

MORE Programmability Skills for Engineers Who Don't Want to Code

cisco Live !

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Distinguished Architect Learn with Cisco
ccie 38336 | devnet expert 20220001

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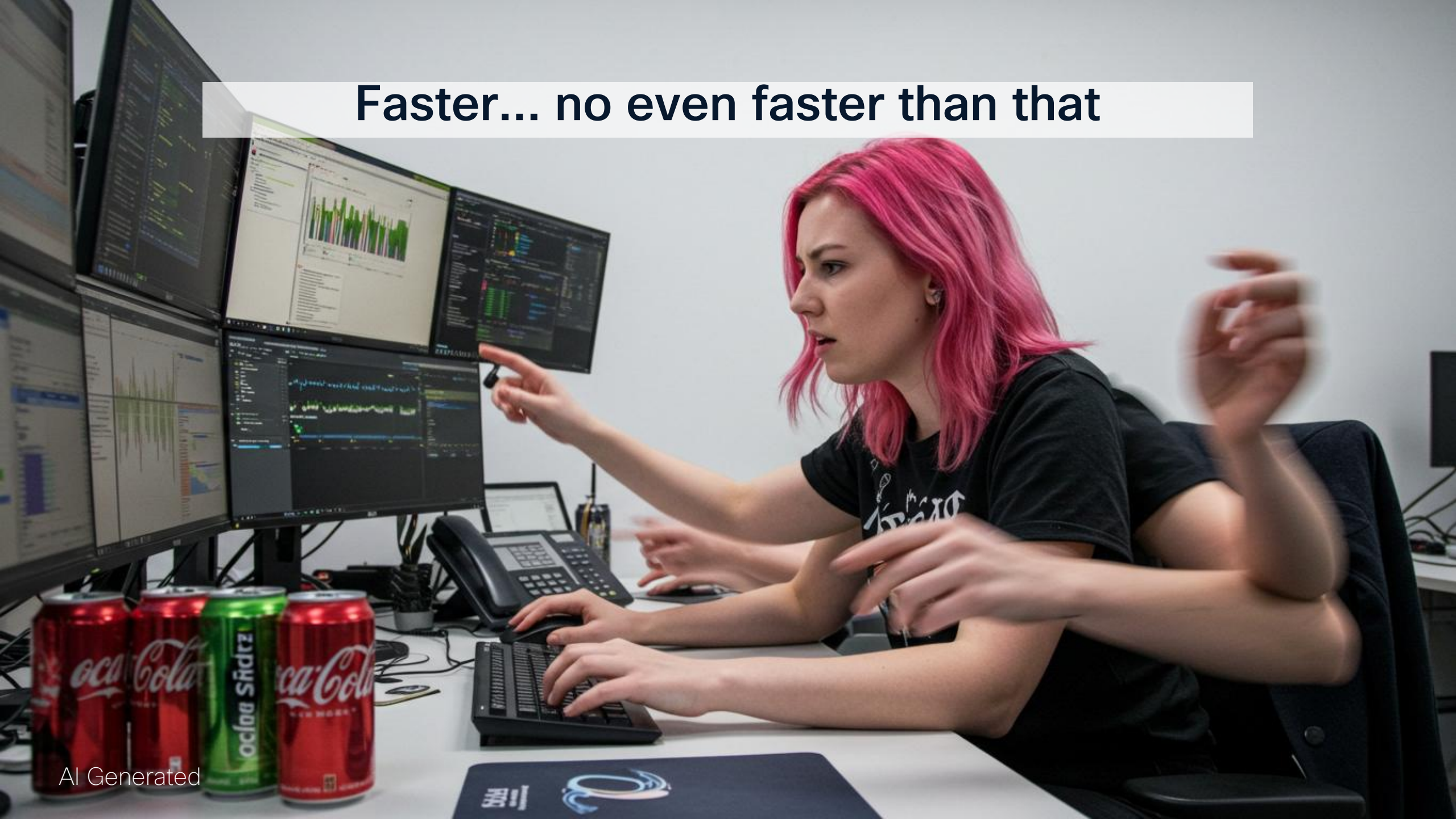
<https://ciscolive.ciscoevents.com/ciscolivebot/#BRKOPS-1238>

Agenda

- 01 Programmability... what's it good for**
- 02 Embrace a virtual world of simulations**
- 03 Infrastructure as someone else's code**
- 04 The artificial elephant in the room...**
- 05 Embedding a vintage option**

