cloud is about simplifying IT everywhere, at every scale, at a time of extreme infrastructure diversity and complexity. In manufacturing companies, a unified management platform is needed to handle both on-premises and cloud operating models. It's the Cisco Networking Cloud vision in action, enabling a consistent way to automate operations, manage diverse devices and solutions, use AI/ML to analyze and diagnose issues, and assure a secure and productive user experience for a hybrid workforce.

Resources

[Try our Meraki instant demo](#)

[Watch a demo of Catalyst and Meraki, together](#)

[See more on Meraki dashboard](#)

[Learn more about access networking](#)