

10 March 2025

QUANTUM MAESTRO

Getting Started Guide



Check Point Copyright Notice

© 2019 - 2025 Check Point Software Technologies Ltd.

All rights reserved. This product and related documentation are protected by copyright and distributed under licensing restricting their use, copying, distribution, and decompilation. No part of this product or related documentation may be reproduced in any form or by any means without prior written authorization of Check Point. While every precaution has been taken in the preparation of this book, Check Point assumes no responsibility for errors or omissions. This publication and features described herein are subject to change without notice.

RESTRICTED RIGHTS LEGEND:

Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013 and FAR 52.227-19.

TRADEMARKS:

Refer to the Copyright page for a list of our trademarks.

Refer to the <u>Third Party copyright notices</u> for a list of relevant copyrights and third-party licenses.

Important Information



Latest Software

We recommend that you install the most recent software release to stay up-todate with the latest functional improvements, stability fixes, security enhancements and protection against new and evolving attacks.



Certifications

For third party independent certification of Check Point products, see the <u>Check</u> <u>Point Certifications page</u>.



Check Point Quantum Maestro Getting Started Guide



Latest Version of this Document in English Open the latest version of this <u>document in a Web browser</u>. Download the latest version of this <u>document in PDF format</u>.



Feedback

Check Point is engaged in a continuous effort to improve its documentation. Please help us by sending your comments.

Revision History

Date	Description			
21 February 2025	 Updated: "Dual Site" on page 173 - aded the "Best Practice" note for direct connection 			
30 December 2024	 Updated: "Getting Started" on page 19 "Quick Start with MHO-140 - Single Site with Two Orchestrators" on page 26 			
21 October 2024	 Updated: "Quick Start with MHO-140 - Single Site with Two Orchestrators" on page 26 "MHO-140 Front Panel" on page 57 "Quantum Maestro Orchestrator Ports and Gaia OS Interfaces" on page 222 			
18 July 2024	 Updated: <i>"Hardware Components" on page 41</i> - on MHO-175, it is not supported to configure ports 17-31 as Uplink 			
12 June 2024	Updated: <i>"Hardware Components" on page 41</i> <i>"MHO-175 Front Panel" on page 50</i> <i>"MHO-170 Front Panel" on page 54</i> <i>"MHO-140 Front Panel" on page 57</i>			

Date	Description
10 June 2024	 Updated: "Changing the QSFP mode and the default type of an Orchestrator port" on page 46 updated the table to show the type "management" only for the correct ports (MHO-175 - only Port 1, MHO-170 - only Ports 1-2, MHO-140 - only Ports 1-4) "MHO-175 Front Panel" on page 50 added a warning "Only ports 1, 2, 31, and 32 support transceivers that require more than 5W (for example, CPAC-TR-100ERL4)." added a clarification that only Ports 1-2 support the port type "management" "MHO-170 Front Panel" on page 54 added a clarification that only Ports 1-2 support the port type "management"
16 January 2024	 Added: "Internal IP Addresses" on page 237 Updated: "MHO-175 Specifications" on page 238 - RAM and Storage "Hardware Components" on page 41 - added the 25 Gbps speed on ports and updated port descriptions "MHO-175 Front Panel" on page 50 - added the 25 Gbps speed on ports "MHO-170 Front Panel" on page 54 - added the 25 Gbps speed on ports "MHO-140 Front Panel" on page 57 - added the 25 Gbps speed on ports "Dual Site with two Switches" on page 193 - added the Gaia Clish command to change the VLAN ID 3951 and VLAN ID 3952 "Dual Site with four Switches" on page 207 - added the Gaia Clish command to change the VLAN ID 3951 and VLAN ID 3952

Date	Description
28 May 2023	Added:
	 "Quick Start with MHO-140 - Single Site with Two Orchestrators" on page 26
	Updated:
	 "Getting Started" on page 19
02 March	Updated:
2023	 "MHO-175 Front Panel" on page 50
02 February	Updated:
2023	 "Quantum Maestro Orchestrator Ports and Gaia OS Interfaces" on page 222
20	Updated:
December 2022	 "MHO-170 Front Panel" on page 54 - only ports 1, 2, 31, and 32 support transceivers that require more than 5W
12 July 2022	Updated (in HTML version):
	 "Introduction" on page 11 - added an overview video "Getting Started" on page 19 - added demonstration videos "Connecting Cables to MHO-140" on page 163 - added demonstration video for Downlink ports
15 May 2022	Updated:
	 "Getting Started" on page 19 - added the steps for configuring the IP address on the MGMT port "Console Port" on page 79 - corrected the Baud Rate from 115200 to 9600

