How Automation is Transforming the Datacenter Landscape

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New technologies are disrupting the traditional data center and dramatically helping them evolve. That means IT teams across organizations are looking at these new technologies and turning to automation to simplify overly complicated network infrastructure and remotely manage their branches from a single console. These improvements to operational efficiency and reliability of data centers are critical to the continuity of the day-to-day operations of any enterprise because they provide better tools for accessing and managing all devices on the network remotely.

Automation helps IT personnel manage and monitor workflows and processes of complex and strategic jobs. The opportunity for automation in the data center goes beyond merely the virtualized environment. Automation in the datacenter keeps track of the real-time status of the physical and logical devices. It also promotes faster deployment time, reducing human errors, controlling and lowering operational expenditures (OpEx) and capital expenditures (CapEx). More importantly, enterprises can achieve quantifiable ROI rapidly because these new technologies provide better tools for accessing and managing all devices on the network remotely.

> "Managing the data center network becomes possible only through automation."
>
> ~ Dinesh Dutt (BGP in the data center)

WHY YOU SHOULD **AUTOMATE**

We get it! Network automation isn't easy because no two networks are alike. Many networks consist of legacy systems patched together, built one on top of the other in response to the evolving needs of the network over time, making a one-size-fits-all tool seem nearly impossible. IT professionals have achieved automation by building a solution that works for them, either by coding the entire thing from scratch or using existing tools from their vendors.

As infrastructures grow and enterprises migrate to a hybrid-type IT infrastructure (both on-prem and off-prem cloud), it's becoming more complex and more expensive to manage. With multiple proprietary technologies, as well as off the shelf technologies, vendors, and legacy systems, the task can seem daunting.

Traditional data centers require a significant effort to manage the variety of devices from multiple vendors, which means using different tools to access and control each device. An automated data center takes much of the work out of provisioning both network and storage resources.

The primary drivers and benefits for network automation:

LOWER COSTS—reducing the complexities of the overall infrastructure increases efficiencies and reduces deployment time

IMPROVE BUSINESS CONTINUITY—delivering higher levels of services with more consistency across branches and geographies, as well as proactively detecting failures

GREATER INSIGHT AND NETWORK CONTROL—adapting to the needs of your network with more visibility into the network

INCREASE BUSINESS AGILITY—improve time-to-market because it's time-consuming to maintain the lifecycle to deploy new applications and services

ENSURE COMPLIANCE—use of standard methodologies for deploying, so you don't have much variation in your end products; unifying policy management

What's the impact of network automation on organizations?

49% *are planning to make investments in network automation*

45% *will be using network auto-mation tools by 2021*

91% *expressed interest in ZTP features, and 39 percent said these features are critical to their automation initiatives.*

Source: Gartner & EMA
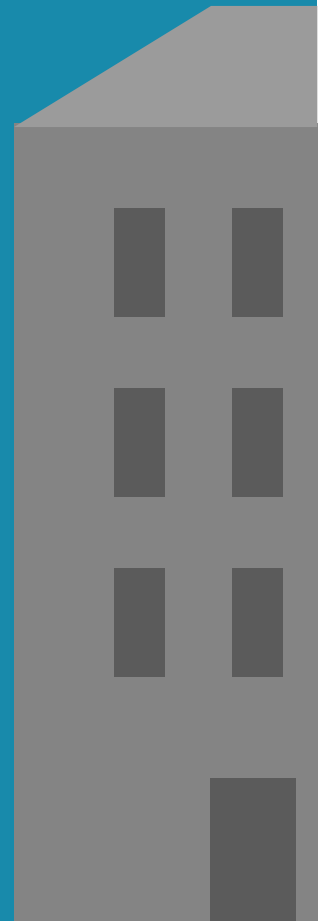
Source:

Gartner, No More Box Hugging: Network Vendors Must Drive NetOps Innovation to Remain Relevant

Gartner, NetOps 2.0: Embrace Network Automation and Analytics to Stay Relevant in the Digital Business Era

Cloud Edge computing: Beyond the Data Center - OpenStack

Autonomous Networking depicts a continuous cycle of observing, analyzing, and improving actions with little to no human intervention (Cloud Edge Computing: Beyond the Data Center - OpenStack). It promises better consistency, efficiency, security, accessibility, and speed of your network. It also promises that IT Professionals can spend more time on network optimization and future planning. With automation, functions act faster and with more precision than their human counterparts. For example, load balancing and provisioning functions can react to network demands in real-time.

