BUILT FOR SPEED: DIFFERENTIATING THE ETHERNET SERVICE EXPERIENCE

Ethernet services have become largely mainstream, with well-established standards and strong global acceptance. However, continued expansion introduces new challenges that must be addressed by enhancing overall service experience. Speed is the key success factor, with the critical components of service delivery, service agility, and service assurance working in concert to sustain market differentiation.

Introduction

The availability of Ethernet services has grown significantly in recent years, with offerings now widely available from hundreds of service providers worldwide. Across the globe, providers of all sizes offer a broad range of service types to meet the needs of customers in nearly every industry. According to research by Vertical Systems Group, total Ethernet service bandwidth surpassed legacy bandwidth in the U.S. in 2011 as Ethernet services continued to gain momentum as the predominant choice for business connectivity.

Standardization of Ethernet services and associated technologies—led by organizations such as the Metro Ethernet Forum (MEF), and driven by IETF, IEEE, and ITU-T—has played a significant role to accelerate adoption by defining fundamental technologies and implementation architectures suitable for large-scale deployment. While ongoing efforts continue to enhance various aspects of network design, deployment, and operations, a full spectrum of Ethernet services are already commercially available today, ranging from basic point-to-point transport to sophisticated multipoint connectivity with advanced application visibility and stringent performance guarantees.

However, with intensifying competition, mere participation in the market no longer guarantees success. The market is no longer a rising tide that lifts all ships, so service providers must differentiate their offerings to remain competitive and sustain growth. Speed has become the primary differentiator in today's Ethernet services market—both in terms of growing bandwidth and as an expanded focus throughout the entire service experience to address challenges such as improving service turn-up and change intervals, accelerating problem resolution times, and enhancing overall customer satisfaction.

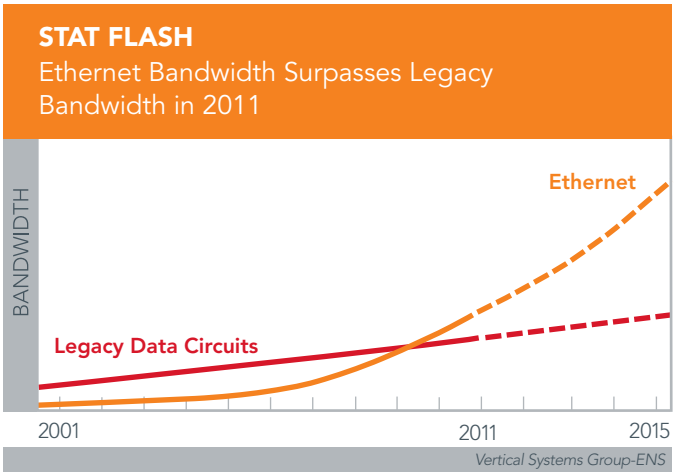

Figure 1. Ethernet service bandwidth (U.S.)

Service Delivery

Service providers need to leverage technology tools to accelerate potentially time-consuming steps throughout the service experience chain. This begins with plug-and-play installation of remote equipment and follows with streamlined service activation and modification workflows. Field experience has shown that automation can consistently reduce Ethernet switch installation and configuration times by 75 percent.

HIGHLIGHTS

- → Breadth of portfolio for best network fit
- → Zero-touch installation of service delivery platforms
- → Accelerated service activation and modification with service profiles
- → Ease of operational scale as service nodes increase by orders of magnitude
- → Customer validation of Service Level Agreements (SLAs) with cloud-based portal