Date	Description
13 March	Added:
2022	"About This Guide" on page 18
	Updated:
	 "Getting Started" on page 19 - added new workflow steps "Mounting the Quantum Maestro Orchestrator MHO-175 in a Rack" on page 86 - removed steps that already appear in the Getting Started workflow
	 "Mounting the Quantum Maestro Orchestrator MHO-140 and MHO- 170 in a Rack" on page 101 - removed steps that already appear in the Getting Started workflow
23 February	Updated:
2022	 "Getting Started" on page 19 - added a step to activate the Quantum Maestro Orchestrators R81.10 or higher
20 February 2022	Improved formatting and document layout Added:
	 "Getting Started" on page 19
13 February 2022	Improved formatting and document layout

Table of Contents

Introduction	
Overview	
Shipping Carton Contents	
Features	
Speed and Throughput	
Ports, Power Supply Units, and Fan Units	
Safety Warnings	
About This Guide	
Getting Started	
Quick Start with MHO-140 - Single Site with Two Orchestrators	
Part 1 - Installing the Hardware and Connecting Cables	
Part 2 - Initial Configuration on each Orchestrator	
Part 3 - Creating a New Security Group	
Part 4 - Configuring Gaia Settings on the New Security Group	
Part 5 - Configuring a Security Gateway Object in SmartConsole	
Part 6 - Monitoring the Security Group Members	
Hardware Components	
MHO-175 Front Panel	
MHO-175 Rear Panel	
MHO-170 Front Panel	
MHO-170 Rear Panel	
MHO-140 Front Panel	
MHO-140 Rear Panel	
LEDs	
LED Notifications	61
System Status LED	
Fan Status LED	

Power Supply Unit Status LEDs	66
Bad Port LED	70
Port LEDs	70
Ports	76
Reset Button	81
Replacing Power Supply Units	82
Replacing Fan Units	84
Mounting the Quantum Maestro Orchestrator MHO-175 in a Rack	86
Mounting the Quantum Maestro Orchestrator MHO-140 and MHO-170 in a Rack	101
Connecting Cables to Quantum Maestro Orchestrators	114
Splitting the Ports with Breakout Cables	115
Breakout Cables	115
MHO-175 Splitting Options	116
MHO-170 Splitting Options	120
MHO-140 Splitting Options	121
Single Site	122
Connecting Two Quantum Maestro Orchestrators for Redundancy	123
Diagram	123
Workflow	132
Connecting Cables to MHO-175	138
Connecting to the Management Port with DAC or Fiber Cables	138
Connecting to the Management Port with Breakout Cables	140
Connecting to the Uplink Ports with DAC or Fiber Cables	141
Connecting to the Uplink Ports with Breakout Cables	144
Connecting to the Downlink Ports with DAC or Fiber Cables	147
Connecting Cables to MHO-170	150
Connecting to the Management Ports with DAC or Fiber Cables	150
Connecting to the Management Ports with Breakout Cables	152
Connecting to the Uplink Ports with DAC or Fiber Cables	154
Connecting to the Uplink Ports with Breakout Cables	157

Table of Contents

Connecting to the Downlink Ports with DAC or Fiber Cables	160
Connecting Cables to MHO-140	163
Connecting to the Management Ports with DAC or Fiber Cables	163
Connecting to the Uplink Ports with DAC or Fiber Cables	165
Connecting to the Uplink Ports with Breakout Cables	167
Connecting to the Downlink Ports with DAC or Fiber Cables	170
Dual Site	173
Dual Site with Direct Connection	174
Dual Site with two Switches	193
Dual Site with four Switches	207
Quantum Maestro Orchestrator Ports and Gaia OS Interfaces	222
Additional Information	237
Internal IP Addresses	237
MHO-175 Specifications	238
MHO-170 Specifications	240
MHO-140 Specifications	242
Thermal Threshold Definitions	244
RJ45 to DB9 Harness Pinout	245
Declaration of Conformity	246
MHO-175	247
MHO-170 and MHO-140	248
What is the Next Step?	249
Glossary	250

Introduction

In This Section:

Overview	11
Shipping Carton Contents	12
Features	13
Speed and Throughput	14
Ports, Power Supply Units, and Fan Units	14

Quantum Maestro Orchestrator is a scalable Network Security System built to secure the largest networks in the world by orchestrating multiple Check Point Security Appliances into a unified system.

The Quantum Maestro Orchestrator provides:

- Security of infinite scale
- Redundancy Quantum Maestro Orchestrator automatically distributes traffic between the Security Appliances assigned to Security Groups
- Ability to connect more Security Appliances and use their resources easily in the existing Security Groups

Overview

Quantum Maestro Orchestrator 1U systems are ideal for leaf and spine data center network solutions that provide maximum flexibility, with port speeds from 1 Gbit/sec to 100 Gbit/sec per port, and port density that enables full rack connectivity to any server at any speed. The ports allow a variety of blocking ratios that suit all application requirements.

Quantum Maestro Orchestrator 1U systems enable the use of 1, 10, 40 and 100 GbE port speeds in a large scale without the need to change power infrastructure facilities.

Shipping Carton Contents

This section describes the contents of the shipping carton.

