

# Innovate for digital success

With an open and certified ecosystem



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5G and edge:

# Creating change

## across industries

Telecommunications service providers (telcos) connect the world. These connections are an essential part of our lives, and their importance continues to grow. Even so, change is inevitable, and service providers face an evolving landscape of technologies, partners, and customer needs. To dynamically respond to new opportunities and challenges, leading service providers are adopting cloud-native architectures and development models.



Partnership and multivendor solutions are critical for rapid, flexible digital service development and delivery. This e-book discusses the value of open, certified partner ecosystems for telecommunications and highlights key partnerships in six essential areas.

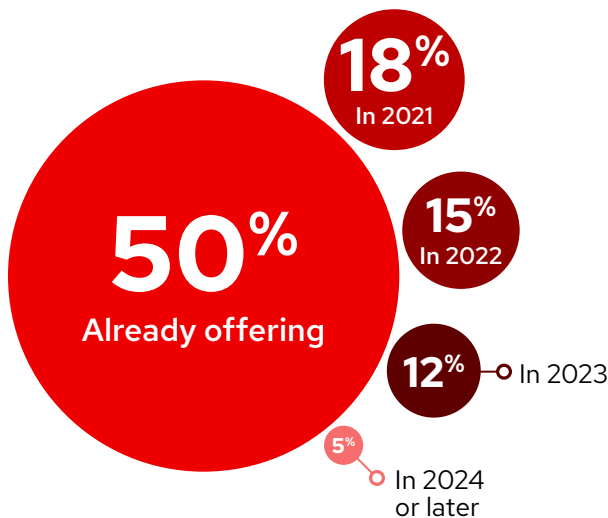
# Catalysts for transformation

5G technologies and edge computing shape how service providers approach cloud services, network infrastructure, business operations, and customer experiences. Telecommunications vendor ecosystems play a critical role in building effective transformation strategies.

## 5G

**5G technologies** offer greater capacity, speed, and cost efficiencies. In fact, 50% of service providers already offer commercial 5G services.<sup>1</sup> Deploying 5G networks can help you create new revenue streams via high-value customer experiences. These networks also have the potential to transform other industries like transportation, medicine, agriculture, and public services.

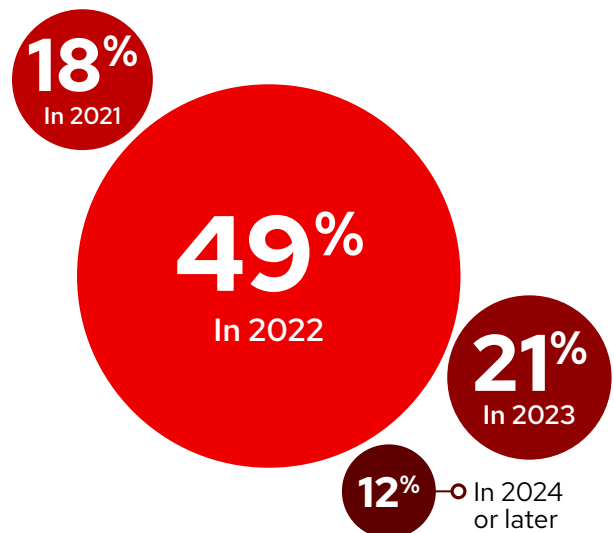
Expected availability for commercial 5G services<sup>1</sup>



## Edge

**Edge computing** shifts compute resources from your datacenter to intelligent endpoints at remote locations while allowing you to centralize resources as needed. By deploying processing power and network functions closer to your network edge, you can improve application performance, reduce network bandwidth consumption and cost, and create differentiated, low-latency services.

Expected availability for 5G edge services<sup>1</sup>

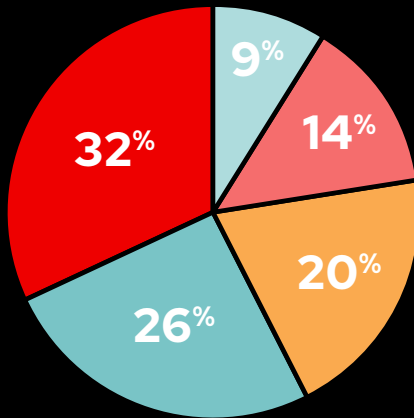


<sup>1</sup> Heavy Reading. "5G Network & Service Strategies Operator Survey," May 2021.

## Unlock the value of 5G technologies and edge computing

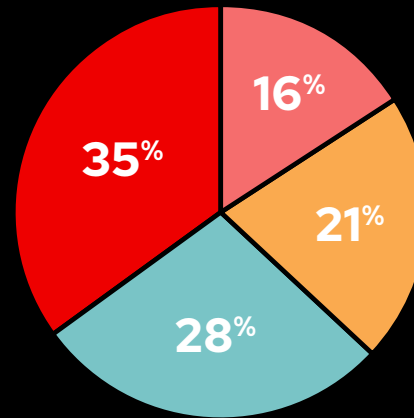
5G technologies and edge computing offer many benefits, but you need new management and operational approaches to effectively monetize 5G and edge services.

### Top limitations to 5G and edge deployment<sup>2</sup>



- Cost and complexity of infrastructure
- Availability of certified, tested, and validated ecosystem applications and use cases
- Limited customer demand
- Application providers are not yet ready
- Internal skills and readiness

### Top reasons for moving workloads to the edge



- Improve application performance
- Better support vertical industry applications
- Reduce bandwidth use and cost
- Offer differentiated services

## Modern, cloud-native approaches are required for success

**Cloud-native technologies** and concepts like containers, Kubernetes, and continuous integration/continuous deployment (CI/CD) can help you become a successful digital service provider.

- ▶ Improve application and service security, scalability, and portability.
- ▶ Develop, deploy, and scale differentiated applications more quickly and cost-effectively.
- ▶ Prepare your infrastructure and business for future change and adaptation.

<sup>2</sup> Heavy Reading. "5G Network & Service Strategies Operator Survey," May 2021.

# Partnership is critical

## for core-to-edge solutions

Modern, core-to-edge network, business, and customer experience solutions rely on vendor and service provider partnerships and ecosystems.