Programmability... what's it good for

Faster... no even faster than that





Consistency... Remove troublesome human errors

Example

New Network Architecture

Value... Spend time on the valuable and interesting tasks



**Embrace a virtual
world of simulations**

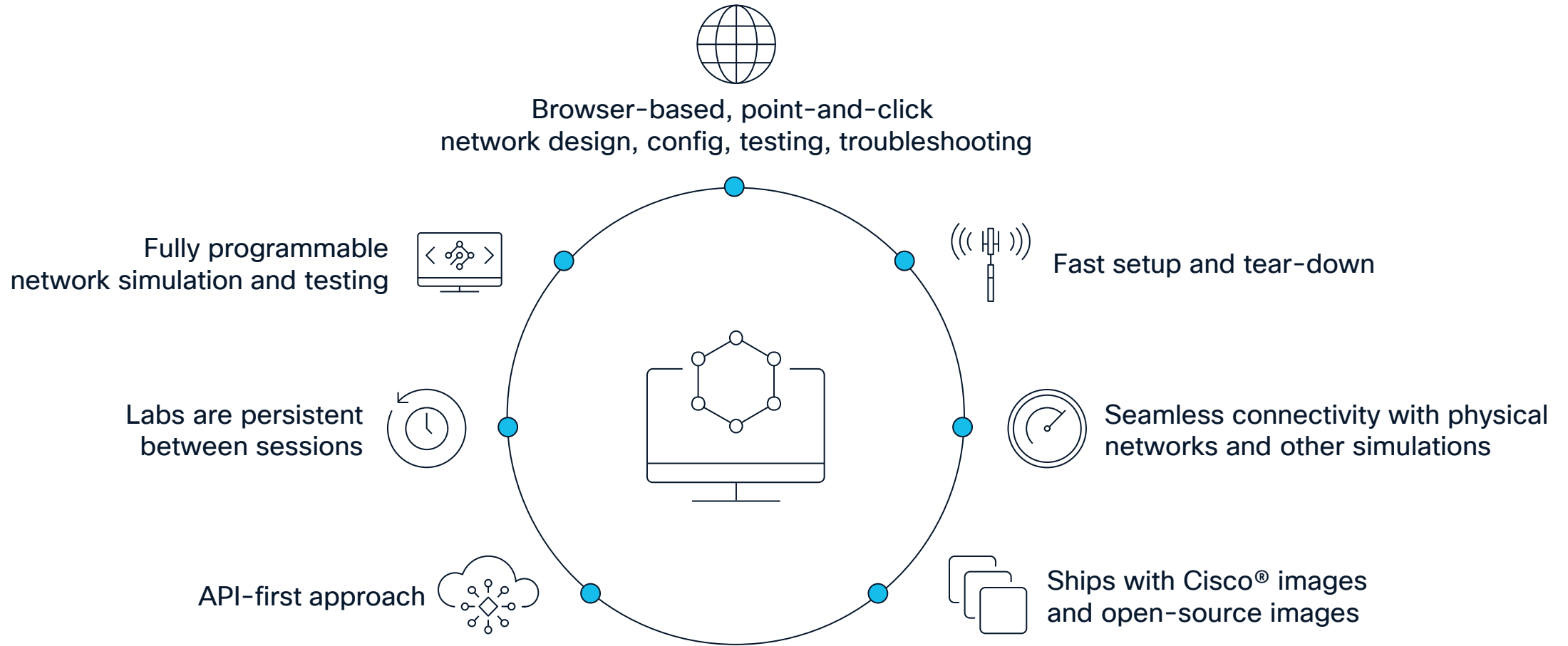
Network Simulations: The Time is Now

Sure... we all like hardware, running cables, and hearing fans spin up. But is it really the best approach today?

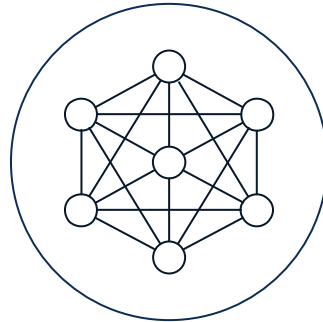
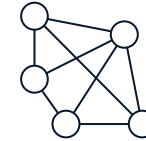


Meet Cisco Modeling Labs

Our premier platform for network simulation



Cisco Modeling Labs for every networking role



Network operations, management, and design

- Test and validate your network, management tools, and deployments
- Design new router configurations virtually