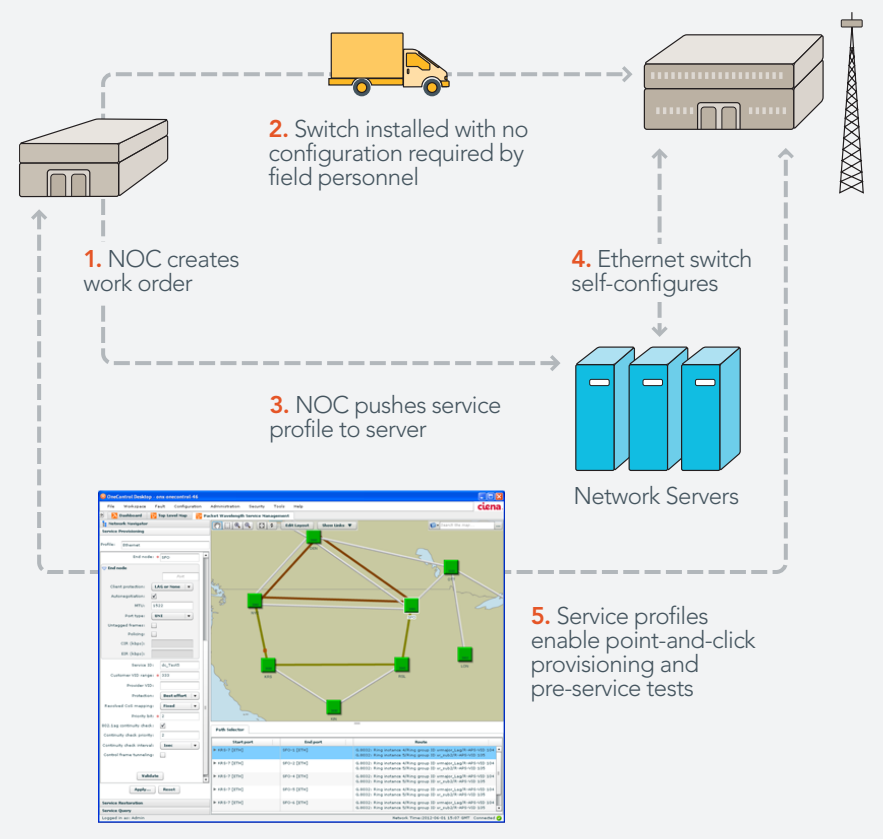

Figure 2. Zero-touch provisioning process

Figure 2 shows an optimized service turn-up process that makes use of automated software capabilities to reduce costly human intervention, both in terms of highly skilled technicians who must otherwise be deployed remotely or on site, and to eliminate potential errors introduced by manual configuration procedures.

With this automated approach, the Network Operations Center (NOC) initiates a work order triggered by a new request for service, prompting physical delivery of the appropriate hardware device to the customer location. As this step does not require further configuration in the field, it can be easily accomplished by any number of personnel, or even provided via third-party delivery. While hardware delivery is being scheduled, the NOC also sends the appropriate software configuration with associated service profiles to the corresponding server for ensuing service activation. Once the end device has been physically installed and connected, self-configuration is performed based on the predefined activation profile, enabling the NOC to remotely complete configuration via simple point-and-click provisioning.

Providers also often perform service performance validation by running an end-to-end service test to ensure customer SLAs can be met. This validation may be done as a preliminary test prior to service acceptance and handoff, or as a means to troubleshoot disrupted or impacted service. Benchmarking and performance analysis, as defined by IETF RFC 2544 /ITU.T Y.1564, are methods to provide such measurements for throughput, latency, and frame loss. However, the traditional mode of operation for this testing can be very expensive and time-consuming, as the common procedure requires expensive handheld test sets that must be used in a coordinated effort between technicians physically present at each test site. In addition, this manual process poses a challenge to consistent and timely test results, as application of test procedures may vary, availability of skilled technicians may be limited, and results captured on handset devices typically require manual transfer back to the NOC to complete analysis.

Natively integrating this benchmarking capability on Ethernet service delivery platforms significantly reduces operational costs and expedites testing procedures, resulting in faster service turn-up and problem resolution. Embedded generation and reflection capabilities provide the flexibility to perform remote test execution from the NOC, reducing the costs associated with on-site service technicians and more rapidly generating consistent, reproducible test reports. With this approach, service disruptions can also be quickly resolved while eliminating costly truck rolls.

Service Agility

Beyond initial service activation, ongoing service changes or additions require the ability to rapidly make continuous adjustments in response to evolving customer needs. Customer requirements have changed dramatically in recent

years, and the rate of change will only accelerate. Service providers must quickly and nimbly scale their offerings to accommodate a proliferation of service endpoints, insatiable demands for bandwidth, and constantly changing dynamics of network applications.