A partner-based approach to transformation can provide:

- ▶ Increased choice of technologies and services.
- ▶ Complete, interoperable solutions based on certified components.
- ▶ Greater network and operations scalability and flexibility.
- ▶ Innovation and best practices that have been proven across industries.

### Start with an agile, open foundation

Effective multivendor solutions rely on a common platform to bring tools, technologies, and workloads together. An open horizontal hybrid cloud platform that can support any workload on any footprint at any location gives you the flexibility to build the right solution for your organization. It also gives you the agility and efficiency you need to quickly introduce new services and forms of revenue and adapt as your needs change.

Deploying a horizontal, cloud-native architecture can deliver:<sup>3</sup>

**27%** Total cost of ownership (TCO) savings.

**30%** Operational expense (OpEx) savings

<sup>3</sup> ACG Research, sponsored by Red Hat. "Telco cloud: Business impact of open platforms," August 2021.

## Build a foundation for the future

Red Hat combines an open horizontal hybrid cloud foundation with a large ecosystem of industry-leading partners to help you build the infrastructure you need to take advantage of 5G and edge opportunities. With this consistent foundation, you can deploy solutions from multiple vendors to implement your business and operational strategies and stay competitive at all times.

**Red Hat® platforms provide a stable yet innovative base for deploying partner products, solutions, and services from a large, certified ecosystem.**

These platforms are based on innovation that began in open source communities, giving you more choice. In particular, **Red Hat Enterprise Linux®**, **Red Hat OpenStack® Platform**, **Red Hat OpenShift®**, and **Red Hat Ansible® Automation Platform** provide an open, programmable, cloud-native software foundation for modern telecommunications networks and operations.

Integration throughout the Red Hat portfolio lets you deploy a consistent, adaptable, reliable, and scalable infrastructure with less work. Standardized tools and operations boost efficiency across your organization. And interoperability and flexibility let you introduce emerging technologies and modern development and operations approaches at your own pace.

95% of telecommunications IT leaders say that their organization uses **enterprise open source**.<sup>4</sup>

<sup>4</sup> Red Hat. "The State of Enterprise Open Source," February 2021.

## The value of open

Open source communities develop many of the technologies needed to modernize your infrastructure, operations, and experiences. They also promote interoperability, collaboration, and innovation across technologies and industries.



## Gain choice and stability with a robust partner ecosystem

Red Hat's **open business model** focuses on collaboration and partnership to bring vendors, customers, and communities together. The Red Hat global telco ecosystem brings together industry-leading partners and trusted open source communities to create diverse innovative, validated, integrated solutions for the telecommunications industry.

Red Hat curates the most useful, reliable, and future-ready partner applications, products, and services to create a robust ecosystem. Each partner offering is tested and validated to perform on Red Hat platforms across use cases. Detailed certification policies ensure compatibility and stable operation. Red Hat also works closely with ecosystem partners to certify their latest releases on an ongoing basis. As a result, you can always choose your preferred cloud vendors, network applications, platforms, and integrated technologies and services, with confidence that they will work together reliably.

### Partner certification

Red Hat works with partners to certify products, services, and technologies on Red Hat platforms. For example, Red Hat offers cloud-native network function (CNF) partners three options to integrate with Red Hat OpenShift, allowing them to choose their level of investment.

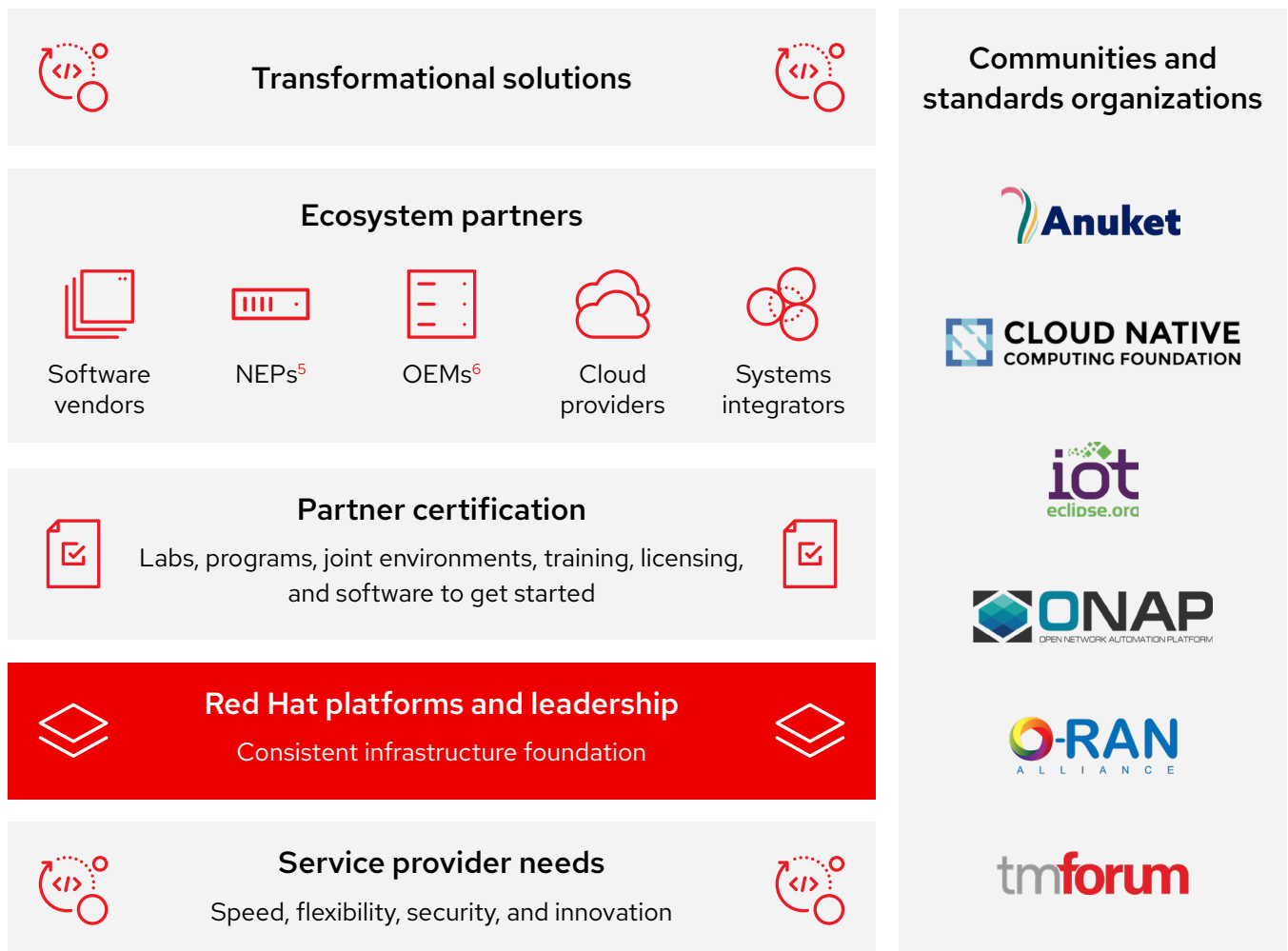
- ▶ **Vendor-validated certification:** The application vendor verifies interoperability in a standard environment.
- ▶ **Red Hat OpenShift operator certification:** The vendor works with Red Hat to build and deliver a Red Hat OpenShift **operator**.
- ▶ **Red Hat OpenShift CNF certification:** The vendor works with Red Hat to apply best practices and perform CNF-specific tests in a standard environment or in Red Hat's integration lab.

