HPE Synergy Fabric Exposed

Inflexible network fabric is not composable

HPE announced Synergy as composable infrastructure. Look at the fabric and you will see that it is anything but.

While marketing a message of composability, HPE Synergy has more hardware, more touch points, and more cabling rules than ever before increasing both complexity and risk. You shouldn’t have to worry about reconfiguring management and network fabrics every time you want to grow or shrink resources. Different applications require different connectivity, and with Synergy this means changing out the many modules and physically recabling each time. In other words, HPE OneView doesn’t compose the physical network—you do.

• **Same old design.** The new chassis (called a frame) uses the same approach as the aging HPE c7000 chassis with blades in front, switches in back.

• **You must predict the future.** The network configuration is set at purchase time. If you don’t estimate your needs correctly, or your workloads change, you will need to purchase costly new equipment, endure downtime, and reconfigure the logical and physical architecture of your networks. OneView’s claimed composability can’t recable networks for you.

• **New management appliances.** Synergy needs even more physical management devices, including two HPE OneView appliances (servers) and frame link modules that must be configured in a cumbersome ring.

Cisco Unified Computing System™ (Cisco UCS®) is self-aware and self-integrating with zero-touch configuration. As your needs change, Cisco UCS changes with you. Our management supports the entire Cisco® server product portfolio, including blade, rack, and hyperconverged servers.
Familiar chassis design

HPE Synergy uses the same approach as the HPE c7000 chassis: blades in the front, switches in the back. But blade density has been reduced from 16 to 12 servers per chassis (now called a frame) to make way for a pair of dedicated management appliance slots in the front. These devices increase per-blade overhead and reduce the space that can be used for servers that run your applications.

The frame-level network configuration is similar to the c7000. Three network fabrics are hardwired to three mezzanine connectors in each server. A fixed port mapping means that traffic flowing over one set of midplane traces can’t be shared with anything else.

Because of this, you must make critical network decisions at purchase time. Since the configuration is so difficult to change, this leads to overpurchasing and overprovisioning.

Inflexible HPE Virtual Connect architecture

Synergy’s network fabric has limited scalability that is based on your initial purchasing decisions. The fabric uses HPE Virtual Connect switches that operate in a master–satellite relationship with Synergy Interconnect Link Modules (satellites). Cables run across the back of the rack and between racks to interconnect either three or five frames in a network domain. It’s up to you to keep track of which masters are connected to which satellites. The Virtual Connect fabric is the only fabric that can operate in a master–satellite relationship, in contrast to the other network modules available for the frame.

As Figure 1 illustrates, any change to your network requires adding and removing modules and recabling the backs of your racks with complex interframe connections. Any changes from 10- to 20- to 40-Gbps networking, or adding 16-Gbps Fibre Channel, require physical reconfiguration to add and/or remove modules and to recable. This is not composable infrastructure.

Support 20-Gbps networking

The most basic Synergy configuration is three frames in a rack. More than this tends to exceed data center power and cooling capacity.

The management network is a ring that must be broken and reconfigured when adding or removing frames (green lines in Figure 1).

Two Virtual Connect switches support two IP network fabrics (orange and blue lines). These are connected with stacking connections (white and black lines) and are cabled across the back of the rack to satellites that bring the network to the other two frames in the rack. Then you need to uplink them to top-of-rack switches. Only one uplink cable is shown because a realistic number of uplinks makes the diagram difficult to decipher.

Next consider how complex the back-of-rack networking looks when you adapt to change, for example adding 16-Gbps Fibre Channel.
Add 16-Gbps Fibre Channel

The Virtual Connect modules support only Fibre Channel over Ethernet (FCoE) for 8-Gbps Fibre Channel. To support connectivity to modern 16-Gbps SANs, you need to take each server down and add a Fibre Channel host bus adapter (HBA)—a total of 36 new devices to configure (middle rack in Figure 1). Then you need to place two Fibre Channel switches in each frame and uplink them to switches for fabrics A and B. The red lines in the middle rack show 16 Gbps of uplinks to each fabric; in real use you would have considerably more cables to provide sufficient bandwidth.

