

Cisco IT Data Center and Operations Control Center Tour



Inside the Build Room

5. Inside the Build Room

Introduction

Figure 1. Inside the Build Room



Ian: “The purpose of the Build room is for the system vendors to rack, stack, and configure new systems before they go into production, to try new equipment and new configurations and burn in new equipment without affecting our production environment or setting off alarms. I should be able to turn off the power to this Build room and we should see no alarms at all.

Dick: “The Build room also gives engineers a safe space to set up, configure, and test the boxes that will be going into the production environment. They get the boxes delivered here from the shipping and receiving truck, open them, put them in this room, do any assembly or configuration required, and then burn them in for whatever period of time makes sense to them and their applications. For example, we might want to take a critical storage frame or server and burn it in for a few weeks, whereas smaller servers might only require a few days. And then when the engineers are ready, they will place them in the data center. There is one Build room in each of the data centers.

“There is a separate subnet in the Build room so there are no problems leaking from this network into the production network. You deal with the problems in here, so you don’t have to deal with them in production.”

Build Room Architecture

Dick: “I think you’ll notice that in the Build room we do our networking using a different architecture than we use in the business process areas. The Build room is very much like our engineering data centers, and I think we are probably going to end up that way in production environments.

Q: How is the Build room architecture different from production? How is it more like engineering?

Ian: “The engineering data centers are a little different from the production data centers. Engineering data centers are built for flexibility because engineering is a very dynamic environment. We want to make sure that when our engineers get a great idea, that in the space of six weeks or six months they can build a new project area in the data center, complete the first customer ship, tear it down and rebuild the systems differently to do a different set of compiles for bills, project stores, and so on. So they have thousands of small systems changing rapidly.

“Business data centers on the other hand tend to have a smaller number of larger systems, primarily supported by vendors that change infrequently. Production systems tend to go into production and then stay there for two or three years until they get replaced by the next version of the application.”

Dick: “Generally what you’ve got in this Build room environment is a rack of network equipment at the end of every half-row. In the production environment we keep the network environment all the way back out one end of the data center to protect it. It’s far enough away from the rest of the equipment that no one working on the servers will bump into it or touch it. The only way you’re going to see the network is if you lift the floor tiles to see the cables underneath. That architecture adds protection, but at the cost of reducing flexibility, which is necessary in the Build room.

“In here, in the Build room, you’re changing out equipment every week, and you need to build for flexibility. We know that when we plug in a box that in a few days we’ll unplug the whole thing, move it into this data center or another data center on this campus, and then plug it into another network. Nothing is permanent in here. So all our network connections are really close to your equipment, and you don’t have to run a lot of cable to connect it; it’s all right here.

“In a production data center we build the network all the way out at the end and then run cables all the way back to the data center equipment, so we end up with a lot of long cables. Adding new equipment or moving equipment means we have to pull long runs of new cable, which is difficult, but in production data centers we don’t change things very often. Everything in the data center is pretty well documented, and also pretty

predictable, so we know where everything is. In fact, I should be able to walk over and pick up any floor tile and know exactly what I'm going to find there.”

Figure 2. Cisco Catalyst 6500 Series Switch and Cisco 3600 Series Multiservice Platform in Network Cabinet in a Half-Row



Ian: “We use Cisco 6500 Series switches everywhere, in every one of the business data centers, and every one of the engineering data centers, and in fact in all the data facilities whether they are on a desktop or in a data center. By standardizing on a single platform we make the infrastructure more stable, and far more predictable and easier to maintain.

“We also have a couple of CCIE experts on our LAN team who have come up with a very stable system – a very scalable configuration for our Catalyst 6500s. It’s also a flexible platform that allows you a several choices in media type: Copper, single-mode or multimode fiber to accommodate the needs of a row in a Build room or data center. It’s so stable it’s like our floor tiles—you don’t need to think about it.

Console Network

Figure 3. Console Network Routers



Dick: “Along with the data center network, we also support a separate console network here. In some data areas they have direct console connectivity, a monitor, and keyboard in various sections to allow people to log directly in to hosts or switches.