Read the **CNF certification for telcos overview** to learn more.



# Red Hat's flexible ecosystem framework

We take a layered, customer-centric approach to our ecosystem. Additionally, we participate in other vendor, customer, and open source ecosystems to maximize your flexibility and choice.

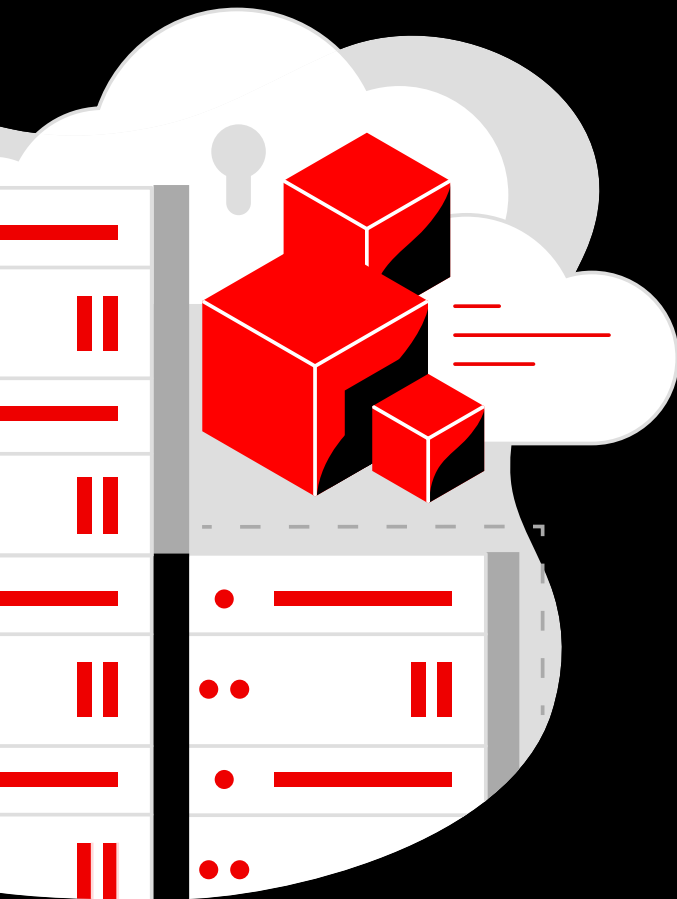


<sup>5</sup> Network equipment providers

<sup>6</sup> Original equipment manufacturers

# Transform for digital success

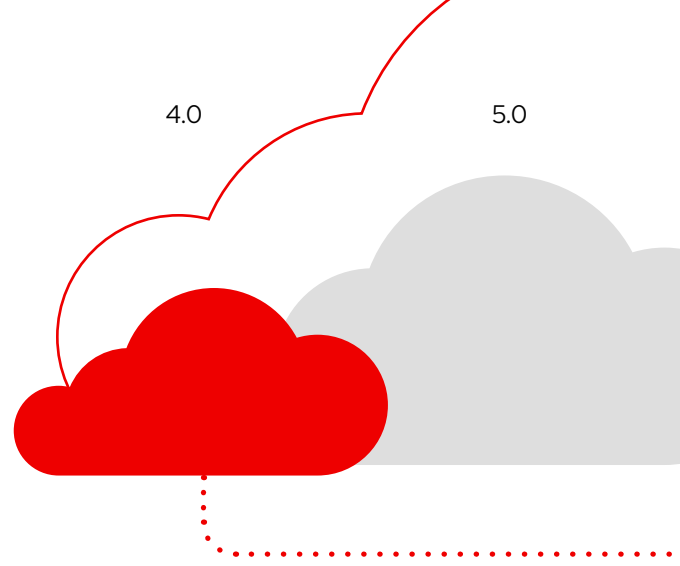
5G technologies and edge computing impact your entire network and business environment. Partnerships can help you implement your 5G and edge strategies successfully. We've identified six key areas of transformation for becoming a digital service provider.



## In this section:

- 3.1** Cloud strategy
- 3.2** Network infrastructure
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# Transform your cloud strategy



## Take advantage of cloud flexibility

Service providers can adopt hybrid and multicloud strategies to expand their business and operations to the edge more easily. Hybrid cloud environments that encompass both datacenter and public cloud infrastructure let you rapidly connect and manage edge devices.

You can also use hybrid environments to modernize your core network services and enterprise applications. Combining cloud services with consistent, cloud-native platforms can help you adopt new development approaches, speed application delivery, boost operational efficiency, and reduce overall costs, all while maintaining flexibility and portability across vendors.

Red Hat works with major public cloud providers to certify and integrate platforms and services so you can build consistent, agile hybrid and multicloud network environments.