Table. Shipping Carton Contents

Item	Description
Appliance	Quantum Maestro Orchestrator
Rack Mounting Accessories	 2 static (fixed) rack mount rails 2 rack mount blades 2 rack mount ears 8 M6 standard cage nuts 8 M6 standard pan-head Phillips screws 4 flat head Phillips screws with a round patch (6-32x1/4", 100-Deg, Patch 360)
Cables and Adapters	 2 power cables (Type C13-C14) 2 cable retainers 1 DB9 to RJ45 serial console cable 1 DAC cable, 3m
Documentation	Quick Start GuidePort MappingUser license agreement

Notes:

- DB9 connectors are also known as DE9 connectors.
- Before installing your new Quantum Maestro Orchestrator, unpack it and check the parts list to make sure that all the parts are in the package.

Check the parts for visible damage that may have occurred during shipping.

Features

- Throughput and processing capacity:
 - MHO-175 Throughput of up to 3200 Gbit/sec and processing capacity up to 4.76 Bpps
 - MHO-170 Throughput of up to 3200 Gbit/sec and processing capacity up to 4.76 Bpps
 - MHO-140 Throughput of up to 1280 Gbit/sec and processing capacity up to 2.97 Bpps
- Flat latency in the cut-through mode:
 - MHO-175 425 ns
 - MHO-170 300 ns
 - MHO-140 300 ns
- Speeds of 1, 10, 40, and 100 GbE
- Dynamically-shared, flexible packet buffering:
 - MHO-175 42 MB
 - MHO-170 16 MB
 - MHO-140 16 MB
- Lowest power, under 5 W per 100 GbE port
- Enhanced scalability
- 1+1 hot-swappable power supplies
- 4 N+1 hot-swap fans
- Color coded PSUs and fans

Speed and Throughput

The table below lists maximum throughput and interface speed for each Quantum Maestro Orchestrator model:

Orchestrator Model	10 GbE SFP28 Interfaces	40 / 100 GbE QSFP28 Interfaces	Maximal Throughput
MHO-175	128 (use QSFP to SFP breakout cables)	32	3.2 Tbit/sec
MHO-170	64 (use QSFP to SFP breakout cables)	32	3.2 Tbit/sec
MHO-140	Total 64 48 SFP+ 8 QSFP28 (use QSFP to SFP breakout cables)	8	1.28 Tbit/sec

Quantum Maestro Orchestrator supports different interfaces and speed rates when you use QSFP to SFP adapters, or hybrid cables. For more information, see "*Splitting the Ports with Breakout Cables*" on page 115.

Ports, Power Supply Units, and Fan Units

Orchestrator Model	MGMT Ports	USB Ports	Console Ports	PSUs	Fans
MHO-175	1 on the front panel	1 on the front panel	1 on the front panel	2 units	4 units
MHO-170	1 on the front panel	1 on the front panel	1 on the front panel	2 units	4 units
MHO-140	2 on the rear panel	1 on the rear panel	1 on the rear panel	2 units	4 units

Safety Warnings

Installation Instructions

Read all installation instructions before you connect the equipment to the power source.

Bodily Injury Due to Weight

Use enough people to lift this product safely:

Weight	Recommended Number of People
<18 kg (<40 lbs)	1 person
18 - 32 kg (40 - 70 lbs)	2 people
32 - 55 kg (70 - 121 lbs)	3 people
>55 kg (>121 lbs)	Use a mechanical lift

Risk of Electric Shock!

With the fan unit removed, power pins are accessible within the module cavity.

Do not insert tools or body parts into the fan unit cavity.

Over-temperature

Do not operate this equipment in an area with an ambient temperature that exceeds the recommended maximum: 45°C (113°F).

To guarantee proper cooling, allow at least 8 cm (3 inches) of clearance around the ventilation openings.

Stacking the Chassis

Do not stack the Chassis on any other equipment. If the Chassis falls, it can cause bodily injury and equipment damage.

Redundant Power Supply Connection - Electrical Hazard

This product includes a redundant power supply or a blank cover in its place.

In case of an empty power supply bay, do not operate this equipment with the blank cover removed, or not properly fastened.

Double Pole/Neutral Fusing

This Quantum Maestro Orchestrator has double pole/neutral fusing.

Remove all power cords before you open the cover of this product or touch any internal parts.

Multiple Power Inlets

The Power Supply Units are all independent.

Disconnect all power supplies to ensure a powered down state inside of this equipment.

During Lightning - Electrical Hazard

During periods of lightning activity, do not work on the equipment, connect or disconnect cables.

Connecting and Disconnecting of Copper Cables

Copper cables are heavy and not flexible. Therefore, carefully attach or detach them from the connectors.

Refer to the cable manufacturer for special warnings and instructions.

Rack Mounting and Servicing

When this product is mounted or serviced in a rack, you must take special precautions to ensure that the Quantum Maestro Orchestrator remains stable.

In general, fill the rack with equipment from the bottom to the top.

