



**Pharmaceutical enterprises  
realize the benefits of  
adaptive networking**



# Adaptive networking in the pharmaceutical industry

## WHAT IS ADAPTIVE NETWORKING?

Pharmaceutical executives see digital disruption taking hold in business operations. Whether in the form of new types of electronic data capture, secure data sharing and collaboration, or new computational and analytics tools, changes are coming faster, shifting network needs in unpredictable ways. Pharmaceutical executives' response is to turn to practices known as "adaptive networking" that are secure, flexible, easy to scale, and deliver on performance. Figure A summarizes the

pharmaceutical sector's priorities and lead benefits from adaptive networking practices.

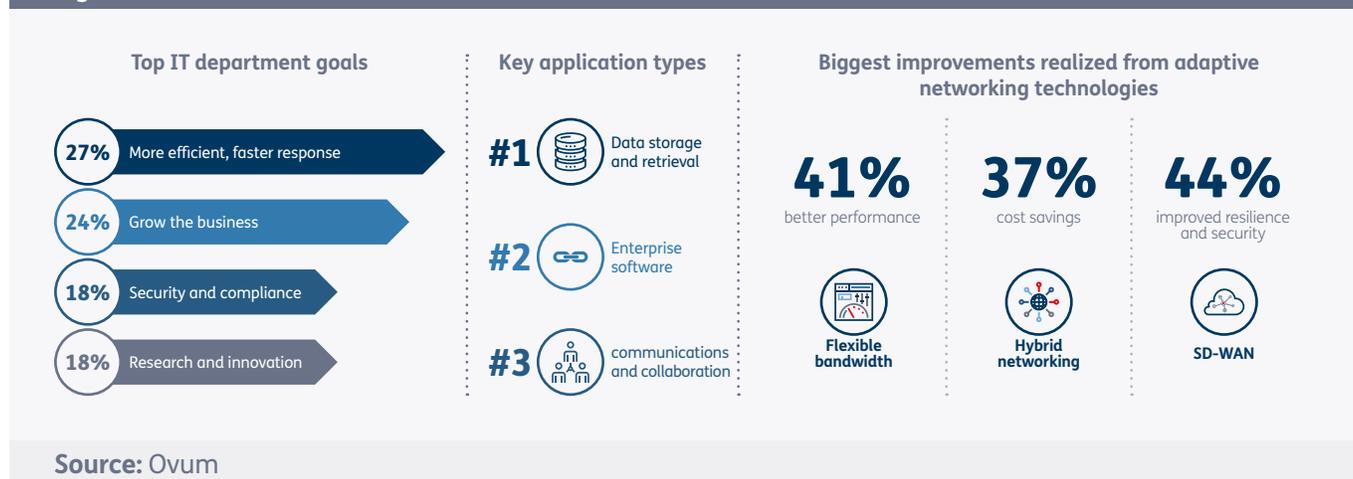
Adaptive networking components include software-defined WAN (SD-WAN); hybrid networks that merge internet VPN and private VPNs; flexible bandwidth, particularly bandwidth on demand; dynamic WAN ports into data centers and clouds; and network functions virtualization (NFV). Healthcare institutions combine these components and wrap them with security and reporting intelligence to meet their accelerating IT needs.

## BUSINESS SUCCESS RELIES ON A VIBRANT PARTNER ECOSYSTEM

The pharmaceutical industry represents organizations that discover, develop, produce, and distribute medications that improve patients' health. These businesses take one or more roles in conducting laboratory research, driving clinical trials, manufacturing at scale, and sales, marketing, and controlled distribution. Introducing a new drug is a massive, costly, and

complex undertaking. Businesses need highly specialized expertise to hurdle the decade of lead time and hundreds of millions of dollars it costs to develop a major new medication, conduct tests and trials, face ongoing expenses of success monitoring and patient data analysis, and meet rigorous compliance requirements.

