

Ethernet Access: Draw the line, Demarc your Network



Ensuring Quality of Service on Carrier-Grade Ethernet Networks

The growing demand in IP-based services, such as Voice over IP (VoIP) and Internet Protocol Television (IPTV), has increased the need for affordable bandwidth while respecting ever more demanding Service Level Agreements (SLA) and ensuring acceptable end-to-end Quality of Service (QoS).

Carrier-grade Ethernet services come up as a very interesting technology to solve this equation, but operators are facing important challenges when the time comes to measuring QoS and ensuring SLAs. Traditional Ethernet was originally intended primarily for LAN usage and lacks functionality in several aspects such as Operations, Administration and Maintenance (OAM), performance monitoring, manageability, demarcation, loop backs and fault isolation.

Despite these shortcomings of traditional Ethernet, carriers are confronted with an overwhelming customer demand and the need for carrier-grade Ethernet access devices is thus increasing rapidly.

Draw the line, Demarc your Network

What is a demarcation device? A simple definition is: “Demarcation is the act of creating a boundary around a place or thing.” (Source: Wikipedia). An Ethernet demarcation device provides separation between the carrier’s network (WAN) and the customer’s network (LAN) – it serves a role similar to that provided by CSU devices with a frame relay service – and allows the carrier to test and monitor its network all the way up to the customer’s premises. This ability is critical for carriers in order to maintain their Ethernet network and properly manage OPEX while keeping truck rolls at a minimum.

Ethernet OAM

Major efforts have been achieved by the Metro Ethernet Forum (MEF), the ITU and the IEEE 802.1 group in defining and standardizing OAM for Ethernet services. The NID, as defined by the MEF, is a new class of product based on Ethernet OAM known as Ethernet Demarcation Devices (EDD). These devices are located at the customer’s premises in order to improve Ethernet service intelligence and allow carriers to properly demarc and manage their network.

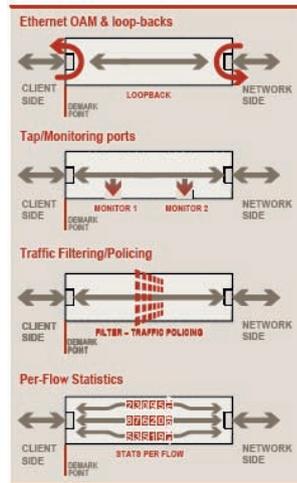
Ethernet SLAs

Service Level Agreements are made between the carrier and the end customer, and thus are defined on an end-to-end basis. Up until now, carriers were unable to measure their Ethernet networks’ quality all the way up to the last mile properly and efficiently while keeping costs manageable. While early adopters would rely on best-effort services, these are no longer acceptable and major enterprise customers will not move on to an Ethernet service until Ethernet SLAs are guaranteed and verified by carriers.

The need for an end-to-end SLA-Meter, all the way up to end of the last mile

With current Ethernet solutions, a service provider can not test or diagnose the entire link, or ensure its SLA end-to-end. The last mile is invisible to operators’ testing equipment, or will include the customer’s network which can in turn affect the results.

The EDD creates a clear demarcation point between the carrier’s and the customer’s networks and provides visibility all the way to the customer’s premises. This solution allows the operator to effectively isolate the customer’s network when testing and monitoring the end-to-end link, and thus eliminate diagnostic errors due to end-customer activities.



Because an Ethernet Demarcation Device is always in the data path, it should be able to sustain wire speed rates and introduce no significant delay or jitter while sporting a bullet-proof reliability in order to avoid any impact on network performance. Furthermore, to be effective and fulfill its core tasks, the Demarcation device should also feature intelligent loop backs, tapping and monitoring, traffic filtering and policing and allow tracking of bandwidth utilization of every stream delivered.

The Ethernet Demarcation Device (EDD), using a high-performance architecture, minimizes intrinsic packet-jitter and latency, and offers the solution to these challenges by implementing standards-based OAM, loop-back capabilities.

Providing per-flow statistics, such as a Performance Assurance Agent (PAA), allows measuring and tracking end-to-end SLA parameters such as latency, jitter, packet loss and availability in a continuous manner, while the service is running. The EDD ports can also be configured for monitoring where external test devices can be connected to perform non-intrusive, in-service troubleshooting, thus offering Layer 1 to 4 visibility in each direction independently or combined, a function that carriers are used to with traditional demarcation devices but lacking from current Ethernet service delivery methods. Furthermore, intelligent wire-speed filters can be applied to selectively monitor specific traffic. Designed for volume deployment, the EDD unlocks the business-case for high-performance, manageable Metro Ethernet service delivery in the last mile.

Applications

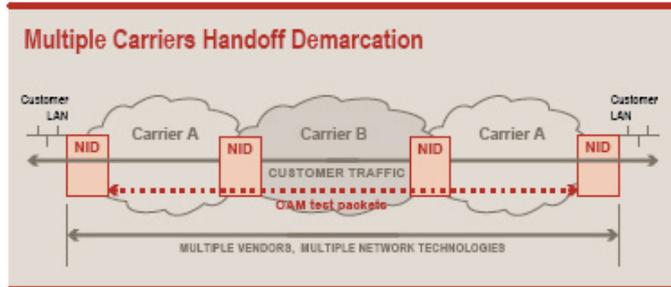
- Customer premises located intelligent Ethernet Demarcation Device
- Inter-carrier handoff demarcation
- End-to-end SLA-Meter™
- Intelligent extension to Metro Access Platforms
- Multi-tenant commercial buildings
- Single-tenant business parks
- Intelligent Ethernet Optical Repeater (SFP to SFP)
- Wire-speed remote loop back responder to portable or centralized Ethernet test-sets
- Intelligent wire-speed Ethernet monitor/tap troubleshooting device

Diagnose and Pinpoint Multi-Carrier problems easily and precisely

In many cases, end-to-end customer links span across multiple carriers and only the most limited diagnostic tools (none in Layer 2 and ping/trace route only in Layer 3) can be used to test and resolve connectivity problems.