Equipment Installation

Only trained and qualified personnel should install, replace, and service this equipment.

Equipment Disposal

Dispose of this equipment in compliance with all national laws and regulations.

Installation Codes

Install this equipment according to the latest version of the country national electrical codes.

For North America, see the applicable requirements in the US National Electrical Code and the Canadian Electrical Code.

Battery Replacement

Warning: Replace only with UL Recognized battery, certified for maximum abnormal charging current not less than 4 mA.

There is a risk of explosion, if you replace the battery with a battery of an incorrect type.

Dispose of used batteries according to the instructions.

UL Listed and CSA Certified Power Supply Cord

For North American power connection, select a power supply cord that is UL Listed and CSA Certified, 3 - conductor [16 AWG], terminated with a molded plug rated at 125 V [13 A], with a minimum length of 1.5 m [6 feet], but no longer than 4.5m (15 feet).

For European connection, select a power supply cord that is internationally harmonized and marked "<HAR>", 3 - conductor, minimum 1.0 square mm wire, rated at 300 V, with a PVC insulated jacket. The cord must have a molded plug rated at 250 V, 10 A.

Interconnection of Units

Cables for connecting to the unit RS232 and Ethernet Interfaces must be UL certified type DP-1 or DP-2 (Note - When residing in non LPS circuit).

Overcurrent Protection

You must incorporate in the building wiring a readily accessible listed branch circuit overcurrent protective device rated 20 A.

Do Not Use the Switch as a Shelf or Work Space

Caution - Do not use the slide / rail mounted equipment as a shelf or a work space. The rails are not intended for sliding the unit away from the rack. It is for permanent installation at final resting place only, not used for service and maintenance.

WEEE Directive

According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and not disposed of with regular household waste.

Dispose of this product and all of its parts in a responsible and environmentally friendly way.

Country of Norway Power Restrictions

This unit is intended for connection to a TN power system and an IT power system of Norway only.

About This Guide

This Getting Started Guide describes:

- Various hardware components in a Quantum Maestro Orchestrator:
 - "Introduction" on page 11
 - "Hardware Components" on page 41
 - "Additional Information" on page 237
- How to replace various hardware components in a Quantum Maestro Orchestrator:
 - "Replacing Power Supply Units" on page 82
 - "Replacing Fan Units" on page 84
- How to mount a Quantum Maestro Orchestrator in a rack:
 - "Mounting the Quantum Maestro Orchestrator MHO-175 in a Rack" on page 86
 - "Mounting the Quantum Maestro Orchestrator MHO-140 and MHO-170 in a Rack" on page 101
- How to connect cables to Quantum Maestro Orchestrators:
 - "Splitting the Ports with Breakout Cables" on page 115
 - "Single Site" on page 122
 - "Dual Site" on page 173
- How the Gaia Operating System on Quantum Maestro Orchestrators shows the ports and interface names:
 - "Quantum Maestro Orchestrator Ports and Gaia OS Interfaces" on page 222

Getting Started

Important - This section describes a general workflow. For the specific workflow, see:

- "Quick Start with MHO-140 Single Site with Two Orchestrators" on page 26
- (more procedures will be added in the future)

Workflow:

1. Mount Quantum Maestro Orchestrators in their racks.

See:

- "Mounting the Quantum Maestro Orchestrator MHO-175 in a Rack" on page 86
- "Mounting the Quantum Maestro Orchestrator MHO-140 and MHO-170 in a Rack" on page 101
- 2. Install the Security Appliances for your Security Groups:
 - a. Install the applicable Expansion Line Cards (if required) in the appliances.

See the *Installing and Removing Line Cards*.

- Notes:
 - Maestro configuration supports only ports 10 Gbps or faster.
 - Maestro does not support Downlink connections from a 10 Gbps Expansion Line Card and a 25 / 40 / 100 Gbps Expansion Line Card at the same time on the same Security Appliance.

Warning - You must remove all unused Expansion Line Cards (not including 1Gbps) from Security Appliances.

b. Mount appliances in their racks.

See the Getting Started Guide for your appliances in sk96246.

- c. Power on the appliances.
- 3. Connect the required network cables to Uplink ports on the Quantum Maestro Orchestrators:

See "Connecting Cables to Quantum Maestro Orchestrators" on page 114.

4. Connect the required network cables from the Downlink ports on the Quantum Maestro Orchestrators to Security Appliances:

See "Connecting Cables to Quantum Maestro Orchestrators" on page 114.

5. Connect to each Quantum Maestro Orchestrator.



Note - It is important in which order you configure the Orchestrators in a Dual Site environment.

The first Orchestrator you configure becomes the "first" Orchestrator on this Site.

It synchronizes the configuration to the "second" Orchestrator on this Site.

Connecting over SSH

a. Connect the included Ethernet cable from your computer to the MGMT port on the Orchestrator.

See "MGMT Ports" on page 76.

