WHITE PAPER

Ciena's Adaptive IP™

IP is the universal language of the internet—the glue holding everything together. Historically, network design was IP-centric. Applications were limited to what was supported by existing IP capabilities, and evolution meant more protocols added to the existing IP software stack.

During the first three decades of the internet, there were no significant changes to this approach. It was a highly competitive game, in which IP equipment vendors dictated a provider's ability to support new applications within closed and proprietary protocols. In doing so, these vendors controlled the market. The consequences of this model were quite clear: a slow innovation pace, high infrastructure refresh rate, vendor lock-in, limited supply chain, limited choice, and fast-growing operational cost and complexity for the network provider.

Within the last decade, the balance of forces has started to change. Internet Content Providers (ICPs) have disrupted the traditional notion of a network. ICPs have emerged in force, with different views on the existing network ecosystem. ICPs have no predefined bias about how to design, deploy, or manage their networks. They are focused on creating the most efficient content delivery mechanism leveraging the most advanced, best-in-breed, connectivity technologies in conjunction with storage and computing capacity. In addition, end-customers' perception of value has shifted—from connectivity to overall Quality of Experience (QoE). This has increased pressure on incumbent service providers to deliver a faster time-to-market and QoE, albeit at a much lower cost.

These changes require moving from a multi-protocol to a multi-cloud service delivery approach. IP-based flexibility is required to move service delivery closer to the network edge, to reduce the transport cost, and improve performance. All of which will result in a significant increase in the number of IP nodes and protocols. The traditional, IP-centric way of building networks is simply unsustainable. Associated revenues no longer support the cost of constant capacity and platform upgrades. The ever-increasing inefficiency of continually adding more IP protocols makes network operations overly complex and unmanageable. A dense, siloed IP infrastructure has simply become too big an obstacle for operators to cost-effectively scale to new and emerging demands.

Service providers and enterprises already face an enormous challenge to support current services and applications while cost-effectively addressing ever-increasing user demands. As the speed of innovation accelerates, technologies such as 5G, IoT, Edge Cloud, and AI create different network requirements that simply can result in increased operational complexity with a direct negative impact on Operational Expenses (OPEX), Time-to-Market (TTM), and Time-to-Revenue (TTR).

In legacy IP architectures, each IP platform needs a full stack of IP protocols to handle different applications. It also needs to interact with many different nodes to identify an optimized route to deliver the content. This box-centric approach is extremely inefficient, as the platform wastes a lot of capacity processing outdated protocols and signaling to many nodes. This makes performance and ability to scale difficult. The monolithic approach makes all routing decisions, with a limited view of the network and the requirements of the applications running on top of it. Legacy IP routing decisions are usually far from optimal. Any new application can require massive networkwide software and hardware upgrades to support it.

The new IP network must be open, programmable, disaggregated, and virtualized in a way that allows resources to be reconfigured rapidly, without physical intervention, to enable both existing and emerging services. It must support