

Winning in the Era of Cloud and IoT with Insight-driven SDN

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We live in an on-demand world where business agility wins. Subscribers assume that unlimited choice and instant gratification are to be expected. Enterprises expect their connectivity services to be up in seconds, just like the cloud services at the core of their business processes.



For network operators, success now hinges on their ability to pivot quickly to meet these expectations. Their networks must adjust faster and scale higher to meet the dynamic connectivity needs of cloud and IoT.

How far will this go? We're only getting started. Web-scale, global cloud providers may already be transforming the business landscape, but they still have a lot of runway in front of them. Meanwhile, the internet of things (IoT) is just getting started. Bell Labs estimates there will be 100 billion connected devices by 2025, far exceeding the number of PCs, tablets, and smartphones now driving most network bandwidth.

The common thread with all the above trendlines is the need for agility. Consumer web-scale applications are increasingly dynamic and bandwidth sensitive. New video content can drive rapid demand fluctuations that can cause network congestion and slow traffic. The next wave of mission-critical, industrial-grade Internet applications is sensitive to latency, packet loss, and round-trip delays. IoT applications used in smart homes, cities, and cars may not generate the same traffic volume as internet video, but they represent a considerably higher value per bit. These applications require network services that are optimized for performance and quality.

Currently, many operators are dealing with rapidly changing demand and traffic patterns by overprovisioning their networks — a heavy iron, expensive approach. This may have worked in the past, but it lacks the economics needed for profitability in the long run, especially as the gap between peak and mean traffic levels rises with dynamic network consumption patterns.

The answer to restored profitability lies in insight-driven network automation, as enabled by carrier SDN. Carrier SDN provides a more cost-effective way to deliver the desired quality of experience required for any app or service, in real-time, while satisfying its unique peak bandwidth and performance needs. It allows networks to automatically place key resources, like bandwidth, wherever and whenever they are needed to provide the best experience for the least cost. Let's take a look at how this works:

One of the first benefits of carrier SDN is its ability to integrate service provisioning and network engineering for IP/optical networks. Why is this important? Today's fulfillment tools lack the real-time network visibility necessary to make good resource mapping decisions in real time. Network optimization tools lack real-time service intelligence to drive their actions. Operators are faced with a tough choice: either act quickly with virtually no data to guide them, or, resort to manual processes that take hours or days to complete, rendering the data stale or irrelevant. By combining these processes and automating their operation, carrier SDN becomes the cornerstone that enables dynamic network environments, cost effectively, and at massive scale.

Service and network assurance tools also need to keep pace with dynamic wide-area SDN environments. They, too, need to be automated, and driven by real-time visibility into the network and its services. Dynamic, or closed-loop assurance, is required to automatically re-map services onto more optimal network resources and paths when a service-impacting issue is detected, such

as congestion or significant latency.

The key to all of the above – automated service fulfillment, closed-loop assurance and dynamic optimization – lies in leveraging policies and using multidimensional insight to drive them.

Operators can define their intentions through network policies that include automated instructions for physical and virtual network elements. Policies are triggered by the insights provided by analyzing multiple dimensions – network, IT, and cloud – in real time. For instance, network optimization processes can be guided by real-time link and tunnel key performance indicators (KPIs) so they can improve overall service health and network efficiency. Cloud context can be added to this network data so that a carrier SDN controller can dynamically adjust the network not only based on changes at link and service levels, but also on how cloud-based applications impact the network and vice-versa. For instance, real-time performance data for a specific cloud service, say Netflix, can be added to the above example so that any network changes work towards optimizing the Netflix service.

The new model hinges on a tremendous array of information that is collected by the network on flow-level attributes and vulnerabilities. Analytics converts that information into insights that can then be used to dynamically program and optimize the network infrastructure and achieve the best outcomes. In this way, operators gain fuller life cycle automation for agile operations.

With insight-driven carrier SDN, traffic flows can be redirected, new IP/optical paths established, and existing IP/optical paths can be resized dynamically. The assurance capability sets the policies and parameters that trigger dynamic decisions and automated actions.

This automated, dynamic characteristic of policy-driven service fulfillment is important to meet the fluctuations characteristic of on-demand cloud-based services. Moreover, it keeps operational overhead down and accelerates the time to market for new services, making operators more responsive to rapid shifts in market demands.

How is this being used? Insight-driven agility is helping operators improve the services they offer around cloud and IoT applications. Integrated analytics within the operator's carrier SDN controller provides streaming telemetry to help solve the traffic engineering problem of keeping pace with the rapidly changing demand and traffic patterns of the cloud and IoT world. Telemetry data provides insights into where the network is causing flows to approach SLAs thresholds. The carrier SDN controller then maps flows with higher SLA requirements to paths in the network where there is more bandwidth or less latency. This is particularly useful for insight into peering optimization for web-scale peering partners or content-delivery networks (CDNs), ensuring quality of experience for OTT applications or global content provider applications out of distributed data centers.

Insight-driving agility also plays a large role in content distribution and delivery. Traffic patterns can change dramatically day by day, depending on what's going on. Unicast video may be operating smoothly one day, but suffer the next as it has to compete for select paths with the latest Game of Thrones episode released on the multicast service, or a surge in popularity of a new World of Warcraft game release. Engineering to statistical peaks based on a 60 percent utilization level no longer makes economic sense. Operators make optimal use of their available bandwidth by moving impacted applications and service flows before they experience serious service degradation.

Agility is also critical to ensuring the network stays safe from external threats. When used in combination with a smart IP network fabric that allows finer-grain control with greater scale, carrier SDN combined with external multidimensional analytics can provide anti-DDoS protection for the network.

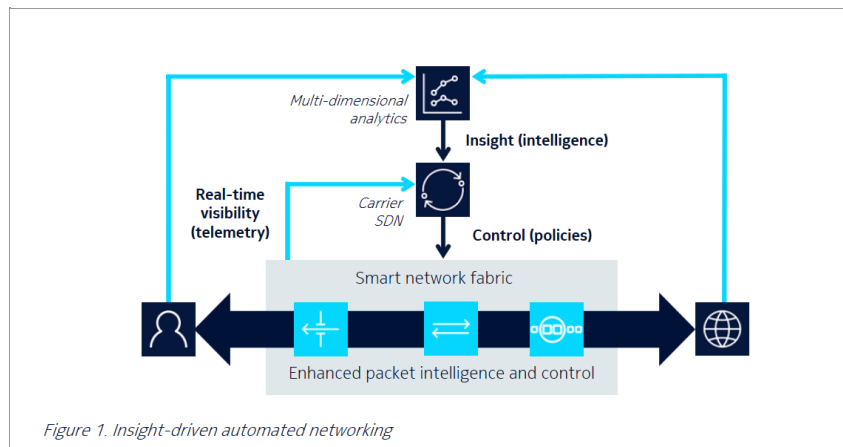


Figure 1. Insight-driven automated networking

See Figure 1. Insight-Driven Automated Networking

For example, DDoS attack mitigation may require the filtering of hundreds of thousands, or perhaps millions, of harmful flows to protect vulnerable infrastructure services and customer assets.

Operators have a unique opportunity. With carrier SDN, analytics and dynamic assurance, they are able to offer superior services to both web-scale firms and enterprises generally. The key to winning in the cloud and IoT era is to become an agile operator with insight-driven automated networking.