You use this MGMT port only to manage the Orchestrator.

- b. On your computer, configure a static IP address (see the documentation for your operating system):
 - i. IP address between 192.168.1.2 and 192.168.1.254
 - ii. Subnet mask 255.255.255.0
 - iii. Default Gateway empty
 - iv. DNS Servers empty
- c. Open an SSH client and connect to this IP address 192.168.1.1
- d. Log in to Gaia Clish on the Orchestrator with these default credentials:
 - Username admin
 - Password admin
 - Best Practice Change the default password.
 If the SSH connection is interrupted after the password change, log in again with the new password.
 See the *Gaia Administration Guide* for your version.
- e. Activate the Orchestrator enter "y" when it asks you.

This Orchestrator activation enables the Downlink ports and the Uplink ports.

For more information, see <u>sk171784 - Activation of a Quantum Maestro</u> <u>Orchestrator</u>.

f. Connect the MGMT port of the Orchestrator to your network.

Connecting through the Console port

- a. Connect to the Console port. See "Console Port" on page 79.
- b. Power on the Orchestrator.
- c. In your Terminal application, log in to Gaia Clish with these default credentials:
 - Username admin
 - Password admin

Best Practice - Change the default password. See the <u>Gaia Administration Guide</u> for your version.

d. Activate the Orchestrator - enter "y" when it asks you.

This Orchestrator activation enables the Downlink ports and the Uplink ports.

For more information, see <u>sk171784 - Activation of a Quantum Maestro</u> <u>Orchestrator</u>.

- 6. Configure the required IPv4 settings on the MGMT port:
 - a. Configure the required IPv4 address and Mask Length:

```
set interface Mgmt1 ipv4-address <IPv4 Address> mask-
length <Length>
```

Example:

```
set interface Mgmt1 ipv4-address 192.168.10.22 mask-
length 24
```

b. Change the state of the MGMT port to "on":

set interface Mgmt1 state on

c. Configure the required Default Gateway:

```
set static-route default nexthop gateway address <IPv4
Address> on
```

Example:

```
set static-route default nexthop gateway address 192.168.10.1 on
```

d. Save the configuration:

save config

7. Connect the MGMT port of each Quantum Maestro Orchestrator to your network.

- Connect to each Quantum Maestro Orchestrator through the MGMT port in one of these ways:
 - With a web browser to Gaia Portal on the Orchestrator:

See the Quantum Maestro Quick Start Guide in the shipping carton.

https://<IPv4 Address you configured on the MGMT port>

Example:

```
https://192.168.10.22
```

• With an SSH client to Gaia Clish on the Orchestrator:

<IPv4 Address you configured on the MGMT port>

Example:



Use these credentials:

- Username admin
- Password the password you configured (the default password is admin)



- On Quantum Maestro Orchestrators R80.20SP R81.20, there is no Gaia First Time Configuration Wizard.
- You do **not** need to install a license on Quantum Maestro Orchestrators.
- 9. In Quantum Maestro Orchestrators R82 and higher, run the Gaia First Time Configuration Wizard.

Procedure

- a. In the Deployment Options window:
 - i. In the section Setup, select Continue with <Version> configuration.
 Click Next.
 - ii. In the section Environment, select the applicable option:
 - Create a new Maestro environment

Select this option if this is a new Maestro environment without Security Groups.

Join an existing Maestro environment

Select this option if you need to add this Maestro Orchestrator to an existing Maestro environment with configured Security Groups.

Click Next.

- b. In the Authentication Details window:
 - i. Enter the desired administrator password for the Expert mode.
 - ii. Enter the desired administrator password for the Maintenance mode.

Click Next.

c. In the Management Connection window:

If needed, configure the IP settings for the Orchestrator Management Port.

Click Next.

d. In the Device Information window:

Configure the required settings:

- Hostname
- Domain Name
- DNS Servers
- Proxy Server

Click Next.

e. In the Date and Time Settings window:

Configure the required settings.

Click Next.

- f. In the Orchestrator Configuration window:
 - i. In the Number of Sites field, select the applicable value.
 - ii. In the **Number of Orchestrators on each Site** field, select the applicable value.
 - iii. In the Site ID field, select the applicable value.
 - iv. In the Orchestrator ID on Site field, select the applicable value.
 - v. Click Next.
 - vi. **Optional:** In the **Internal Sync** field, select the applicable interface other than the default.
 - vii. **Optional:** In the **External Sync** field, select the applicable interface other than the default.
 - viii. Optional: Select Change VLAN configuration, if it is necessary to change the default VLAN IDs used for Orchestrator synchronization. Configure the required VLAN IDs. See <u>sk168092</u>.
 - ix. Click Next.
- g. In the First Time Configuration Wizard Summary window:
 - i. Read the information on this page.
 - ii. Click Finish.
- 10. On the Orchestrator (in Gaia Portal or Gaia Clish), configure the required Security Groups and configuring their Gaia settings.

