



# Routing and SD-WAN for hybrid work

with Cloud and Sustainability Drives

Magdy Louis

Technical Solutions Architect

June 2022



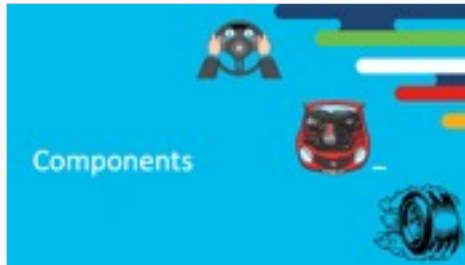
# Magdy Louis



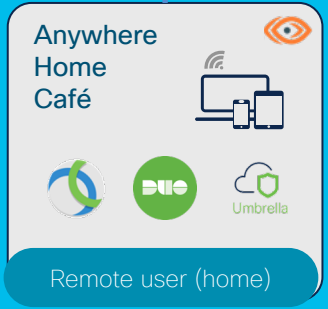
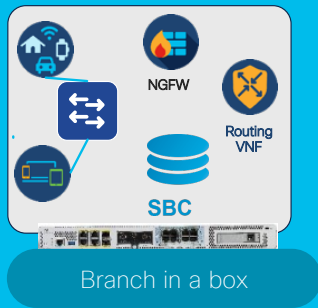
## **Senior Technical Solutions Architect, SP EMEAR**

- A member of the EMEAR SP technical specialist team
- Over 20+ years experience in SP solutions, Enterprise technologies
- Current role is driving EMEAR SP-as-an-Enterprise technical leadership, leading a strong SP-as-an-enterprise technical community, supporting SP customers requirements/opportunities and fostering strong and trusted relationships with Service Providers in the region.

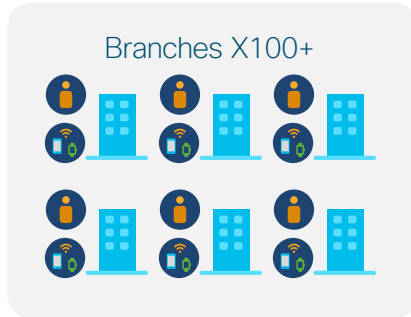
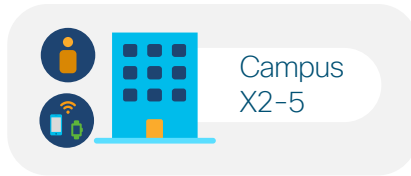
# Agenda



# Why



# Internet Connectivity Becomes Business Critical



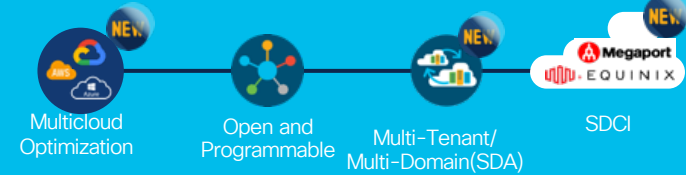
More users, things and applications, everywhere

# Cisco SD-WAN – Leading With Innovation

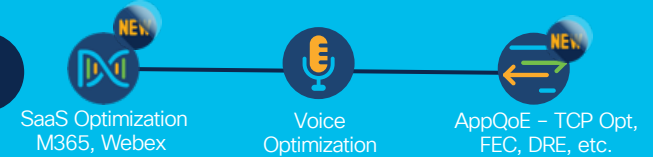
- Transport agnostic with hub-spoke and mesh architectures
- Direct internet access
- Centralized management and orchestration
- Circuit cost savings



## Multicloud



## Application Experience



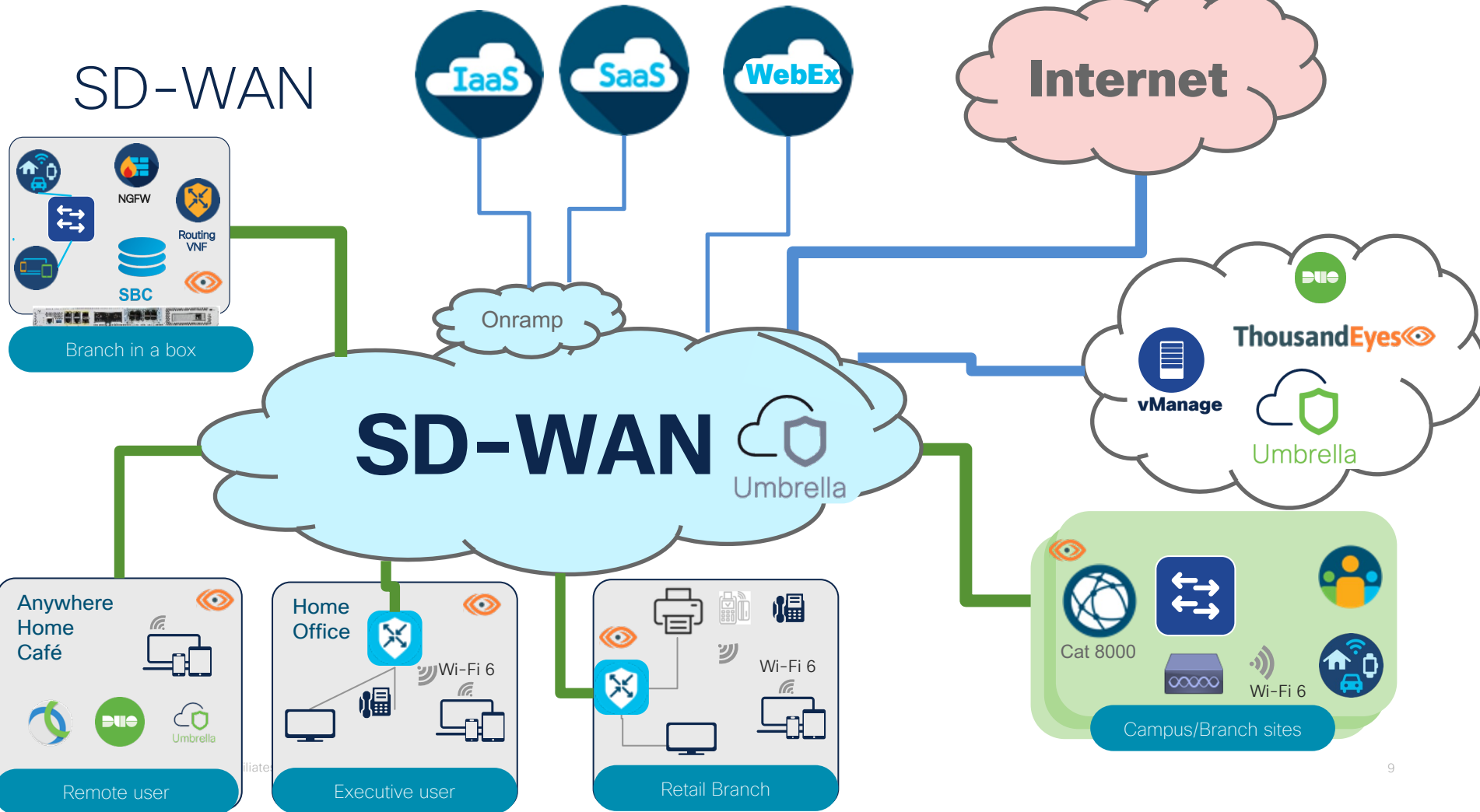
## Security



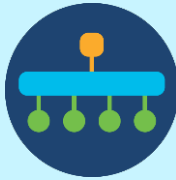
## Analytics



# SD-WAN



# Built to enable multitude of use cases at the WAN Edge



**Software-Defined WAN**  
Automate your entire network, from policies to multicloud access



**Software-Defined Branch**  
Consolidate branch services in a single edge platform



**5G Ready**  
Connecting remote sites at speeds that go beyond broadband using 5G

Augmenting underlay MPLS/SR/etc. as the underlying transport adding value to SP



**SASE Architecture**  
Evolve your WAN architecture to a Secure Access Service Edge (SASE)



**Edge Computing**  
Edge compute and acceleration for low latency applications including IoT



**Secure Remote Access**  
Cloud delivered security for securing direct internet access



# Business Value of Cisco SD-WAN



Lower five-year cost  
of WAN operations



Faster to implement policy/  
configuration changes



Less unplanned  
downtime

Full IDC report available on [www.cisco.com/go/sdwan](http://www.cisco.com/go/sdwan)



Predictable app  
experience



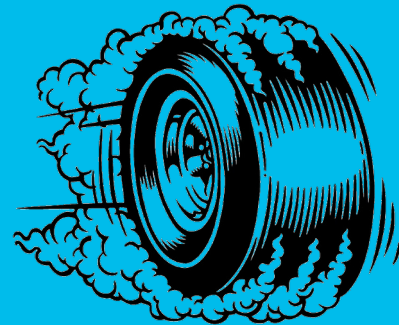
Right security, right place



Enterprise grade,  
simplified



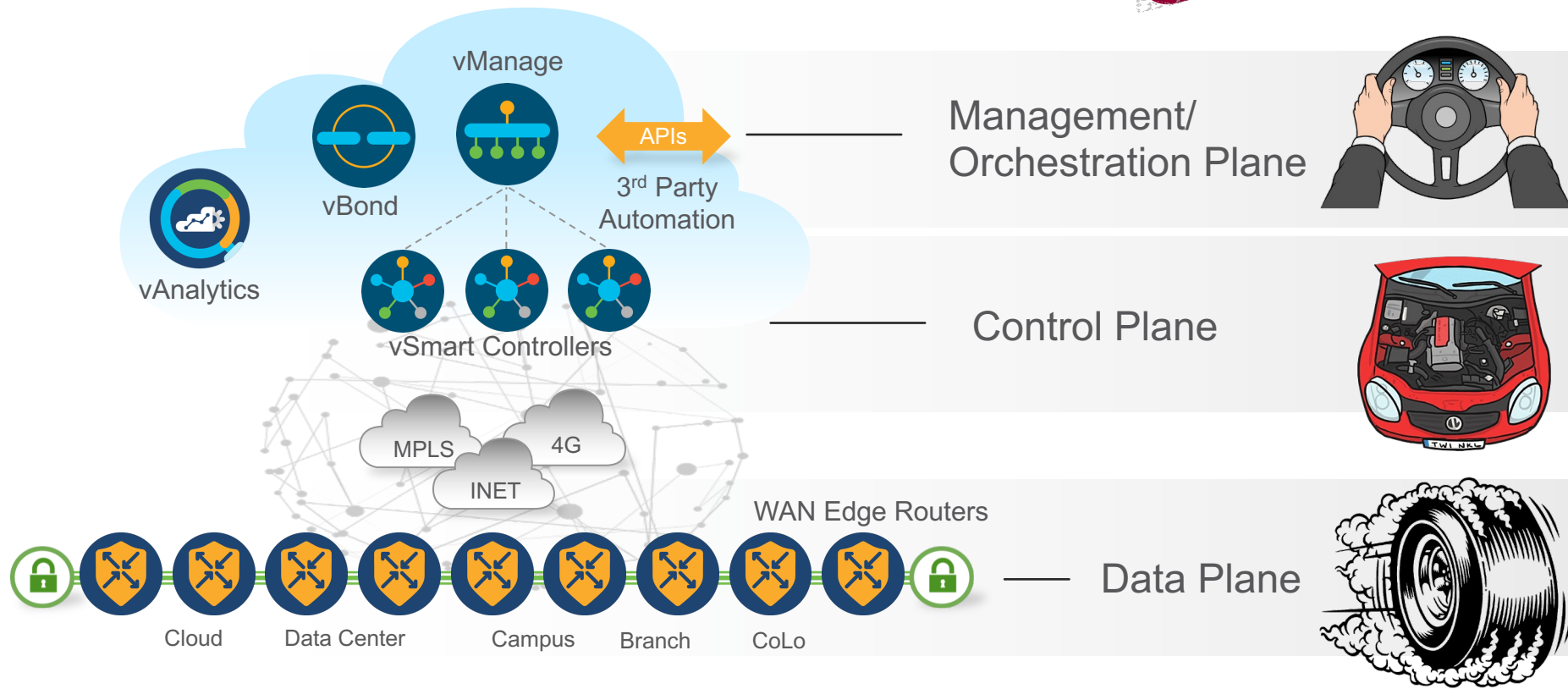
# Components



# Cisco SD-WAN Solution Overview

Applying SDN Principles Onto The Wide Area Network

Multi-tenancy included



# Cisco Routing Portfolio

Leading with IOS XE – Branch, Aggregation and Cloud

IOS XE SD-WAN

Catalyst  
8500 Series  
\*Up to 29G



Catalyst  
8500L Series  
\*Up to 10G



Catalyst  
8300 Series  
\*Up to 7G



Catalyst  
8200 Series  
\*Up to 1G



Catalyst  
8200L Series  
\*Up to 500M

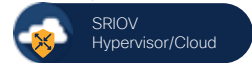


ISR 1000  
\*Up to 428

ISR 1100-4G/6G/LTE  
ISR1100X-4G/6G  
(IOS XE SD-WAN)  
\*Up to 428



Catalyst 8000V  
Up to 4.6G



Catalyst  
8200 uCPE  
Series  
\*Up to 500M



CSP 5000



ENCS 5400



Aggregation

Branch Office

Virtual

# Why Catalyst 8000?



## Cloud Native Agility

Higher Scale for Distributed Services  
Integration with leading Cloud Providers



## SASE

Support for Cisco Umbrella's cloud security services  
Integrated security and advanced segmentation to contain threats