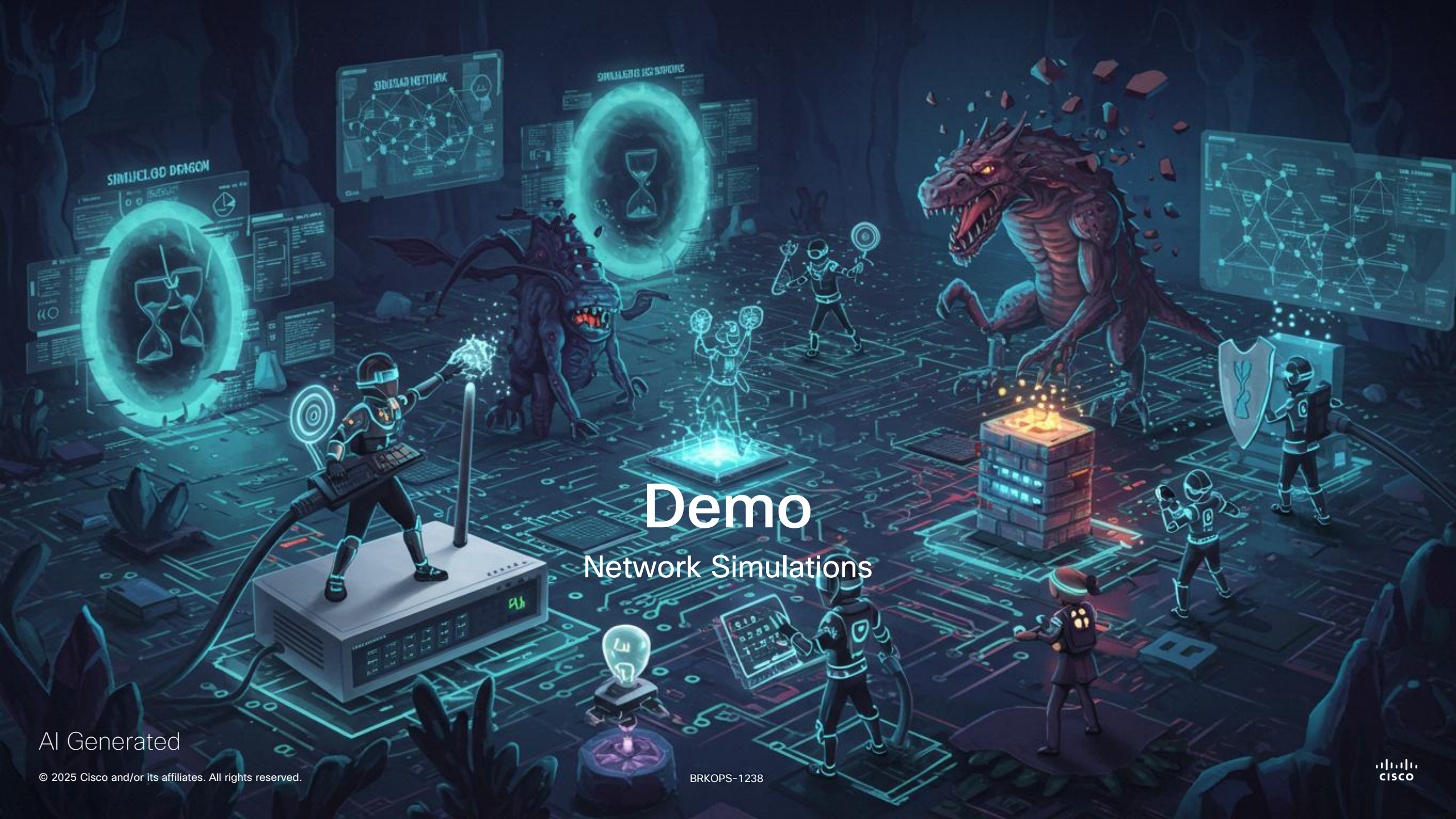
Network security

- Design and test security configurations on a virtual network
- Simulate attacks, find fail points



Learning

- Build and share labs for yourself and your team
- Using supplied Cisco® images, build configurations to prepare for certification exams



Demo

Network Simulations

AI Generated

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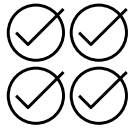
The Why's for Network Simulation



Faster

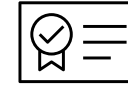
- Startup time for nodes
- Finding and running cables
- Code upgrades

Relative
Impact



Consistent

- Portable lab environments
- Repeatability
- Clone labs



Value

- Spend time on actual labbing
- Experiment in minutes from anywhere
- No need to dumpster dive



Why should I care?

- We all need a place to learn, experiment and practice
 - Doing it "in production" is a good story... at your next job
- Physical labs just aren't practical
 - Old gear, not enough gear, broken gear...
- Virtual platforms exist!

Where to get more information?

- [Introduction to Network Simulations with Cisco Modeling Labs – Free on Cisco U](#)
- [Cisco Modeling Labs Product Home Page](#)
- [Cisco Modeling Labs FREE Signup](#)
- [GitHub CML Community – Labs, 3rd Party Node Definitions](#)
- [CML Personal Community – Discussions, Support](#)
- [CML Utils – The CML CLI interface](#)

More Cisco Modeling Labs info at Cisco Live!

BRKOPS-1104 Model it up: Building Networks with Cisco Modelling Labs

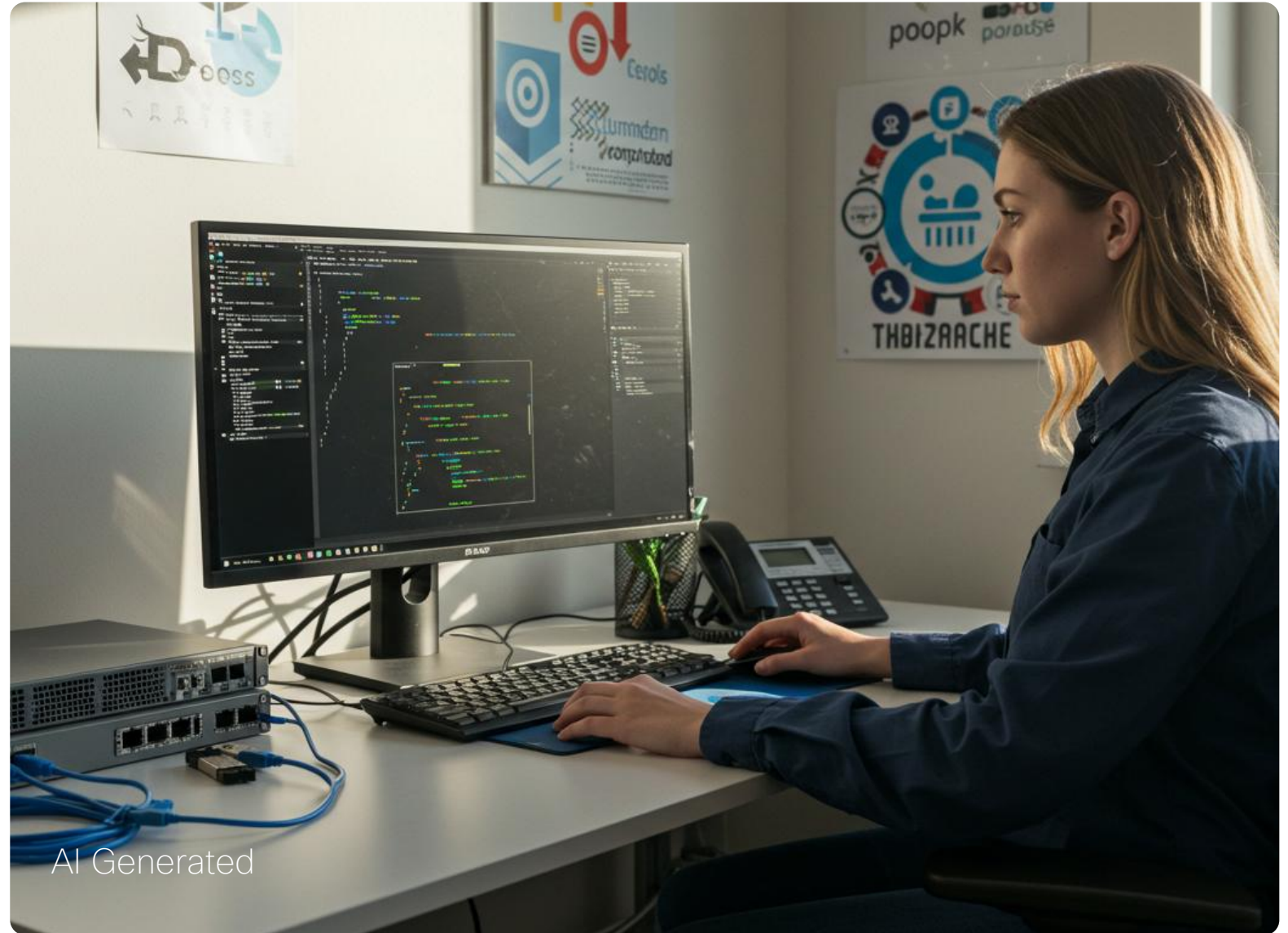
Dive deeper into lab creation with Cisco Modeling Labs and some advanced features like Packet Capture!