Figure A: Pharmaceutical sector vital statistics



Pharmaceutical companies depend on partnering and specialization for success. Their ecosystem includes contract research organizations, research hospitals, physician practices, academic medical institutions, and contract manufacturers. Companies across the development and supply chain share two common IT challenges. First, close collaboration is critical as companies need to coordinate, document, and share complex project work that is often global. Second, all companies involved in a project must live up to the same standard of stringent security, reporting, and compliance requirements. These companies need rich collaboration and information sharing practices, but also need to protect

company intellectual property, patient privacy, and patient health across all stages of the process.

Pharmaceutical companies draw on the full range of adaptive networking practices to support their industry applications (see Figure B). For some aspects of adaptive networking, pharmaceutical companies realize greater cost savings and bigger security and resilience benefits on average than peers in other industries. Companies select different combinations of adaptive networking practices based on their needs. Compute-heavy research companies rely on centralized cloud and data center resources that they can access securely and efficiently with flexible bandwidth services. Drug manufacturers

**Figure B: Key pharmaceutical industry applications and their adaptive networking solutions**

Application	Adaptive networking solution
LIMS, CTMS, CDMS, and SDMS are specialized <b>enterprise management software</b> for handling lab resources, clinical trials, clinical data, and scientific data. These systems manage an expert workforce, patient populations, and lab resources. Their core is built around <b>workflow systems</b> that record and track, authorize, and enforce compliance.	Newer pharmaceutical management platforms are delivered via cloud-based SaaS models. Secure, <b>flexible bandwidth</b> to cloud can shift network resources as project workloads change. <b>Hybrid networking</b> can route security-sensitive and performance-sensitive data over private WAN, connect to external sources via dedicated or broadband internet VPN, and mix network types for other traffic as needed.
<b>Electronic lab notebook (ELN)</b> maintains critical legal records that document a company's research. The software uses fine-grained access controls, and stores data in searchable formats.	Security is key to protecting this core intellectual property asset: <b>SD-WAN</b> and secure, <b>flexible bandwidth</b> to cloud help enforce policies and track transactions. Dynamic bandwidth improves search and retrieval performance for large-scale ELN repositories.
<b>Electronic data capture (EDC)</b> collects and stores data from clinical trials, handling data entry validation and trial results analysis. Data collection can include remote data capture using smartphones or tablets, or wearable IoT devices in the field, which enables new decentralized, virtual clinical trials.	<b>Hybrid networking</b> helps comply with patient data privacy and data protection laws while also supporting external data collection from internet-connected devices. Secure, <b>flexible bandwidth</b> to the data center and cloud handles increasing data collection loads when trials enter new stages. When combined with <b>flexible bandwidth</b> on demand to enterprise sites, it also supports intermittent analytics reports and large-scale data transfers.
<b>Supply chain management (SCM)</b> and <b>product lifecycle management (PLM)</b> are critical to drug manufacturers, which must keep the flow of reliable materials sources and partners active, and need quality control with tracking and reporting across all phases of their manufacturing process. Blockchain is being tested as a new technique to establish provenance of supplied materials.	<b>SD-WAN</b> is a key technology for manufacturers to track and verify that vital application transactions are being completed. <b>SD-WAN</b> also prioritizes performance-sensitive application traffic from IoT-enabled platforms on the production floor, which report status and any trouble with conditions in real time to minimize downtime.
<b>Computational platforms</b> include molecular design and nanotechnology design that simulate and evaluate chemicals, compounds, and structures virtually inside a compute environment. This research modeling can be extremely compute intensive.	<b>Flexible bandwidth</b> helps upload data and download results quickly between remote research teams and data center/cloud compute resources. This allows for efficient, intermittent transfer of large volumes of data, saving costs when bandwidth is idle.
<b>Business analytics</b> tools are widespread throughout pharmaceutical software applications. Project teams benefit from <b>operational analytics</b> and <b>predictive analytics</b> that regularly review and adjust project direction based on available data. The size of repositories and volume of data flows will continue to grow as operations evolve into smart digital labs.	<b>Hybrid networking</b> optimizes traffic to wherever analytics are run, whether on-net or off-net. <b>Flexible bandwidth</b> between data centers and cloud resources can quickly upload analytics tools and return results. <b>Flexible bandwidth</b> also supports big traffic bursts when working on datasets that reside in different locations.