## Connected Experiences

Enhanced Wireless capabilities for IoT Scale  
Improved applications performance  
- User to Cloud



## Business First Resiliency

Resource elasticity for edge compute and virtualization  
Built to produce massive and rich telemetry capabilities



- Next Generation QFP3.0
- Higher SD-WAN Performance
- Open and programmable IOS XE
- Future Proofed – 5G Ready

# ISR 1131 Series Platforms List

C1131X-8PLTEPWx  
(2x1G WAN Ports)



(8GB DRAM, CAT 4|6|18|5G\*, WiFi6)

C1131-8PLTEPWx  
(2x1G WAN Ports)



(4GB DRAM, CAT 4|6|18|5G\*, WiFi6)

C1131X-8PWx  
(2x1G WAN Ports)



(8GB DRAM, WiFi6)

C1131-8PWx  
(2x1G WAN Ports)



(4GB DRAM, WiFi6)

IMIX traffic (Avg. 352 bytes)  
CEF: 1.8 Gbps throughput  
IPsec: 650 Mbps throughput  
\*5G is on the roadmap

SD-WAN, Cellular Gateway, Trustworthy Solutions: Compatible with all ISR 1000 Platforms

# C1131X-8PLTEPWx

DRAM/FLASH  
8GB/16GB

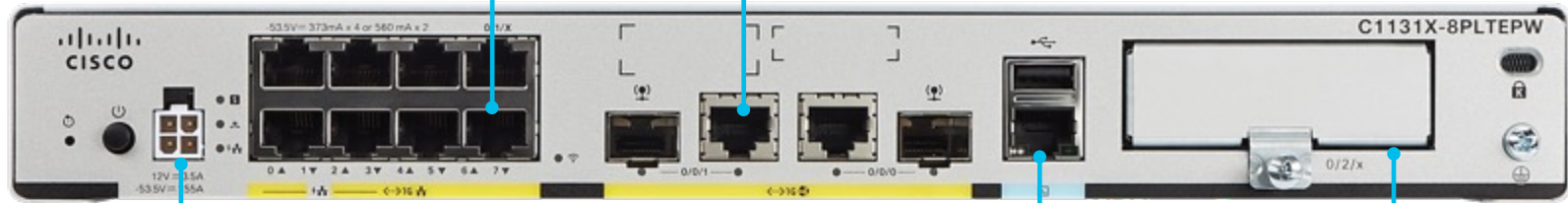
SD-WAN Ready

802.11ax  
Wi-Fi6

External PSU

## Data Interfaces

- 8 x GE LAN
- 4 PoE or 2 PoE+ Capable
- 2x RJ45/SFP GE WAN Combination



## Status and physical security

- Status LED
- Power button
- Reset button
- Power connector

## Management/USB Storage

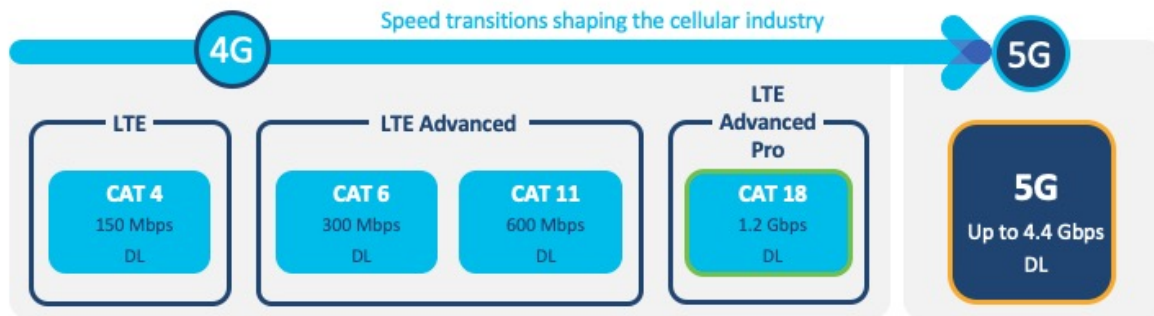
- RJ45 Console
- USB 3.0, Type A

## Pluggable LTE Technology

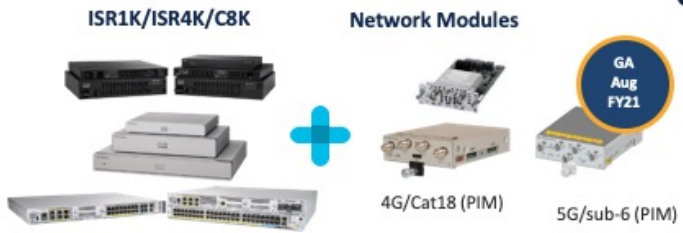
- CAT 4
- CAT 6
- CAT 18

# Enabling Secure, High Speed Wireless Connectivity

1<sup>st</sup> SD-WAN  
w/ multigigabit  
5G!



## Integrated Solutions



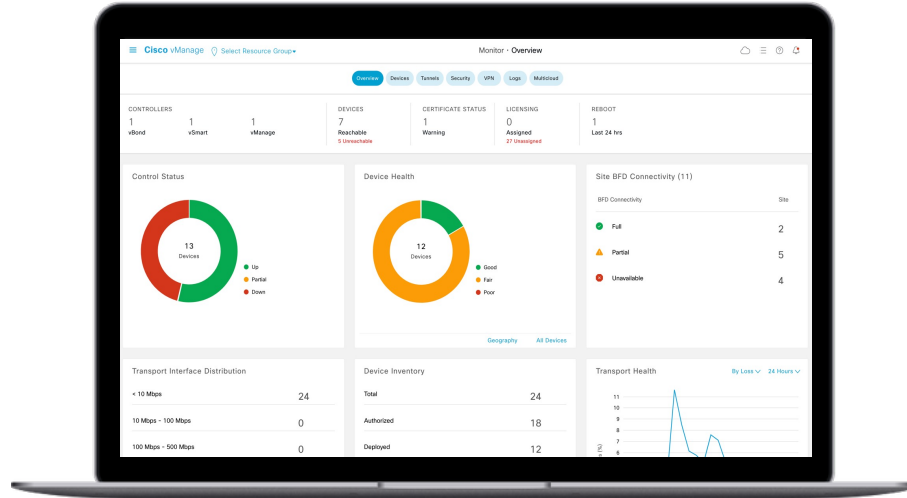
## Cellular Gateways





# SD-WAN Controller for simplified management

Cisco vManage



## Single Monitoring Dashboard

Configuration: OnRamp, Security,  
Devices, Policies, Templates

Lifecycle  
Management

Role based access/  
Multi-tenant

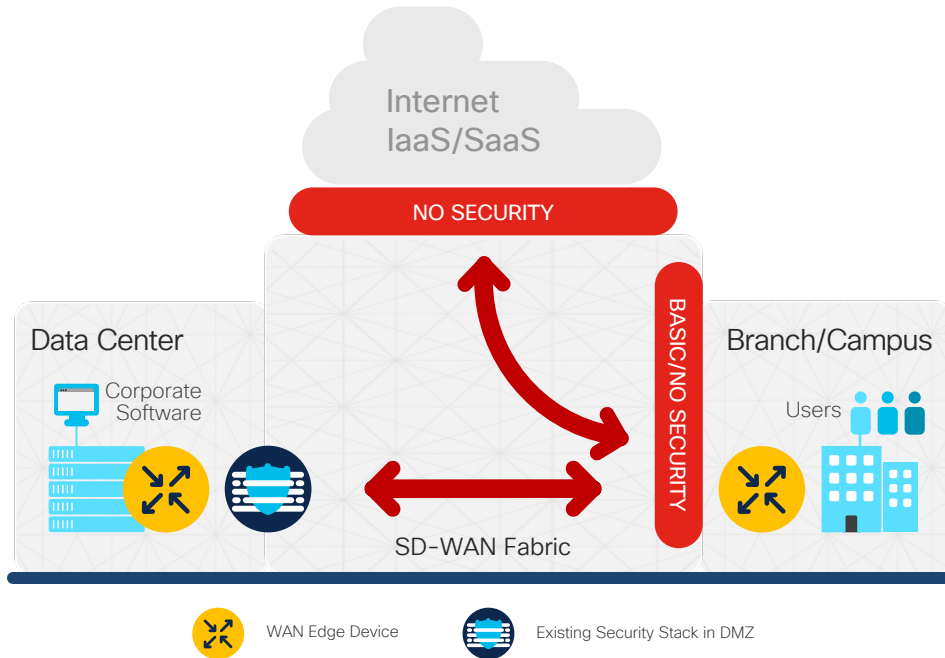
One management dashboard for branch, co-location, cloud and Security

SASE



Umbrella

# SD-WAN leverages new security challenges



## Internal & External Threats

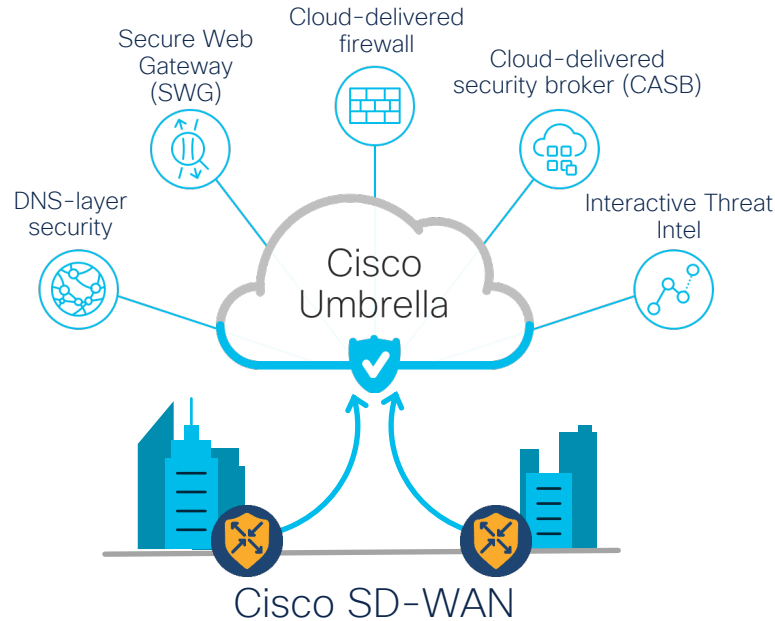
### External

- Exposure to malware & phishing due to direct internet and cloud access
- Data breaches
- Guest access liability

### Internal

- Untrusted access (malicious insider)
- Compliance (PCI, HIPPA, GDPR)
- Lateral movements (breach propagation)