Follow the *Maestro Administration Guide for your version* > Chapter *Configuring Security Groups*.

Quick Start with MHO-140 - Single Site with Two Orchestrators

In This Section:

Part 1 - Installing the Hardware and Connecting Cables	
Part 2 - Initial Configuration on each Orchestrator	
Part 3 - Creating a New Security Group	
Part 4 - Configuring Gaia Settings on the New Security Group	
Part 5 - Configuring a Security Gateway Object in SmartConsole	
Part 6 - Monitoring the Security Group Members	

Part 1 - Installing the Hardware and Connecting Cables

1. Mount the two Quantum Maestro Orchestrators MHO-140 in the racks on the site.

See "Mounting the Quantum Maestro Orchestrator MHO-140 and MHO-170 in a Rack" on page 101.

2. Install the Security Appliances for your Security Groups.

Procedure

a. Install the applicable Expansion Line Cards (if required) in the appliances.

See Installing and Removing Line Cards.

Notes:

- Maestro configuration supports only ports 10 Gbps or faster.
- Maestro does not support Downlink connections from a 10 Gbps Expansion Line Card and a 25 / 40 / 100 Gbps Expansion Line Card at the same time on the same Security Appliance.

Warning - You must remove all unused Expansion Line Cards (not including 1Gbps) from Security Appliances.

b. Mount appliances in their racks.

See the Getting Started Guide for your appliances in sk96246.

c. Power on the Security Appliances.

3. Connect a DAC cable between the dedicated Synchronization ports **48** on the two Orchestrators.

For more information, see "Port Mapping for the Quantum Maestro Orchestrator MHO-140" on page 44.

4. Connect the required cables between the Security Appliances and the applicable 10 Gbps Downlink ports **27** - **47** on each Orchestrator.

More information



- Maestro configuration supports only ports 10 Gbps or faster on Security Appliances.
- To connect Security Appliances to these 10 Gbps Downlink ports, use a Fiber cable or a DAC cable.
 You can connect Fiber cables and DAC cables to the same Security.

You can connect Fiber cables and DAC cables to the same Security Appliance.

To connect Fiber cables, you must use only the supported transceivers.
 See <u>sk92755</u> - Compatibility of transceivers for Check Point appliances.

See:

- "Port Mapping for the Quantum Maestro Orchestrator MHO-140" on page 44.
- "Connecting Two Quantum Maestro Orchestrators for Redundancy" on page 123.

Diagrams:

Connecting cables between Downlink ports on each Orchestrator and 2 ports on the Dual Port Card on each Security Appliance



Connecting cables between Downlink ports on each Orchestrator and 1 out of 4 ports on the Quad Port Card on each Security Appliance

Illustration	Instructions
	 On each Security Appliance (C) in the Security Group: a. Connect a cable from Port 1 on the Quad Port Card to a Downlink port on the first Orchestrator (A). b. Connect a cable from Port 2 on the Quad Port Card to a Downlink port on the second Orchestrator (B).

Connecting cables between Downlink ports on each Orchestrator and 2 out of 4 ports on the Quad Port Card on each Security Appliance

Illustration	Instructions
	 Important - In R80.20SP, this connection method is supported only with the R80.20SP Jumbo Hotfix Accumulator (Take 105 and above) installed on Orchestrators and Security Groups. On each Security Appliance (C) in the Security Group: a. Connect a cable from Port 1 on the Quad Port Card to a Downlink port on the first Orchestrator (A). b. Connect a cable from Port 3 on the Quad Port Card to a Downlink port on the first Orchestrator (A). c. Connect a cable from Port 2 on the Quad Port Card to a Downlink port on the first Orchestrator (A). c. Connect a cable from Port 2 on the Quad Port Card to a Downlink port on the second Orchestrator (B). d. Connect a cable from Port 4 on the Quad Port Card to a Downlink port on the second Orchestrator (B).

Legend

Item	Description	
Α	First Orchestrator.	
В	Second Orchestrator.	
С	Security Appliances in Security Groups.	
	A DAC cable connected to the dedicated Synchronization ports on the Orchestrators.	
	Cables that connect odd ports on the Quad Port Card to the first Orchestrator.	
	Cables that connect even ports on the Quad Port Card to the second Orchestrator.	

5. Connect the required cables between the applicable Uplink ports **5** - **26**, **49** - **55** on each Orchestrator and your switches.

More information

Important - To connect Fiber cables, you must use only the supported transceivers.

See sk92755 - Compatibility of transceivers for Check Point appliances.

Best Practice - In a Dual Site environment, configure the Uplink ports in the same way on each Orchestrator.