## Support your developers

Red Hat provides a variety of resources, tools, and programs that help you develop quickly and cost-effectively on our platforms:

- ▶ Low-cost and no-cost developer **subscriptions**
- ▶ Free developer **sandboxes**
- ▶ Interactive **learning paths**
- ▶ Developer **tools and plugins**

Learn more: [developers.redhat.com](https://developers.redhat.com)

# 59%

of service providers plan to offer edge services on hybrid (public and private) telco cloud infrastructure.<sup>7</sup>

<sup>7</sup> Heavy Reading. "5G Network & Service Strategies Operator Survey," May 2021.

## Key public cloud partners



Amazon Web Services (AWS) provides telecom solutions to transform infrastructure and processes, strengthen security posture, and integrate advanced technologies. Together, Red Hat and AWS offer a proven, scalable and consistent hybrid cloud foundation through offerings like Red Hat OpenShift Service on AWS.

**Learn more** about our solutions and how we can help expand your business capabilities.



Google Cloud helps businesses solve their toughest challenges. Together, Red Hat and Google Cloud deliver flexible hybrid cloud solutions that help you transform your IT infrastructure and operations to be modern, agile, and digital.

**Learn how** you can create automated processes that span your infrastructure using Red Hat cloud and automation platforms on Google Cloud.



Red Hat and Microsoft give you choice and flexibility for hybrid cloud deployments, delivering enterprise operating systems, simplified container technologies, rigorous security, and integrated support. Red Hat platforms on Microsoft Azure let you deliver any application, anywhere, without additional overhead or complexity.

**Find out** how we provide an ideal public cloud foundation to support modern IT needs.

## Get started faster with cloud services

Red Hat works with cloud partners to deliver fully managed cloud services that simplify deployment and operations while saving costs over in-house construction:

- ▶ Red Hat OpenShift Dedicated on AWS or Google Cloud
- ▶ Red Hat OpenShift Service on AWS
- ▶ Microsoft Azure Red Hat OpenShift
- ▶ Red Hat OpenShift on IBM Cloud

Learn more: [redhat.com/en/technologies/cloud-computing/openshift](https://redhat.com/en/technologies/cloud-computing/openshift).

# Transform your network infrastructure

## Deploy cloud-native, software-defined network infrastructure

Demand for new services and bandwidth continues to grow. In fact, global mobile data use is expected to increase by 3.6x between 2020 and 2026.<sup>8</sup>

Most service providers' existing network infrastructure is not flexible enough to handle this growth. Expansion and modernization are critical as aging and rigid infrastructure can be difficult and expensive to scale quickly. As a result, you may miss valuable market and revenue opportunities.

To compete effectively, you need to increase network efficiency, flexibility, and scalability while supporting rapid service development and controlling overall costs. Transforming your network from core to edge can help you achieve these goals.

Red Hat partners with leading vendors to help you build a cloud-native, software-defined network infrastructure for digital growth.

Global mobile data use is expected to increase by 3.6x between 2020 and 2026.<sup>8</sup>

<sup>8</sup> GSMA. "The Mobile Economy 2021," July 2021.

## Key network infrastructure partners



Cisco uses a cloud-to-client approach to unify multivendor solutions into a streamlined open network architecture that is simple, resilient, and able to be automated. Cisco and Red Hat deliver open, security-focused solutions that help you digitally transform your business, modernize your datacenter, and deploy hybrid cloud environments.

[Learn more](#) about our long-standing partnership.



Dell Technologies helps service providers roll out new 5G and edge environments with advanced solutions and an enhanced services portfolio. Red Hat partners with Dell Technologies to deliver solutions and services for telco cloud and multi-access edge compute (MEC) based on Red Hat OpenShift and Red Hat OpenStack.

[Learn more](#) about our integrated solutions.



Hewlett Packard Enterprise (HPE) offers unique, open technology solutions delivered as a service to advance the way people live and work. Through a long partnership, Red Hat and HPE simplify and reduce the risks associated with open, cloud-native network deployment. Our solutions help you develop new business models and increase operational performance.

[Learn more](#) about our partnership and solutions.



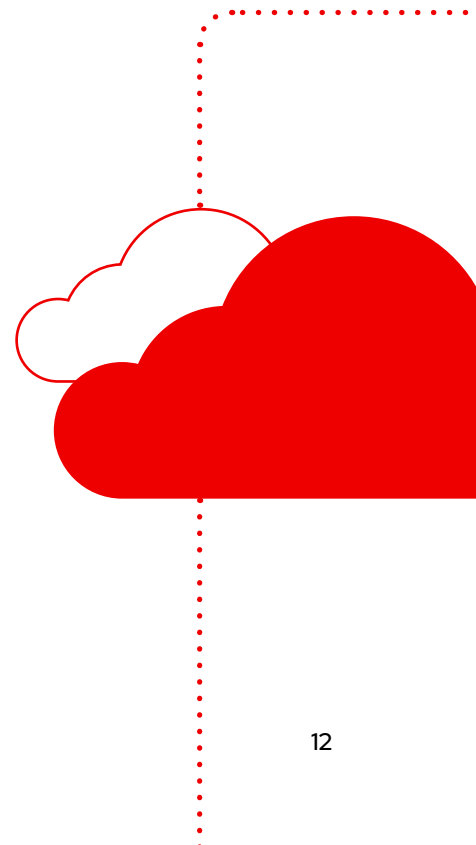
Juniper Networks simplifies networking with products, solutions, and services that connect the world. The company works with Red Hat to streamline adoption of distributed, scalable cloud environments with open, security-focused solutions based on Red Hat platforms and Juniper Contrail Networking and Contrail Cloud offerings.

[Learn how](#) we deliver distributed, scalable solutions.



Lenovo shapes computing intelligence to create a better world. From edge to datacenter to cloud, Red Hat and Lenovo deliver integrated hardware and software solutions to customers worldwide. We offer high-performance, reliable servers with software to automate infrastructure deployment and management and speed intelligent transformation.

[Learn more](#) about our partnership and solutions.





