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[Executive Platform](#)

# Reimagining the Internet for the Future

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In the blink of an eye, the world realized how critical the Internet is to our daily lives. Video conferences replaced physical meetings. Virtual “happy hours” replaced get-togethers. And over 1.2 billion children began distance learning.

## The Heroes and The Villain

Heroes emerged, some maintaining critical connectivity for humanity to function. Almost overnight, the Internet seemed to cross a fuzzy boundary between luxury and necessity. Traffic spiked by 25% to 45% across the globe. Cloud-first suddenly became very real. In the wake of the pandemic, digitalization rates accelerated by seven fold. Globally, 88% of enterprises encouraged employees to work remotely.

The Internet enabled the world to adjust... well, most of the world. A lurking villain became more apparent, the digital divide. Unfortunately, over three billion people remain [unconnected or underserved](#). As more devices connect, more entities go virtual, and more services move online, the digital divide widens. Today, an Internet connection is affordable in only twenty-nine countries.

We must work together to close the digital divide. Bringing the Internet to the offline world could add \$6.7 trillion to the global economy and lift five-hundred million people out of poverty. We need to figure out how to connect the next billion users. Now.

## The Failure of Current Internet Economics

Today, economics mostly determines who has connectivity. Investment tends to favor affluent economies with denser populations. [Rural deployments](#) and lower-income areas tend to suffer and fall behind.

Profitability is a familiar struggle for communication service providers that is made more difficult with legacy architecture. Traffic continues to grow significantly at over 35% per year (mostly due to video). We know it costs an average of five dollars to manage a network for every dollar spent on equipment. If nothing changes, this cost-ratio only gets worse with more growth.

To connect the next billion users, we need to fundamentally change the economics of the Internet so it will work for everyone, not just the privileged. We need to reimagine the Internet for the Future.

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“Simplicity is the ultimate sophistication.”

– *Leonardo da Vinci*

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Let’s start by taking a hard look at the Internet today. Its underbelly is showing its age. Thirty-five years of incremental evolution have created rigidity within the Internet, much like scar tissue accumulating in the body.

The biggest problem? IP and optical networks operate in silos and often in conflict. When it comes to operating massive networks, two heads are not better than one. In the worst of cases, problems are handled manually with trouble tickets passing back and forth between IP and optical organizations. This archaic model challenges any hope of economic viability into the future.

The practice of building and using separate networks with multi-layered architectures is now unproductive, redundant, complex, and expensive to operate. That must end. We need to simplify the Internet and use the cloud to deliver future experiences and close the digital divide. We must begin by reinventing networking within the foundations of the Internet itself.

## Silicon

In December 2019, Cisco introduced the [Cisco Silicon One Q100](#). It was the first to break the 10 Tb/s barrier without sacrificing carrier-class features. In October 2020, just ten months later, Cisco announced the next generation, [Cisco Silicon One Q200](#) family; six new variants offer routing and switching with improved power efficiency and speeds up to 12.8 Tbps. Three weeks ago, we announced three more variants for 8 Tbps and [25.6 Tbps](#).

We promised new iterations in very short timeframes. We are delivering them. And we challenge our competitors to keep up.

Even before the first cat video went viral, the industry has been playing a vicious game of bandwidth catch-up. With Cisco Silicon One, for the first time ever, we have enabled a bandwidth surplus. We can use this bandwidth surplus to do radically new things, like enabling us to reimagine the Internet for the future.

## Optics and Acacia

For years, Cisco has been advancing silicon photonics technologies to bring down costs. We want to transform the closed, handcrafted optic and optical industry by using silicon processes to improve yields, volumes, and densities for optics.

The [acquisition of Acacia](#) expands Cisco's existing optics portfolio with industry-leading coherent technology. Acacia adds 100G, 200G, and 400G coherent pluggables to our portfolio, including 400G ZR and OpenZR+. They are essential to redefining Internet architecture.

## Systems and Software

This is where it starts to get exciting. We have used these foundational technologies in silicon and optics together with our IOS XR software to build the [most advanced systems](#) on the planet.

[IOS XR](#) is now cloud-enhanced, delivering telemetry data and advanced intent-based programmability with [Cisco Crosswork](#). New [Traffic Analysis](#) functionality provides visibility and actionable insights to optimize complex traffic patterns. With the addition of [cloud-native broadband network gateway](#) (cnBNG), we begin to unify subscriber management with a common cloud-native approach for wireline, wireless, and cable.

Our new Cisco 8000 routers include the latest Cisco Silicon One, the Q200. In fixed platforms, power is cut nearly in half. In modular systems, power is decreased by a third. The new platforms are up to seven times more power efficient than the latest models from our competitors. At 2.25W/100G, 100G can now be delivered with less power than it takes to light a LED flashlight.

And now, our routing portfolio has been enhanced to support pluggable coherent optics from Acacia. You can deliver 100G and/or 400G end-to-end across access, aggregation, edge, and core. Using Segment Routing and EVPN, these systems work together in a new solution architecture that we call Routed Optical Networking.

## A New Routed Optical Networking Solution Emerges

After today, if you're building networks like you used to, you're spending up to [46% too much](#). Every day, you are already spending in excess of 57% on **recurring** operational costs alone. Now is the time to begin converging IP and optical networks with [Routed Optical Networking](#).

Now you probably thinking... architectural change... that's big... that's complex... that's going to take years. Here is the good news. You can start with a simple change. A phased approach can be used to migrate existing networks over time.

You can start right now by plugging digital coherent optics directly into routers to save on transponders and short-range optics. You not only reduce redundant capital expenses, but you also save on recurring operations costs in power, space, and maintenance.

Over time, legacy optical services can migrate over IP using Private Line Emulation. Routers with pluggable optics can connect hop by hop over point to point WDM links. Segment Routing and EVPN can be used to deliver

can connect hop-by-hop over point-to-point WDM links. Segment routing and EVFN can be used to deliver traditional circuit-style services. For example, services can be protected against any node or link failure in under fifty milliseconds. Traffic paths can be *automated* for service assurance around diverse criteria such as latency, bandwidth, trustworthiness, and path avoidance.

Going forward, investment in the optical layer can be capped as new growth is handled by a Routed Optical Network. The network becomes simplified, flattened, and automated and the economics are redefined.

## Reimagining the Internet for the Future

Long ago, data ran over voice networks. Remember dial-up modems over telephone lines? At higher speeds, the economics inverted, and VoIP ran over data networks. The 5G era will be marked by a similar transformation of monumental significance. IP services will no longer primarily run over optical networks. Instead, optical services will join the rest of legacy services and primarily run over IP networks.

If we are willing to reimagine the way we build and operate the Internet, we can put ourselves on the path to connect the next billion users. And with that, we can begin to close the digital divide. We can begin to create an inclusive future for all.

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