

## CLEAR CHOICE TEST: CISCO CATALYST 4500 SWITCH

# Cisco powers up Catalyst 4500

New UPOE spec supplies 60 watts per switch port

BY DAVID NEWMAN

**C**isco doesn't just want to sell you switches. It also wants to be your power distribution vendor.

New line cards for the Catalyst 4500 switches support Universal Power over Ethernet (UPOE), a means of supplying up to 60 watts per switch port. That's enough to power all devices in a cubicle, including a 23-inch monitor, thin-client computer and webcam-equipped IP phone.

We lit up all that gear in this exclusive Clear Choice Test, and also examined performance and features of a new Supervisor 7-E management module and an energy-efficient Ethernet line card that drops power consumption when idle. These transformed the venerable Catalyst 4500 from modular Ethernet switch to master power-distribution system.

UPOE differs from previous versions of PoE in that it uses all four pairs of an Ethernet cable to supply power, doubling the wattage available to UPOE-capable devices. Cisco's implementation is proprietary, but the vendor says it will bring this variant of the existing 802.3at specification to the IEEE for standardization.

### Cisco bolsters switches

The new WS-X4748-UPOE+E line card has 48 Gigabit Ethernet ports, 24 of which can supply UPOE power. We verified this by using Sifos Technologies' PowerSync analyzer to draw a full 60-watt load on 24 ports during all performance tests. UPOE had no impact on system throughput or latency, as measured with a Spirent TestCenter analyzer.

We also verified UPOE functionality by plugging in devices typically found in an office cubicle. For the phone and computer, we used a Cisco 9971 IP phone equipped with a webcam and embedded CVXC-2111C virtual desktop client. The latter is a thin-client computer that we used with VMware's Virtual Desktop Infrastructure (VDI). We also attached a 23-inch Samsung SyncMaster NC220 monitor over UPOE.

Finally, we attached BT Group's ITS.Netrix, a phone intended mainly for stock traders with up to 20 lines, four speakers and a video display. All these devices operated successfully using UPOE.

Two kinds of devices that won't work with UPOE, at least for now, are conventional notebook and desktop PCs. While they're getting more efficient, most laptop and desktop PCs currently draw well more than the 60 watts supplied by UPOE.

For example, this article was written and edited on an Apple MacBook Pro with an 85-watt power supply and a Dell OptiPlex desktop that can draw up to 590 watts. Even though actual power draw is usually far lower, 60 watts sometimes isn't enough for either type of machine.

### Net management ABCs

A common PoE misperception is that adding wattage means adding heat in the wiring closet. PoE is a method of power distribution, with the switch acting merely as a pass-through system. Most heat dissipation occurs at the powered device, not at the power-supplying equipment (in this case, the switch).

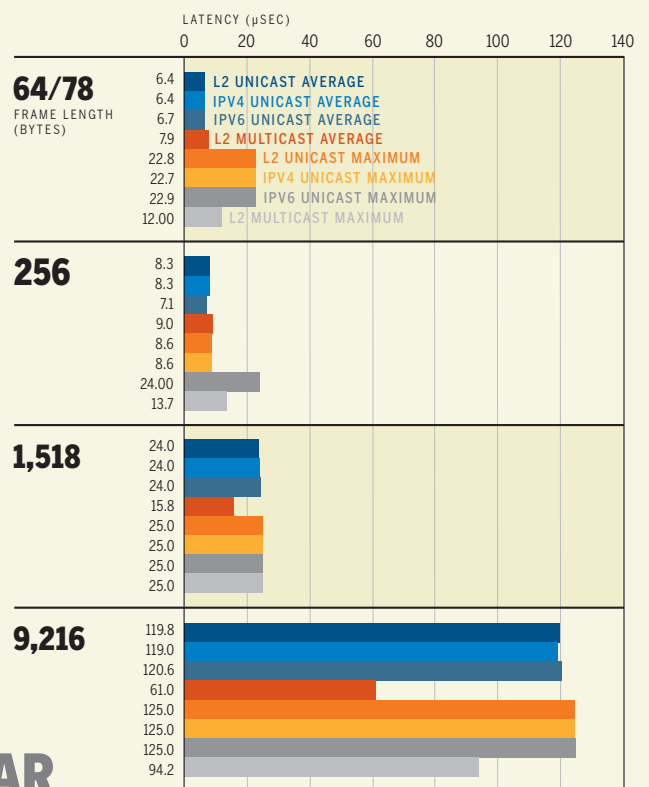
In contrast, another IEEE spec called energy-efficient Ethernet (EEE) specifically aims to reduce power at the switch port during idle periods. In a test of new EEE-capable line cards involving 384 copper Gigabit Ethernet ports, we saw power consumption fall from 1,462 watts to 1,278 watts when we enabled EEE, a 12.6% power savings.

Cisco also demonstrated an alpha version of a protocol analyzer running on the Supervisor 7-E module. Network engineers familiar with Wireshark and tcpdump will be right at home with the analyzer, which can save captures to a file or present them in format similar to a Wireshark decode in a terminal window. This early version captured only 100 packets, but Cisco says a version slated for release this fall will be limited only by buffer memory on the supervisor card. Like Wireshark, the analyzer uses capture and display filters to zero in on interesting packets.

The analyzer can be used in conjunction with Flexible NetFlow (FNF) and Embedded Event Manager (EEM) features of the supervisor card

### Catalyst 4500 delivers low latency

We blasted various frame sizes and types of traffic through all 384 Gigabit Ethernet ports on the Catalyst 4500 and found that the switch consistently delivered low latency.



NOTE: 64-byte frames used for L2 and IPV4; 78-byte frames used for IPV6



to take action in response to network conditions. For example, FNF can identify a SYN flood attack, and a simple EEM script could then shut down the affected switch port or throttle traffic rates. Similarly, the analyzer could start a capture of any unknown protocol.

FNF can track more than 70,000 concurrent flows on the Supervisor 7-E module. We verified this by enabling FNF during all performance tests, and saw FNF tracking 73,536 of the 147,072 flows we generated.

### Performance is job one

Delivering high throughput and low latency is job one for any Ethernet switch, and accordingly we devoted most testing in this area. We measured throughput and latency with four test cases: Layer