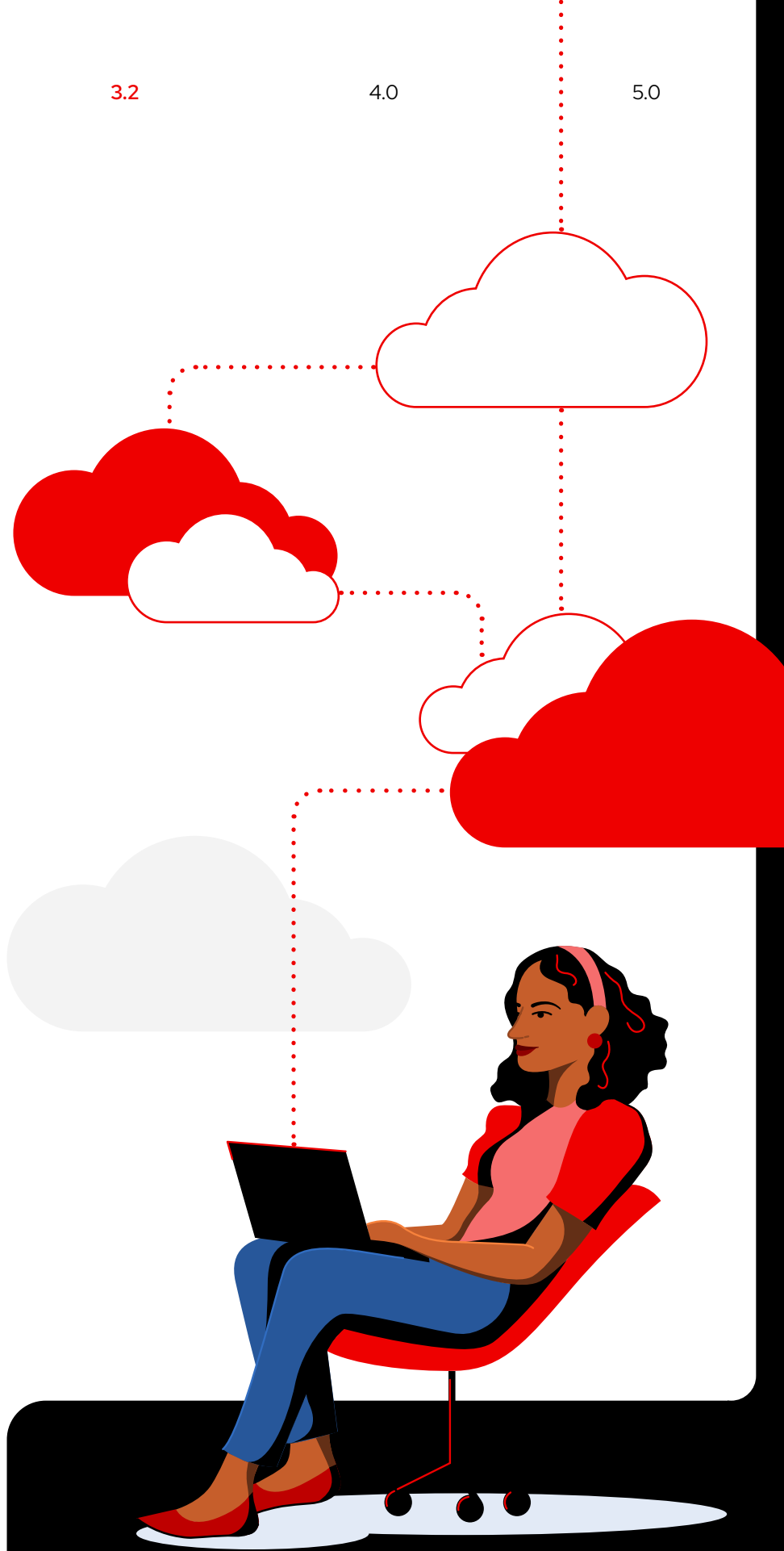
Intel builds agile, cloud-ready network architectures based on high-performance, industry-standard platforms and open, software-defined infrastructure. Together, Red Hat and Intel provide innovative and more secure enterprise-grade solutions to help you gain a competitive advantage.

**Learn more** about our partnership and collaboration.

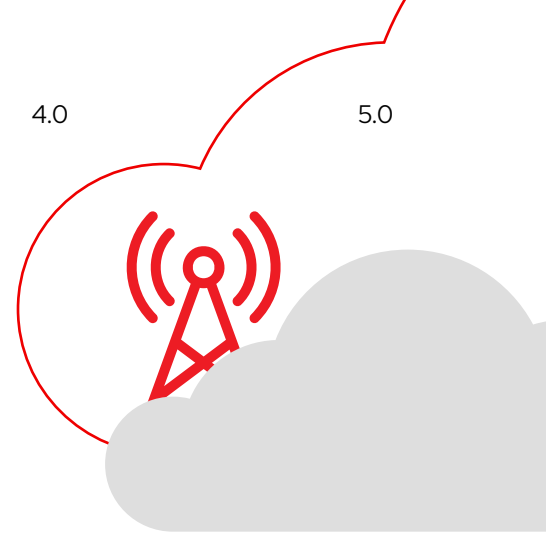


NVIDIA builds high-performance computing platforms that support scalable artificial intelligence (AI), 5G, and edge solutions. NVIDIA and Red Hat collaborate to integrate graphics processing units (GPUs) with Red Hat OpenStack and Red Hat OpenShift to deliver transformative connectivity solutions for service providers