# Secure Access Service Edge Transitioning to a Cloud-First Security Model



Cisco SD-WAN + Umbrella

## What is SASE?

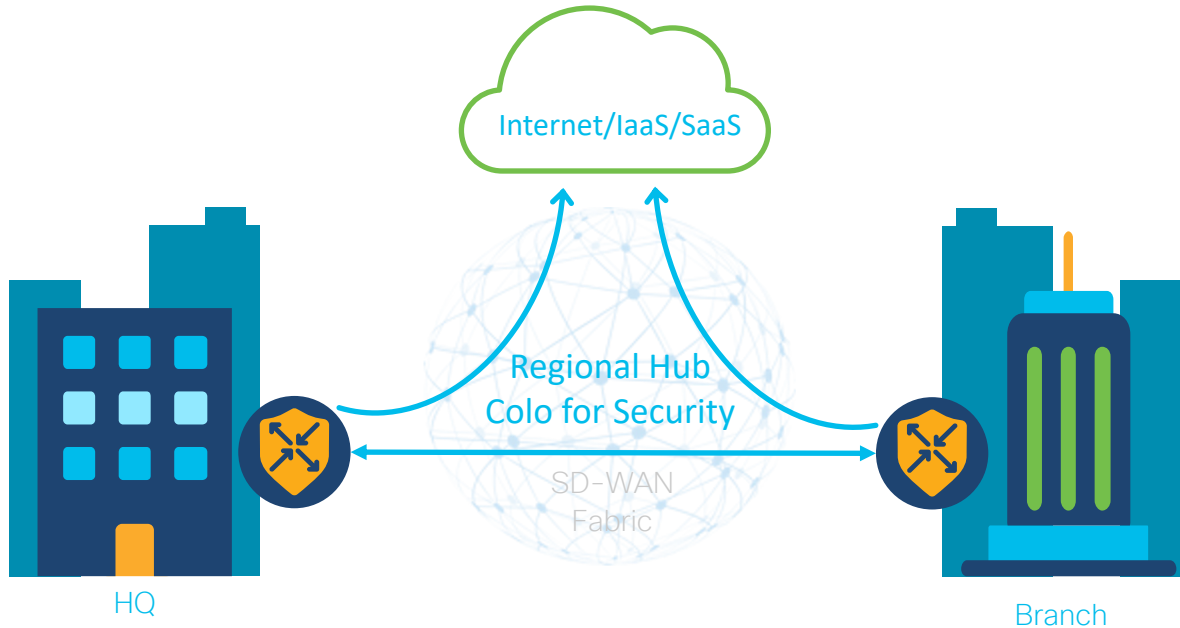
*“SASE combines network security functions (such as SWG, CASB, FWaaS and ZTNA\*), with WAN capabilities (i.e., SDWAN) to support the dynamic secure access needs of organizations. These capabilities are delivered primarily aaS and based upon the identity of the entity, real time context and security/compliance policies.” –Andrew Lerner, Gartner Inc.*

<https://blogs.gartner.com/andrew-lerner/2019/12/23/say-hello-sase-secure-access-service-edge/>

\* ZTNA = Zero Trust Network Access

# SD-WAN Cloud Security

Auto Tunnel, Intelligent Traffic Steering



## SASE Journey - Cloud Security

vManage  
Auto-Templates



DNS-Layer Security

Secure Web Gateway

Cloud-Delivered Firewall

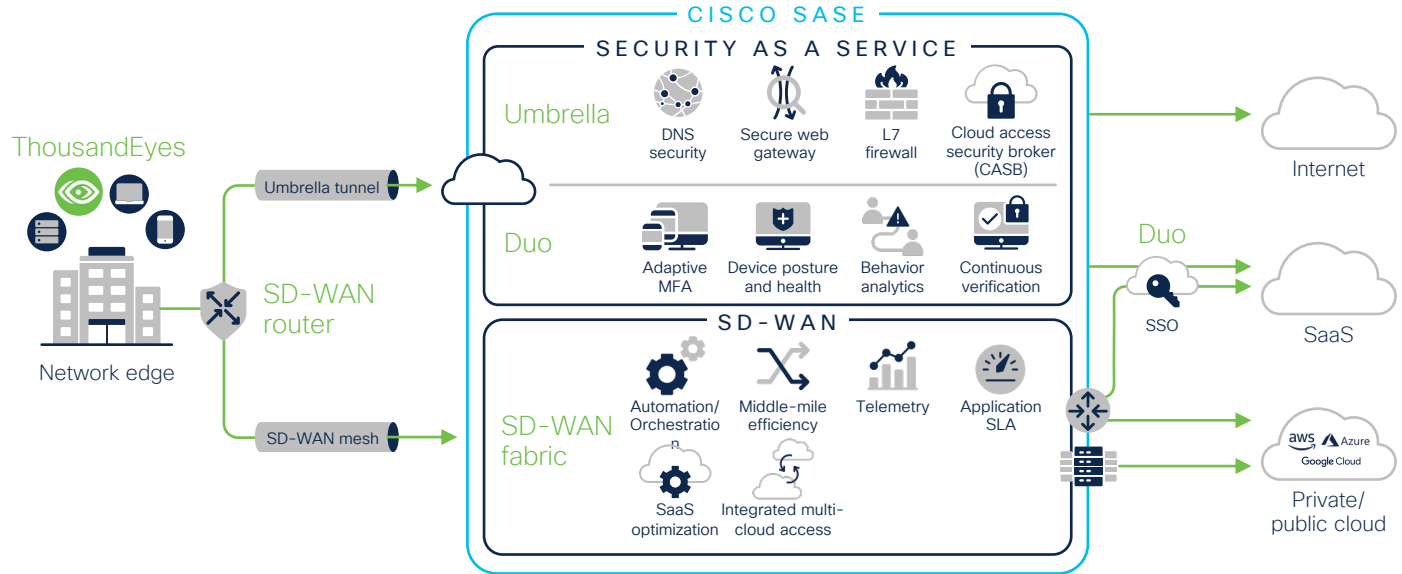
Cloud Access Security Broker

Interactive Threat Intel

# Full SASE Deployment: Secure Edge

## CORE ELEMENTS

- ▶ Cloud security
- ▶ Zero trust secure access
- ▶ SD-WAN router
- ▶ Teleworker gateway
- ▶ Existing gateway
- ▶ Observability



## Connect

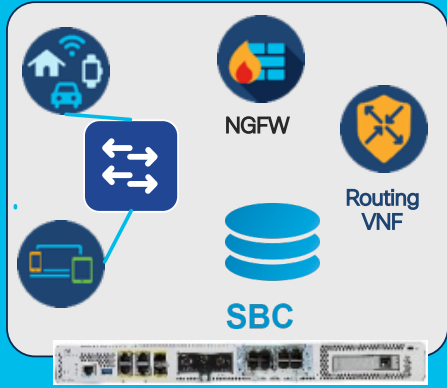
- Provide software defined transport from any network edge (Whole office, office of 1, HQ)
- Encrypted transport to SASE for direct internet access
- Dynamic path selection via SD-WAN fabric
- App aware Intelligent path selection through telemetry exchange between SDWAN and O365

## Control

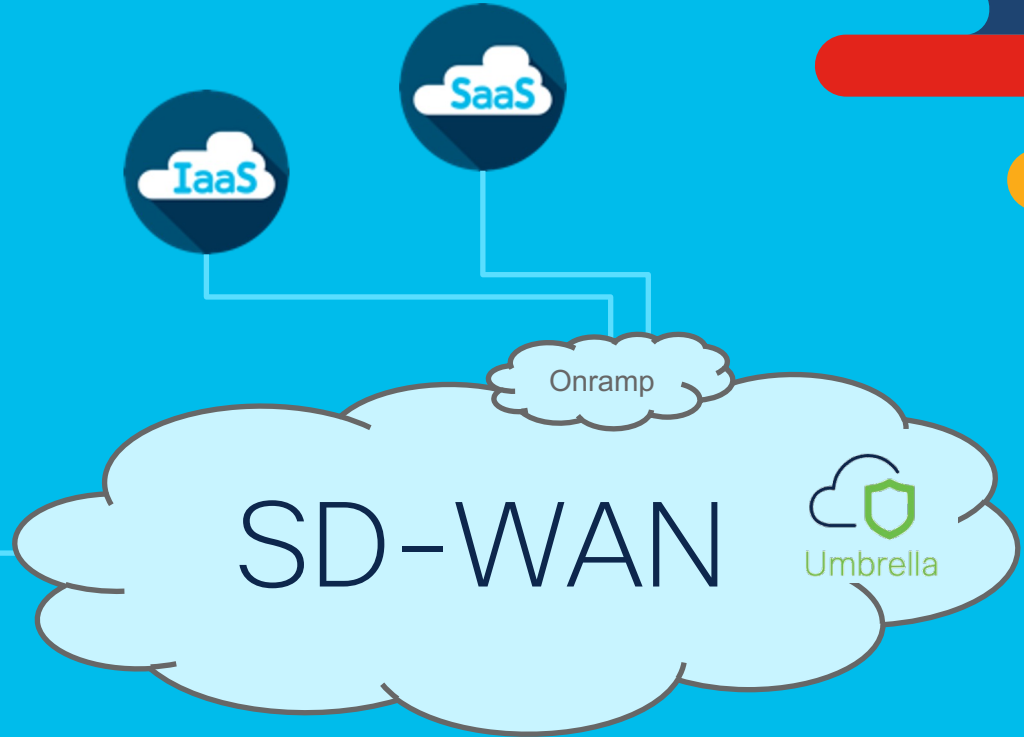
- Cloud security stack to secure all outbound traffic to internet/SaaS
- Establish zero trust application access for user/device

## Converge

- Simple, fast deployment of network and security
- Zero touch provisioning
- Common cloud-delivered security policy
- Automate response across network diameter with SecureX
- Common observability into all networks and services with ThousandEyes.