See:

- Port Mapping for the Quantum Maestro Orchestrator MHO-140" on page 44
- "Connecting to the Uplink Ports with DAC or Fiber Cables" on page 165
- "Connecting to the Uplink Ports with Breakout Cables" on page 167

Port Speed on a Switch	Port Type on the Orchestrator	Cable to Use
10 Gbps	SFP+ / SFP28 Ports 5 - 26	Fiber or DAC
25 Gbps	QSFP / QSFP28 Ports 49 - 55	Fiber, DAC, or Breakout

Port Speed on a Switch	Port Type on the Orchestrator	Cable to Use
40 Gbps	QSFP / QSFP28 Ports 49 - 55	Fiber, DAC, or Breakout
100 Gbps	QSFP / QSFP28 Ports 49 - 55	Fiber, DAC, or Breakout

Note - The 25 Gbps speed is available in:

- Check Point R81.20 and higher
- <u>R81.10 Jumbo Hotfix Accumulator</u> Take 110 and higher (MBS-14158)
- 6. Power on each Orchestrator.

See "Step 7: Initial Power On" on page 112.

Part 2 - Initial Configuration on each Orchestrator

Procedure for Orchestrators R82 and higher

Notes:

- You do **not** need to install a license on Quantum Maestro Orchestrators.
- It is important in which order you configure the Orchestrators. The first Orchestrator you configure becomes the "first" Orchestrator on this Site.

It synchronizes the configuration to the "second" Orchestrator on this Site.

1. Connect with a web browser to Gaia Portal on the "first" Orchestrator.

```
https://<IPv4 Address you configured on the Orchestrator
MGMT port>
```

Example:

https://192.168.10.22

- 2. Log in with these default credentials:
 - Username admin
 - Password admin

The Gaia First Time Configuration Wizard opens.

- 3. In the **Deployment Options** window:
 - i. In the section **Setup**, select **Continue with <Version> configuration**.

Click Next.

- ii. In the section Environment, select the applicable option:
 - Create a new Maestro environment

Select this option if this is a new Maestro environment without Security Groups.

Join an existing Maestro environment

Select this option if you need to add this Maestro Orchestrator to an existing Maestro environment with configured Security Groups.

Click Next.

- 4. In the Authentication Details window:
 - a. Enter the desired administrator password for the Expert mode.
 - b. Enter the desired administrator password for the Maintenance mode.

Click Next.

5. In the Management Connection window:

If needed, configure the IP settings for the Orchestrator Management Port.

Click Next.

6. In the **Device Information** window:

Configure the required settings:

- Hostname
- Domain Name
- DNS Servers
- Proxy Server

Click Next.

7. In the Date and Time Settings window:

Configure the required settings.

Click Next.

8. In the Orchestrator Configuration window:

- a. In the Number of Sites field, select the applicable value.
- b. In the Number of Orchestrators on each Site field, select the applicable value.
- c. In the Site ID field, select the applicable value.
- d. In the Orchestrator ID on Site field, select the applicable value.
- e. Click Next.
- f. **Optional:** In the **Internal Sync** field, select the applicable interface other than the default.
- g. **Optional:** In the **External Sync** field, select the applicable interface other than the default.
- h. Optional: Select Change VLAN configuration, if it is necessary to change the default VLAN IDs used for Orchestrator synchronization. Configure the required VLAN IDs. See <u>sk168092</u>.
- i. Click Next.
- 9. In the First Time Configuration Wizard Summary window:
 - a. Read the information on this page.
 - b. Click Finish.
- 10. Connect the MGMT port of the Orchestrator #1 to your network.
- 11. Make sure the connection from a computer on your network to Orchestrator #1 works.

More information

With a web browser, connect to this URL:

https://<IPv4 Address you configured on the MGMT port>

Example:

https://192.168.10.22

12. Repeat Steps 1 - 11 for the Orchestrator #2.

You must configure a different IPv4 address than that of the Orchestrator #1.

Procedure for Orchestrators R80.20SP - R81.20

- Notes:
 - You do **not** need to install a license on Quantum Maestro Orchestrators.
 - It is important in which order you configure the Orchestrators. The first Orchestrator you configure becomes the "first" Orchestrator on this Site.
 - It synchronizes the configuration to the "second" Orchestrator on this Site.
 - It is possible to configure each Quantum Maestro Orchestrator through the Console port. See "Console Port" on page 79.
 - 1. Connect the included Ethernet cable from your computer to the MGMT port labeled **0** on the rear panel of the Orchestrator #1.

See "MHO-140 Rear Panel" on page 59.

You use this MGMT port only to manage the Orchestrator.

- 2. On your computer, configure a static IP address (see the documentation for your operating system):
 - a. IP address between 192.168.1.2 and 192.168.1.254
 - b. Subnet mask 255.255.255.0
 - c. Default Gateway empty
 - d. DNS Servers empty
- 3. Open an SSH client and connect to this IP address 192.168.1.1
- 4. Log in to Gaia Clish on the Orchestrator #1 with these default credentials:
 - Username admin
 - Password admin

Best Practice - Change the default password. If the SSH connection is interrupted after the password change, log in again with the new password.

