
TOMORROW starts here.
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Delivering a Network Virtualization Platform

What is VIRL ?

A multi-purpose network virtualization platform that provides an easy way to build, configure and test new or existing network topologies

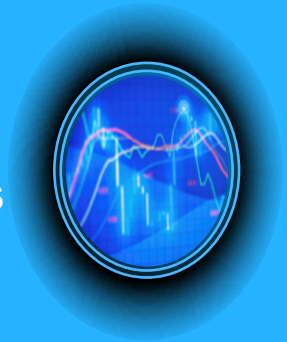
Virtualized network devices run Cisco's network operating systems

VIRL's Virtual Machine orchestration can:

- Create highly-accurate models of real-world/future networks
- Scale from 10's to 1000's of virtual network devices
- Integrate virtual network appliances into physical networks
- 'Wire' VMs on-demand into the physical network for Elastic Services

Business & Technical Advantages

Technical Opportunities



- Build, test & deploy networks - virtually
- Validate and verify designs and configurations
- Rapid prototyping of new service offerings
- Reduce Risk & Errors by improved training
- Easy to use, yet powerful

Benefits

- Lower spend on lab equipment
- Improved access to resources
- Flexibility to scale resources on demand
- Improve time to market for new services
- Accessible: On or Off-Prem usage

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DEMO

VIRL: Architecture Overview

VIRL GUI

Services Topology Director

Cisco OpenStack Edition

Cisco Virtual Platforms

- Design and visualization workbench
- CLI/API-based Virtual Machine orchestration layer
- Virtual Machine control, management and networking
- Virtual Machines running Cisco Operating Systems

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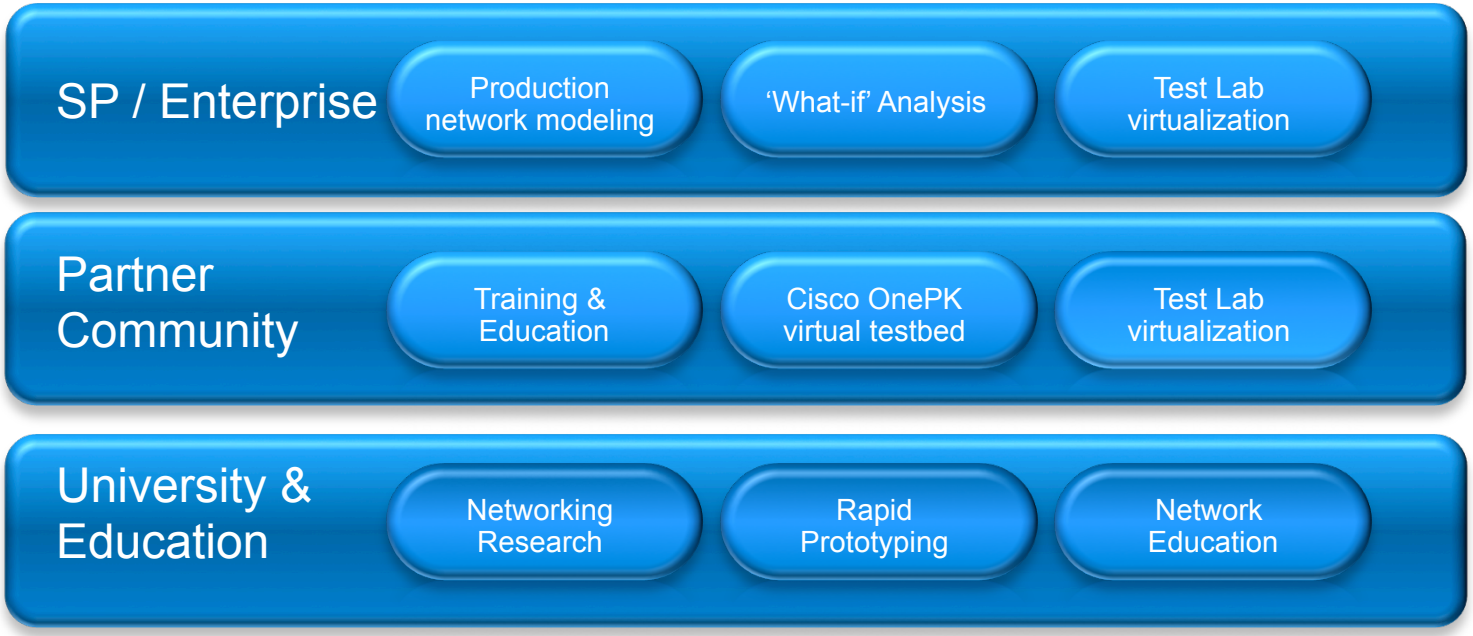
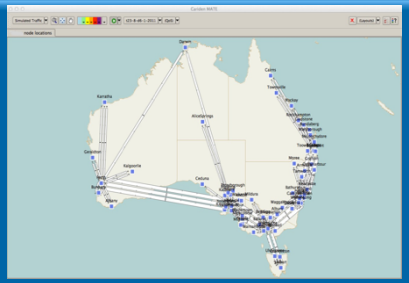
VIRL: Easier, Faster, Smarter Solutions