# SD-Branch



# Cisco delivers on these key Requirements



Simplicity

Plug & play

Centralized management  
and monitoring at scale



Security

Essential on-prem security

Centralized enterprise  
grade and multi-layer  
security



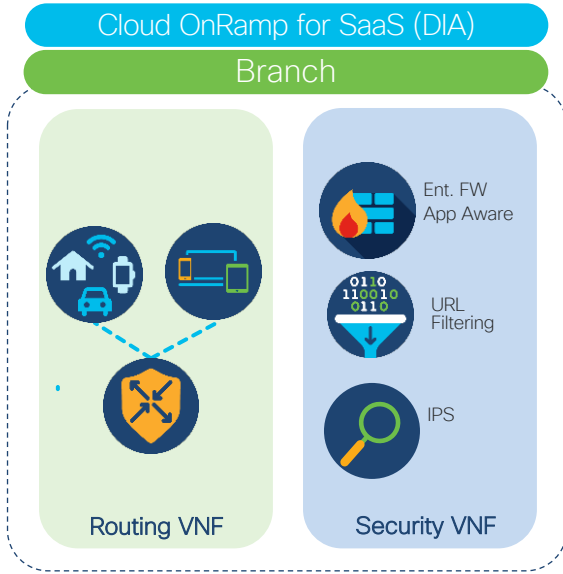
Performance

Optimized for multicloud  
application experience

Application QoS and  
network HA



# Enterprise Virtual Branch Office /



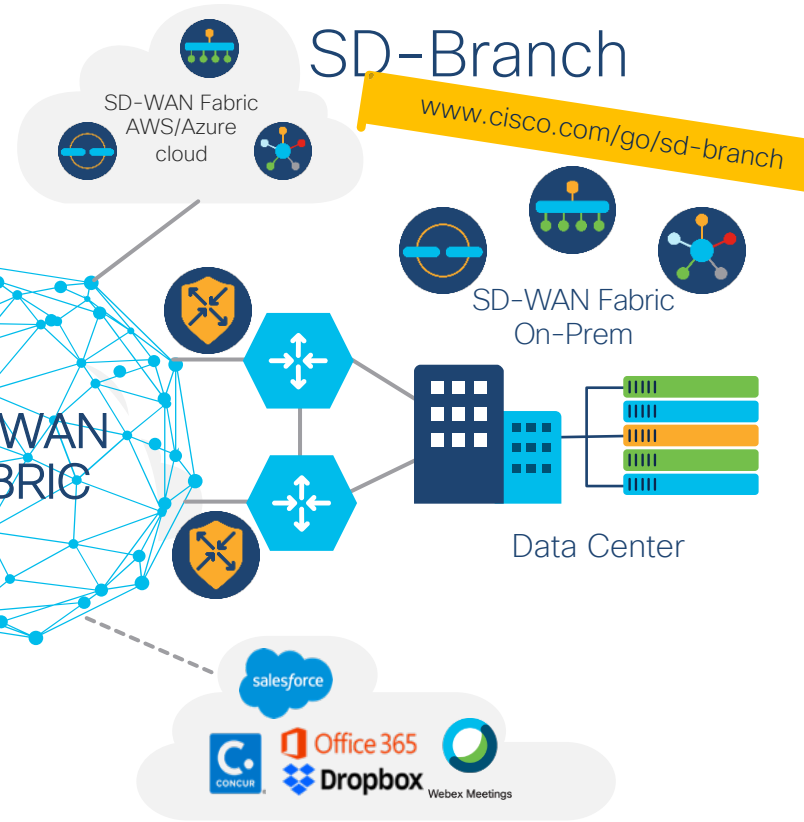
Catalyst 8000v

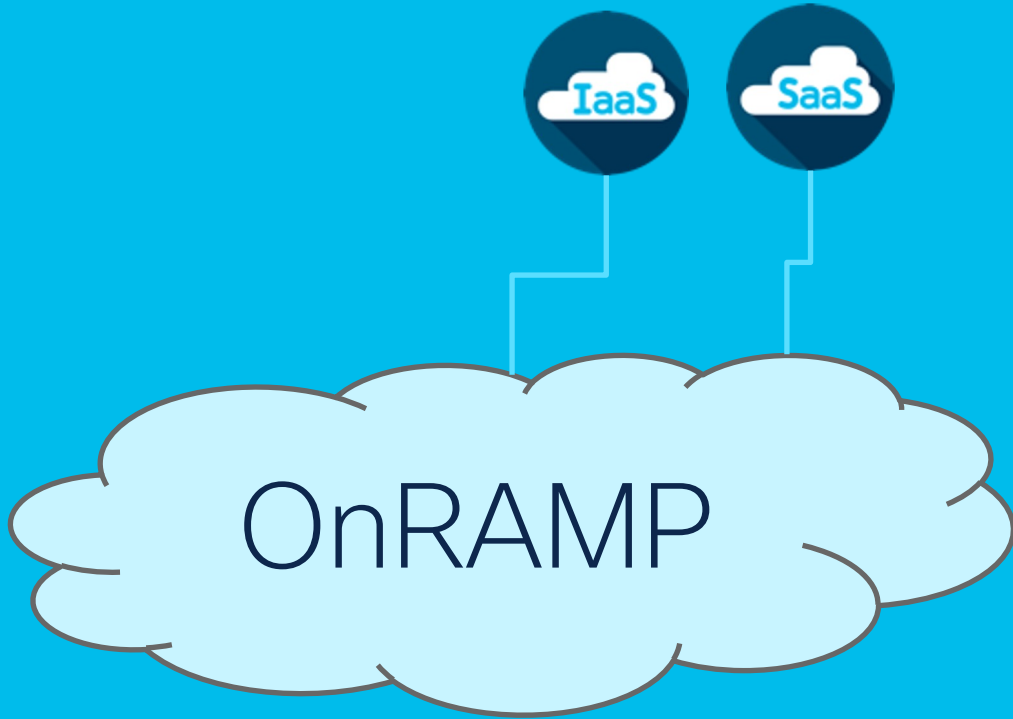
Catalyst 8200uCPE

Consolidated Routing & Security

Zero-touch Provisioning with vManage

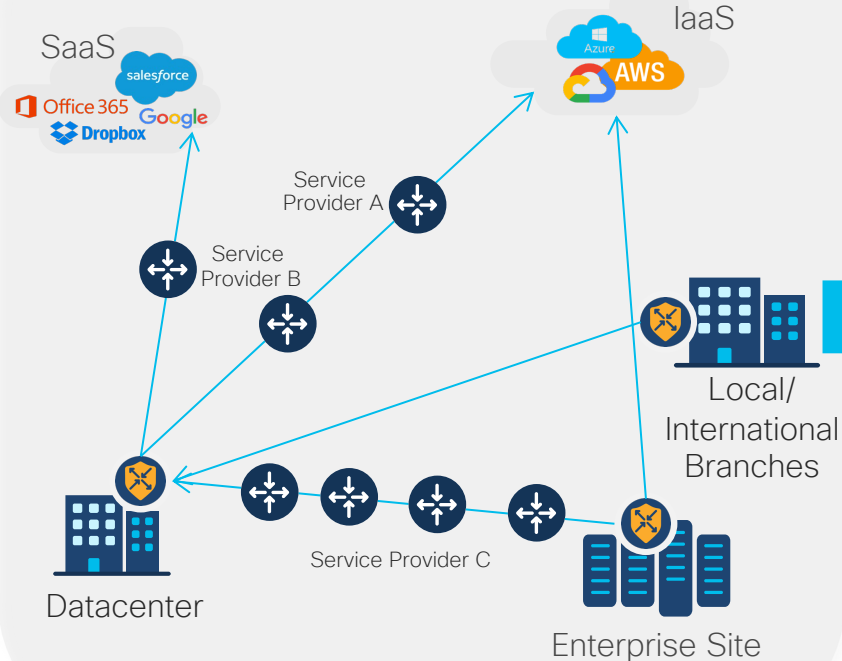
Quick & Easy Delivery of Software-based Services



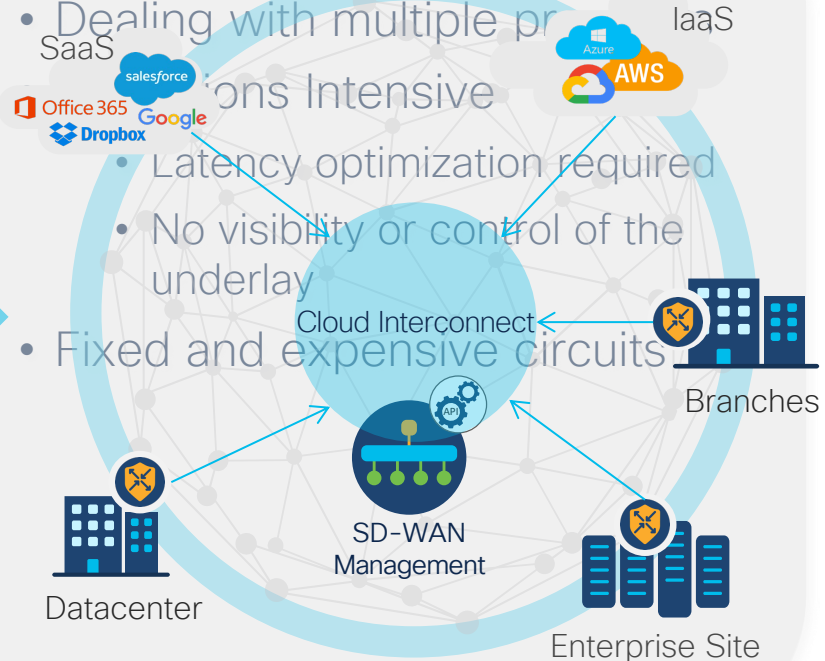


# Transforming the Network with Cisco SD-WAN Cloud Interconnect

## Static Networks stitched by Multiple Providers



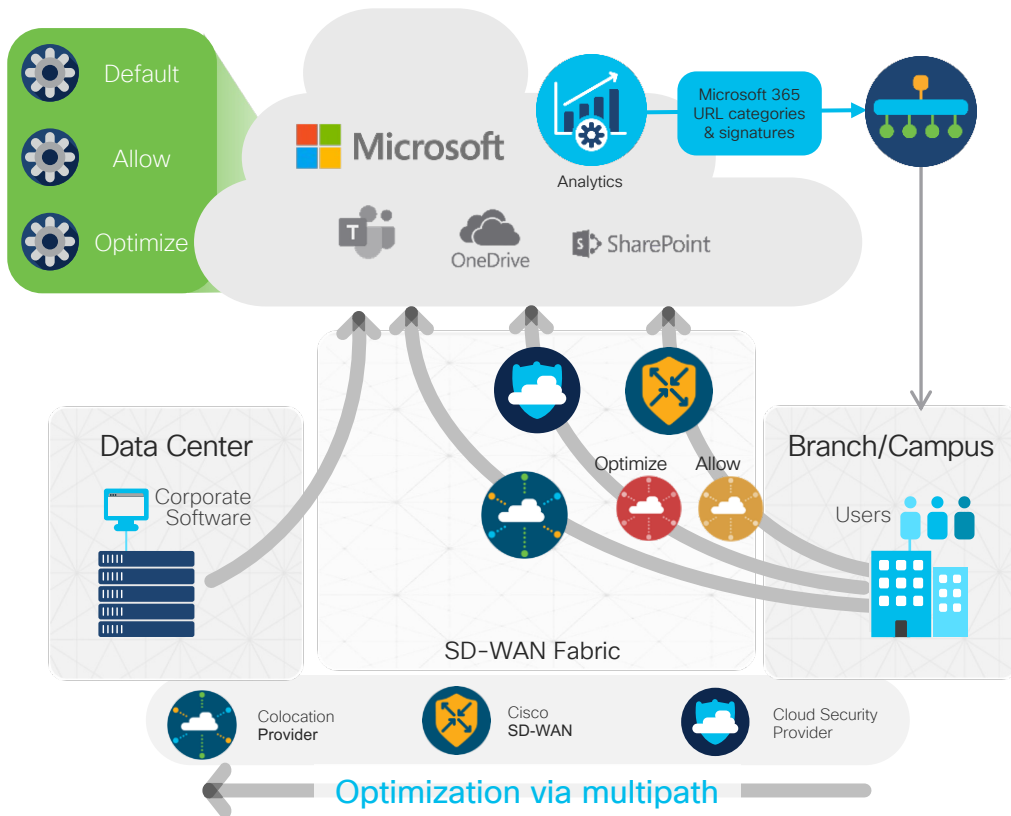
## Dynamic, Programmatic Private Backbone



# Microsoft 365 Optimization with Cisco SD-WAN



Improving the user experience



## Developed in partnership with Microsoft

- SD-WAN Solution is Microsoft Networking Partner Program Certified
- First SD-WAN vendor to support Microsoft 365 Informed Network Routing (Telemetry)

## Optimal SaaS experience

- Optimal path selection through proactive link probing
- Optimization at scale with lower TCO
- Visibility on QoE metrics
- App aware path selection through telemetry exchange
- Granular policy per class of Microsoft 365 application

- [Microsoft Networking Partner Program](#)
- [Microsoft 365 Informed Network Routing](#)