**See an example** of how we work together to support customer success.



# Transform your radio access network



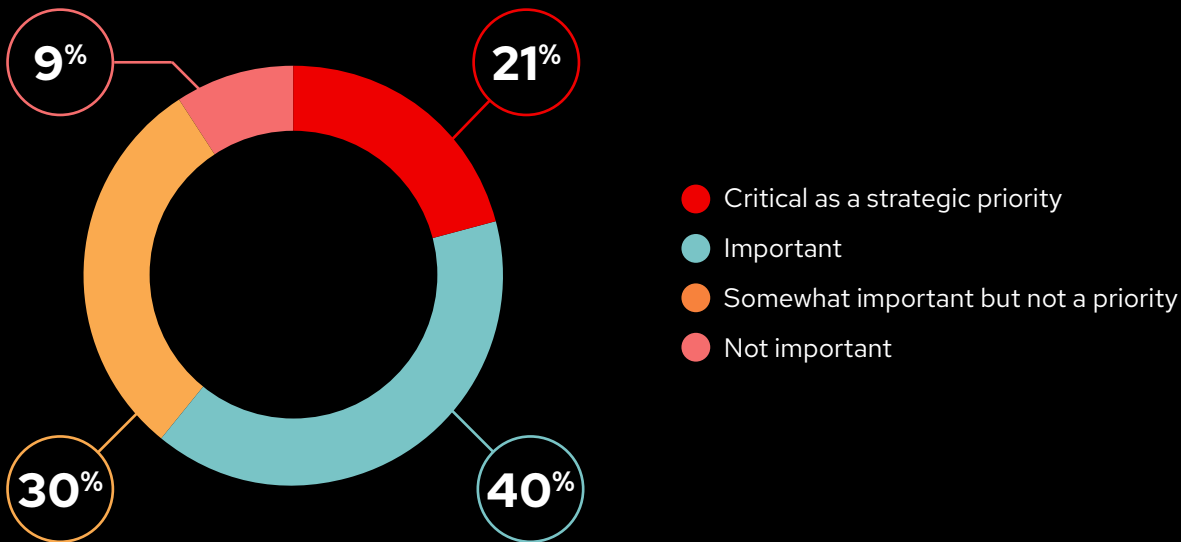
## Build a modern foundation for service delivery

In today’s digital world, radio access networks (RANs) play a critical role in delivering innovative telecommunications services. However, traditional RANs often require specialized hardware that can be difficult and costly to upgrade and scale.

To deliver innovative, high-performance services and customer experiences, you need to modernize your RAN. A cloud-native foundation and containerized technologies can help you optimize operations, improve scalability, and increase flexibility. You can also deploy automation to manage workload life cycles and operations consistently across open RAN and cloud architectures. With a modern, open RAN infrastructure, you can innovate faster and rapidly deliver low-latency, high-throughput services.

Red Hat works with leading RAN partners to deliver preintegrated and certified virtualized and cloud-native solutions that help you modernize your service delivery.

### The importance of Open RAN in service provider networks in the next three years<sup>9</sup>



<sup>9</sup> Telecoms.com Intelligence. "5G: Realities and Expectations," August 2021.



## Key RAN partners

### ERICSSON

Ericsson is a leading provider of 5G software and hardware. Ericsson and Red Hat work together in many areas to onboard and host Ericsson network functions on Red Hat cloud platforms. Red Hat is also an Ericsson Open Lab partner, collaborating to create innovative cloud RAN solutions and cloud-native applications.

[Learn](#) about our technical collaboration.

### MAVENIR™

Mavenir helps service providers accelerate their software network transformation. Through strategic collaboration, Red Hat and Mavenir deliver complete 5G and RAN functionality using Red Hat OpenShift as the CNF infrastructure with 5G core, IMS (IP multimedia subsystem) and open RAN CNF software from Mavenir.

[Learn more](#) about Mavenir's 5G and RAN solutions.

### NOKIA

Nokia uses the power of open to accelerate 5G and cloud RAN innovation. As long-standing partners, Nokia and Red Hat build open source solutions to speed time to market for telecommunications services. Together, we have successfully demonstrated an end-to-end 5G data call using virtualized RAN products and container application platforms.

[Learn more](#) about our partnership and solutions.

### Parallel WIRELESS

Parallel Wireless offers a unique, unified 5G, 4G, 3G, and 2G **OpenRAN** architecture for cost-effective wireless coverage and capacity. The company collaborates with Red Hat to help you modernize your network, reduce deployment cost and complexity, increase operational efficiency, access new revenue streams, and deploy multivendor 5G networks

[Learn more](#) about our interoperable solutions.

### Rakuten Symphony

Rakuten Symphony – a Rakuten Group organization with operations across Japan, Singapore, India, Europe, the Middle East, Africa, and the United States – is a platform company created to transform the telecom industry through cloud-native, Open RAN telecommunications infrastructure platforms, services, and solutions.

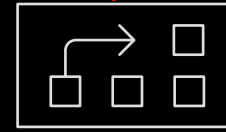
[Learn more](#) about Rakuten Symphony.

### SAMSUNG

Samsung Networks is a leader in 4G and 5G vRAN innovation with cloud-native, flexible, and scalable solutions that deliver recognized value for mobile operators. Samsung and Red Hat continue to help operators successfully deploy a variety of use cases, including 5G core, vRAN, edge computing, Internet of Things (IoT), and machine learning.

[Learn more](#) about our partnership and solutions.

# Transform your operations



## Connect and automate your operations systems

The market for digital telecommunications services is changing dramatically. Digital service delivery requires you to become more open, agile, and efficient. However, legacy operations support systems (OSS) typically use large, monolithic applications that are difficult to modify, scale, and update quickly and cost-effectively, impeding your ability to effectively deliver new services.

To stay competitive in the digital services market, you must increase operational efficiency and build a foundation that supports frequent, fast changes. Modernizing your OSS can help you increase flexibility, speed, and innovation. A containerized, microservices-based architecture delivers the capabilities you need to become a successful digital service provider. OSS modernization occurs in four main areas: process automation, resource integration, application development, and hybrid cloud migration.

- ▶ **Automate:** Automate your processes to enhance efficiency, eliminate errors, and increase consistency, all while reducing costs.
- ▶ **Integrate:** Connect diverse, distributed applications, data sources, and development teams to remove bottlenecks, optimize resource and component reuse, and promote collaboration.
- ▶ **Develop:** Adopt modern application development and delivery approaches – based on containerized microservices and DevOps models – to create cloud-native applications, improve productivity, and scale elastically.
- ▶ **Migrate:** Deploy and move your OSS applications across private, public, and hybrid cloud environments without change.

Red Hat partners with key OSS vendors to help you modernize your operations and maximize the value of both new and legacy networks.

## Key operations partners



Amdocs helps service providers build the future through cloud migration, differentiated offerings, and streamlined operations. As strategic partners, Amdocs and Red Hat integrated Red Hat cloud platforms with Amdocs Microservices Management Platform, supporting fast, scalable cloud-native application development and deployment across on-site and cloud environments.

[Learn](#) about our partnership.