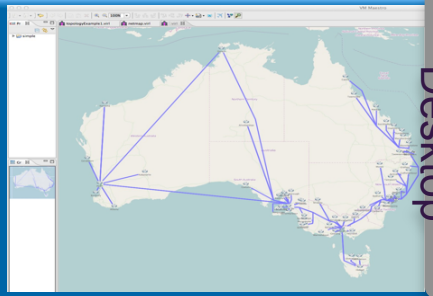
VIRL: Customer Example: Network Import

Laptop to Cloud



Real-world network

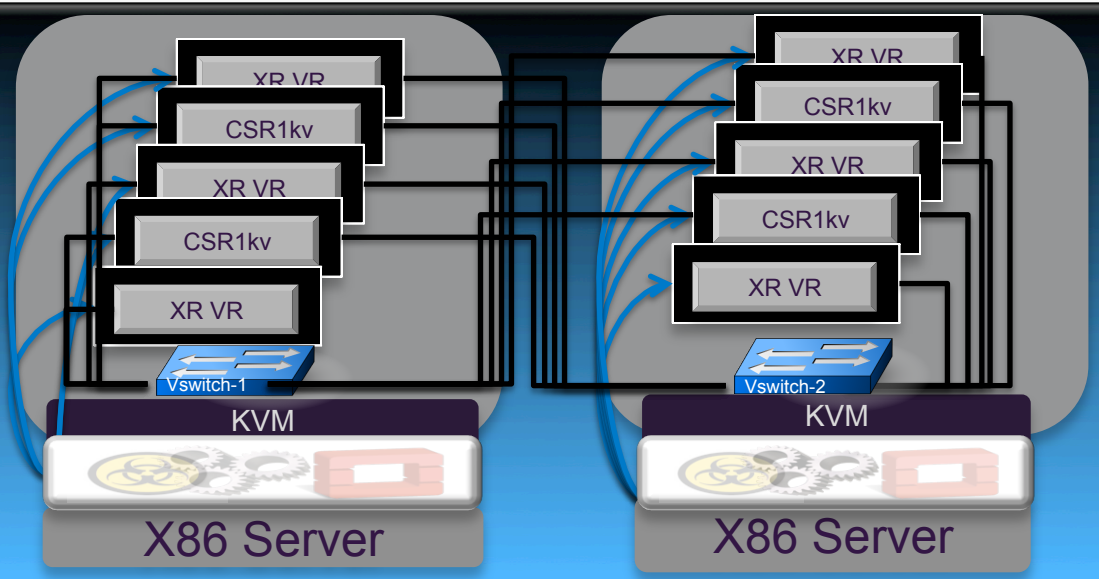
Topology Import



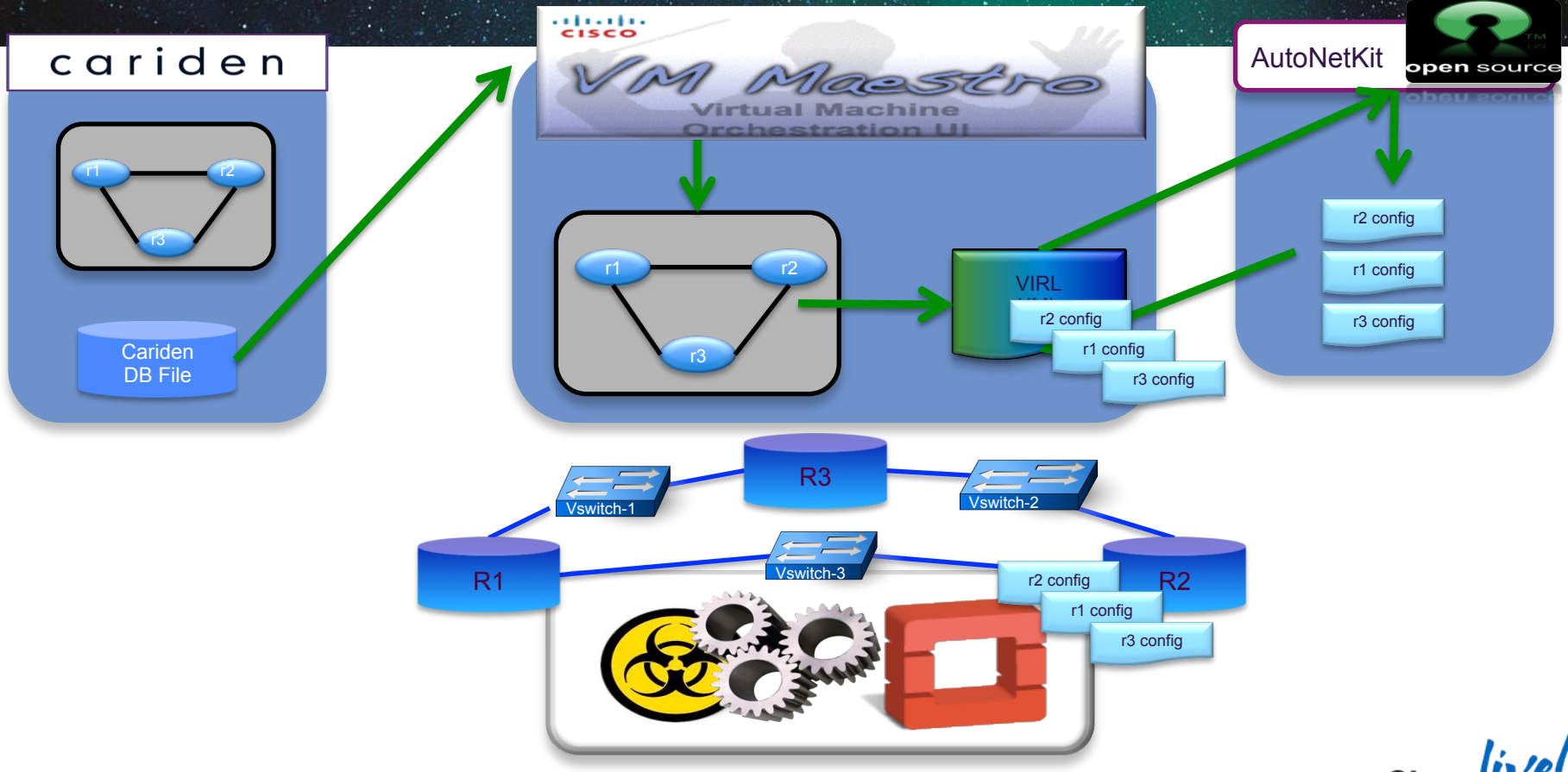
VIRL GUI

Laptop/ Desktop

Cisco Virtual Machines deployed on x86 OpenStack server cluster modeling real-world network



