



VERTIV WHITE PAPER

Rack and Roll: Explaining the Surging Demand for Integrated Racks

We have long thought of data centers as snowflakes, with no two looking the same. On a granular level, that's still true – different loads require subtle differences in equipment and capacity – but there is a growing move toward more normalized data center equipment and designs. This move is especially true among dedicated data center companies, such as cloud and colocation providers, with the push to the edge adding to the desire for more standardization.

Colocation provider Digital Realty is the unquestioned leader on this front, with a disciplined design approach that ensures repeatable operation and performance across their 200 or so data centers around the world. Microsoft, Facebook, Amazon, and other cloud providers also have embraced standardized designs that ensure their facilities look, act and can operate and service more or less the same whether they're in Prineville, Oregon, or Cape Town, South Africa. There are regional nuances, to be sure, but it's getting harder and harder to distinguish these snowflakes.

Interestingly, however, cloud providers and colocation companies take different approaches to standardization. Cloud and hosting providers own all of their equipment and tend to do their system integration. They have a defined infrastructure, and they roll out additional capacity when they need it. If Google needs to add servers to meet increased demand, for example, they add more of what they already have, and they use their internal personnel to do it. The racks will look the same across their facilities, but they are unquestionably Google racks.

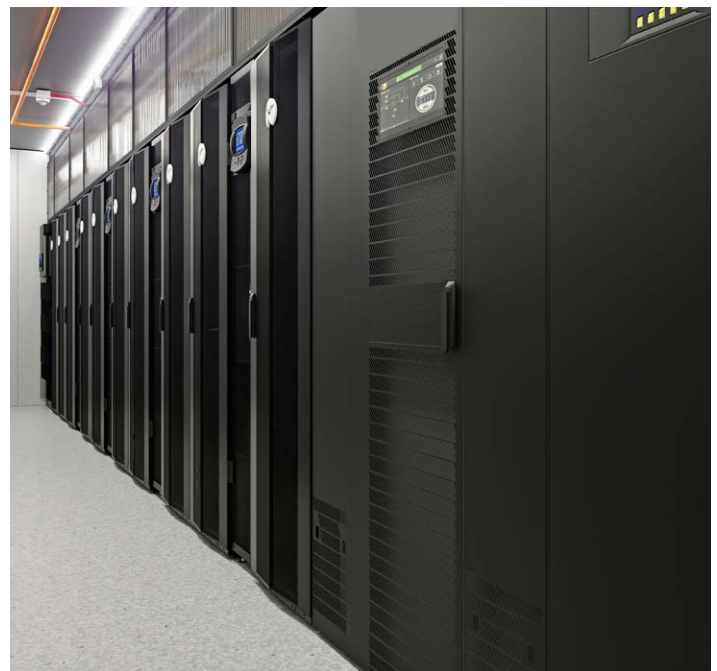
Colos, on the other hand, are deploying their customers' racks. That customer can choose the servers and associated equipment in those racks. If that equipment ships to the colocation facility, the customer typically works with a third-party system integrator to assemble and activate that rack when everything eventually arrives. If it sounds like there are a lot of moving parts in that process, it's because there are. And that can cause delays in deployment and increases in costs.

The alternative, which is becoming the overwhelming preference of colos and their customers, is to work with system integrators who build an integrated rack offsite and ship that fully assembled integrated rack to the colo. In our recent experience with certain colos, as high as 70 percent of the racks shipped to colocation providers are integrated racks. There are compelling reasons for this number.

The Case for Integrated Racks

There are advantages to deploying an integrated rack that goes beyond the zip code where the equipment is shipped. Let's examine those.

- **Speed of deployment:** One of the more critical competitive advantages a colocation provider can offer is the speed with which a client can stand up equipment within the data center. Deploying integrated racks accelerates the process in several ways. The system integrator building the integrated rack typically has ready access to all of the equipment – from rack to server to cables – through a single fulfillment channel. Assembly and configuration usually are faster in a dedicated space as opposed to the data center floor, and installation of a fully assembled, integrated rack is quicker and easier.
- **Lack of disruption:** Assembling and installing a rack is a relatively complex, time-consuming process that requires significant workspace to complete effectively. Floor space is at a premium in colocation data centers, and finding room to store the disparate pieces and then assemble them when the time is right is a tall order. Simply sliding in a fully integrated, plug-and-play rack eliminates potential interruptions to adjacent racks and operations. In most



cases, the customer doesn't even have to be there. Also, when the rack is assembled in the data center, it can require coordination among multiple vendors who specialize in rack assembly, cable connections, and all the other details needed before going online.

- **Reduced packaging materials:** You would be surprised how many customers tell us cleaning up and disposing of equipment packaging materials is a severe distraction, waste of time, and unwanted expense. But think about it – when you consider packaging materials for the rack itself, servers, UPS, rack PDU, cables and any other equipment going in the rack, that’s a lot of cardboard, Styrofoam and plastic. With an integrated rack, all of that is managed offsite.
- **Predictable pricing:** With an integrated rack, the invoice is simple – equipment costs and time for the system integrator, all billed together. Buying and installing separately means invoices for every piece of equipment and every vendor involved in installation and setup.
- **Predictable quality:** A single system integrator offers repeatable assembly practices. On-site assembly with multiple vendors expands the number of people involved and increases the opportunities for error.

Where to Start

We’ve mentioned repeatability a few times already, and that certainly is an essential benefit to using integrated racks. When planning such a rack, however, it’s important to tailor it to the application and facility. The usage will dictate choices of servers, rack size, depth, and cabling considerations. For example, if its primary function is networking, that will mean there will need to be more switches and punch panels, and probably means a wider or deeper rack to accommodate accessories and cabling. High-performance computing for applications like bitcoin mining or artificial intelligence requires higher-level servers, likely generating a lot of heat. That changes the cooling profile. Even the height of the rack should be considered. In colocation facilities, where floor space equals revenue, taller racks can maximize capacity per square foot.

All of these variables matter. They dictate power distribution, plugs, cooling, and any number of other decisions within the rack.

The Mechanics of Shipping an Integrated Rack

The single most significant consideration when shipping an integrated rack is the safe, secure transportation of what routinely is a 2,000-pound cabinet of sensitive IT equipment worth hundreds of thousands of dollars. When secured from reputable sources, fully integrated server racks are designed for on-site delivery with specially designed shock packaging for shipping. The delivery includes the use of a heavy-duty pallet with foam cushioning, reinforcement, and special wrapping to protect the rack and the IT equipment during transport. This assures safe shipment and faster deployment of fully loaded and integrated IT racks for complete on-site system configuration.

To make sure the rack ships properly, there is specific testing that should take place prior to packaging. The testing includes:

- **Static load:** How much weight the rack can safely hold when stationary
- **Dynamic load:** How stable the loaded rack is when rolled on its casters
- **Transit testing:** The shipping pallet must absorb shock so the rack will arrive without any damage



Bottom Line

Fewer and fewer IT racks are shipping without integrated equipment installed. Today’s integrated racks are business assets and strategic investments that can be deployed and installed faster, minimize disruption to the data center, and deliver more consistent performance and reliability. Working with a trusted system integrator to build and install an integrated rack can streamline and simplify those installations for colocation and enterprise data centers.



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