Atos is a leader in telco cloud core and edge solutions as well as system integration services. Atos and Red Hat provide a path to cloud-native, container-based platforms and open architectures for telco and edge workloads. Together, we provide the technology foundation, skills, and processes to speed network transformation while upholding reliability and security.

[Learn more](#) about our partnership and initiatives.



IBM, Red Hat's parent company, is a leading cloud platform and cognitive solutions company. Based on deep open source values and experience, Red Hat and IBM support your transition to modern, cloud-native infrastructure with innovative platforms, flexible automation, intuitive management tools, and leading services offerings.

[Learn more](#) about IBM solutions for telecommunications.



MATRIXX delivers solutions to help service providers harness network assets and business agility to succeed at web scale. Red Hat and MATRIXX Software offer an agile, cloud-native converged charging system (CCS) solution to help you monetize 5G services and unify 3G, 4G, and 5G charging functions across your entire organization.

[Read the brief](#) to learn more about our CCS solution.



MYCOM OSI provides assurance, automation, and analytics solutions for service providers and enterprises. Based on the company's Assurance Cloud and Experience Assurance and Analytics (EAA) technologies, MYCOM OSI and Red Hat offer a solution with cloud-native assurance for all components.

[Read the brief](#) to learn more about our cloud-native service assurance solution.



Netcracker Technology, a wholly owned subsidiary of NEC Corporation, offers business-critical digital transformation solutions for service providers. Red Hat and Netcracker deliver a real-time business and operations environment that supports automation and innovation to speed service delivery, ease service updates, and increase sales performance.

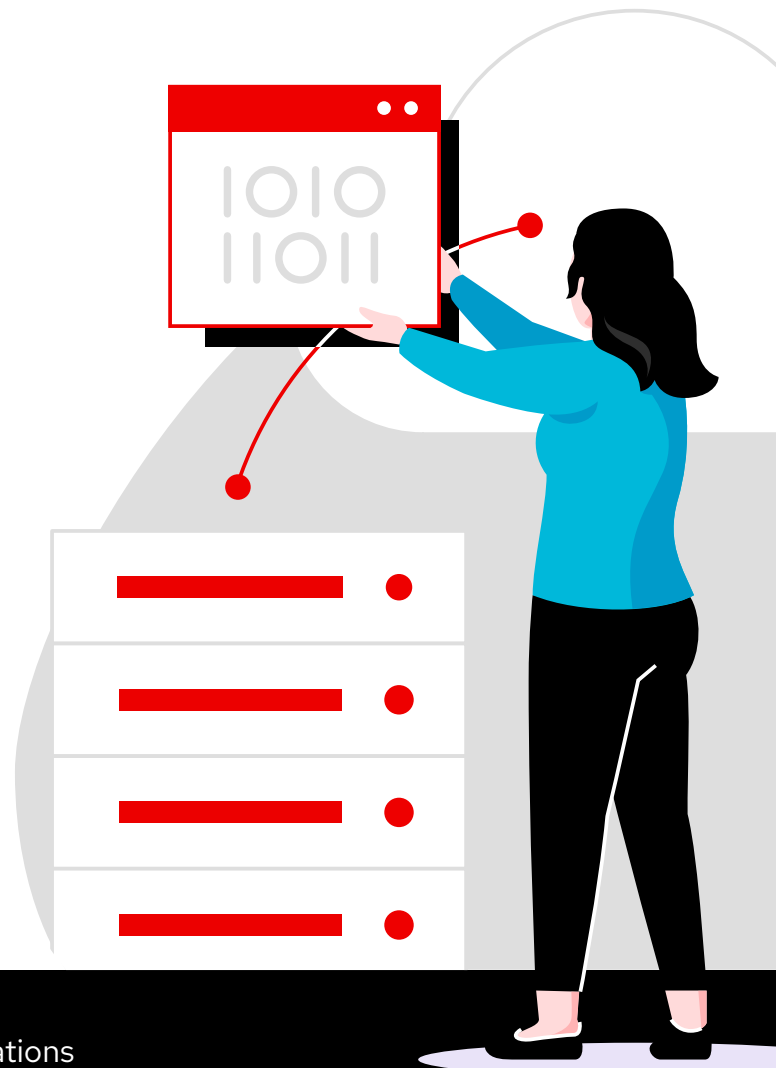
[Read the brief](#) to learn more about this solution.

# Transform your customer experiences

## Rapidly build and deliver rich, integrated offerings

Advancing technology has made richer and more valuable customer experiences possible. As users become accustomed to connected, contextual experiences in their everyday life, they demand the same experiences from all of their service providers. And if customers have poor experiences, they are likely to consider competitors' offerings.

To compete effectively, you must continually provide valuable, personalized digital experiences and content to your users. Connecting business systems – including marketing, sales, and customer care operations – lets you build the rich, layered services your customers demand. Adopt microservices architectures, DevOps methodologies, and CI/CD pipelines to speed development and deployment of new, high-quality offerings. Add flexible automation across all disciplines to further accelerate tasks while increasing security and compliance.



Red Hat partners with experts in telecommunications experiences to help you rapidly develop and deliver innovative, differentiating services to your customers.

# Transform through systems integration

## Integrate your environment

Telecommunications infrastructure contains technologies, products, and components from many vendors and open source communities. Incompatibilities between components can lead to increased downtime, reduced performance, and lower customer satisfaction. Interoperability, connectivity, and integration across your environment are critical for delivering reliable, high-quality services to your customers.

To maximize uptime, performance, and customer satisfaction, you need reliable, unified telecommunications infrastructure, operations, and services. Integration across all aspects of your organization should be a key part of your transformation journey.

## Choose your integration path

Red Hat works with many integration partners to deliver complete solutions and services and solutions you need. Purchase and deploy complete, integrated, and co-engineered solutions within your environment, or engage an integration partner to plan and build a custom infrastructure – based on a consistent, flexible, and open Red Hat foundation – for you.

Red Hat collaborates with leading systems integrators to help you transform your telecommunications infrastructure, operations, and services rapidly and effectively.