VIRL workflow of tool integration

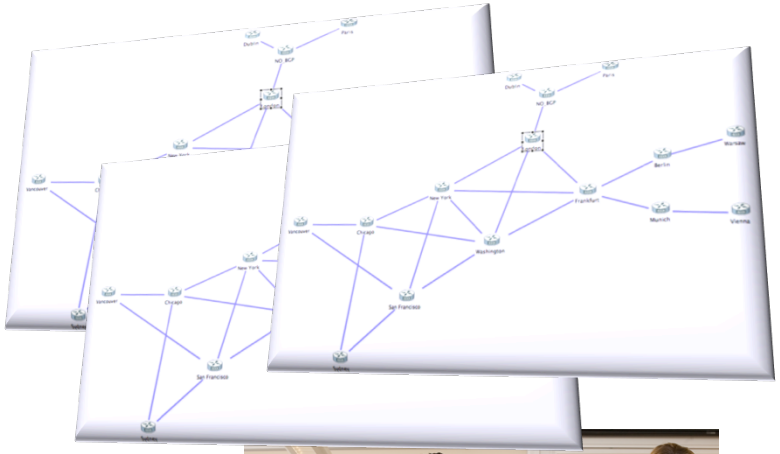





Use Cases

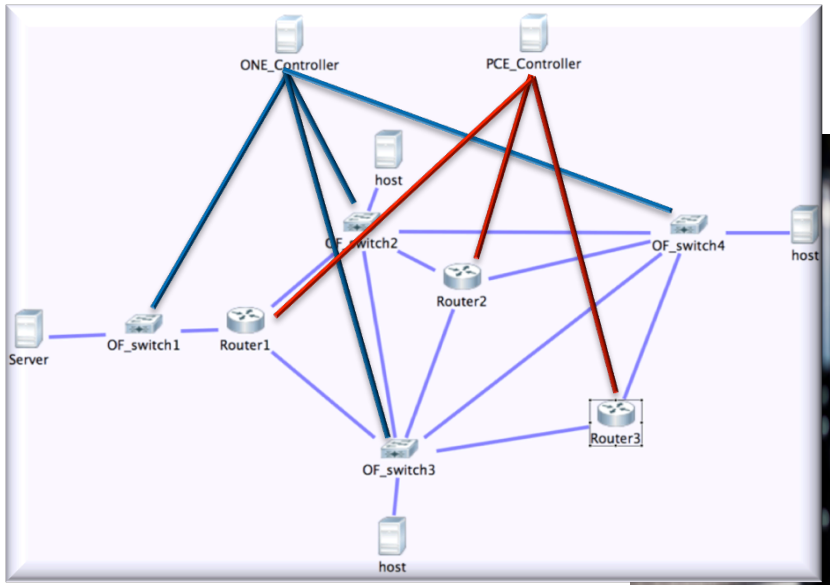
Training & Education

- Teach and train the next generation
  - Network engineers
  - Operators
  - Designers
- Students need ‘hands-on’ experience, but Challenge is access to hardware
  - Learn by doing!
  - 10 students to 1 router or 1 student to 10 routers?
- Virtualized solution offers
  - Flexibility
  - Scalability
  - Repeatability
  - Reduced Capex and Opex



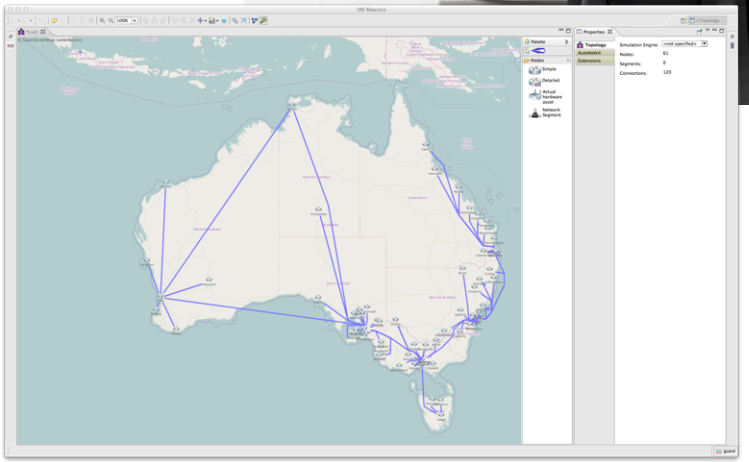
SDN and OnePK

- Enable building, testing, learning and experimenting with Cisco SDN technologies
- E,g. OnePK-enabled virtual Openflow switches and routers in a mixed Openflow and MPLS-TE topology
- Virtual-machine based Cisco ONE and PCE controllers drive traffic through the network
- OnePK developers are able to test and validate applications against virtual devices before deploying to the real network



Test Labs

- Model and troubleshoot live networks, validate new network designs, test new features and configuration before deployment, reduce time to market
- Reduce lengthy times typically required for NMS and OSS integration by testing against a scaled virtual network
- Create ‘hybrid’ lab: mix physical devices with virtual machines to create real-world scale without real-world cost
- Reduce risk of change by verifying network operations in virtual world before applying to the live network






Deployment Models

The Product: 'Cisco Modeling Labs'

Cloud

- Cisco Hosted platform
- On-demand Service
- Single User to Enterprise Scale

On-Premise Clusters

- Linux & OpenStack Solution
- Scale Servers to suit user's needs
- Dedicated resource

Laptop

- Linux and OpenStack Solution
- Scale limited by CPU & Memory
- Virtualized network on the move

Scale → Deployment Flexibility → User Experience

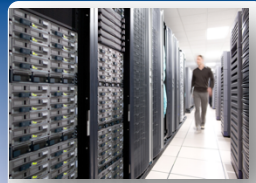
Pricing Models

Cloud

- Multi-tenant instances in the cloud
- Auto upgrade
- Subscription model: Tiered - per resource & scale
- Instant access to design tools

$100-$500/VM/Month

Training, Education



On-Premise Servers

- Scales to 1000's of nodes
- VIRL License
- Right To Use per network scale

VIRL Perpetual License: $20K-$30K/ Server

VM Right To Use: $1.2K-$6K/VM

Virtual Test Labs, 'What if', Modeling

Laptop

- Limited in Scale
- VIRL License

VIRL Perpetual License: $2K - $3K/PC

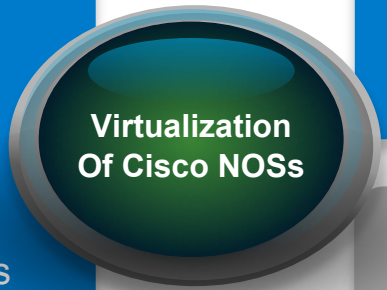
VM Right To Use: $1.2K-$6K/VM

OnePK Dev, Students, SEs

Cisco Support Contract: | **For License & RTU** | **SmartNet & SAS/U**

Cisco Virtual Machines

- Provide virtualized products across all major Cisco network operating systems, specifically:
  - IOS - vIOS
  - IOS-XE – CSR1000v
  - NXOS – vNXOS
  - IOS-XR – XR-VR
- Provide reference platform target as part of regular build cycle
- Enable production use cases such as controllers, route reflectors, etc
- Support major Hypervisors (KVM-QEMU, VMware ESXi)



- Ethernet-only focus given virtualization environment
- Package Systems using standard OVA VM packaging model

Key differences vs physical platforms

- Will not provide 100% Feature Parity
- Reduced Data Plane Performance
- Will not provide Full Media support
- Multi-tenant models, i.e. SDR support, must run separate VM instances

EFT Status

In EFT with External Customers

In EFT with Internal Customers (eating our own dog food)