- Tuesday November 11th, 5-6 pm
- Room 217 (This room!)

**Infrastructure as someone
else's code**

Network as Code: Not just for developers and cloud

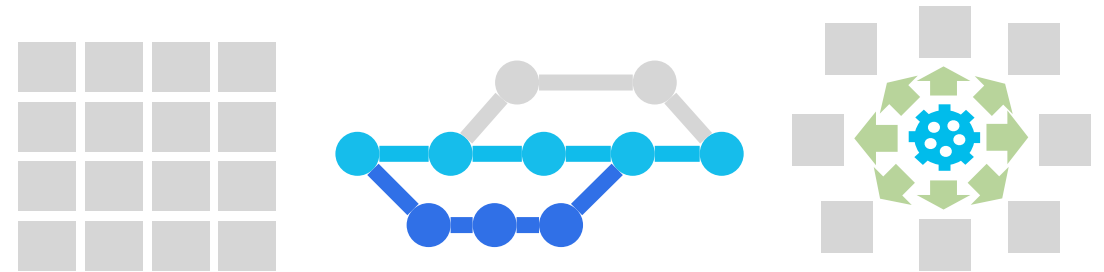
We've built and used templates for years... Infrastructure as Code is an updated and modern approach that you should become comfortable with.



What is Network as Code?

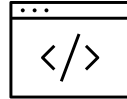
An approach to network management and configuration that applies the principles of "Infrastructure as Code" (IaC) specifically to networking.

- **Automation and Code:** Describe network configurations with code for deployment via automation tools.
- **Consistency and Repeatability:** Achieve consistent, repeatable network configurations across environments.
- **Version Control:** Track network configuration changes through version control systems.
- **Testing and Deployment:** Enable automated testing and deployment to minimize human error.
- **Scalability and Efficiency:** Streamline network management for greater scalability and efficiency.

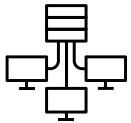


Consistent Version Controlled
Infrastructure deployed with Parallel &
Automated Provisioning

Introducing Terraform by Hashicorp

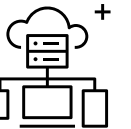


Define network infrastructure using declarative configuration files



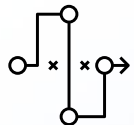
Support numerous platforms through providers

Manage resources across various cloud and on-premises platforms.



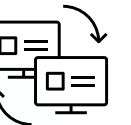
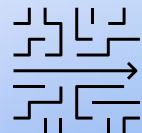
HashiCorp