As Ethernet service coverage moves beyond the initial wave of adoption and service points increase by orders of magnitude, inherent consistency of capabilities across a diverse range of service delivery platforms enables providers to effectively scale operations. Coupled with automated provisioning using predefined service profiles, service additions and changes can be rapidly accommodated. Bulk configuration enables changes to be propagated simultaneously across a multitude of devices, accelerating widespread service adjustments while eliminating error-prone procedures resulting from manual repetition. Additionally, bandwidth upgrades from 1G to 10G no longer require initial overbuild or complete replacement of on-site equipment, but instead can be easily transitioned as needed to meet growing capacity needs.

Ethernet has become the transport technology of choice for today's applications, but needs to account for the wide differences in network performance required for those applications. Some real-time and interactive applications such as voice, video conferencing, or distance learning require dynamic bandwidth capabilities and impose requirements for minimal loss, latency, and jitter. Other applications may be high priority, such as back-office transactions or MRI image transfers, but are more delay-tolerant. Finally, applications such as email, Internet access, and instant messaging are lower bandwidth, bursty, and easily sequenced using normal Ethernet traffic controls.

Customers may use any combination of these types of applications simultaneously and therefore require fine-grained Quality of Service (QoS) capabilities to properly prioritize their traffic and optimize their bandwidth usage. Instead of strictly dividing bandwidth among various applications or assigning all traffic the highest real-time priority, as with traditional, fixed classes of service, per-packet class of service offerings allow customers to take a more strategic approach and maximize performance efficiency. This enables enterprise customers to use Ethernet services in a simple and transparent manner, as they do today in their LAN environment.

Service Assurance

With a growing emphasis from customers on service performance and associated guarantees, providers are finding it increasingly important to validate end-to-end SLA compliance throughout the service lifecycle. The ability to automatically monitor the health and performance of the network and end-customer services plays a key role in achieving customer satisfaction with timely service assurance.

Of critical importance is the ability to monitor the status of system and network links, measure the performance of customer Ethernet services, confirm link and service throughput and quality conform to SLAs, and distribute this management information across the network. The important Operations, Administration, and Maintenance (OAM) features related to service assurance include:

- IEEE 802.1ag Connectivity Fault Management (CFM)
- IEEE 802.3ah Ethernet in the First Mile (EFM)
- IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
- ITU-T Y.1731 Performance Monitoring: Delay, Jitter, Loss
- IETF RFC 5618 TWAMP Sender and Responder for L3 SLA Monitoring
- IETF RFC 2544 Performance Benchmarking Test Generation and Reflection
- ITU-T Y.1564 Service Activation Testing

Beyond supporting these protocols with scalable hardware-based implementation, visualization tools for real-time performance enable identification of problem areas throughout the network. Upon discovering a network fault or service degradation, the provider can use easily accessible diagnostic tools in the NOC with proactive service correlation to rapidly isolate and correct the issues and provide higher availability for business-critical services.

With direct access to SLA reports via a cloud-based portal, customers are empowered to self-diagnose Ethernet service health and verify SLA adherence, resulting in improved satisfaction and retention. This model must inherently provide robust security with granular controls for isolation between customer domains, and protection of information flow throughout the process of data collection, storage, and presentation. With proper implementation, a vendor-enabled approach with highly customizable, "white-labeled" packaging enables a flexible value-added offering for service providers without additional operational overhead. This capability also helps absolve providers of issues not originating from their network, and enables customers to more rapidly take corrective action within their own network environment.

Putting It All Together

Many individual capabilities within service delivery, service agility, and service assurance are available as separate offerings to assist with particular aspects of enhancing overall service

velocity. While each component provides an important contribution, a complete system is the key to advance from offering marginal service improvements to providing truly differentiated services. As part of this system, the associated business competency to identify appropriate target segments, accelerate market development, and execute on go-to-market programs plays a vital role in complementing the technology solution. In this environment, a focused solution partner that can address both technology and business needs of service providers is ideal.

Conclusion

The market for Ethernet services continues to grow, but increasingly sophisticated customers are creating new challenges for service providers to deliver a more responsive service experience. Customers want both the satisfaction of knowing their immediate service needs can be met quickly, without complex forecasting, and the confidence that a network is in place that can easily meet their escalating requirements with minimal risk and overhead.

Speed is the differentiator that can change the way service providers compete. By leveraging the right combination of purpose-built platforms and software, along with corresponding market enablement services, providers can implement a successful Ethernet service solution to keep pace with today's rapidly changing environment.