



Pica8 White Paper

AmpCon Network Controller

Software Switch Automation for
Flexible Enterprise Networking



Contents

Introduction	1
Zero Touch Provisioning	1
Lifecycle Management and Automation	3
CONFIGURATION MANAGEMENT	3
CONFIGURATION BACKUP, COMPLIANCE, AND ROLLBACK	4
SWITCH INVENTORY	4
LICENSE UPDATES	4
RMA REPLACEMENTS	4
FLEXIBLE ANSIBLE EXTENSIONS	4
SIMPLIFIED SOFTWARE SWITCH UPGRADES	5
ADDITIONAL FEATURES	5
Flexible, Affordable – and Simple	6

Introduction

Network operations teams are under stress. Trends including Internet of Things, cloud computing and an influx of mobile devices all mean enterprise networks need to support more traffic – and it's all entering at the edge, on enterprise networks at switches closest to end users. Companies are being forced to upgrade these switches, from dozens to thousands, to accommodate more traffic. And since networks are in essence a utility, there is always new infrastructure to deploy and configure, fault-trace, or repair/replace.

The challenge is complexity and time. Legacy switches run proprietary operating systems that have become bloated over the years, loaded with hundreds of thousands of lines of code for features and functions only a fraction of customers actually use. The time is right for a fresh approach, one that emphasizes time savings, simplicity and ease of use.

Pica8 answers the call with its software-based approach to flexible networking as an alternative to Cisco DNA Center and Catalyst switches, and other legacy hardware vendor products. Pica8's software automates the drudgery of common network tasks to save valuable administration time and free up staff power to focus on objectives that drive the business.

Zero Touch Provisioning

The need for automation is evident early – at the switch provisioning and deployment phase. While it's true that legacy vendors have tools that can help automate switch deployment, they come at a steep price, require an expert network programmer to master and may require that you upgrade all your switches to the latest model.

Take Cisco's DNA Center for example. Before it can automate anything, you first must set up Cisco DNA Center itself, which can get complex; again, it requires software on both the server and switch sides.

Pica8 doesn't think it should require complexity to achieve simplicity. Pica8 AmpCon™ (short for Amplified Control) is a network controller intended to be simple to set up and use day to day. Literally in minutes you can spin up AmpCon on a virtual machine on your premises or in the cloud and you'll be ready for automated switch deployment and error-free configuration at scale.

Here's what the switch deployment process goes like with AmpCon.

You take bare metal (or branded "brite box") switch of your choosing, from vendors including FS, Dell Technologies, Delta and EdgeCore Networks (see list of compatible hardware here) and install a default PicOS Software Switch image on it. This step is often performed by resellers or systems integrators if you're working with one, but it's also simple enough to perform as part of the rack-and-stack process if you're doing it yourself.

TESTIMONIALS

“ We ran an audit on 150 switches and found 900 different configurations, which breached the standards that we defined. AmpCon automation fixes this problem with a single click, all in software.

Network Architect for Top 10 Global Systems Integrator

“ Time is money. AmpCon automation and zero touch provisioning saves us loads of time on switch license management and standardizing configurations.

Senior Network Manager for Top 3 Service Provider with 4,000 retail sites



AmpCon's deployment module makes this really simple. With the default image installed, the switch is ready to ship to its ultimate destination, be it a branch office, retail store, data center or a building across campus. Once there, simply plug it in and the switch will kick off an auto-connection script that enables it to find the Pica8 Automation Server and register with it.

Importantly, no experienced network personnel are required at the remote site; anyone who can install the switch in the right place and plug it in will do. The Automation Server includes a component called the Configuration Manager. Your network team uses it to create a standard configuration to be deployed on all switches, along with any site- or region-specific variations. All configurations are tied to specific switches by the switch serial number (or Service Tag) and stored in a database.

After registering with the Automation Server, each switch then downloads its appropriate configuration. At the same time, the switch will access another Automation Server component, the License Manager, which will access the customer's account on the Pica8 License Portal to generate a license key and install it on the switch.

Finally, the switch runs a script to automatically reboot, apply (and validate) the new configuration, update its status in the configuration database and join the network. From your perspective, all of this switch configuration happens with the touch of a button – as close to “zero-touch provisioning” as you can get. Now it's possible to deploy dozens or hundreds of switches to far-flung sites while most if not all of your network team stays home and monitors the process centrally.