# Cloud OnRamp for Custom App

Bring Your Own App to Cloud OnRamp for SaaS

Extend Cloud OnRamp for SaaS support  
across all apps

aws Microsoft 365

salesforce

ORACLE

G Suite

box

Dropbox

SAP Concur

GoToMeeting

intuit

zendesk

webex  
by CISCO



SUGARCRM



1500+

NBAR Recognized Apps

+

Any Custom App

Standard supported apps

Add your own app

## BENEFITS



Dynamically route SaaS traffic  
to the best path

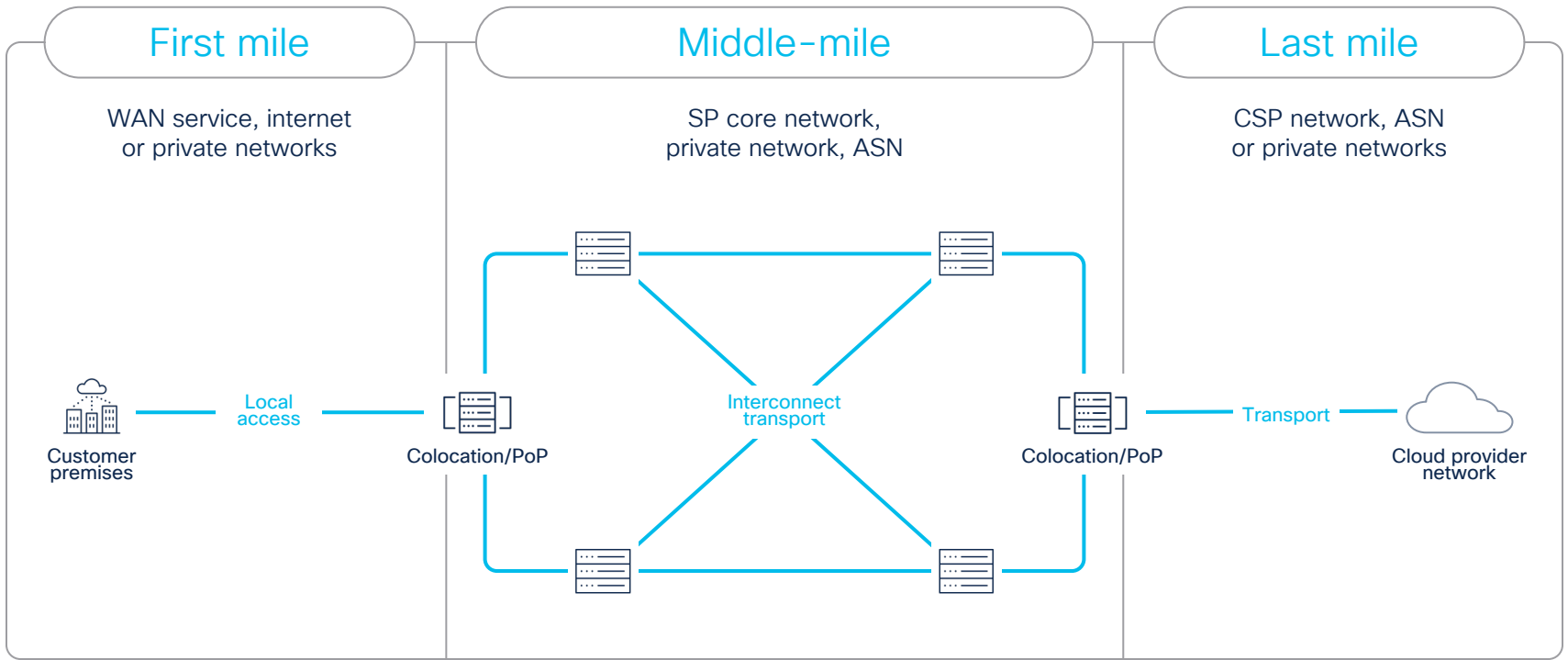


Fast, secure and reliable user  
experience

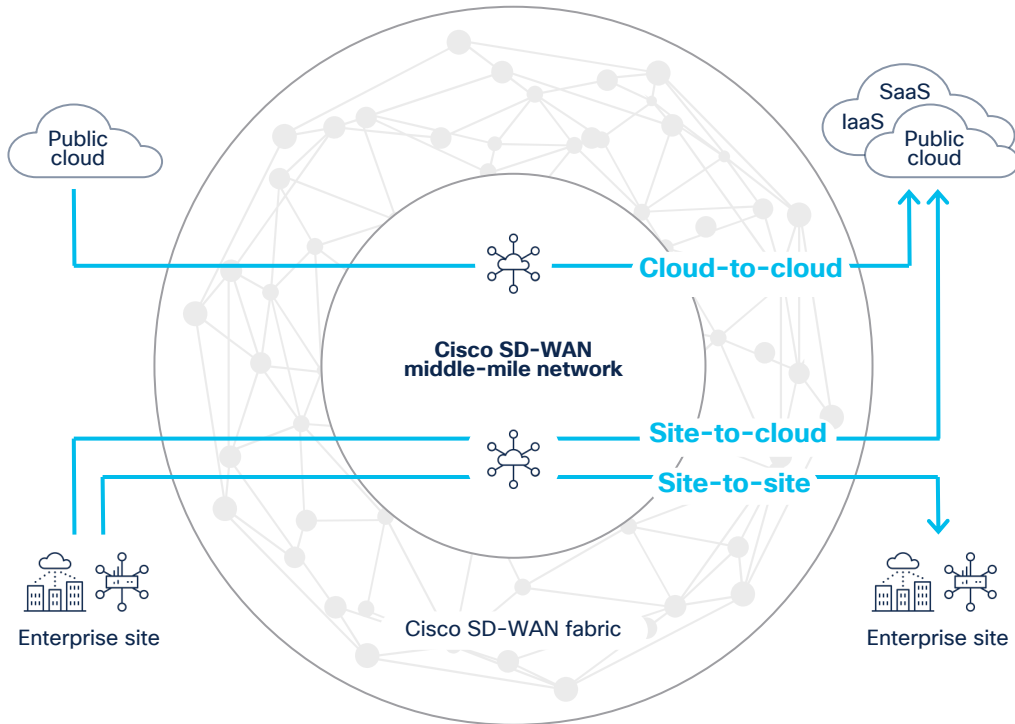


Gain real-time and historical  
visibility into application  
performance

# What is the middle-mile?



# Why use Cisco SD-WAN with middle-mile networks?



Cisco SD-WAN delivers an optimized global network by provisioning a private backbone via API, to directly and securely interconnect cloud and enterprise sites

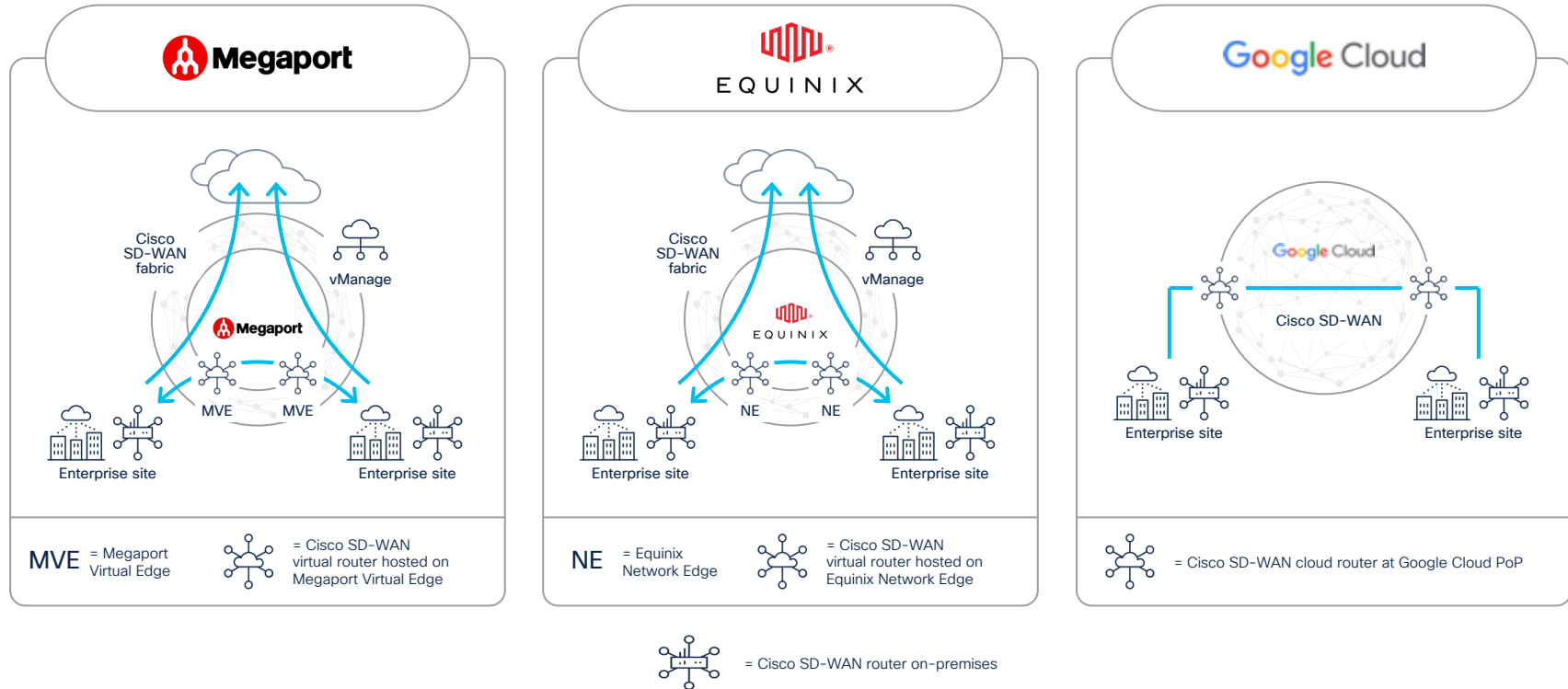
IT providers can accelerate their cloud transformation journey with on-demand consumption to connect any network, anywhere, anytime

Network admins benefit with full stack automation that addresses today's low cost and low latency requirements

 = Cisco SD-WAN virtual router hosted at mid-mile provider's colocation/PoP

 = Cisco SD-WAN router on-premises

# Cisco offers a choice of middle-mile partners





# Value offered



## Secure multicloud networking

Reduced network risks  
(with private backbone connectivity)

Strong security posture  
(end-to-end encryption and segmentation)



## Single pane of glass automation

Full network stack automation  
(automate overlay + underlay via vManage)

Centralized control  
(provisioning and orchestration  
via vManage)



## Business continuity

Global availability: Points of presence (PoP)

Consistent uptime (99.99% availability)



## Improved operations

Single vendor experience  
(buy, onboard, deploy and support  
through Cisco)

Support via Cisco TAC  
(seamless handoff to backbone provider)

Visibility (backbone underlay and  
SD-WAN overlay with vManage)



## Return on investment

Improved application performance  
(through guaranteed SLA)

Time to value (with fast deployment)

Significant savings  
(on WAN circuit costs and egress fees)

Flexible consumption  
(allows usage-based spending)

Home / Branch Office




Executive user (home)

This block represents a local office environment. It includes icons for a computer monitor, a mobile phone, and a laptop, all connected to a Wi-Fi 6 network. A blue shield icon with a white 'X' is positioned above the Wi-Fi 6 icon. The text 'Home / Branch Office' is at the top left, and 'Executive user (home)' is at the bottom. A red eye icon is in the top right corner.



# Hybrid Work

Anywhere Home Café

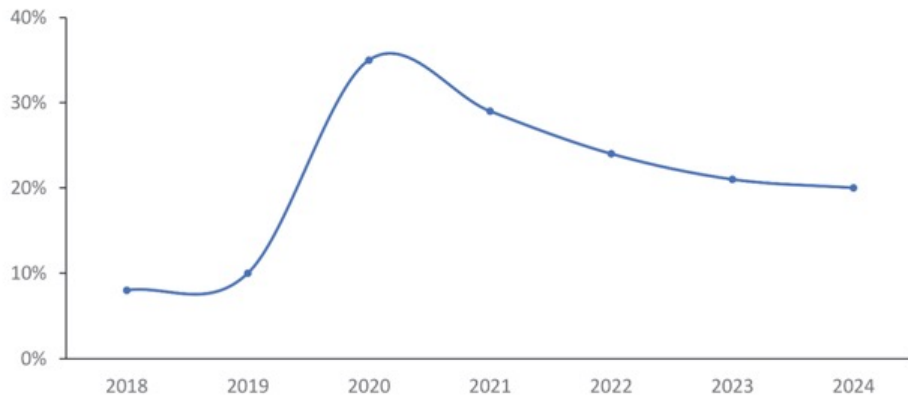


Remote user (home)

This block represents a remote user environment. It includes icons for a laptop and a mobile phone connected to a Wi-Fi network. The Umbrella logo is also present. The text 'Anywhere Home Café' is at the top left, and 'Remote user (home)' is at the bottom. A red eye icon is in the top right corner.

# The next era of Remote Access

What Business problem are we solving?



