

Cisco Meraki Fundamentals

Cloud-Managed Operations



Cisco Meraki Fundamentals

Cloud-Managed Operations

Arun Paul
Mike Woolley
Medi Jaafari
Jeffry Handal

Cisco Meraki Fundamentals: Cloud-Managed Operations

Table of Contents

Cover

Title Page

Copyright Page

Contents at a Glance

Contents

Foreword

Introduction

Part I: Knowledge Is Power: Understanding the Cloud Architecture

Chapter 1 Cisco Meraki Cloud Architecture Basics

Dashboard Architecture

Cloud/Back-end Architecture

Device to Cloud Communication

Data Security and Retention

Firmware Management and Lifecycle

Summary

Additional Reading

Chapter 2 Building the Dashboard

Creating an Organization

Creating a Network

Claiming and Adding Devices

Defining Administrators and Privileges

Special Access Roles

Table of Contents

SAML Roles

Maintaining Control of the Dashboard

Tagging to Scope

Intro to Tags

Tagging for Administrative Privileges

Network and Device Configurations

Configuring SSID Availability on MR Access Points

Configuring Non-Meraki VPN Peer Availability for MX and Z Series Devices

Meraki Systems Manager

Dashboard Alerting and Reporting

Dashboard Email Alerts

Webhooks

Syslog

SNMP and SNMP Traps

Automated Summary Reports

Meraki Insight Alerts

Alert Hubs

Global Overview

Summary

Additional Reading

Part II: Building a Scalable Foundation with Dashboard

Chapter 3 The Meraki Admin Experience

Org-wide Health

Firmware Status

Detailed Firmware Status and Security

Proactive Replacements

Dashboard Early Access Program

Magnetic Design System

New Landing Page

New Organization Alert Page & Alert Hub Enhancement

Switching Overview

Global Overview

Table of Contents

Network-wide Health Views

- Network-wide and Uplink Health

- Wireless Network Health

Automated Topology Views

- Network-wide Layer 2 Topology

- Network-wide Layer 3 Topology

- Network-wide Multicast Topology

Summary

Additional Reading

Chapter 4 Automating the Dashboard

Configuration Templates

- How Do Templates Work?

- Local Overrides

- Template Caveats and Limitations

- Template Best Practice Considerations

Using Webhooks, Syslog, and SNMP to Trigger Outside Automation

- Webhooks

- Syslog

- SNMP

Dashboard API

- What Is the Dashboard API and How Is It Used?

- API Tips and Tricks

- Dashboard API Examples

- Automated API-based Organization Status

- Automated MR Naming Based on Upstream Switch

MT Automation

- Dashboard-Based Automation

Summary

Additional Reading

Part III: The MXThe Cloud-Managed Swiss Army Knife

Chapter 5 MX and MG Best Practices

Table of Contents

MX Scaling

Deployment Modes

- Routed Mode

- Passthrough or VPN Concentrator Mode

Security

- L3/L7 Firewall

- HTTP Content Filtering (TALOS)

- Cisco AMP

- IDS/IPS

- Cisco Umbrella

- Dashboard Group Policy

- Adaptive Policy (SGT)

VPN

- Meraki Auto VPN

- Client VPN

- Cisco AnyConnect

- Non-Meraki VPN

Routing

- Route Priority

- Static Routes

- OSPF

- BGP

Deploying Meraki Auto VPN

- Configuring Auto VPN

- Hub Versus Spoke

- NAT Traversal

- Hub and Spoke Recommendations

- Sizing It Right

- Hub Prioritization

- Full Tunnel Versus Split Tunnel

- Advanced Configurations

Monitoring Your Deployment

- Meraki Insight

Table of Contents

Web Application Health

WAN Health

VoIP Health

Insight Alerts

ThousandEyes Integration

Monitoring VPN

Reviewing Dashboard Alerts

Alert Hub

Organization Alerts

Threat Assessment on Meraki Dashboard

Security Center

Most Prevalent Threats

Most Affected Clients

Introduction to MG Cellular

4G LTE Versus 5G

5G NSA Versus 5G SA

Dashboard Monitoring for MG

MG Deployment Considerations

Cellular Primary or Backup?