AmpCon delivers cost savings that every C-level will appreciate. The reason is simple:

- We use flexible software
- We include only the features users truly need – zero bloat
- AmpCon is intended to be highly scalable –customers use it to build big networks (although it works just fine for small- and medium-sized networks, too)

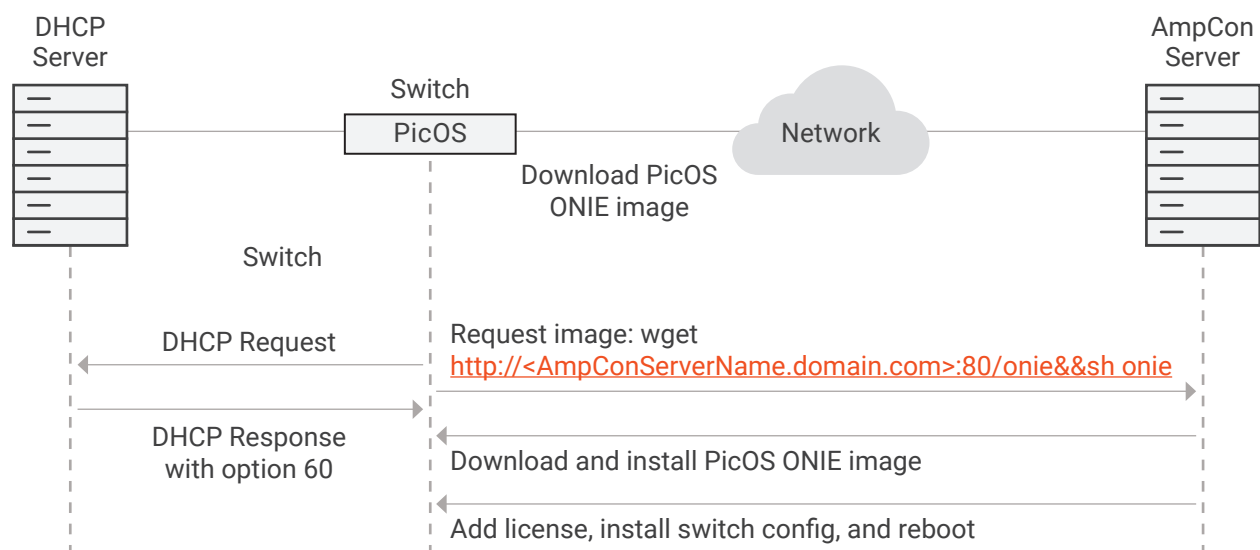


Figure 1 - Automation Process Flow



Lifecycle Management and Automation

Once installed, AmpCon also simplifies the ongoing management of Pica8 PicOS Software Switches including configuration management, switch inventory, software updates and more.

TASK	MANUAL	AMPCON AUTOMATION
Custom Workflow (e.g. Add VLAN)	7 hours	20 minutes
Upgrade PicOS Software Switches	1-2 days	Overnight, in background
Config Update (e.g. Change Syslog Server)	7 hours	< 20 minutes
Daily Compliance Check	1 Full Time Engineer	Automated

Figure 2 - Time Savings for a Block of 100 Switches

CONFIGURATION MANAGEMENT

Companies to date have had two main ways to implement configuration changes in their networks.

- Log in to each switch individually and push out changes. While this is relatively easy to do for a single switch using a CLI from a centralized console, it's time-consuming in a large network – and risky. That's because only the person who made the change knows about it (unless you're fastidious about logging) and there may be no compliance check.
- Use a configuration management system to perform changes, which is the approach most companies take. Such a system ensures more structure, including cataloguing every change, performing compliance checks and providing a way to back out any changes should anything go awry.

Configuration management tools, however, represent yet another tool that adds to both capital and operating costs, not to mention complexity if it's a third-party product that has to be integrated with the rest of your management suite.

AmpCon includes native configuration management capabilities, enabling you to push out an update to a single switch or to an entire group of switches. It eliminates the need to pull up and edit configurations one by one, reducing the likelihood of errors, and simplifies the process by enabling it to be done from the same centralized tool; no need to deal with the added expense or headache of a third-party tool.

In practice, the configuration management feature can greatly simplify the job of updating switches to deal with a new class of device, such as security devices to protect Internet of Things sensors. Network administrators can detail how the network should treat the security devices, perhaps putting them on their own VLAN, and detail where traffic from the devices is allowed to go. With a single command, the update can then be pushed out to appropriate network switches.



Other common network additions for which AmpCon can simplify management include:

- Video cameras for remote monitoring across a campus network
- Energy management systems that include dozens or hundreds of thermometers
- Door entry systems

In each case, AmpCon greatly simplifies the job of detailing just what level of network access and priority each class of device should get – and then pushing the update at once to all relevant switches.

CONFIGURATION BACKUP, COMPLIANCE, AND ROLLBACK

Once the desired configurations are set and the network is stable, we would like to lock it down and make sure accidental changes don't disrupt operations. And when a config change is made to add devices or say a VLAN, it is important to back it up. AmpCon makes this really simple by automating config backups on a specified schedule, and saving the last *n* backups (default=100), which can be used to recover quickly from a crash or corruption of a switch. And it allows marking a specific instance as the "Golden Config" which will never be deleted and used by default as the config to rollback the switch to a stable configuration in case the switch operation is compromised. The Golden Config can also be used as the basis to run an automated compliance check to verify that the network is operating as designed.