Percentage of U.S. workforce working remotely 2018-2024  
(full-time or occasionally)

Source : Dell'Oro Group



## “Work From Anywhere” Era

- COVID-19 has transformed the Network & Security Strategies of Enterprises
- Growing trends of highly distributed workforce



## “The Post-2020 Effect”

- Remote workforce has increased by ~4x times
- Re-architect the Remote-access VPN network segment

## Consistent User experience

- ✓ Access to applications across Corporate Data-Center and Cloud-based SaaS

## Service Agility

- ✓ Flexible WAN Edge
- ✓ Ability to handle Distributed load
- ✓ Operational within hours

## Elasticity

- ✓ Dynamically scale-up/down
- ✓ Location/device agnostic
- ✓ Preserve Security stack

## Security

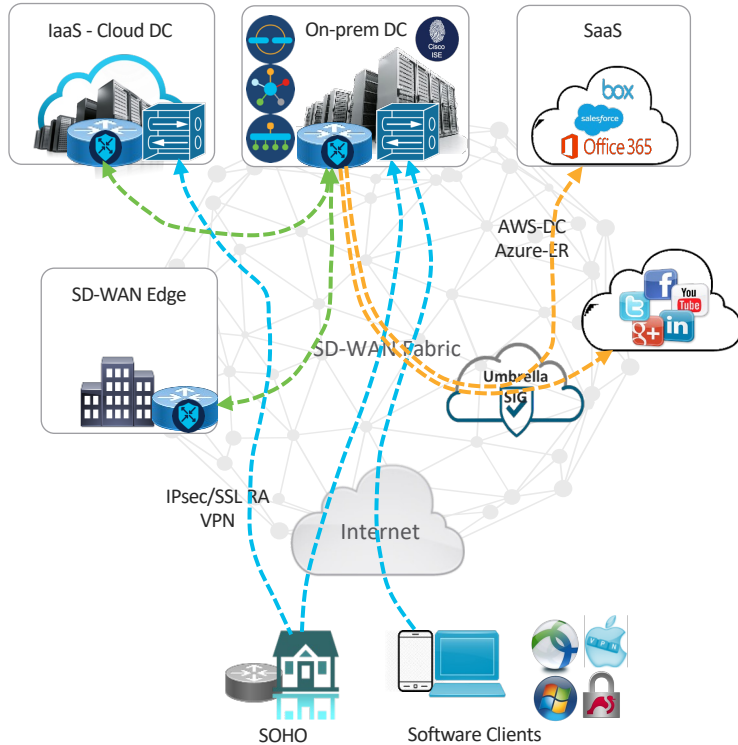
- ✓ User-based & Device-based
- ✓ Extensible Corporate security policy

## Manageability

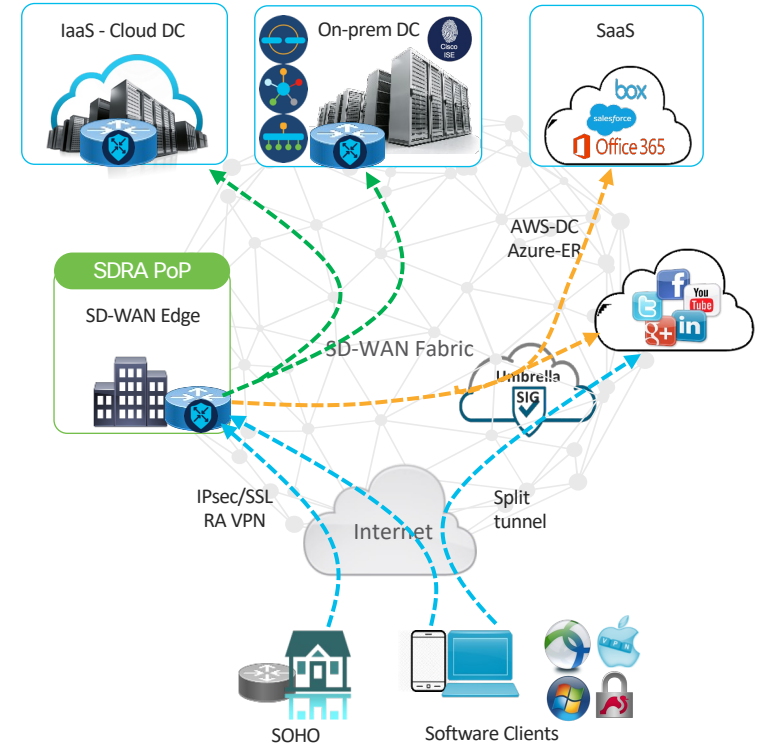
- ✓ Centralized admin-console
- ✓ Proliferation of Network & Security policies
- ✓ Visibility & Control

# Traditional vs SDRA Remote Access

- > RA user traffic
- > SD-WAN overlay traffic
- > SASE, SaaS, etc traffic



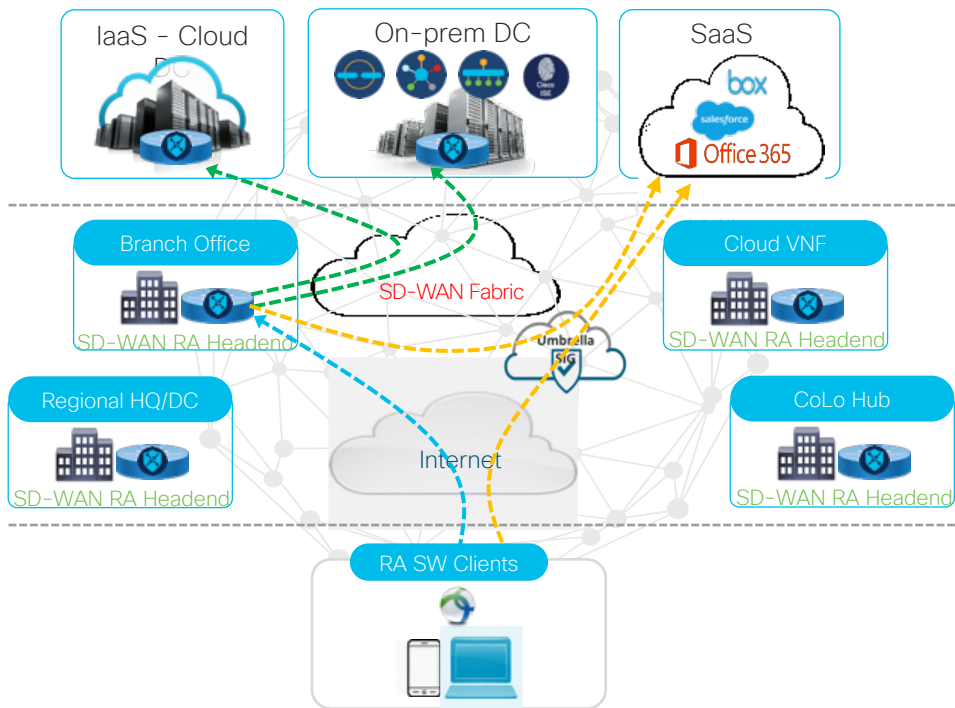
Traditional Remote Access VPN design









SD-WAN Integrated Remote Access VPN

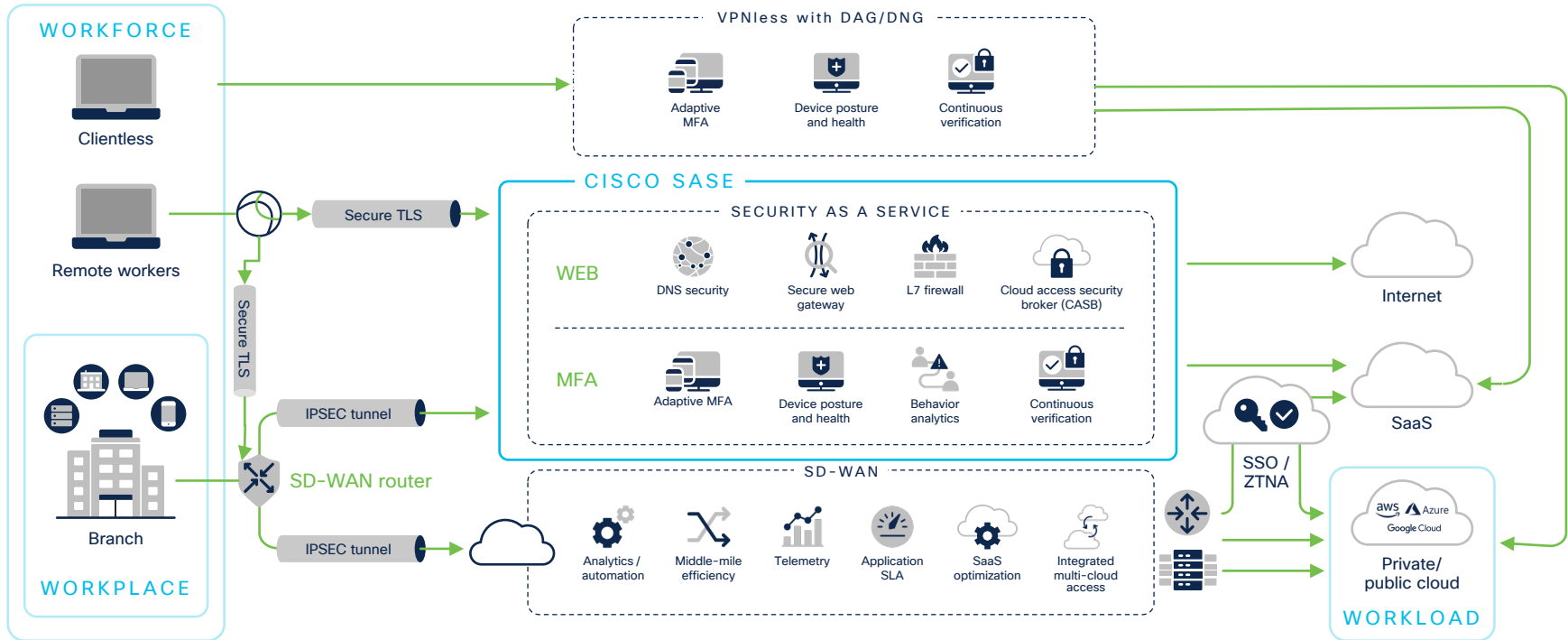
# Cisco SD-WAN RA Value-proposition

## SD-WAN RA Value Proposition

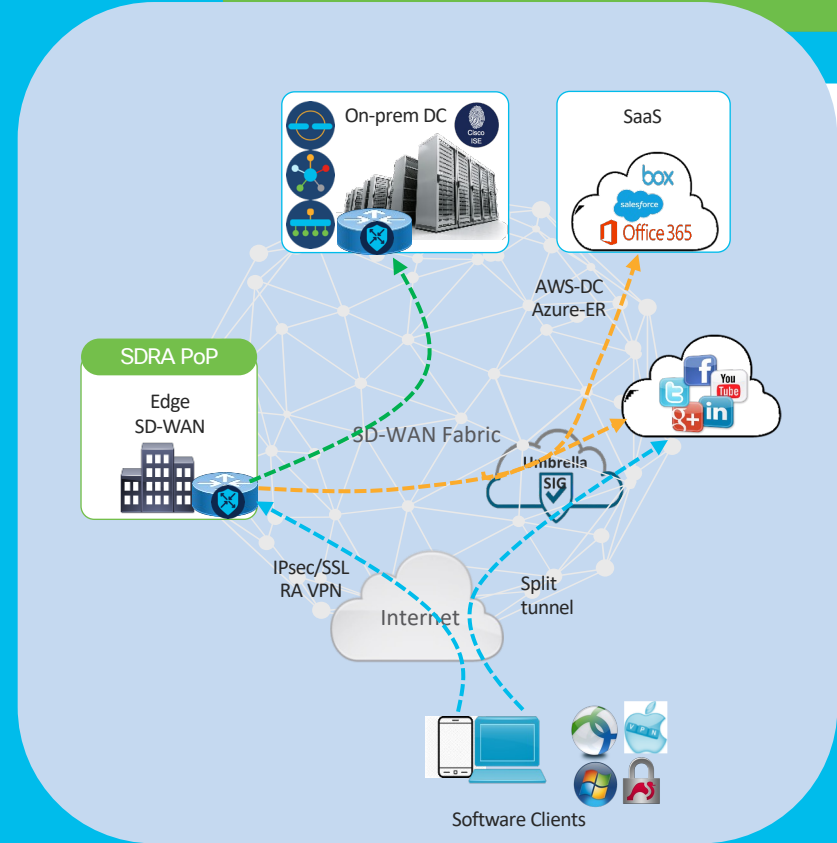


-  Lower TCO, SD-WAN Lite control-plane
-  Unified fabric, Single-pane-of-glass management
-  Elastic & highly distributed deployment
-  SD-WAN / Enterprise benefits extended to RA users
-  Unified user policy using Cisco ISE for on-site and remote access users.
-  RA termination within enterprise fabric

# Software-Defined Access Target Architecture



# Demo: SDRA



### Cisco vManage

- Monitor >
- Configuration** >
- Tools >
- Maintenance >
- Administration >
- vAnalytics >
- Workflows >

- Devices
- TLS/SSL Proxy
- Certificates
- Network Design
- Templates
- Policies**
- Security
- Unified Communications
- Cloud onRamp for SaaS
- Cloud onRamp for IaaS
- Cloud onRamp for Multicloud
- Cloud onRamp for Colocation

