Application Note

Monitoring Private Network Connections from Enterprise to Cloud

The rise in the adoption of cloud-based solutions over the past few years is driving the cloud computing market globally. In a 2021 research report by Facts & Factors, the global cloud computing market will grow from $321 billion in 2019 to $1026 billion by 2026. This is due at least in part to global brands like Amazon, Microsoft, and Google serving enterprises reducing the use of on-premises computing equipment and moving that function into the cloud.

Some IT professionals will always be comforted by managing their own metal servers located in the basement. For the rest, they are glad to be rid of maintaining the space, power, cooling, access, and other headaches associated with physical servers. Add to that the flexibility of cloud-based storage and compute, the pay-as-you-go model, and additional security and its clear why cloud computing services are growing so rapidly.

Perhaps the one weakness in the cloud computing model is what the cloud providers do not control - the means to access a company's off-premises data and applications, the Internet. Most of the time, the Internet is quite suitable for the majority of online applications. However, as anyone who has failed to make one last bid in an online auction knows, the Internet is not 100% reliable, or consistent, or worse, secure. For cloud computing to win over the most conservative IT managers, a better way to send and receive latency-sensitive, mission-critical data to and from the cloud (rather than the Internet) is required.

Cloud service providers began partnering with local Ethernet service providers to provide enterprise customers with an alternative: an Ethernet connection directly from the customer to the data center. Cloud-enabled colocation with an Ethernet on-ramp allows enterprises to bypass the inconsistencies and intrusion vulnerabilities of the Internet, and get a 1:1 private connection, essentially combining colocation with the cloud (Figure 1). The private Ethernet connection allows data to circumvent the traditional public Internet which results in ultra-low latency, reduced data transfer costs, improved security and consistent network performance.

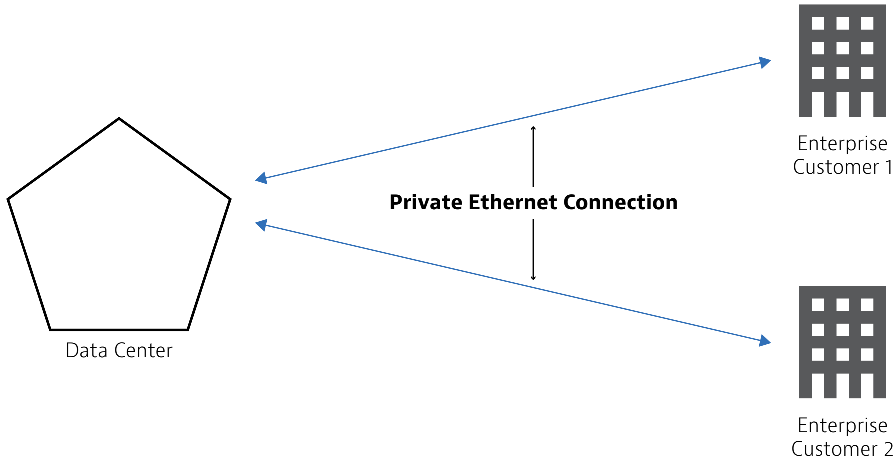

Figure 1. Bypassing the Internet with a direct Ethernet connect to cloud-hosted assets.

Problem: Who's Watching the Ethernet?

Initially, the use of an Ethernet circuit to connect an Enterprise customer with its cloud-based applications and data was a win-win. It made the enterprise happy with better performance and the cloud services provider happy because its customer became stickier, and a better connection made the product better. An Ethernet circuit complimented cloud computing so well that cloud providers began offering Ethernet as part of a bundled offer, as a convenience to its customers and as a recurring revenue stream.

Problems arise in this scenario when the performance of the Ethernet circuit declines. Although Ethernet links are stable, problems still happen. Human error is the cause of most problems including mis-configured VLANs, incorrect throughput parameters input, and IP addressing issues. An area where many service providers do not even test, the TCP/UPD layer, is where web traffic traverses and is frequently the cause of application performance degradation.

Although the cloud provider sells the Ethernet connection and charges the customer, neither one has responsibility for it. The Ethernet circuit is managed by a third party, the network services provider. That local provider likely performed service activation testing when the circuit was installed but may not proactively test the circuit after it was successfully installed. If a fiber is cut, alarms will be triggered at the service provider's NOC, but outside of that service degradation is often left to end-users to identify.

When the cloud provider's enterprise customer first notices a degradation of service, it will call the cloud provider (as they are the customer of record for the Ethernet). The cloud provider then places a trouble ticket with telco/ cable company. By that time, many hours might have passed resulting in unsatisfied end-users, and maybe even a loss of revenue.

Solution: Proactive Testing of the Customer Network

A better scenario is the cloud provider proactively testing the Ethernet circuit provided for the enterprise customer. With standards-based testing applied to those customer circuits, the cloud provider will get instant information regarding the nature of the service degradation, the severity of it, and diagnostic information that could possibly lead to a fix before the hassle of opening a trouble ticket with the service provider.