5G Line of Sight

CGNAT and You

Prestaging for Deployment

Troubleshooting Meraki Devices

Local Status Page

Safe Mode

Support Data Bundle (SDB) Logging

Integrated DM Logging

Summary

Additional Reading

Chapter 6 MX SD-WAN Best Practices

Introduction to Meraki SD-WAN

The Science of Transport Performance

Table of Contents

The Anatomy of SD-WAN Policies

- SD-WAN Uplink Policies
- Custom SD-WAN Performance Classes
- Traffic Analysis and Identification
- Dynamic Path Selection Policies
- Global Preference Policy
- Basic Load Balancing Policy
- Basic Policy-Based Routing
- Performance-Based DPS
- Policy Routing with Performance-Based DPS

SD-WAN over Cellular

SD-Internet

Integrating MPLS

- MPLS on the LAN: Failover to Meraki Auto VPN
- MPLS on the WAN: Meraki Auto VPN Overlay

Summary

Additional Reading

Part IV: The Ultimate Cloud-Managed Access Layer

Chapter 7 Meraki Switching Design and Recommendations

Introduction to Meraki Switches

Meraki Switching Design

Designing a Wired Enterprise Network

- Planning Your Deployment
- Selecting the Right Switch Product Mix

Planning Hybrid Campus LAN Architectures with Cloud Management

- Designing the Access Layer
- VLAN Deployment
- Using Native VLAN 1
- Planning QoS
- Fine-Tuning STP in a Hybrid Environment
- Tags to Optimize Deployment
- MTU Recommendation

Table of Contents

- Connecting Trunk Ports
- Connecting MR Access Points
- Layer 3 Best Practices
- OSPF Best Practices
- Multicast Best Practices

Securing Layer 2 Operations

- Infrastructure Security
- DHCP Snooping
- Storm Control
- Dynamic ARP Inspection
- SecurePort
- Port Profiles
- VLAN Profile
- Network Security
- Sticky MAC
- Port Isolation
- 802.1X Authentication
- MAC Authentication Bypass
- Change of Authorization with ISE Integration
- End Point Security
- Micro-Segmentation with MS (Adaptive Policy)
- Identity Classification and Propagation
- Security Policy Definition
- Policy Enforcement
- SGT Assignment Methods
- Caveats in Setting Up Adaptive Policy

Operating and Optimizing Meraki Switches

- Virtual Stacking
- Firmware Upgrade Consideration on MS
- Configuration Validations
- Config-Safe Mechanism
- Auto-Rollback on Bad Uplink
- MS PoE Budget

Table of Contents

MS Power Overview

Sustainability Using MS

Cloud-Monitored Catalyst

Troubleshooting Your Meraki Deployment

Dashboard Reporting

Dashboard Live Tools

Ping

Packet Capture

MTR

MAC Forwarding Table

Cable Testing

Cycle Port

Wake-on-LAN

Summary

Additional Reading

Chapter 8 Meraki Wireless Best Practices and Design

Scoping and Scaling the Dashboard

Physical WLAN Design

Location-Aware Wireless Network

Wi-Fi 6E and Dual 5-GHz Mode

6-GHz RF Propagation

AP Mounting Recommendations

AP Adjacency and Overlap

Configuring Meraki Wireless

RF Profile Best Practices and Recommendations

Band Selection: Per SSID Versus All SSIDs

Client Balancing

Minimum Bitrate

Channel Planning Best Practices

Frequency Bands

Channel Width

Channel Selection: DFS Channels

Table of Contents

Meraki Auto RF

Other Design Considerations for Meraki Wireless

Why Distributed Networks?