Network automation lets you automate critical network activities to meet the scope and scale of IoT, artificial intelligence (AI), blockchain, and other technologies. Technologies like AI and blockchain require flexible network capabilities.

The *future* really does depend on *network automation.*

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Optimize manual processes before you automate them, ensuring you don't automate inefficient processes.

*WHAT YOU SHOULD **AUTOMATE***

The top challenge for adopting automation—especially for those that are getting started—is the overwhelming number of technology choices. The challenge lies not only in knowing where to go, but how to get there.

So, how do you go about adopting network automation?
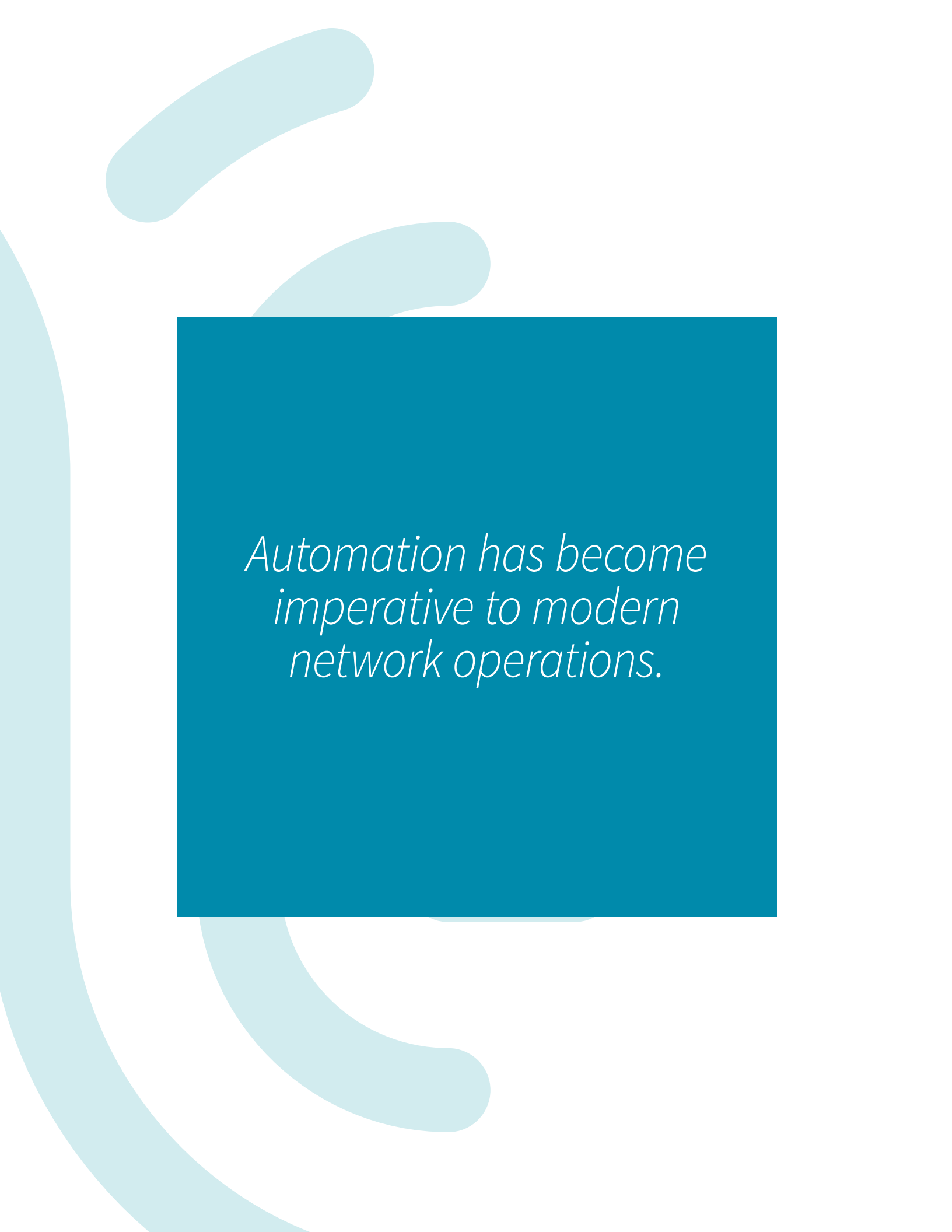
The focus should be on the tasks or processes that will most improve the business value and the end-user experience. Consider automating what causes the most issues to your organization. Rethink processes and governance to take advantage of network automation and enable agile operations fully.

Start by creating a list of network components and configurations in existing data centers, as well as the diverse workloads, the various dependencies, and the most time-consuming and error-prone activities. Optimize manual processes before you automate them, making sure that you're not automating inefficient processes.