## Key systems integration partners



Accenture provides a broad range of strategy, consulting, technology, and operations services with digital capabilities. Together, Accenture and Red Hat combine technology and human ingenuity to empower you to run without boundaries in the cloud and to reach new levels of autonomy, visibility, and innovation.

[Learn more](#) about Accenture services for telecommunications.



Capgemini is a global leader in consulting, digital transformation, technology, and engineering services. Using modern technologies, extensive experience, and industry leadership, Capgemini and Red Hat bring an open, cloud-native approach to digital transformation and DevOps for service providers.

[Learn more](#) about our partnership and solutions.



IBM, Red Hat's parent company, is a leading cloud platform and cognitive solutions company. Based on deep open source values and experience, Red Hat and IBM support your transition to modern, cloud-native infrastructure with innovative platforms, flexible automation, intuitive management tools, and leading services offerings.

[Learn more](#) about IBM solutions for telecommunications.



NTT Data provides digital business consulting and technology for cybersecurity, application, workplace, cloud, datacenter, and network managed services – all supported by industry expertise, innovation, and solutions. NTT Data is a global Red Hat systems integration partner delivering Red Hat solutions and technology worldwide.

[Learn more](#) about NTT Data solutions.



Tech Mahindra offers services for building integrated customer experiences to service providers, equipment manufacturers, and software vendors. Using Red Hat technologies, Tech Mahindra helps you transform your operations and accelerate your hybrid cloud strategy.

[Learn more](#) about Tech Mahindra services.

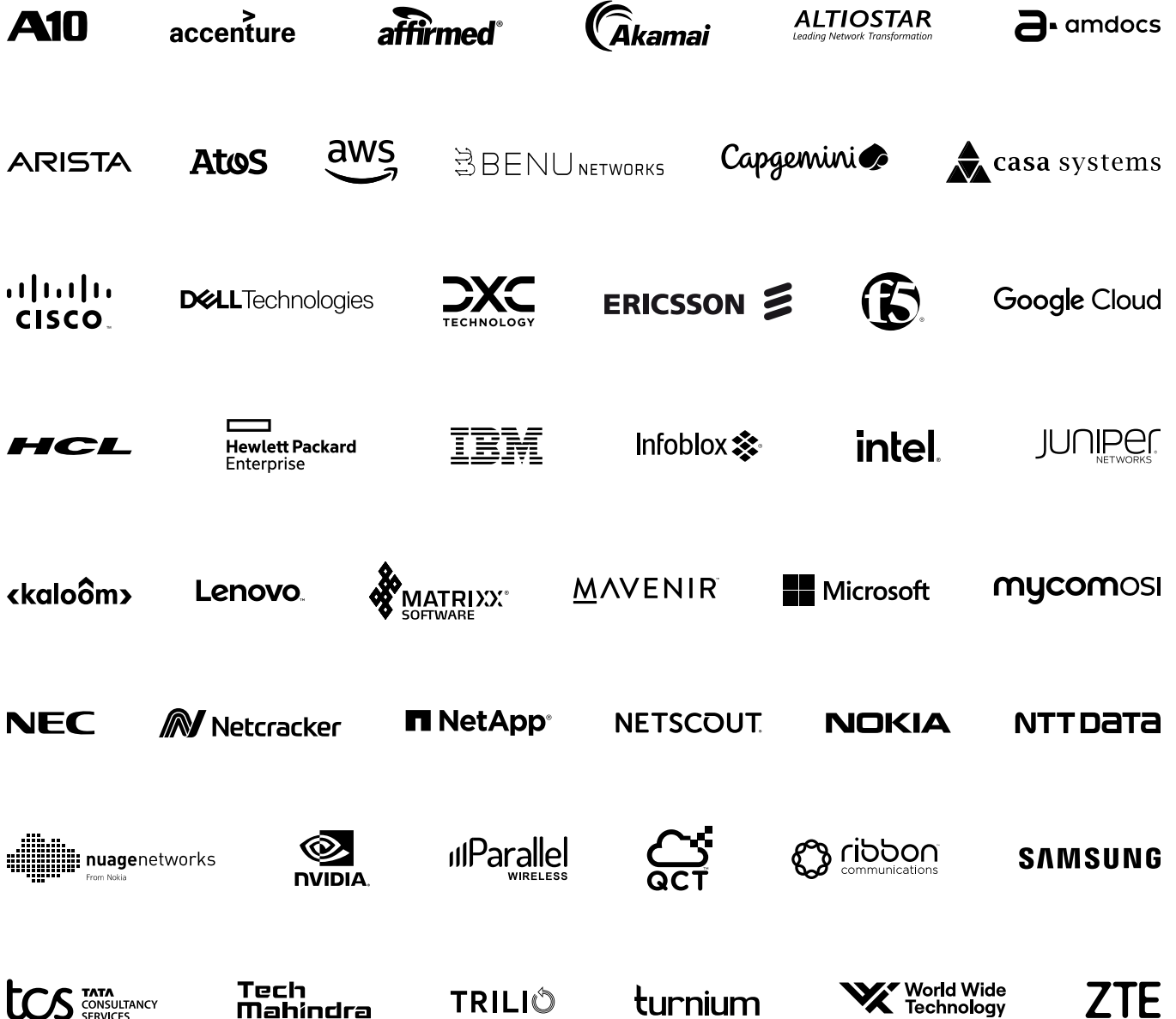


World Wide Technology (WWT) provides digital strategy, innovative technology, and supply chain solutions for large organizations. WWT collaborates with Red Hat and our partner ecosystem to create virtual central office (VCO) solutions based on open, software-defined platforms.

[Learn more](#) about the WWT and Red Hat partnership.

# The choice is yours

Modernize your network infrastructure, business operations, and customer experiences with innovative, interoperable, and adaptable solutions from a robust telecommunications partner ecosystem. Whatever your needs, we can help you successfully prepare for a changing future.



# Ready to start your transformation?

Through collaboration with industry leaders and innovators, Red Hat provides the reliable, standards-based software foundation and certified partner ecosystem you need to **become a digital service provider.**



Get started at [redhat.com/telco](https://redhat.com/telco).



## Want to partner with Red Hat?

Red Hat collaborates with partners in many ways.

Learn how we can advance business together:  
[connect.redhat.com](https://connect.redhat.com)