FCS: Target Dec'13

Take-aways

- Lower spend on Equipment
- Improved TTM
- On/Off-Prem usage
- Better Resource Utilization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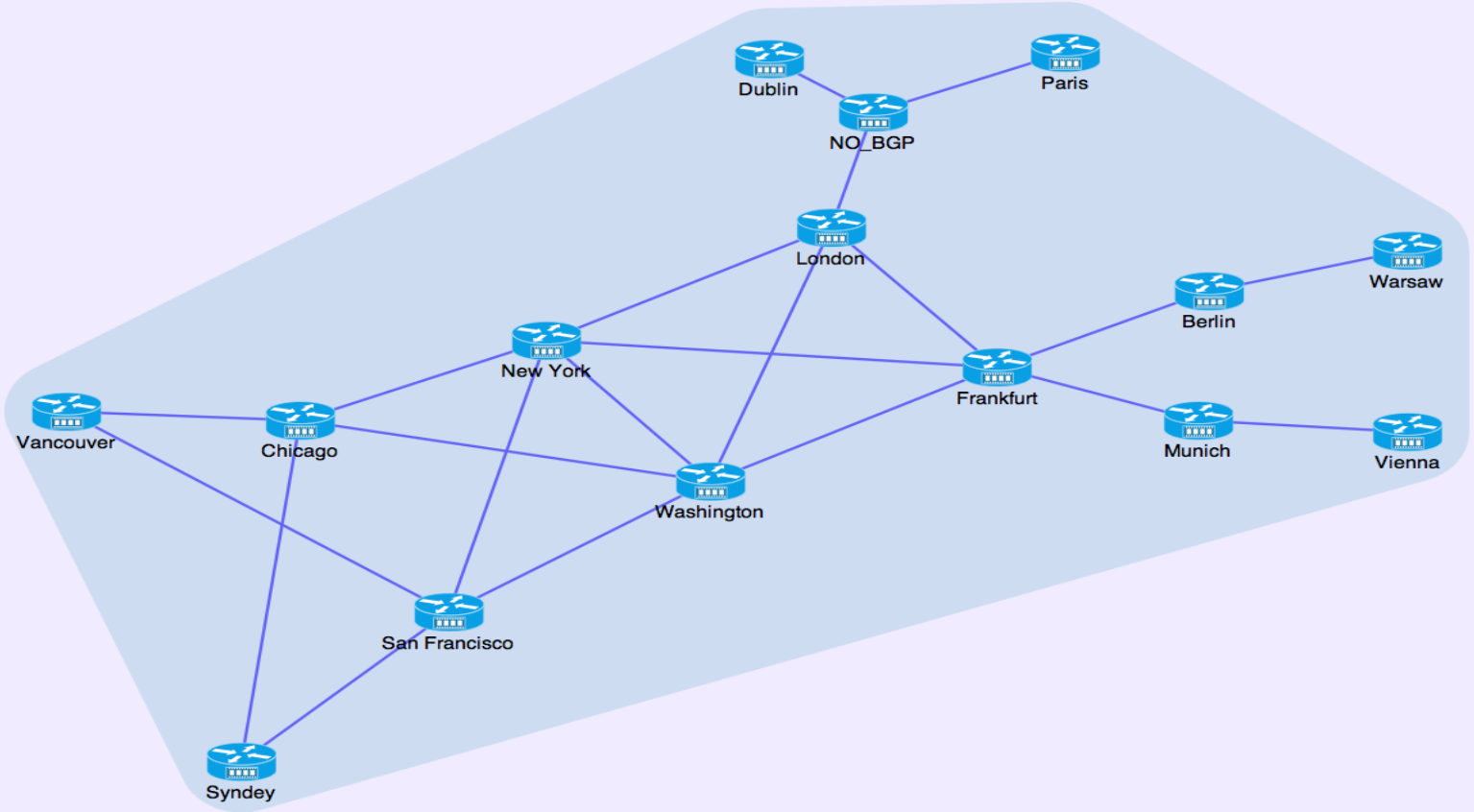
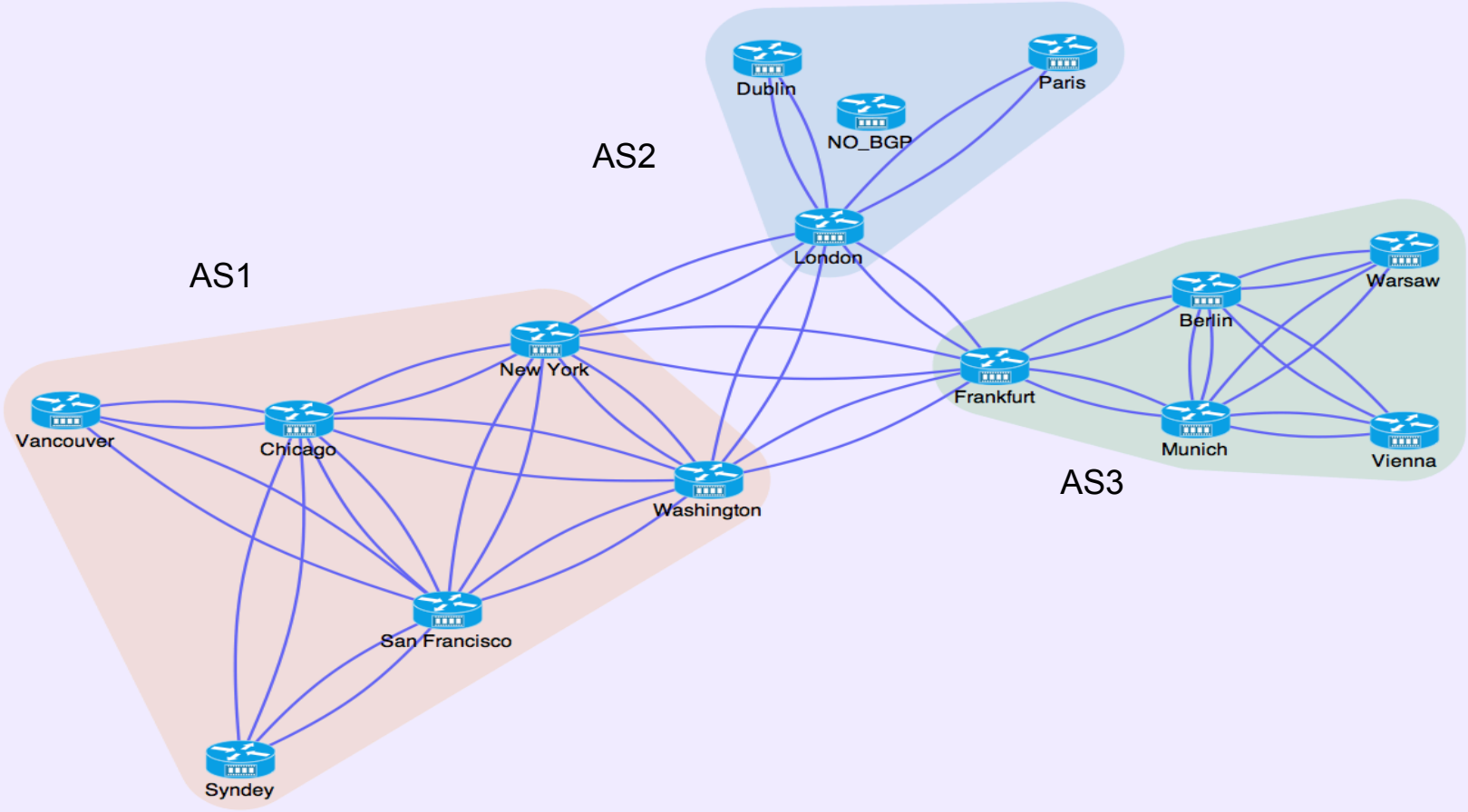
TM