Automate everything you can, including niche and non-recurring issues, for example:

- Scheduling and monitoring tasks
- Insights of server, nodes, and their configuration
- Patching, updating, and reporting

Aim for a self-healing system to detect events. When the system can't fix itself, you can set up notifications to alert you to investigate further— for example, initiating a support request when the BGP password is incorrect or sending an email to transit providers on high service degradation due to packet loss. Self-healing systems also apply to the necessary changes.

Automation has become imperative to modern network operations.

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The top challenge for adopting automation is the overwhelming number of technology choices.

TECHNOLOGY CONTRIBUTING TO
AUTOMATION

On-premise data center automation removes vendor dependency and provides a dynamic system and an extra layer of security. By using the right technology, data centers easily standardize, consolidate, and automate server operations. The right platform facilitates the automation of the daily administrative tasks necessary to manage IT tasks, processes, and operations.

SOFTWARE-DEFINED NETWORKING

Software-defined networking (SDN) simplifies network management and enables innovation because the forwarding hardware gets decoupled from control decisions. It reduces the need for the traditional CLI interface and provides a more straightforward, single interface for all your equipment in the infrastructure layer.

According to a survey on the future of programmable networks, the main idea of SDN lets software developers rely on network resources in the same manner as they do with storage and computing resources. In SDN, the network intelligence is logically centralized in software-based controllers (the control plane), and network devices become simple packet forwarding devices (the data plane) that can be programmed through an open interface.

Source:

IEEE, A Survey of Software-Defined Networking: Past, Present, and Future of Programmable Networks (DOI: 10.1109/SURV.2014.012214.00180)

EDGE CLOUD

Automation plays a significant role in operating edge cloud infrastructure. Edge cloud represents an extension of data center resources where the control and data planes are separated, so traffic is processed closer to where it's generated. Moving some or all of the processing functions closer to the data collection point or users, or both, cloud computing mitigates the effects of distributed sites by minimizing latency on the applications.

Today, the cloud infrastructure supports latency-sensitive applications such as the Internet of Things (IoT) and augmented reality/virtual reality (AR/VR). Tools such as OpenStack and Kubernetes optimize workload performance and service chaining. SDN platforms provide the policy and control for the edge cloud, and with virtual routers, extend networking to the edge for connectivity and service chaining.

Cloud infrastructure improves service performance and lowers transport costs because the functionality that once resided in a centralized data center gets distributed to "edge" locations, such as branch offices. That means, the system decides where the best place is to run an application.

AI/ML

The motivations for adopting artificial intelligence (AI) and machine learning (ML) in day-to-day network operations include the increasing complexity. AI and ML have become extremely important for network management because of the advancing maturity of the underlying technology, coupled with increasing pain experienced in trying to apply and scale manual processes.

AI/ML techniques predict traffic capacity and usage trends and then auto-scale and self-heal during outages. These machine intelligence techniques use an intelligent grouping of cross-domain alarms matching patterns to detect incidents, recommend actions, initiate remedies, and finally identify the root cause, not mere correlation. The network management becomes an almost autonomous operation—predict imminent fault conditions and perform corrective actions.

AI and ML are boosting automation capabilities across network operations, including configuration, troubleshooting, and problem remediation. AI and ML aim to simplify operations, reduce costs, and provide fresh insights. AI can pinpoint network failures before they occur and can diagnose the root cause of poor-quality network streams to determine the location of the problem—backbone or service provider's network. AI can solve network congestion, provide bandwidth allocation, fix insufficient network utilization, and achieve higher network performance.

WI-FI 6 AND 5G

Wi-Fi 6 and 5G offer opportunities to connect more devices reliably via wireless, which is vital for mission-critical IoT devices used in manufacturing automation, healthcare, energy, and many other industries. Since wireless traffic aggregates to wired networks, the wired networks must also evolve. With multi-gigabit Ethernet driven into the access layer, bandwidth needs are higher at the aggregation and core layers.

Wi-Fi 6 enables unified operations and pervasive segmentation across the entire network because of its enhanced connectivity. Designed for high-density public or private environments, Wi-Fi 6 looks to be beneficial in IoT deployments and branches that use bandwidth-hopping applications. It's crucial to consider capabilities such as intent-based networking to let you manage and operate your entire network, using automation to drive policy across the network, and assurance to know it's working as planned. You can build in security and analytics from the network up to applications, users, and devices.

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The right platform facilitates the automation of the daily tasks necessary to manage processes and operations.

