

Mastering virtualization challenges

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While cutting costs, and without increasing physical resources, companies can exponentially increase workload capacities by virtualizing their existing servers. However, despite the many obvious benefits of virtualization, it can also present challenges regarding the actual location of data on servers, which in turn raises security, traceability and potential disaster recovery concerns for users who have mission critical, or highly sensitive, data needs.

Deploying innovative solutions within the physical layer can bridge the gap between the benefits of the virtual world and the security of the physical world.

An Accepted Standard

Why has virtualization become such an accepted standard in the data center? Apart from the obvious user and business benefits mentioned above, virtualization has been adopted by businesses to support two key initiatives:

1. **Agility** – The ability to dynamically control the resources that a physical server offers and make it part of a “pool” of computing power that can be easily harnessed to work on the processes that businesses need at any given time.
2. **Efficiency** – Instead of having many physical servers dedicated to a single business unit or process, fixed physical servers are configured to become virtualized, meaning a single server can replace the workload of many servers. This triggers a reduction in energy costs (power and cooling) and frees up expensive floor space.

High Availability

In addition to these two initiatives, maintaining high availability and fast response times from a virtualized network is critical to keeping consumers and internal stakeholders happy. It also helps disguise the fact that they are using a “pooled” resource.

From Layers 2 and up in the Open Systems Interconnection (OSI) stack, control and flexibility can be easily achieved. However, a network is only as strong as its weakest link, and in many cases this is the physical layer (also known as the cabling), which happens to be the foundation that all data center operations are built on.

Since it is passive, the physical layer presents problems to network architectures that need to understand how and where things are connected. Today, this can happen logically, but logical data gives no indication of the physical routes packets

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take between two points. Did the data flow between servers in adjacent racks, or did it flow via different buildings, or even via different countries? Was the path taken declared “secure” by the data owner, or was the path shared with other unknown users? Both of these questions are becoming increasingly pertinent as virtualization becomes more prevalent in data center networks around the globe.

Being able to monitor and communicate with each connection point in the physical layer is critical to answering these complex questions and solving audit/compliance challenges. One way of monitoring the physical layer cabling is Connection Point Identification (CPID) technology, where an Electrically Erasable Programmable Read-Only Memory (EEPROM), housed in the body of a fiber or copper connector, can allow the physical layer cabling to communicate with the management layers of the network when inserted into a CPID-enabled patch panel.

In this scenario, automatic associations can be made between the connected devices in the path that the packets are flowing through. The interconnecting points, which are supported by an EEPROM, allow management software to interrogate the physical layer cabling to understand facts about its length, data-carrying capacity, or to even use CPID data to allocate a physical route to high priority/high value traffic, while another route can be dedicated to low priority/low value traffic. Similarly, operations will be able to distinguish between fiber and copper channels within the physical layer, a critical factor in identifying suitable routes for supporting future growth paths for higher data rates.

Having this granular view of cabling offers a whole new perspective to the physical layer and allows the network owner to consider it as a value-adding asset, as opposed to a simple device to interconnect servers, switches and storage devices.

Previously, we discussed how virtualized networks aggregate resources into “pools,” which means that next-generation networks will have to be built ready to transmit data packets at 40 and 100Gb/s. Today, the medium of choice for architects and engineers to achieve those throughput rates would be parallel optics, via either 4 x 10 Gb/s or 10 x 10 Gb/s channels, due to the lower cost of the optical modules at those data rates.

Remember that fiber is not a full duplex technology. Unlike its copper cousin, fiber requires eight lanes (4 Tx/4Rx) for 40Gb/s communication and 20 lanes (10 Tx/10Rx) for 100Gb/s. These data rates can be achieved via a pre-terminated fiber network based on a 24 Multiple Fiber Push-On (MPO) connector technology. 100GbE optical modules that are currently available on the market already incorporate a 24 fiber MPO connector interface, making it simple and easy to build out a future proofed network ready for throughput-hungry virtualization activities today.

Not planning to build a network ready for 40 or 100Gb/s may prove to be costly in the long run, both in terms of the CAPEX required to re-configure the existing physical layer to meet demand, and in terms of lost revenue through network downtime while this activity is being conducted.

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Virtualization Makes Sense

Virtualization is an enabling technology that makes sense in so many ways, supporting IT initiatives while keeping financial costs in balance. It allows a business to scale to meet customer demands without requiring the same linear increase in physical resources.

However, as in life, achieving great things and stepping to the next level of performance and reward requires focused control and ability. Controlling the physical layer with CPID and enabling it for 40 and 100Gb/s throughput will help support network virtualization that delivers at its full potential and results in real business benefits.

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