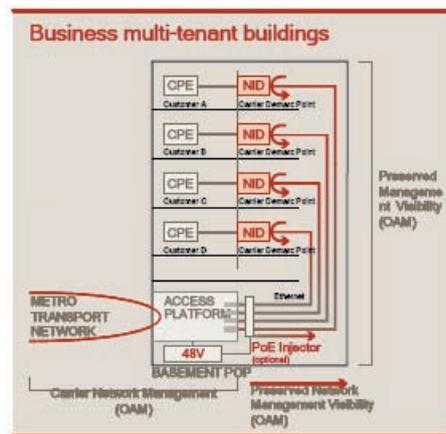
By allowing a better sectionalization of the end-to-end link, the Ethernet Demarcation Device can help operators diagnose multi-carrier situations when experiencing issues, and eliminate needless finger pointing between carriers.

In regards to his customers, an operator is responsible for the entire end-to-end SLA, and not only has to be able to measure the entire performance, but also has to be able to pinpoint the exact location of potential problems in order to resolve these.



Per-flow statistics, or JDSU EtherNID’s Performance Assurance Agent (PAA), can be used to obtain precise measurements of parameters, thus assuring end-to-end performance across multi-vendor/multi-carrier layer 2 and layer 3 networks.

Transparent LAN service delivery for business multi-tenant buildings



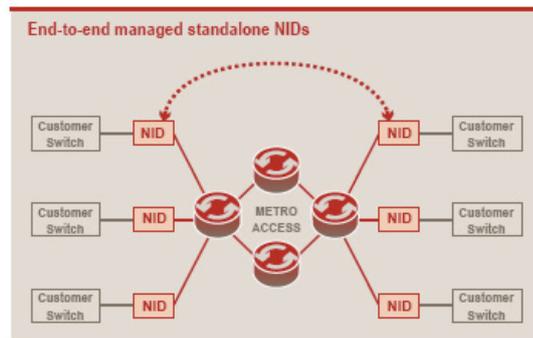
As a sample application in a business multi tenant building environment, Ethernet Services are typically delivered from a carrier point of presence in the basement. When no demarcation device is used, the network management visibility is lost as soon as coming out of the access platform where Ethernet is extended for substantial lengths to reach the individual business tenants.

The demarcation NID products extend the OAM reach of the Network all the way to the end-customer’s IT closet where the service is delivered.

The EDD can be line-powered via Power over Ethernet (PoE) to avoid dependency on customer-provided power, and thus extend 48V power plant reliability all the way to the customer’s wiring closet.

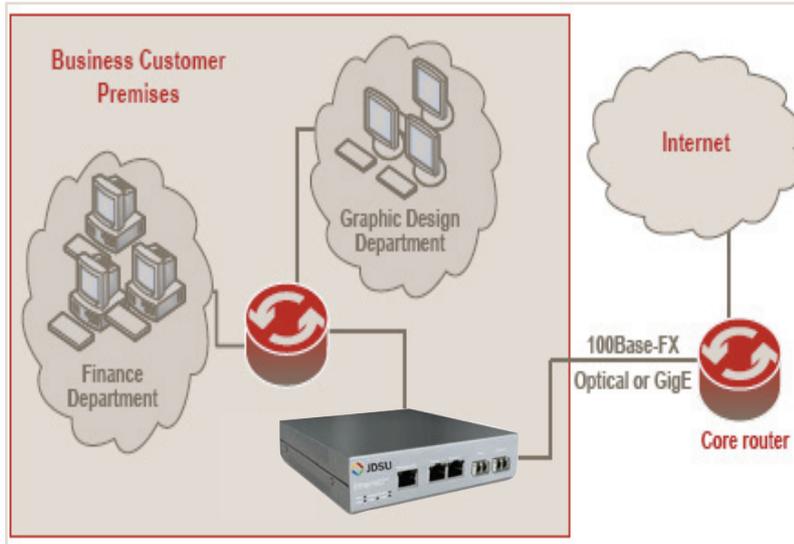
Business park FTTP/EFM

The EtherNID also allows the operator to simplify and enhance the typical bookend duct-tape topology into an efficient end-to-end managed standalone NIDs topology, providing a clear demarcation point between the metro access and the customer’s networks.



Using versatile SFP modules, the Ethernet demarcation device allows easy conversion of the media (100Base-FX optical or GigE) using dual fibre or single-bidirectional fibre.

Super High Speed Internet for Businesses



In the case where super high speed Internet access is provided to a business, the high-speed connection would be brought all the way up to the customer premises using the Ethernet NID. Typically the carrier would bring fibre to the building and would use the demarcation device as a port extension to the core router at the customer premise. Using this setup and equipment, wire speed service is brought all the way to the customer.

Conclusion

In the growing environment of carrier-grade Ethernet networks and IP services such as VoIP and IPTV, ensuring Service Level Agreements and assuring the best Quality of Service possible evolved from being a competitive advantage to an absolute necessity. In order to achieve the expected performance, operators need enhanced equipment and capabilities, as well as devices used to actually measure performance of their own network as well as end-to-end links while disregarding the customer's own network. Ethernet demarcation devices such as JDSU's EtherNID™ are the only way to really enable Ethernet access and allow carriers to measure their networks' performance in order to guarantee their service level agreements.

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