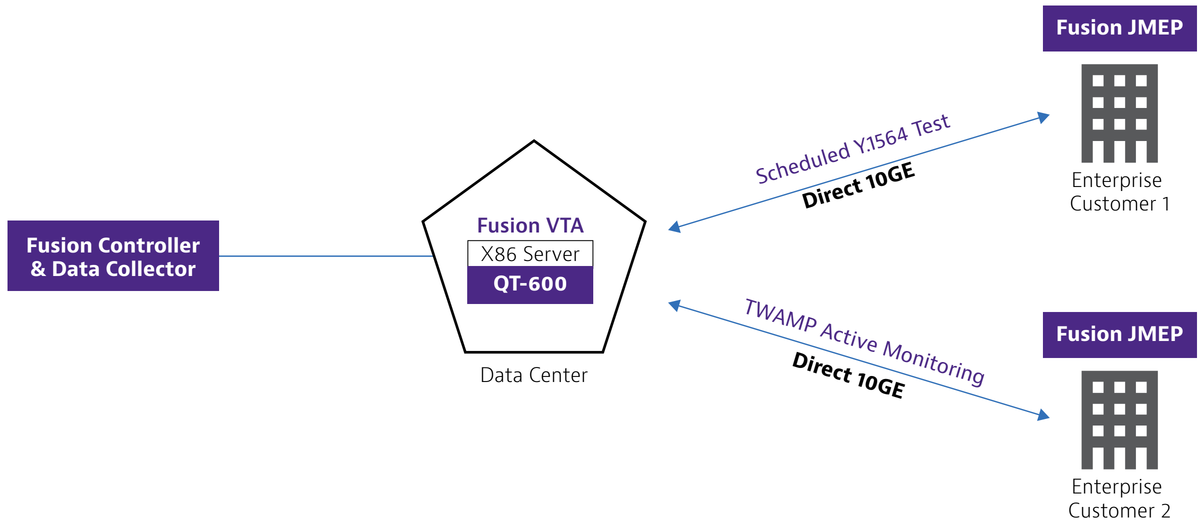

Figure 2. Throughput testing and monitoring Ethernet circuits.

There are two primary ways to check the transmission health of the customer Ethernet circuits; with continuous monitoring via Two-Way Active Monitoring Protocol (TWAMP) and/or standards-based throughput testing, like Y.1564 (see Figure 2). There are pros and cons to each, so the choice will depend on the goals of the cloud provider and/or enterprise customer.

For example, while TWAMP is constantly sending test packets through the circuit under test, it does take up a small portion of the circuit's transmission capacity. If the cloud provider is comfortable with that trade-off, then TWAMP is an excellent tool to continuously check connectivity and latency. TWAMP is not, however, a throughput test.

To test the full capacity of a circuit's throughput and round-trip delay, then a Y.1564 or RFC 2544 test is needed. The drawback is that because those protocols are testing the full bandwidth of a network segment, no customer or production traffic can be transmitted at the same time. Consequently, throughput tests must be scheduled during off hours so as not interfere with a customer's operations. Ideally, the test system could first check the circuit for any live traffic present before starting a throughput test sequence.

The VIAVI Solution: Fusion

To address the need for both proactive and timed monitoring of Ethernet circuits, VIAVI offers Fusion. Fusion is the premier product in the VIAVI NITRO Transport platform, which addresses the challenges of test and measurement for new virtual and hybrid networks. Fusion provides the user with a virtual service activation and performance management tool set, designed on industry standards, that deliver accurate test results on which managers and engineers can depend.

At the circuit's initial installation, Fusion users should run a full throughput test to simply confirm that it's working properly, but also to establish a performance baseline to which all subsequent throughput tests can be compared. It is the circuit's birth certificate, essentially. Fusion can then monitor network performance and verify Service Level Agreements in both virtual and physical networks.

With a Fusion system, the user has many options for the test end points. They can be a rack-mounted unit, a portable/hand-held test device, a software-based test agent loaded onto an off-the-shelf server, or a smart SFP plugged into an existing network port (see below).

Ethernet has become the connection method of choice for these types of datacenter connectivity use cases. However, another challenge is that the cloud provider's enterprise customer must have access to network provider fiber to take advantage of Ethernet. That has created an opportunity for an alternative connection method — private 5G. The wireless technology allows enterprises to connect to DCs close to them via a low latency connection, with similar benefits as Ethernet, but without the fiber requirement. If the data center or edge is too far away from the enterprise, even Ethernet won't help with latency-sensitive applications. To take advantage of private 5G, cloud providers have built a large number of locally-dispersed locations and can offer low latency 5G, serving many more enterprises than they could with just Ethernet.

The strength of Fusion is its flexibility, not just with the test end points but the with connection types and data rates as well. Fusion can be used to test any mode of transport mechanism and physical media used to offer Ethernet services up to 100GE, whether fiber (e.g. standard fiber links or xPON), copper (e.g. symmetrical twisted pair, DSL, or cable) or wireless access (5G, 4G, WiFi). Over a wide range of network circumstances Fusion can help cloud service providers properly monitor the performance of their critical connections to their valuable enterprise customers.

VIAVI Fusion Test End-Point Options

MAP-2100
Rack-mounted test unit

QT-600
Rack-mounted probe

Fusion Virtual Test
Software-based test agent

T-BERD®/MTS-5800
Portable/hand-held test device

JMEP 10
Smart SFP

VIAVI Solutions

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