Terraform



Track infrastructure changes using versioned code files

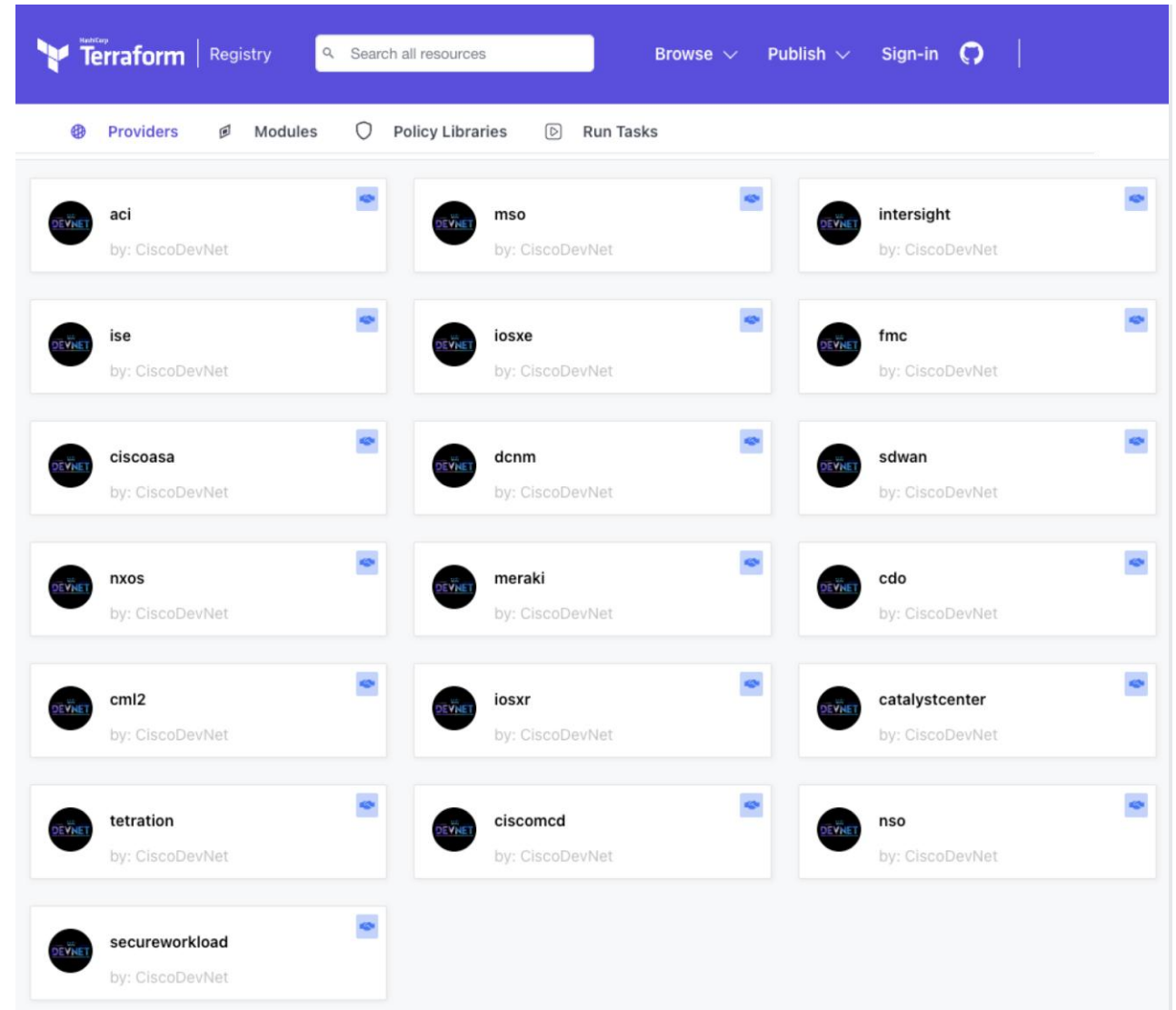
Maintain the current state of infrastructure for accurate updates



Automatically map relationships between resources for efficient planning

Robust Terraform support for Cisco platforms

Official Terraform Registry for Cisco Platforms
Cisco with Terraform on DevNet





TERRAFORM FACTORY

Network as Code with Terraform
The way to build your network is to write code

VLAN GENERATOR

VLAN CREATOR

GENERATOR

POLICY

Demo

Network as Code with Terraform

AI Generated

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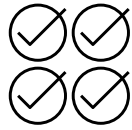
The Why's for Network as Code



Faster

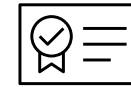
- Executing created automation very fast
- Parallel processing
- Rapid adjustment deployment

Relative
Impact



Consistent

- Ensure uniform deployments
- Minimize config mistakes
- Predictable results



Value

- Focus on network design
- Shorter deployment windows
- Potential for rollback



Why should I care?

- The traditional manual way of network configuration just doesn't work anymore
- Align with the systems and application standard methods of management at your organization
- Significant operational advantages at scale

Where to get more information?

- [Official Terraform Registry for Cisco Platforms](#)
- [Cisco with Terraform on DevNet](#)
- [Terraform Introduction](#) – Free on Cisco U
- [Cisco IOS XE Terraform Provider](#) – Free on Cisco U
- Snack Minute: [Learn how to use Terraform with IOS XE](#)

**The artificial elephant
in the room...**

Generative AI: Yes, it is more than just hype

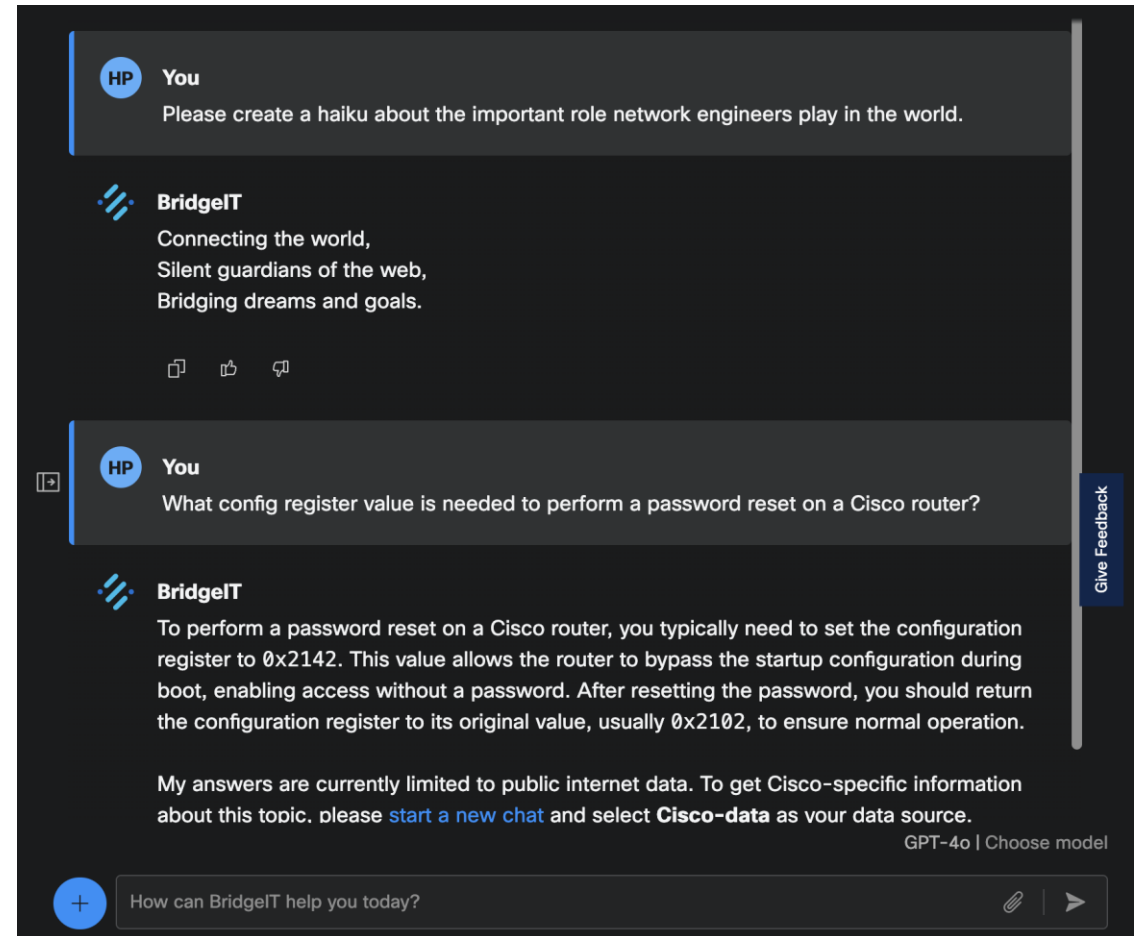
Generative AI is EVERYWHERE...
There truly are significant ways
network engineers can use it to
help YOU be better at your daily
job.