Backup Slides

A network of layers – Physical Connectivity



BGP Layer Connectivity



Deployment scenario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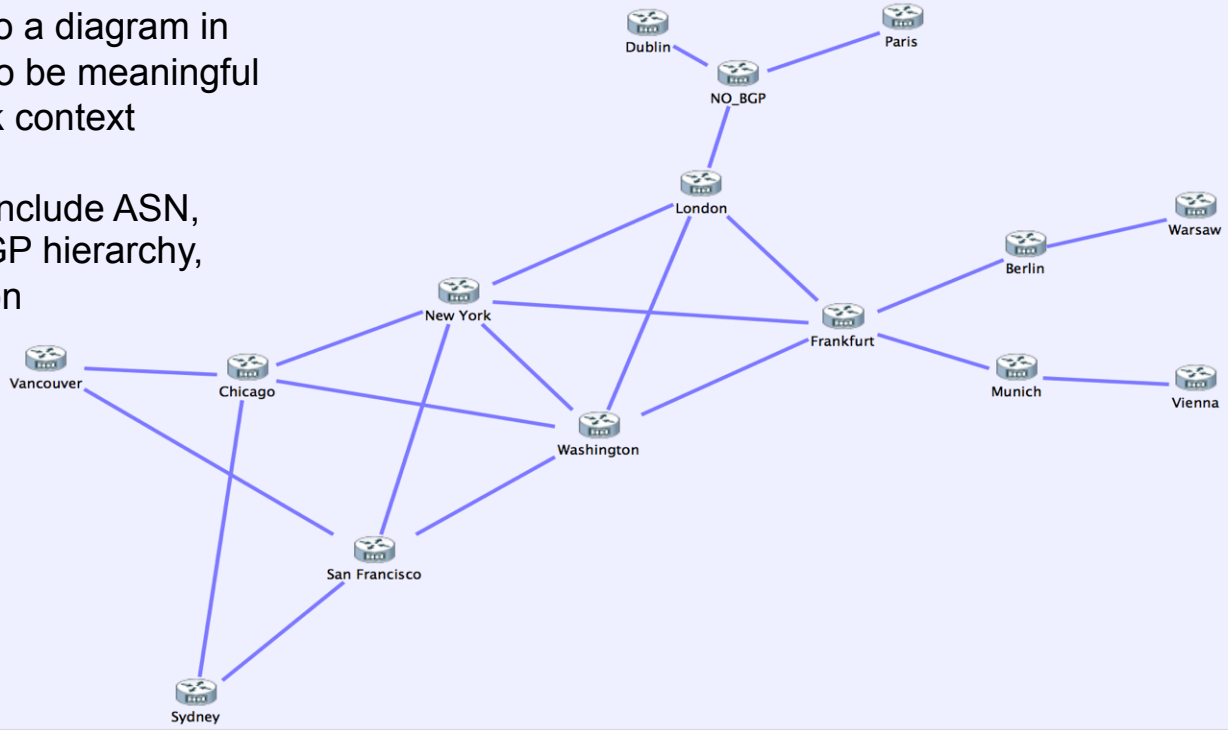
Building configurations from the network

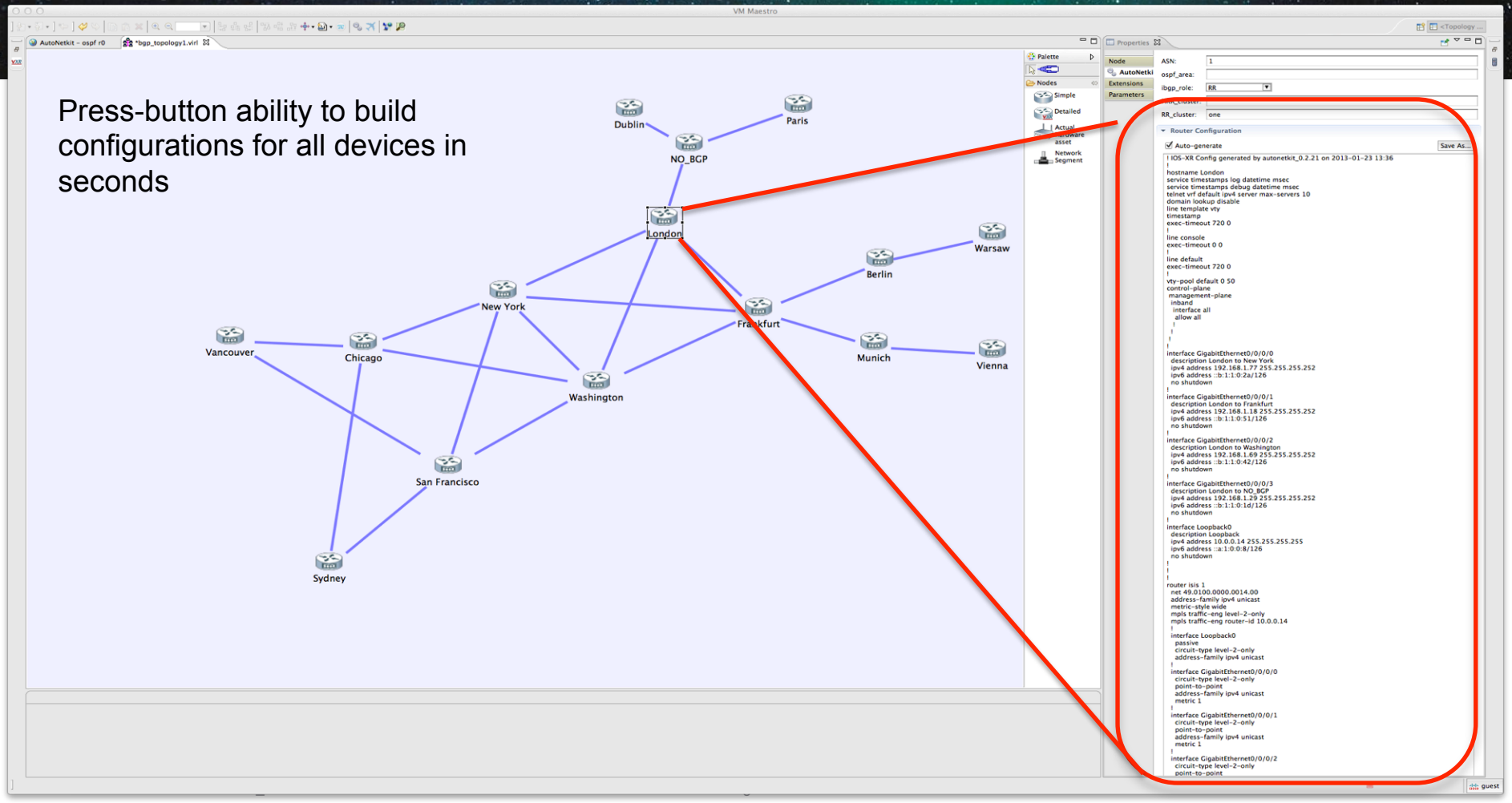
We need to be able to add ‘attributes’ to a diagram in order for it to be meaningful in a network context