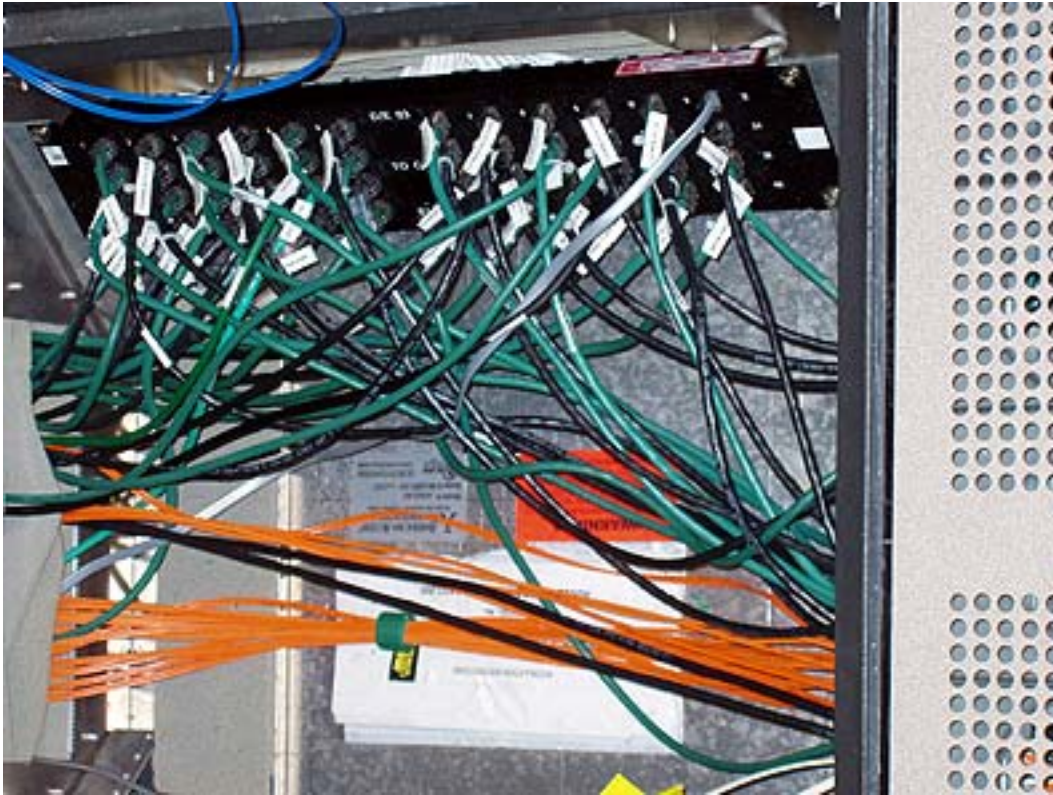
“You won’t see any monitors or keyboards here inside the data centers. Instead, all our console ports are connected into a separate and secure console network. This allows our network engineers and host engineers to work where they’re most needed, and without having to come into the data center they can network into the console ports and manage these resources from anywhere on the network.”

Ian: “Also, by putting all our console ports on the network we don’t have all the keyboards and monitors in our data centers. Our floor space is too expensive to be filling it with keyboards and monitors, and the like. We concentrate all the console server access over the network that way; and so that it’s easy for our engineers to access the right host or router or switch, we use consistent standards for the host names and router names that tell you where it is and what type of resource it is. It’s a naming standard that’s scalable in terms of nomenclature as well the subnet allocations and DNS as well.

Dick: “This is all set up to help a distributed environment, which really helped us with the move to Bangalore as the second Operations Center, because we’re set up to access everything remotely, and that means we can manage it from anywhere in the world.”

Cabling

Figure 4. Under Floor Cables with Breakout Boxes



Ian: “The cabling system is standard as well. If we look under the floor, we’ll see breakout boxes. We see a box that is clearly labeled with the port numbers, and there is room for 12 and 24 fibers behind each floor tile. That allows us to drop a patch cable to the breakout box and then go over to the zonal cabinet, which is clearly labeled with which row and which breakout box and which port it is. When you plug that in to the switch, you’re done. You don’t have to pull up a whole series of floor tiles or cables under the floor.

“In fact, it’s so standard and consistent that, you can go to any Cisco data center in the world and use the same system, connect equipment in exactly the same way. I’ve been in Glasgow, Milan, Texas, Research Triangle Park (RTP) in North Carolina as well in San Jose, and they are all the same.

“The standardization keeps training costs down and keeps error rates down. It also helps our acquisition strategy. When we acquire a company for engineering talent, you want to keep all those people equal, you want to keep them productive and stable and the way to do that is to erase all the irrelevant differences, like how we access data center resources. “When we get SEC approval for an acquisition, our teams can go there that weekend and cut them over to the standard data center and network IT environment. When they come in on Monday, and they start working at Cisco, it’s all the same to them, except that now we can support them a lot more easily and with fewer people, because we don’t have to

train on new standards. We're able to do that kind of SWAT team approach because we have a standard architecture to work with. So the network is consistent, the racks, the shelves, the screws, power bars, the power cabling, patch cabling, the supplies against the wall are all the same worldwide."

Production Data Center Architecture

Figure 5. Network Rack at End of Half-Rows



Ian: "You won't see this same architecture or standardization in this business data center, however. In this data center, instead of a network rack at the end of each half-row, we use the production network standard: A single rack of network equipment at the end of the data center. There are two reasons for that: First, our production data centers are a bit older and their design predated the standardization effort here in Cisco. Also, business systems tend to go in and stay in for a long period of time, so you can afford a higher level of defense and a higher level of effort to put them in place because you're not going to have to change them several times over three years. If we ever redo the production data centers or build a new one, we would build it like this, with these zonal cabinets.

End

Inside the Build Room

You can go back to the Root Cause Analysis and Change Management section, move ahead to see how storage and servers are kept and managed, or you can go to any other part of the tour.

We hope you have enjoyed this part of the Cisco IT Data Center tour. You can contact your Cisco sales person to arrange an Executive Briefing Center visit, and request a live tour of the Cisco main production data center and operations control center.

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