What is Generative AI?

A form of artificial intelligence that emulates human creativity by understanding and learning patterns, structures, and conceptual relationships from existing data.

- **Content Creation:** Generate text diverse media content based on prompted requests.
- **Data Analysis:** Review input to find patterns, anomalies, or desired details improving efficiency
- **Natural Language:** Interaction via everyday language, removing need for technical expertise.
- **Data Transformation:** Seamlessly perform substitutions, format changes, and other conversions.
- **Question Answering:** Quickly delivers answers, streamlining access to information without manual searches.



Example Generative AI Tools



ChatGPT

From OpenAI. Kinda the like the “Klinex” of Generative AI tools.



Le Chat

From Mistral AI, a French AI startup. Provides helpful tools and features.



LM Studio

Desktop application to run LLMs locally, keeping data private. Great for personal* exploration and learning.



Demo

Using AI to help with day to day tasks of network engineering

AI Generated

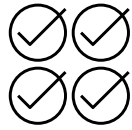
The Why's for Generative AI?



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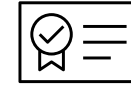
- Reduced manual effort
- Tool to unblock or get started
- Bulk creation tasks

Relative
Impact



Consistent

- Leverage samples to build similar solutions
- Custom training can be done to influence results



Value

- Create “assistants” to offload tasks
- Previously cost prohibitive options opened



Why should I care?

- You don't want to be left behind
- There are clear ways using AI can make you more productive
- Help shape the future of AI use within your team, organization, and community

Where to get more information?

- [Introduction to Modern AI](#) – Cisco NetAcad
- [Understanding AI and LLMs as a Network Engineer](#) – Cisco U Tutorial
- [Hands-On ChatGPT: A Practical Guide to Networking Prompt Templating](#) – Cisco U Tutorial
- [Hands-On ChatGPT: Leveling Up Your Network Engineering GPT Prompts](#) – Cisco U Tutorial
- [Run Your Own LLM Locally for Free and with Ease](#) – Cisco U Tutorial

Embedding a vintage option

Embedded Event Manager: Party like it's the early 2000's!