‘Attributes’ include ASN, IGP type, IGP hierarchy, BGP function



Auto-generate router configuration

Press-button ability to build configurations for all devices in seconds



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Delivering a Network Virtualization Platform

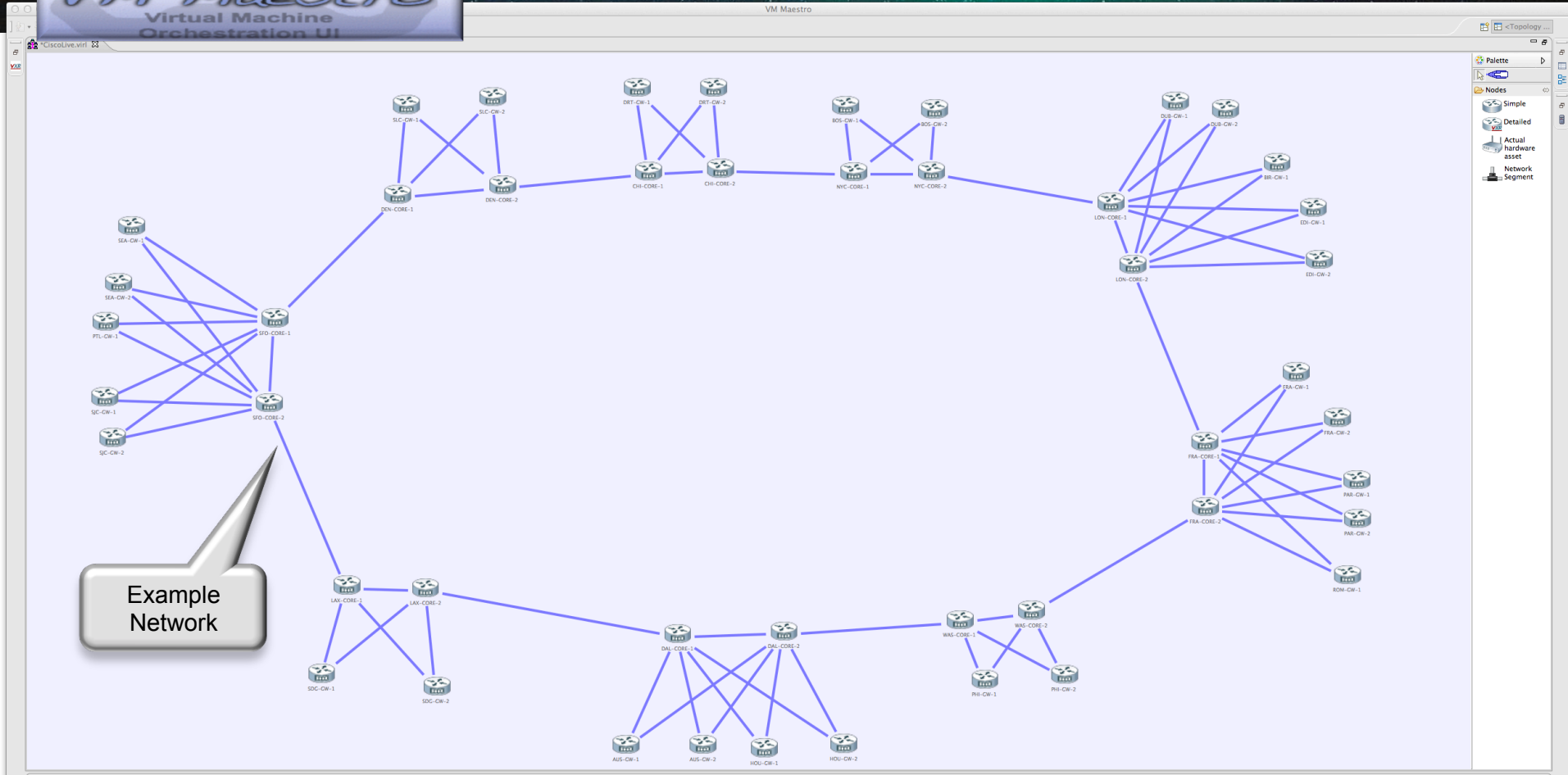
Joel Obstfeld
Director,
CAO Team

Ed Kern
Consulting Engg,
Corporate Dev

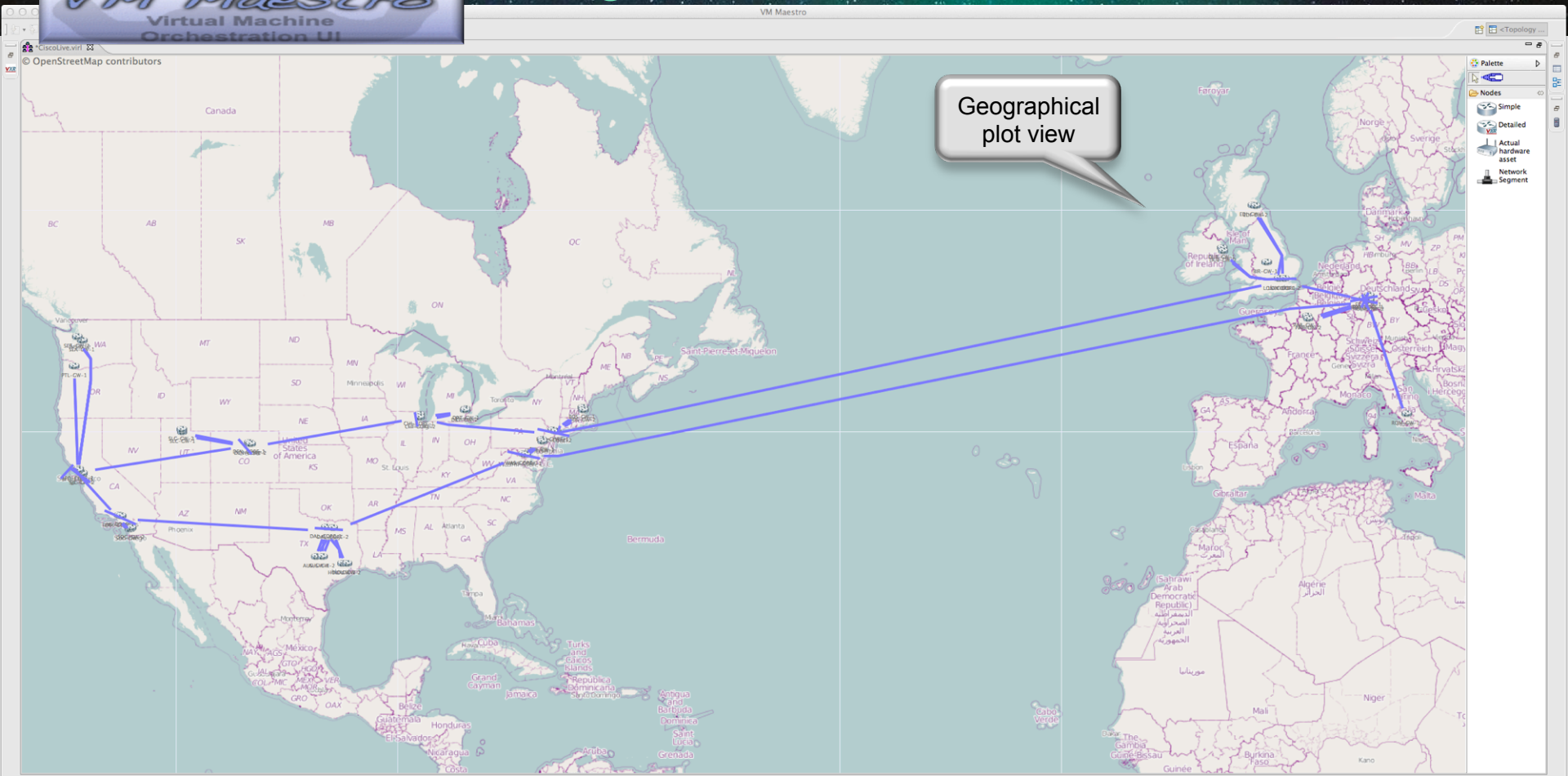
Mike O'Gorman
Director,
CAO Team

Vittal Krishnamurthy
Product Manager,
NOSTG

Design Workbench