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By using the right technology, data centers easily standardize, consolidate, and automate server operations.

ZPE'S *INNOVATIVE* APPROACH **CHANGES** THE GAME

Automation has become of vital importance to modern network operations. Those who automate find themselves in a cycle that gives them more time to spend on strategic or transformative endeavors, while those who fail to automate are pulled further into the vicious cycle of firefighting to keep the lights on.

When considering all the benefits and challenges of network automation, ZPE Nodegrid® platform simplifies day zero deployment, configuration, and access and control of in-band and out-of-band compute, network, storage, and power infrastructures. Whether you are already on the path to automation or just beginning, we are a **GREAT** platform for achieving your automation goals because we provide:

With these capabilities, for example, you can run your existing scripts or automate the provisioning of routers directly from our platform.

1. A vendor-neutral platform helping IT teams increase productivity and provide quick scalability while reducing downtime, training, and IT management costs with a unified solution.

2. Additional connectivity to your devices, which allows you to use existing tools that you have and utilize.

3. A platform with a standard x86 Linux Kernel, which allows you to run an existing client on our system.

4. A platform with the tools you need for network automation, such as scripting languages (bash and Python).

5. An environment-ready platform that requires no setup.

Use Case #1

Have you asked yourself, **Why can't I use the same connection method for all of my network devices and automate that initial configuration?**

Well, you can. To achieve this, all you need to do is plug a device into Nodegrid, which then automatically detects the device and communicates back to the automation tool to start the deployment process. The deployment process connects through the Nodegrid to the Enterprise and then pushes the initial configuration.

Once you bring the device up onto the network, you can use your typical automation methods or manual configuration items to manage the device and configure it as needed. You simply need someone in the data center to power on the device and connect the console port to the Nodegrid.

And with cloud deployments, you can use one method to automate the deployment and initial configuration of any device.
Let's say you're pushing a configuration out to a device, and for whatever reason, the configuration is not correct, and you lose network connectivity to the device. It's not unheard of that a wrong configuration got pushed. At this point, you have no choice but to connect manually to the console port to figure out what happened and then fix it.

Use Case #2

So, **why not extend your automation process in such a method that you do your change, and then you use a second channel to the console port to verify the change is successful?**

For example, you start your automation process by connecting to the device to create a backup. You do your change and then push it out. Then you do the verification of the change, which could be a simple ping of the default router or a couple of basic network checks. If the device is still up, everything is good, if the device isn't up and cannot reach the endpoint, then you restore the backup. Using the console port connection to verify the changes potentially reduces an outage from a couple of hours where someone manually verifies what the issue is to a couple of minutes because you're automatically rolling back, giving the network engineers time to verify why the change didn't work.

DOWNLOAD OUR
5 Steps to Network Automation

The challenge lies not only in knowing where to go, but how to get there. To make the process a little less intimidating, we provide some simple steps, or best practices, toward network automation.

STEP 1:
Discover & Identify   ▶

STEP 2:
Segment & Analyze   ▶

STEP 3:
Simplify & Standardize   ▶

▼ *DOWNLOAD NOW*

Schedule your FREE professional services consultation today!

ZPE MAKES LIFE EASY!

SO, HOW CAN WE HELP YOU AUTOMATE YOUR NETWORK?

WORK WITH US

LEADING
THE WORLD

ZPE Systems is the industry's first provider of an "Open Infrastructure Management Solution™" for in-band and out-of-band access and control of Network, Compute, Storage and Power Devices in both physical and virtual IT Infrastructures. The company's Nodegrid® platform easily consolidates, organizes, and simplifies the need for a complete and highly secure remote access and control solution.

ZPE US Corporate HQ

ZPE Systems, Inc.
46757 Fremont Blvd.
Fremont, CA 94538 USA
+1 844 4 ZPE SYS (+1 844 497 3797)
+1 510 298 3022
sales@zpesystems.com

LETS TALK

ZPE Europe

Alexandra House, 3 Ballsbridge Park,

Ballsbridge, D04 C7H2, IRE

+353 (01) 631 9164

+1 844 419 7338 Toll Free (France)

sales-eu@zpesystems.com

ZPE Brazil

R 7 de Setembro, 1678, Centro,

Blumenau, SC 89010-202, Brazil

+55 47 99161 6262

sales-br@zpesystems.com

ZPE India (APAC)

#12, Narayan Reddy Colony, Annaswamy

Mudaliar Road, Near Ulsoor Lake, Bangalore

560042, KA, India

+91 080-42157539

sales-apac@zpesystems.com