EEM 1.0 Guide

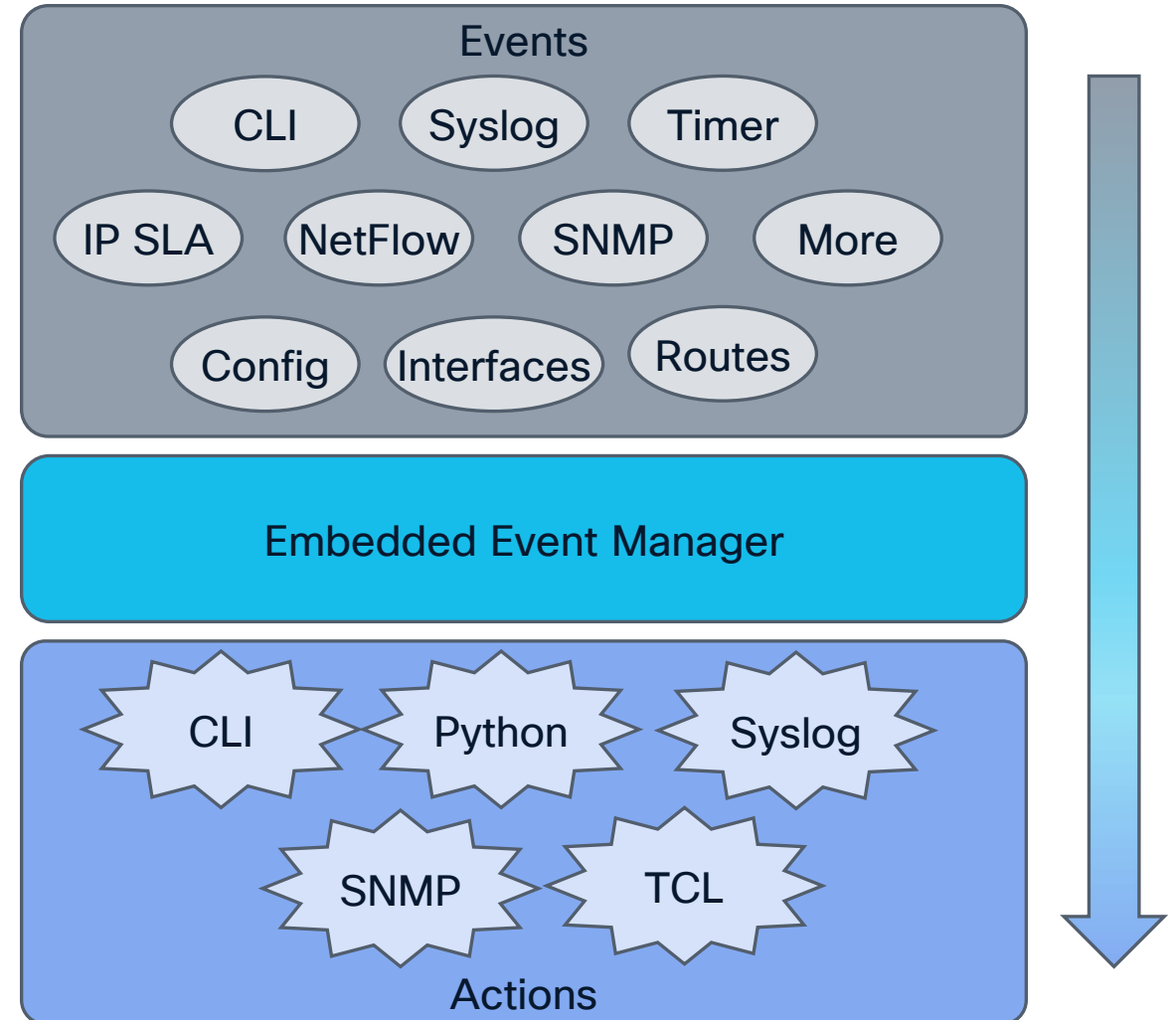
EEM has been a programmability tool in Cisco's network platforms for over 20 years. Just because it's a feature old enough to drink doesn't mean it isn't still super useful!



What is Embedded Event Manager?

A subsystem in Cisco networking devices that enables real-time network event detection and automation to adapt device behavior to business needs

- **Automated Responses:** Execute predefined actions automatically, minimizing manual intervention for network events.
- **Customizable Policies:** Enable creation of tailored scripts to address specific network conditions and requirements.
- **Real-Time Monitoring:** Continuously track network conditions for proactive management and quick issue response.
- **Event Detection:** Monitor devices for changes, triggering actions based on specified events and thresholds.
- **Flexible Triggers:** Support various trigger conditions, including time-based events and state changes, for dynamic management.