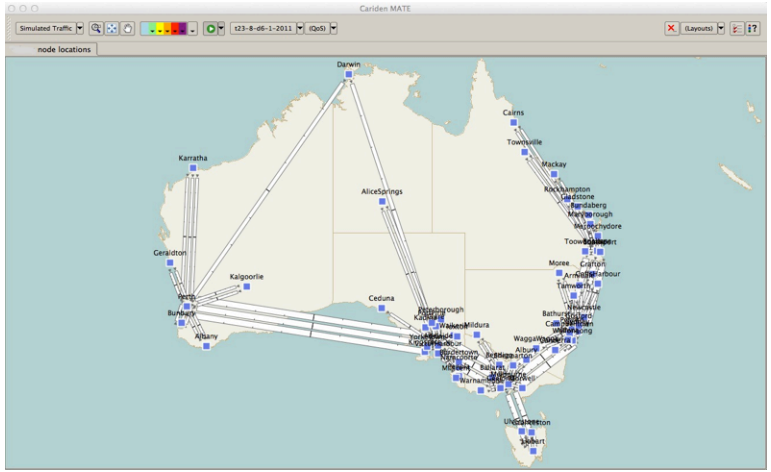


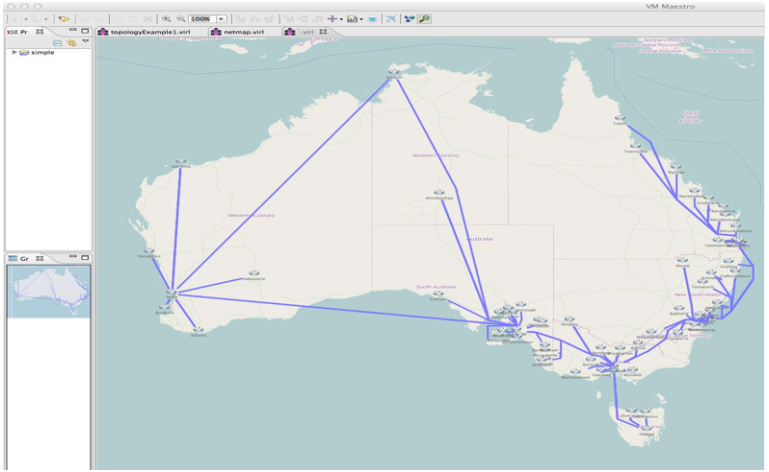
Design Workbench



Real-World Network import

Topology Import





Cariden MATE Design builds view based on customer's network data
MATE PLAN files imported to Maestro and prepared for topology launch

Generate router configurations (REMOVE)

- Building a virtual network needs to be quick and efficient
- Manually creating configuration takes many hours – the larger the network, the more time required

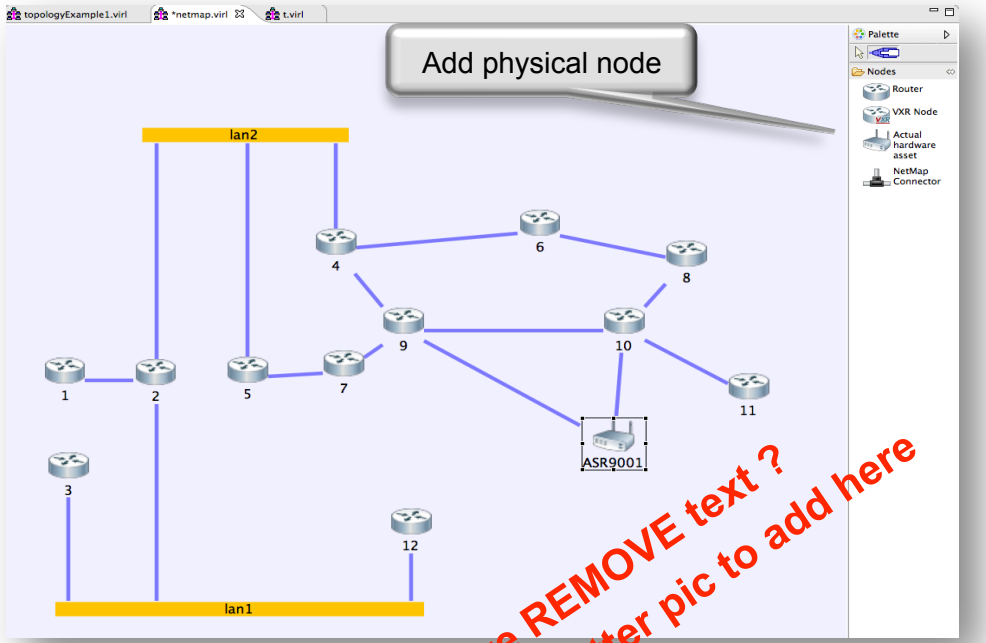
- Solutions:

1. Take configurations from real-world devices and load onto Virtual devices, where possible

2. Create configurations automatically based on the network topology

Support IOS, IOS-XR, NX-OS syntaxes – must be extensible for other applications

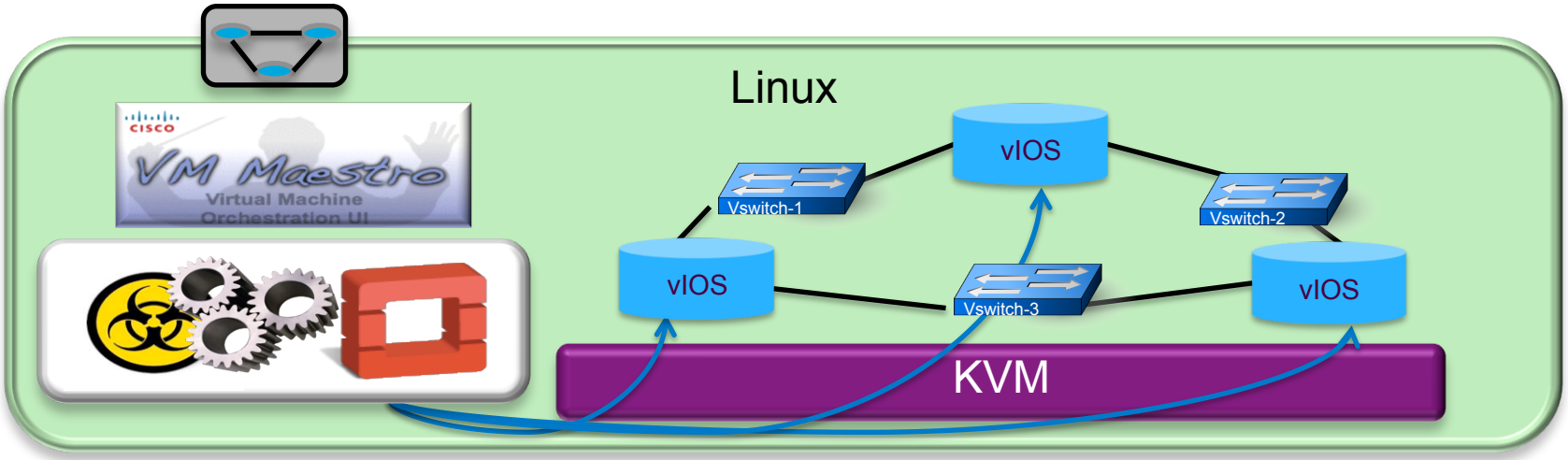
Hybrid Topologies: Mixing virtual & physical



Enables physical nodes to added to a virtual topology

- Provide node property information (OS type, mgmt IP address etc.)
- Draw a connection from the physical to the virtual topology
- Click on “Launch” and the VMs will be created and a Network connection between the 9001 and the Virtual Network will be constructed

Small Topology on a laptop



Cisco Modeling Labs

Powered by VIRL

Basic Product Structure

PROPOSED

CML standalone PC/Mac

- VIRL SW
- Limited Scale

- VIRL License
- NE RTU per laptop scale

Lic: $2K - $3K/PC
RTU: $1.2K-$6K/NE

CML on-premise Server

- VIRL SW
- Server Scale

- VIRL License
- RTU per network scale

Lic: $20K-$30K/Server
RTU: $1.2K-$6K/NE

CML in the Cloud

- Multi-tenant
- Auto upgrade

- Subscription per scale & usage

$100-$500/NE / Month

Cisco Technical Support Options

Annual SW Support for Lic and RTU ~ SmartNet/SAS

Virtual Network OS sold separately for standalone PC/Mac and Server editions

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Cisco Virtual Platforms

IOS-XR

VM-based tool: XR VR

NX-OS

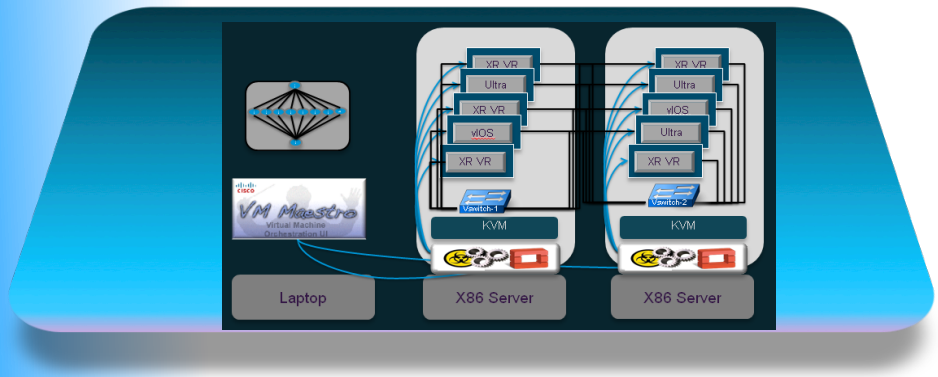
VM-based tool: vNXOS

IOS-XE

VM-based tool: CSR1000v

IOS

VM-based tool: vIOS



2 Products

Powered by VIRL

Cisco Learning Labs

For any VIRL instance used in Educational Settings

Individual Edition
For individual self-study and practice
Cloud

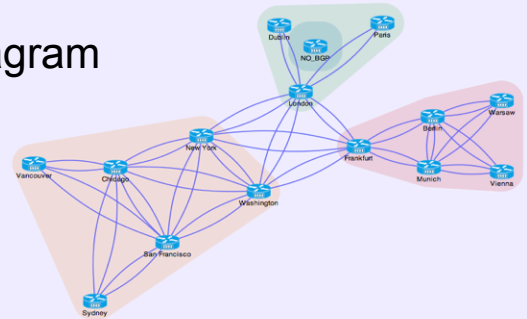
Teaching Edition
Classroom use by Learning and Academic Partners
Cloud • On-Premise

Resale Edition
Resale by Learning and Academic Partners
Cloud

Embedded Editions
Sales Acceleration for Cisco direct-delivery training to corporate accounts
Cloud • Part of $3500/student/class • Part of $3300/person/CTE subscription

Visualization before deployment

Relationships displayed in diagram before VMs are launched



Ability to ‘visualize’ the network configuration before VMs are launched aids configuration troubleshooting

VIRL Timeline

Solution	Date	Detail
Laptop	EFT February'13	VIRL 'laptop' solution in EFT with major SP customers
Server	EFT February'13	VIRL 'on-premise' solution in EFT with major SP customers
Cloud		Internal Trials