Source: Ovum

lean on SD-WAN to help monitor and control performance-sensitive machines and applications traffic but, above all, the pharmaceutical sector has embraced hybrid networking: 61% of pharmaceutical businesses operate hybrid networks, merging the advantages of private WAN and public internet VPN. Hybrid networking is a natural evolution of pharmaceutical companies' existing mix of internal private networks, connections to a shifting ecosystem of partners through exchanges, and data from external partners connected over the public internet. Hybrid networking lets pharmaceutical companies optimize traffic across private IP and public internet routes based on security, cost, and performance.

Executives in pharmaceuticals rank data storage and retrieval, enterprise software, and unified

communications and collaboration among key applications traffic. Storage and retrieval takes top position because documentation is the lifeblood of the pharmaceutical industry. Enterprise software includes a range of supply chain management, analytics, and business intelligence tools. Pharmaceutical companies also rely heavily on unified communications and collaboration tools to align teams internally and keep in close contact with their ecosystems of partners. Other applications commonly used by the sector include digital applications and the Internet of Things (IoT) to assist with tracking medications and patients, as well as customized software applications, developed for specialized tasks across research, development, trials, production, and delivery logistics.

## ADAPTIVE NETWORKING CONTRIBUTES TO BETTER FLEXIBILITY AND UPTIME

The net adaptive networking benefits that pharmaceutical executives value most are: flexibility to add and reconfigure sites more quickly; ways to reduce dependence on legacy systems; and better uptime, with faster troubleshooting and trouble recovery. IT executives in pharmaceuticals draw on the spectrum of adaptive networking tools: cloud connectivity, bandwidth on demand, hybrid networking, and SD-WAN. Ovum makes the following recommendations, based on the benefits realized by pharmaceutical companies that have adopted adaptive networking practices:

- Pharmaceutical companies that maintain a private network and public internet access are candidates to optimize both through hybrid networking. The majority of pharmaceutical companies already use hybrid networking to improve applications performance and network uptime. IT executives note **lower cost** as the lead benefit for hybrid networking, realizing an average of **37%** in savings.

## WHY CHOOSE CIENA

Ciena is a CenturyLink partner that provides solutions to help customers create the Adaptive Network™, enabling better customer experiences for their digital transformation journey. The Adaptive Network is Ciena's vision to empower financial services organizations to

- Companies should explore SD-WAN as a natural add-on to hybrid networking. This versatile technology adds security, visibility, and control over network applications, and improves overall performance. IT executives identify SD-WAN's **security and improved resilience** as their most valuable aspects, which improve their business by an average of **44%**.
- Pharmaceutical companies need to transfer large amounts of data intermittently between their own sites, and to their data centers and clouds. IT executives in the sector value **dynamic bandwidth** most for better performance, which improves by an average of **41%**.
- Companies need to think of adaptive networking as a platform rather than individual tools. While any one technology helps the business, Ovum finds companies reap vastly higher benefits when they combine technologies to assemble an adaptive networking platform.

realize improved network agility, optimization, and real-time insights. The Ciena platform's key foundational elements are: Programmable Infrastructure, Analytics and Intelligence, Software Control and Automation, and Services.

## **NEXT STEP: BUILDING YOUR OWN ADAPTIVE NETWORK STRATEGY**

In its survey research, Ovum finds most enterprises do not have a formal adaptive networking roadmap. Instead, IT executives treat adaptive networking as an ongoing, iterative, and interactive process. They investigate the solutions and services available, what the business can gain from each approach, and how, together, they deliver increased benefits to the business. IT executives set the organization on the right path to adaptive networking, reevaluate their options regularly, and make necessary adjustments.