Authentication and Encryption

VLAN Considerations

AP Tag Use Cases

Setting Up Enterprise-Grade Meraki Wireless

Defining Roaming

Defining Domains

Roaming Domains

Layer 2 Domains

Layer 3 Domains

Defining DHCP Scope

Security Features and Wireless Security Best Practices

Air Marshal

Traffic Segregation and Access Control

Operating the Network

Site-Level Wi-Fi Overview

Wireless Health and Overview

Anomaly Detection (Smart Thresholds)

Server RCA

Device Monitoring and Reporting

Roaming Analytics

Client Overview

Client Details

Client Timeline

Access Point Timeline

Summary

Additional Reading

Part V: The Environment: The Next Frontier

Chapter 9 MV Security and MT (IoT) Design

Redefining Surveillance: The Meraki Difference

Table of Contents

Meraki Camera Architecture

MV Video Architecture

Ensuring Security

Built-in Analytics

Designing with Purpose: Building an Effective Surveillance System

Planning Camera Mounting Options and Accessories

Technology Considerations

Lens Types

Field of View

Resolution

Other Deployment Needs

Cisco Meraki MV52: An Example of MV Camera Offerings

Choosing the Right Storage

Planning for Power Requirements

Planning Camera Connectivity: Wired and Wireless

General Network Considerations

Considerations for Wired Connections

Considerations for Wireless Connections

Building an Optimized Camera System

Defining Camera Names and Tags

Defining Camera Administrators

Dashboard-Defined Camera-only Administrators

Role-Based Camera Permissions for SAML/SSO

Accessing Footage: Meraki MV Camera Views

Meraki Dashboard

Meraki Vision Portal

Meraki Display App

Meraki Mobile App

Configuring and Optimizing MV Cameras

Listing Camera Details

Configuring Camera Profiles

Assigning Camera Profiles

Manual Camera Configurations

Table of Contents

Recording in Low Light

Camera Motion Alerts

Fine-Tuning Camera Alerts

Configuring Privacy Windows

Setting Up RTSP Integration

Configuring Video Walls

Operating Meraki MV Cameras

Navigating the Video Timeline

Built-in Analytics

Audio Detection

Motion Search and Motion Recap

Sharing Video

Exporting Video

Working with Cloud Archive

Accessing Video Event Logs

Meraki MV Sense

Troubleshooting Meraki MV Cameras

Enabling Firewall Ports for Meraki Cloud

Providing Camera Access to Meraki Support

Strengthening Security: Implementing Meraki IoT with MV

Building Smarter Spaces with Meraki MT Sensors

Designing Smart Spaces with Meraki MT Sensors

Ensuring Sustainability

Understanding MT Security Architecture

Protecting Business Assets Using MT Sensors

Environmental

Physical

Exploring MT Sensors

Physical Infrastructure Monitoring

MT12Water/Leak Sensor

MT20Door Sensor

MT40Smart Power Controller

Environmental Monitoring

Table of Contents

MT11Cold Storage Sensor

Temperature, Humidity, and Air Quality Sensors

MT30Smart Automation Button

Smart Button Automation

Deploying Meraki MT Sensors

Basic Configuration and Setup

Understanding Meraki IoT Gateways

Accounting for Distance to Sensors

Power Considerations

Configuration Considerations

Configuring and Monitoring Alerts

Setting Alert Types

Reviewing Generated Alerts

Sensor Sight

IoT Operational Best Practices

Troubleshooting Meraki MT Sensors

Monitoring Sensor Status

Viewing Sensor Event Logs

Monitoring BLE Signal Strength

Summary

Additional Reading

MV Camera References

MT Sensor References

Appendix A: Cisco Meraki Licensing

Enterprise Licensing Versus Advanced Licensing

External Licensing for Integrations

Dashboard Licensing Models

Co-termination Licensing (Classic)

Per-Device Licensing

Meraki Subscription Licensing

Summary

Table of Contents

Additional Reading

Index