Example EEM Use Cases



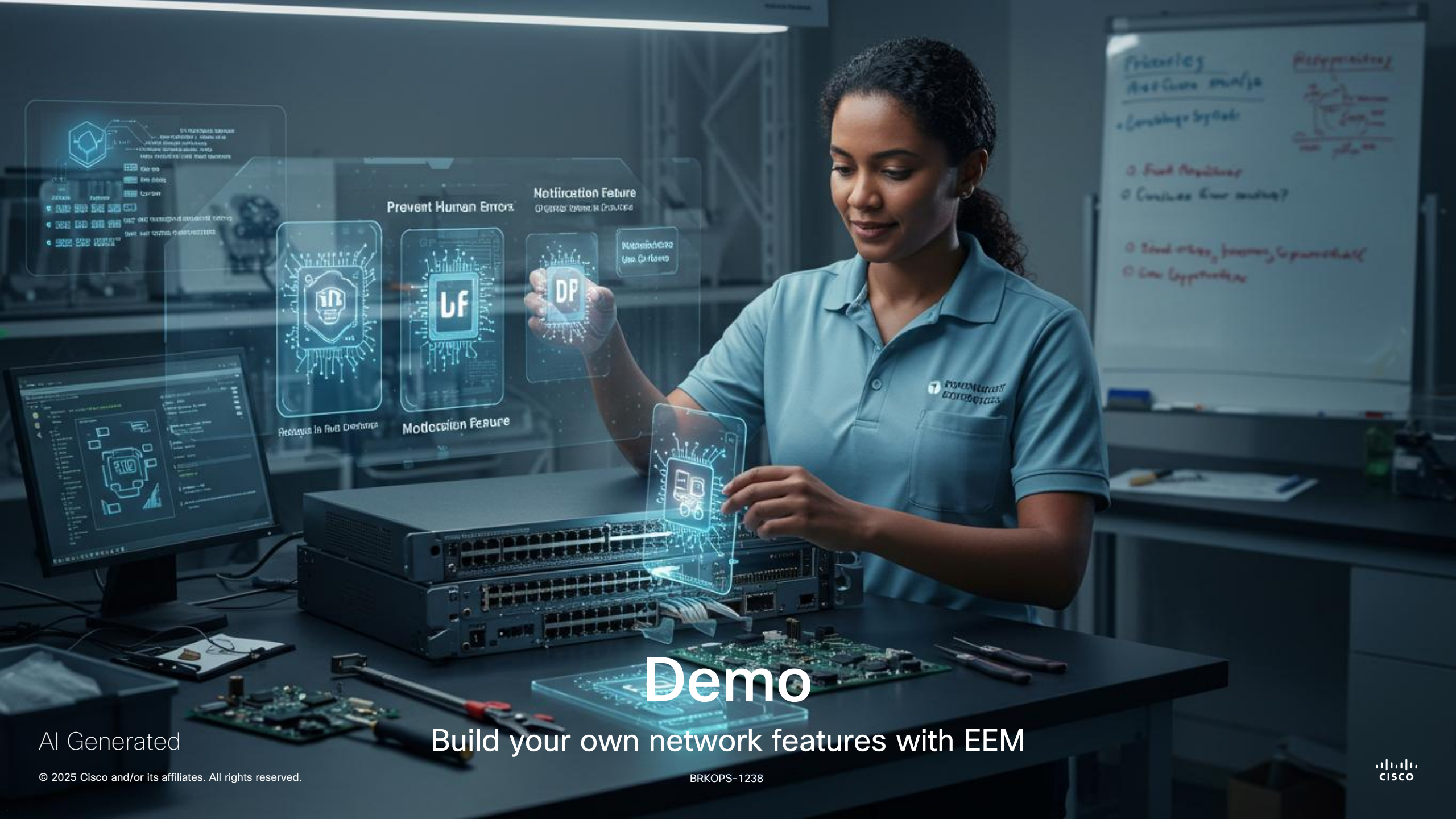
Prevent Common Human Errors



Automatic Notifications



Enforce Standards and Policies



Prevent Human Errors

Notification Feature
Critical Events & Alerts



Notification
Key Alerts

Resilience in Real-time

Notification Feature

Demo

Build your own network features with EEM

AI Generated

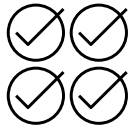
The Why's for Embedded Event Manager?



Faster

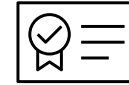
- Immediate reaction to events
- No extra tool/system needed

Relative
Impact



Consistent

- Same response every time
- Wide platform support*



Value

- Customize actions and alerts for what matters



Why should I care?

- The network often “hints” at problems before users notice... take advantage of that
- A mature feature that is widely available but underused
- Programmability options without extra tools, systems, services
- Supported by TAC!

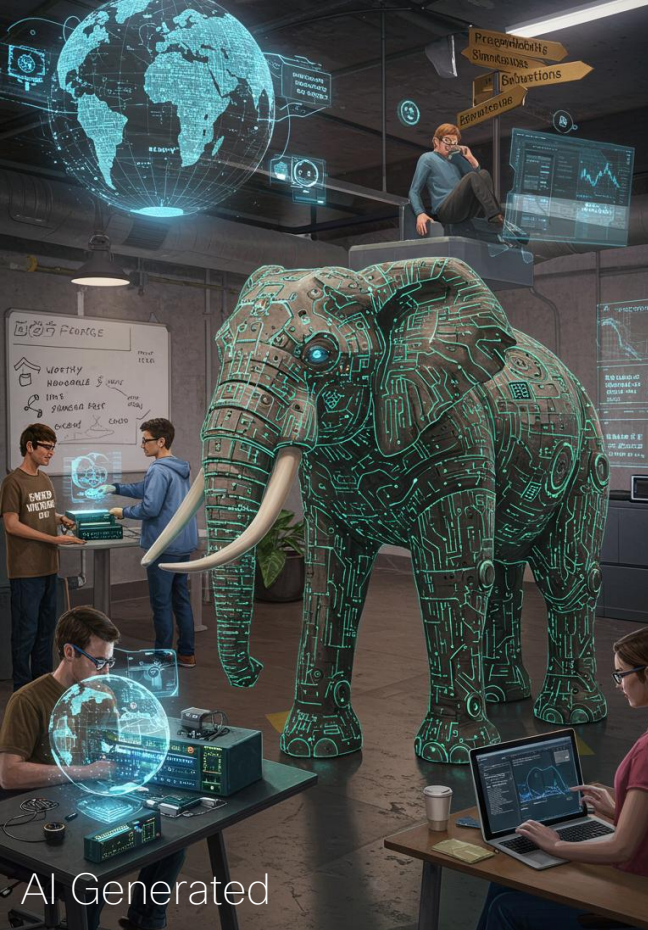
Where to get more information?

- [Cisco EEM Best Practices](#)
- [Understand Best Practices and Useful Scripts for EEM](#)
- [Understanding Cisco EEM by examples Part 1](#)
- [Construct an EEM Applet for Enterprise Automation](#) – Free Tutorial on Cisco U
- [How To Send a Customized Trap Using EEM](#)
- [How To Run an EEM Policy Every Time a Device Boots](#)
- [How To Introduce Large Delays In EEM Policies](#)
- [EEM Built-in "Action" Variables](#)
- [EEM Applet to TCL Policy Converter](#) – tool by Joe Clarke
- [Automation in Data Collection with Advanced Embedded Event Manager - BRKATO-2105](#) – Cisco Live Recording
- [Programmability & Automation on Catalyst Wireless Platforms - BRKEWN-2730](#) – Cisco Live Recording



**Yeah... we've made
it to the end**

Review



- 01 Programmability... what's it good for
- 02 Embrace a virtual world of simulations
- 03 Infrastructure as someone else's code
- 04 The artificial elephant in the room...
- 05 Embedding a vintage option

Agenda

- Spreadsheet driven automation
- Aw CRUD, we gotta talk a little about APIs
- Source of Truth, it doesn't have to be you anymore
- pyATS - How to no-code and automate networks
- Ansible the Hammer of Network Automation

For more ideas, checkout the "original"
[Programmability Skills for Engineers Who Don't Want to Code](#)
[BRKOPS-1237](#)

Hank Preston

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Blogs: <https://blogs.cisco.com/author/hankpreston>



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