When you add equipment and recable the backs of your racks you must reconfigure OneView so that it understands the new hardware topology. This is another example of how OneView does not compose your network, you do. With Cisco UCS, all of this is accomplished by changing the network configuration in software.

Scale to 40-Gbps networking

Suppose that you need more IP network capacity. Synergy has no native 40-Gbps-per-port connectivity so the only way to support this amount of bandwidth is to replicate your 20-Gbps networks and use network interface card (NIC) teaming in the operating system or hypervisor to aggregate bandwidth.

As the rightmost rack in Figure 1 illustrates, you need 36 new NICs, two new Virtual Connect switches, and 4 new satellites. And you now have 2 network domains to manage, including more uplinks to top-of-rack switches.

Limited management at a high cost

Synergy requires two OneView appliances (composers) per management domain. These are full x86-architecture servers that must be configured, maintained, powered, and cooled.

OneView for Synergy only

The version of OneView on the composers is specific to Synergy. The appliances can’t manage any other servers in HPE’s product portfolio, including HPE c7000 blade servers or HPE ProLiant.
rack servers. For these, you need a separate virtual appliance. The composers in one domain can’t be linked to those in another domain. HPE requires another OneView software appliance that provides dashboard-only visibility for multiple domains.

**Daisy-chained management network**

The management network requires customers to connect every frame together in a bidirectional ring using Ethernet cables. To add a new frame, you must break the ring, insert the new frame, add more cables, and update your complex cabling diagram.

**Local storage**

HPE Synergy introduces chassis-resident storage, where you can replace up to 10 blade server slots with storage modules. This requires SAS connection switches in the frame, and SAS controllers in each blade in the frame. Storage installed in one frame can be accessed only by blades within the frame.

While HPE claims that this is a good solution for software-defined storage, consider the cost. Reducing the usable number of blades increases per-port fabric costs and also increases management complexity and overall touch points.

It is telling that HPE chose to implement its own software-defined storage solution—SimpliVity— not on Synergy frames with local storage, but on low-cost rack servers.

**You must predict the future**

The data center of today must be ready to adjust rapidly to changing workloads. With today’s DevOps and continuous deployment development models, your workloads can change in minutes. Are you ready to adjust?

To make any change to your Synergy infrastructure you must first change the physical configuration and then update OneView so that it understands what it connected to. It does not do this automatically as Cisco UCS does.

To add or remove a chassis, you need to add it to or remove it from the management network and also insert it into or remove it from a master/satellite Virtual Connect configuration. Need to add bandwidth? We have shown how difficult this is. When you have to endure downtime and network reconfiguration to change bandwidth, Synergy is anything but composable.

**Cisco UCS design philosophy**

Our philosophy from the very beginning has been to simplify everywhere we can, reduce touch points, and increase flexibility. We stripped our chassis of complexity.
so that it is only sheet metal, sensors, and a midplane. The result of Cisco UCS being a truly programmable infrastructure is that the same design has endured five generations of Intel® Xeon® processors and three generations of interconnect technologies. It can adapt to rapidly changing workloads without downtime due to error-prone, hands-on server and network configuration.

**Management is our DNA**

Cisco UCS management is based on firmware that forms the DNA of every system. We don’t believe in management appliances and management modules. We use a common API for all of our products, including blade servers, rack servers, storage servers, and hyperconverged nodes. This allows us and our ecosystem partners to build management tools on top of Cisco UCS that provide global resource awareness and management for ease of policy enforcement. Automated management and orchestration products. Cloud management tools that turn your Cisco UCS system into a private cloud with seamless interconnection to public clouds. And Cisco Intersight™ management as a service that can securely manage every one of your Cisco UCS servers with consistent role- and policy-based configuration.

**True innovation**

Even when HPE had the opportunity to design a new generation of blade chassis, its choice was to continue the legacy of selling up to 10 modules per frame and having independent networks that limit sharing. After eight years in the market, Cisco UCS is still the simplest and most flexible platform, with a fabric that scales and adapts to meet your workload needs today and into the future.