SWITCH INVENTORY

AmpCon also supports switch inventory features. Here again, third-party tools are available to support this capability, but they add expense. In addition to the software, such tools typically run on a Windows Server Enterprise Edition machine, which means additional server licensing costs.

Not so with AmpCon which, as previously noted, deploys in minutes on a virtual machine. It provides detailed inventory of all switches, including switch hardware details, software version, configuration and more. It also features a map view of your network showing all locations. You can pull up any location and drill down on an individual switch, right to the port level, to check port stats, and overall health of the switch.

LICENSE UPDATES

AmpCon can automate the process of checking and updating the switch licenses with new Support entitlements. A License Audit task checks the (group of specified) switches for a valid license and created a report of their license status (showing the support expiration date and other details). Running "License Update (or Action)" automatically updates the license keys on all switches whose support is due to expire in the next 30 days, and logs the result in a report that can be examined or downloaded.

RMA REPLACEMENTS

AmpCon incorporates a unique workflow to help with return merchandise authorization (RMA) replacements. When hardware fails and is replaced with new hardware, the RMA module takes the config from the failed hardware, updates it with the serial number of the replacement hardware, and pushes out this config to the switch to bring it up seamlessly in the network.

FLEXIBLE ANSIBLE EXTENSIONS

While AmpCon provides commonly used features and functions network teams need for day-to-day operations, it also enables companies to add capabilities they may require by writing Ansible playbooks to create customized



workflows. If there's a certain routine your company follows on a regular basis, you can build a workflow to automate it, such as by using a series of "if/then" statements.

Additionally, Pica8 offers a series of Ansible playbooks, which are templates for automating routines including:

- Compliance and consistency checks, to ensure switches stay in compliance with industry regulations that require a certain configuration to maintain proper security and privacy
- Connectivity check for PicOS Software Switches
- Network operation and remediation routines, including dynamic policy enforcement

SIMPLIFIED SOFTWARE SWITCH UPGRADES

Finally, the nature of PicOS itself makes it simpler to manage vs. any legacy switch/router network operating system (NOS). Because it's Linux-based, PicOS is compartmentalized, which means you can update or change one component or aspect without affecting the other components. For example, if you're pushing out a security patch, that affects only the security component of the NOS; you don't have to replace the entire software/firmware image.

If you're familiar with legacy NOSs such as Cisco IOS, you know that's not the case. Any update requires a wholesale software/firmware change, with all the attendant disruption that comes with it: putting the change through a qualification cycle, lab testing, the works.

By contrast, if you're making a change to PicOS that has nothing to do with the movement of data, such as a security change, you don't need to go through all of those steps.

AmpCon makes it easy and error free to upgrade your switches to the latest PicOS version. When you are ready to go, you simply schedule a job identifying the group of switches, the new software image, and the time window when you want the upgrades to be executed. The task executes automatically in the background and captures the results in a logfile that can be checked for the details and updates the task status on completion.

ADDITIONAL FEATURES

AmpCon has many other capabilities to facilitate day to day workflows:

RBAC (Role Based Access Control for users)

- User logins are authenticated via a TACACS+ server which also determines their access permissions based on their role; users can also be defined for local fallback

Parking Lot

- Manage switches that have shown up in the network and registered with AmpCon, but not yet setup with configs by the admin

Setting Up Groups (of switches)

- Switches can be organized in groups by region, location, building etc. for performing lifecycle operations

Importing Switches

- Helps incorporate and manage switches that were not originally deployed through AmpCon

Decommission Workflow

- Used for temporarily taking a switch down and then redeploying it in another location



Operational Logs

- Track all activity in AmpCon, and can be used for troubleshooting to drill down and analyze issues

Map View

- Displays all switches on a Google map based on the location data entered

Monitoring

- Allows drilling down into a switch to look at its current status, port statistics, etc.

SDN Applications

- Centralized controller for setting up VXLAN tunnels
- Endpoint controller to manage host access and assignment to VLAN on a specific port

Flexible, Affordable – and Simple

If you're fed up with the network status quo, and with paying ever-larger sums to your current network vendor for overly complex software full of features and functions you know you'll never use, it's past time to take a hard look at flexible PicOS software networking.

Pica8's AmpCon Network Controller provides centralized management and automation for PicOS Software Switches for a new level of simplicity and ease of use to enterprise network teams. From initial, zero-touch switch deployment and configuration to ongoing, automated operations and management, AmpCon enables network groups to keep up with the burgeoning demand that digital transformation efforts are placing upon them.

And you can get all these capabilities at a fraction of the cost that you'd pay legacy vendors like Cisco. What's more, it all runs on bare metal switches that likewise cost far less than their legacy counterparts – for the exact same switch hardware.

Pica8's approach to flexible PicOS software networking can simplify your life as a network professional and make your team far more productive with savings every C-level executive will appreciate.

[Contact us](#) to get set up with a demo package and see for yourself.