Initiated By: makrupin From: 185.107.65.165

Total Rows: 1

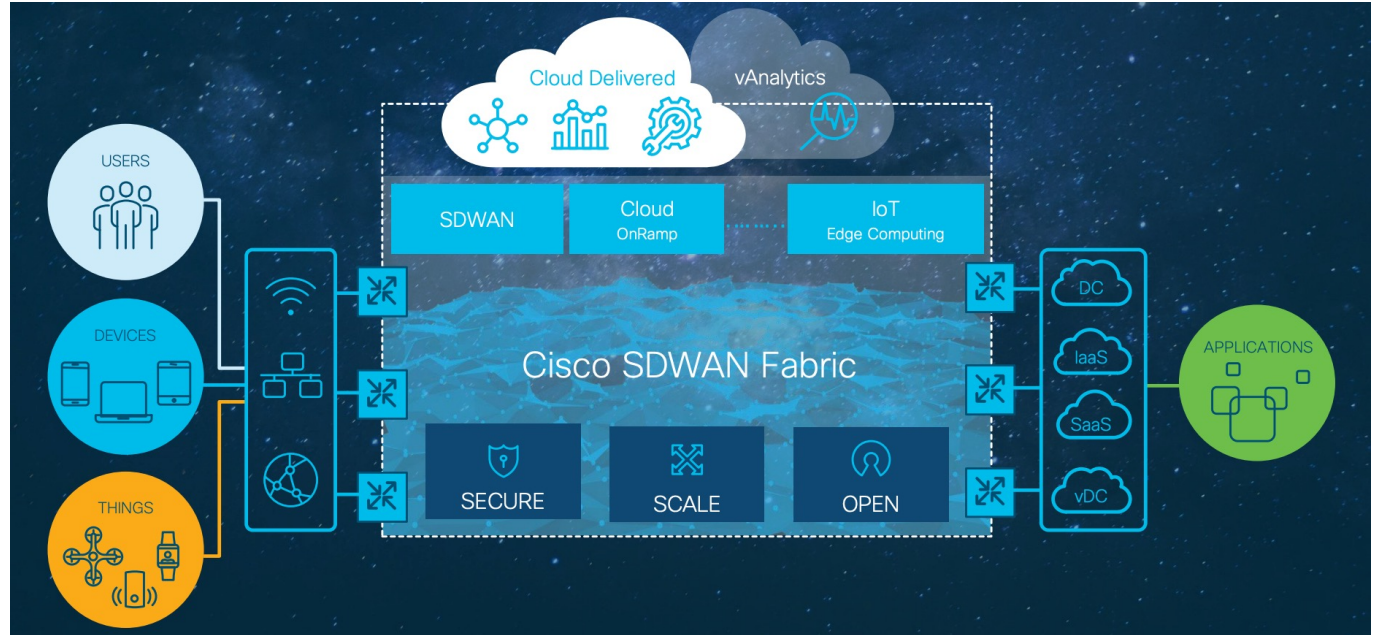
Hostname	System IP	Site ID	vManage IP
vSmart	10.255.255.11	1	10.255.255.10





# Monitoring

# vAnalytics



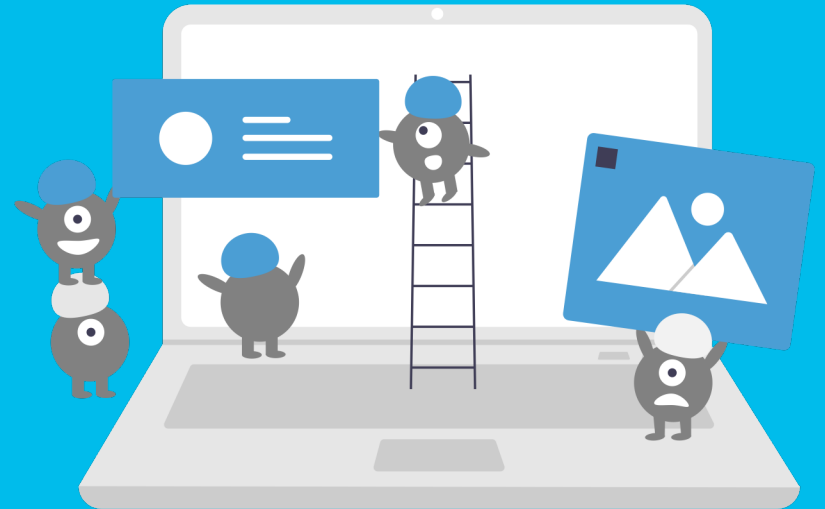
vManage

- Real-time visibility
- Historical Visibility
- Troubleshooting Tools
- Capacity Utilization
- Network Utilization

vAnalytics

- Baseline / Trending
- Anomaly Detection
- Comparisons
- Cause - and - Effect
- Capacity Planning

# Demo: VAnalytics



### Overlay Summary

Filter

12h 24h 7 days 1 month Custom

\*graphs are using logarithmic scale

Applications

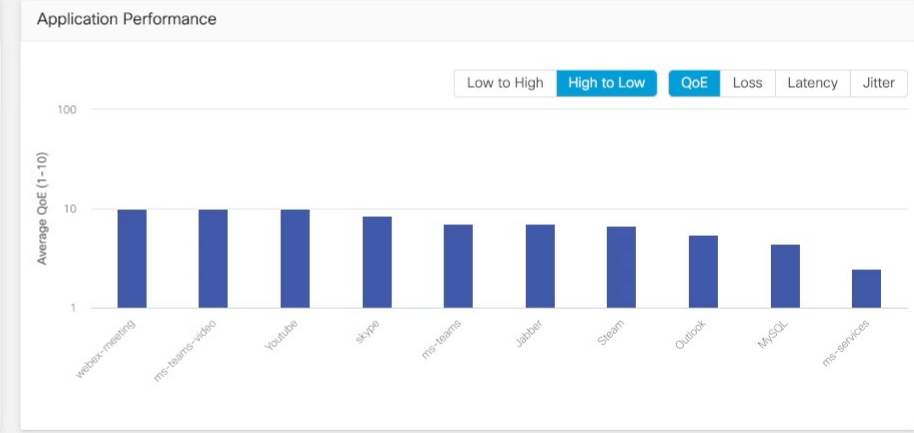
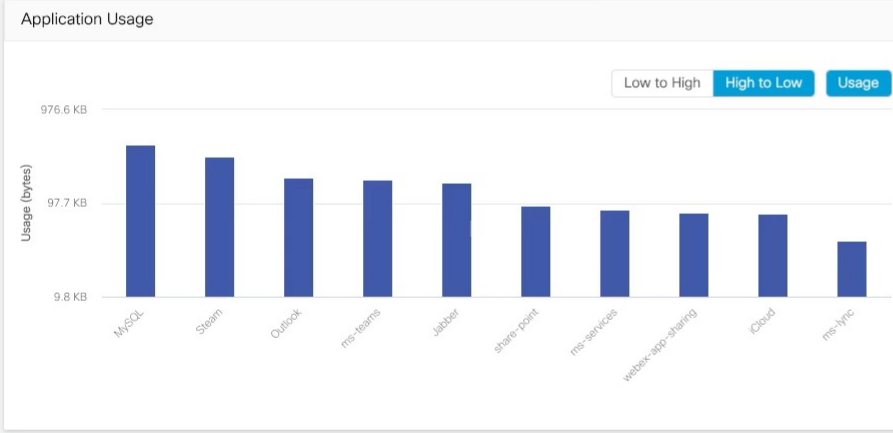
17

WAN Sites

4

WAN Edge Devices

4



### WAN Sites - Usage and Performance

Low to High High to Low Usage QoE Loss Latency Jitter



# What is ThousandEyes?

ThousandEyes is a Digital Experience Monitoring SaaS platform to see, understand, and improve digital experiences of customers and employees over any network. We offer a distribution of global vantage points from where users can run a variety of tests.



## Cloud Agent

Globally distributed agents installed and managed by ThousandEyes in 200+ cities.



External Vantage Points



## Enterprise Agent

Lightweight software-based agents, easily installed on your own network, provide visibility from within the enterprise campus, data centers, cloud VPCs/VNets, and branches.

Supports active monitoring, SNMP-based monitoring, and topological mapping of internal network devices.

**Enterprise Agent is applicable to Enterprise Switching Infra**



Internal Vantage Points



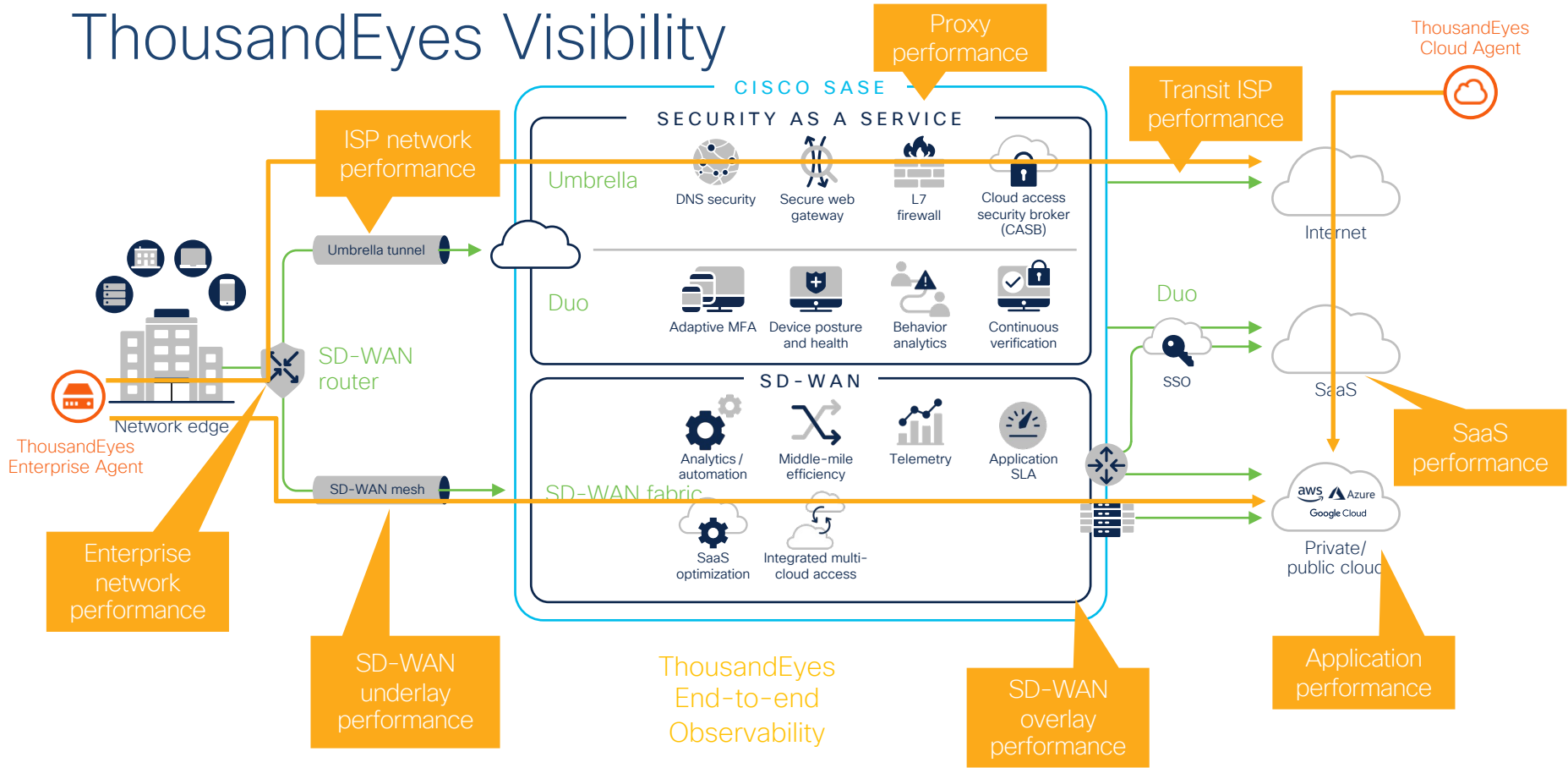
## Endpoint Agent

Lightweight service installed on end-user laptops and desktops that provides proactive and real-time monitoring of application experience and network connectivity