Ovum's survey research finds organizations benefit most if they combine adaptive networking elements to build a solution. But enterprises do not have to revamp their operations completely to start seeing results. Organizations report benefits even from small changes. For example, the enterprise might add network virtualization in just a few places to add missing functionality. Or the organization might add bandwidth

on demand to relieve a few key points in the network that need rapid scaling to deal with unpredictable traffic changes.

An adaptive networking solution is not built in a vacuum. The enterprise needs to have a dialog with service providers to understand what adaptive networking aspects they support and how they fit together elegantly. A complete solution to support enterprise applications meshes together provider services and vendor platforms into a unified solution. A strong partner will support a broad portfolio of adaptive networking services that fit together for this unified approach: a flexible, scalable network that is overseen by network intelligence and underpinned by network security. With a strong partner, the organization can add more adaptive networking practices where and when it needs them and benefit from platform synergy as it regularly reassesses progress, adds more pieces, and deepens its use of these practices over time.

## **WHY CHOOSE CENTURYLINK AS YOUR ADAPTIVE NETWORKING PARTNER?**

Ovum sees CenturyLink as a major US and international provider of advanced networking services. The company is an innovator across the adaptive networking services spectrum. CenturyLink was a pioneer in national US bandwidth on demand down to the access port in 2012, including network intelligence tools and user controls over class of service. The company has extended its network intelligence tools to end locations and PoPs across its global network, covering North America, Europe, South America, and Asia. The company's global Cloud Connect service boasts one of the world's most far-reaching footprints connecting global data centers and cloud services.

CenturyLink debuted NFV-based commercial services in 2015 and launched its SD-WAN service in 2016. For both, the provider took a different approach from its peers. Its first virtualized network service comprised centralized firewalls designed to serve as flexible gateways between enterprises' own networks, their data centers and cloud services, and the public internet. With SD-WAN, CenturyLink took an open approach.

The company engaged the industry with well-defined packages and price plans at a time when most service providers kept their SD-WAN offers tightly under wraps.

CenturyLink understands both network and enterprise IT challenges. The company is a provider of managed services for cloud, big data, and hosted business applications. Enterprises use CenturyLink tools to enhance their DevOps and applications lifecycle management. The company adds a portfolio of managed security services to protect and support its network and IT services.

CenturyLink offers a Dynamic Connections feature that lets organizations rapidly set up private port connections from their data centers to private clouds and hyperscaler platforms including AWS, Google Cloud, and Microsoft Azure. Since its initial launch of NFV services, the provider has extended its NFV portfolio to enterprise sites. CenturyLink delivers the overall platform, orchestrates and manages individual network functions.

# Appendix

## RESEARCH METHODOLOGY

This document sources data from an enterprise survey on adaptive networking conducted by Ovum and sponsored by CenturyLink. Ovum conducted 320 telephone and voice interviews of US-based enterprises across seven vertical industries, including 48 businesses in the pharmaceutical industry. Ovum questioned qualified enterprise IT executives about their experiences, in terms of realized benefits and improvements, from their adoption of adaptive networking technologies.

IT executives were asked both to estimate business improvements from individual adaptive networking

practices, and to estimate benefits from their net adaptive networking practices. Enterprise improvement claims presented in this document are based on averaged results of respondents qualified to provide meaningful answers based on their experiences.

Additional data on the pharmaceutical sector comes from Ovum enterprise network services research surveys (which included 32 businesses from the pharmaceutical sector), and from qualitative discussions with enterprise IT executives about their networking plans and challenges.

## OVUM CONSULTING

We hope that this analysis will help you make informed and imaginative business decisions. If you have further requirements, Ovum's consulting team may be able to help you. For more information about Ovum's consulting capabilities, please contact us directly at [consulting@ovum.com](mailto:consulting@ovum.com)

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Adaptive networking described in this paper is a separate term from the Adaptive Network™ by Ciena. Service providers use Ciena's Adaptive Network to build and operate platforms and infrastructure elements. Adaptive networking is an umbrella term representing agile, flexible enterprise platforms and services.

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