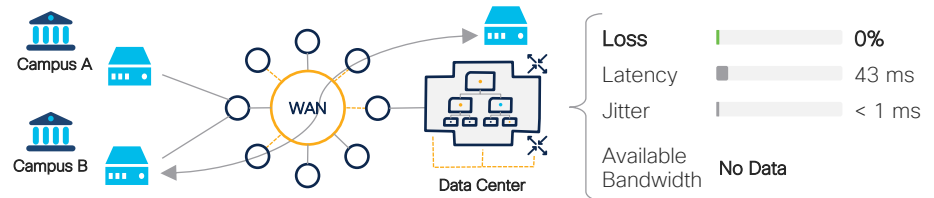
End-User Experience

# ThousandEyes Visibility

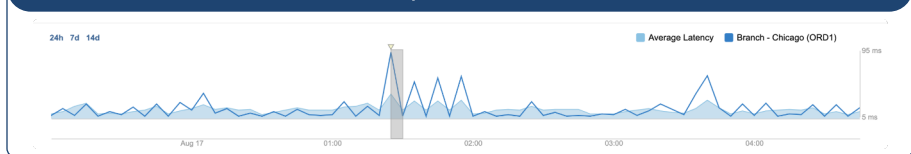


# Troubleshooting SaaS and monitoring performance

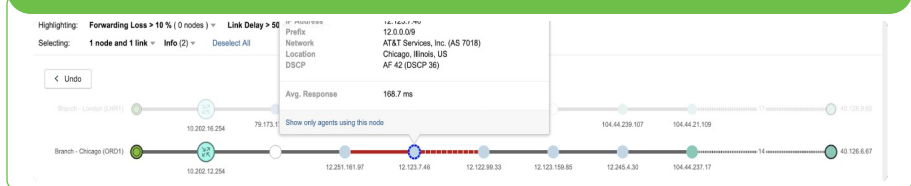
- Identifying **poor user experience**
  - Did traffic hand off to SaaS app optimally?
  - Was there an outage within the enterprise, WAN, or SaaS backbone?
- Having **full path visibility** to identify and resolve issues
- Active monitoring for **latency, loss, bandwidth, jitter**



## Historical performance view



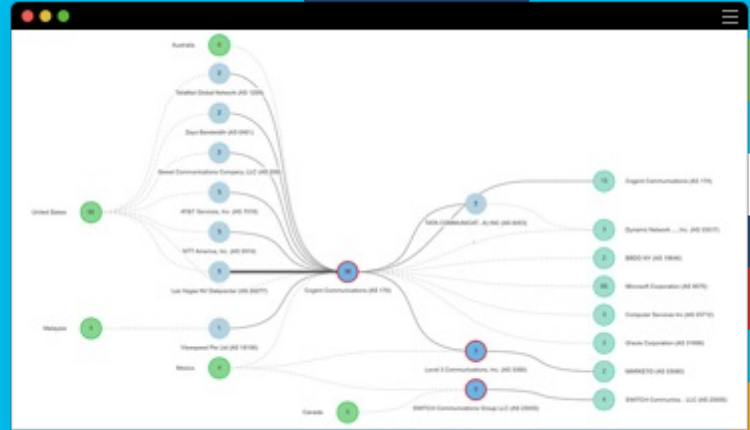
## Path visualization



Hop-by-hop view of network paths and performance with proactive, customizable alerts

Demo:

ThousandEyes





- Cloud & Enterprise Agents >
- Views
- Test Settings
- Agent Settings
- BGP Monitors
- Endpoint Agents >
- Devices >
- Internet Insights >
- Dashboards >
- Alerts >
- Reports
- Sharing >
- Account Settings >

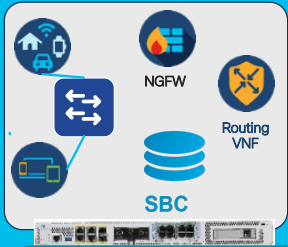
1 New Enterprise Agent has been added: TE-makrupin-home

Agents Notifications Kerberos Settings

Assigned to Account Group **rtelbusi** Add a filter

Search... 5 Enterprise Agents Add New Enterprise Agent

<input type="checkbox"/>	Agent Name	Hostname	Utilization	Status/Last Contact
<input type="checkbox"/>	TE-site100	TE-site100	General 1%	Just now
<input type="checkbox"/>	TE-cEdge	TE-site39-LTE	General 1%	Just now
<input type="checkbox"/>	TE-cEdge-382626	TE-site38-corpo	General 0%	Just now
<input type="checkbox"/>	TE-site39	TE-site39	N/A	117 days ago
<input type="checkbox"/>	TE-makrupin-home	TE-makrupin-home	N/A	Just now



Branch in a box

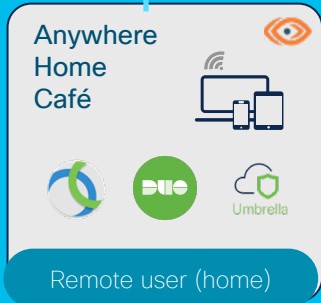


Onramp

Putting it together...

Umbrella

Internet



Remote user (home)

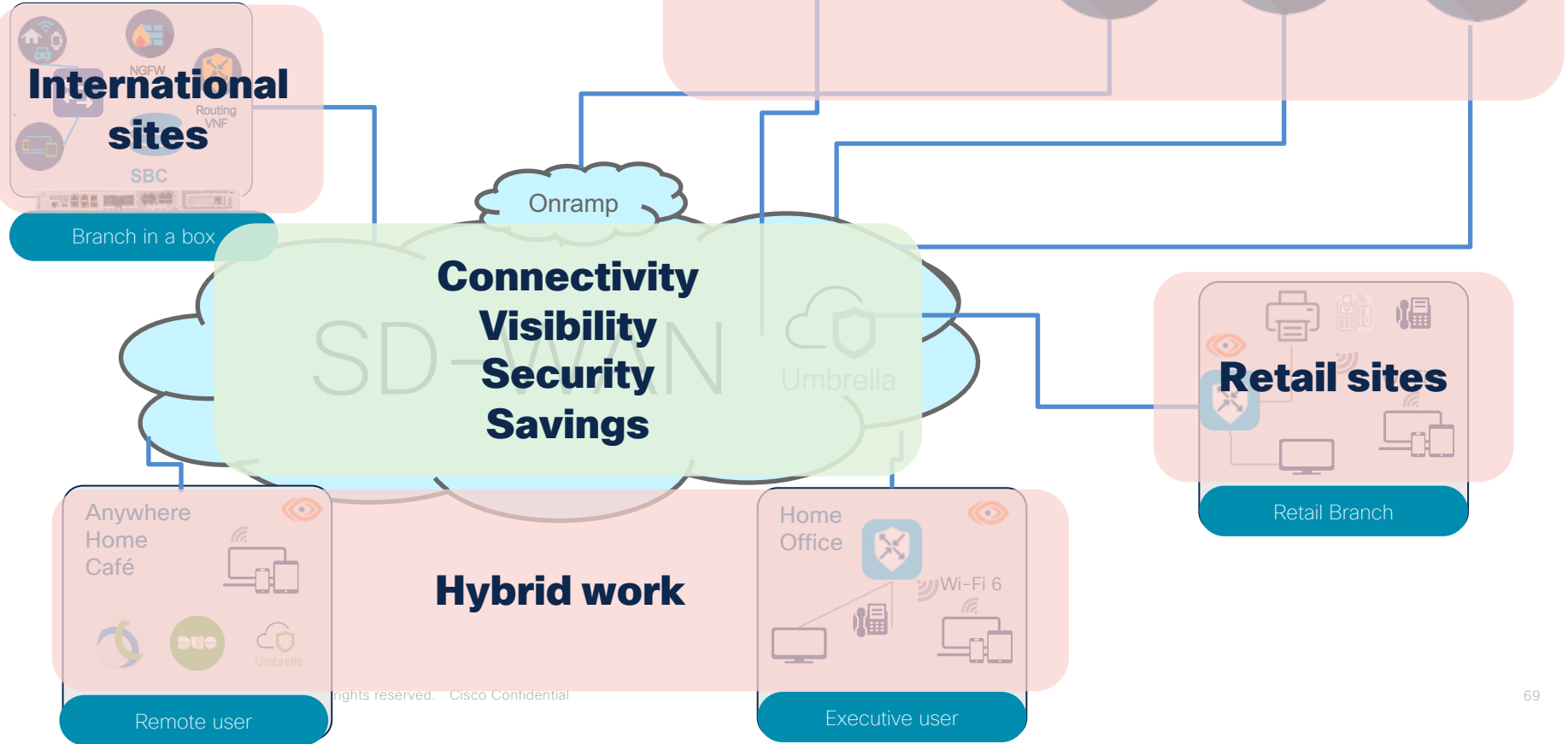


Executive user (home)

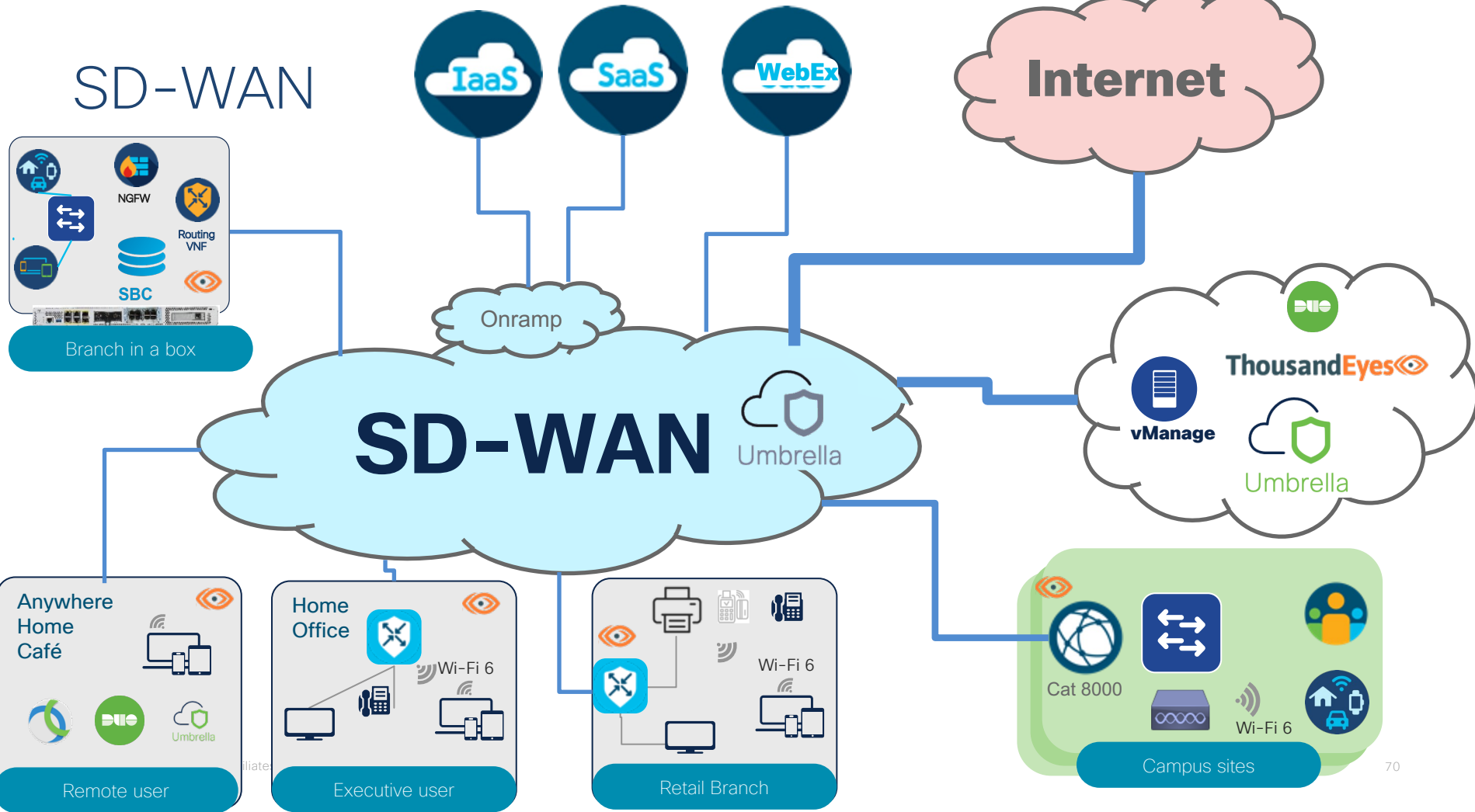


Retail branch

# SD-WAN



# SD-WAN



# Call to action

Pilot SDWAN

Implement  
your hybrid  
work strategy

Move on  
cloud  
adoption