More information

See the Gaia Administration Guide for your Orchestrator version:

- <u>R81.20 Gaia Administration Guide</u>
- <u>R81.10 Gaia Administration Guide</u>
- R80.20SP Quantum Maestro Gaia Administration Guide

5. Activate the Orchestrator #1 - enter "y" when it asks you.

More information

This Orchestrator activation enables the Downlink ports and the Uplink ports.

For more information, see <u>sk171784 - Activation of a Quantum Maestro</u> <u>Orchestrator</u>.

6. Configure the IPv4 settings on the MGMT port on the Orchestrator #1 as required in your network.

Procedure

a. Configure the required IPv4 address and Mask Length:

```
set interface Mgmt1 ipv4-address <IPv4 Address> mask-
length <Length>
```

Example:

```
set interface Mgmt1 ipv4-address 192.168.10.22 mask-
length 24
```

b. Change the state of the MGMT port to "on":

```
set interface Mgmt1 state on
```

c. Configure the required Default Gateway:

```
set static-route default nexthop gateway address <IPv4
Address> on
```

Example:

```
set static-route default nexthop gateway address
192.168.10.1 on
```

d. Save the configuration:

```
save config
```

7. Connect the MGMT port of the Orchestrator #1 to your network.

8. Make sure the connection from a computer on your network to Orchestrator #1 works.

More information

With a web browser, connect to this URL:

https://<IPv4 Address you configured on the MGMT port>

Example:

https://192.168.10.22

Notes:

- On Orchestrators R80.20SP R81.20, there is no Gaia First Time Configuration Wizard.
- You do **not** need to install a license on Orchestrators.
- 9. Repeat Steps 1 8 for the Orchestrator #2.

You must configure a different IPv4 address than that of the Orchestrator #1.

Part 3 - Creating a New Security Group

1. Connect with a web browser to Gaia Portal on the "first" Orchestrator.

```
https://<IPv4 Address you configured on the Orchestrator MGMT
port>
```

Example:

https://192.168.10.22

2. Log in.
- 3. From the left navigation panel:
 - In the Orchestrator versions R82 and higher:

In the Orchestrator Management section, click the Security Groups page.

In the Orchestrator versions R80.20SP - R81.20:

Click the Orchestrator page.

More information

The **Topology** section contains the table that shows these sections (from left to right):

Pane	Description
Unassigned Gateways	All detected Security Appliances that are not part of configured Security Groups.
Topology	Configured Security Groups with their assigned Security Appliances and ports.
Unassigned Interfaces	All interfaces on Orchestrators that are not part of configured Security Groups.

- 4. In the middle pane **Topology**, at the top, right-click **Security Groups** and click **New Security Group**.
- 5. In the **Security Group <X> configuration** window, enter the required information, including the **First Time Wizard**, and click **OK**.
- 6. From the left pane **Unassigned Gateways**, drag and drop at least one Security Appliance to the Security Group's **Gateways** section.
- 7. From the right pane **Unassigned Interfaces**, drag and drop at least one Management port (eth<X>-Mgmt<Y>) to the Security Group's **Interfaces** section.

More information

See:

- Port Mapping for the Quantum Maestro Orchestrator MHO-140" on page 44
- "MHO-140 ports on the front panel and their default names in Gaia" on page 231
- 8. From the right pane **Unassigned Interfaces**, drag and drop the required Uplink ports to the Security Group's **Interfaces** section.
- 9. At the bottom of this page, click **Apply**.

10. Wait for the Orchestrator to create the new Security Group.



R Important - This takes approximately 10 minutes, and it automatically reboots the assigned Security Appliances.

11. Connect a cable between the assigned Management port (eth<X>-Mgmt<Y>) on the Orchestrator front panel and your switch.

More information

See:

- Port Mapping for the Quantum Maestro Orchestrator MHO-140" on page 44
- "Connecting to the Management Ports with DAC or Fiber Cables" on page 163

For more information, see the Maestro Administration Guide for your version:

- R82 Scalable Platforms Administration Guide
- R81.20 Quantum Maestro Administration Guide
- R81.10 Quantum Maestro Administration Guide
- R81 Quantum Maestro Administration Guide
- R80.30SP Quantum Maestro Administration Guide
- R80.20SP Quantum Maestro Administration Guide

Part 4 - Configuring Gaia Settings on the New Security Group

1. Connect with a web browser to Gaia Portal on the Security Group (through the assigned Management port eth<X>-Mgmt<Y>).

https://<IPv4 Address of Security Group>

Example:

https://192.168.10.66

- 2. Log in.
- 3. Configure the applicable interfaces and other settings.

More information

See the Gaia Administration Guide for your version:

- <u>R82 Gaia Administration Guide</u>
- <u>R81.20 Gaia Administration Guide</u>
- <u>R81.10 Gaia Administration Guide</u>
- R81 Gaia Administration Guide
- R80.30SP Quantum Maestro Gaia Administration Guide
- R80.20SP Quantum Maestro Gaia Administration Guide

Part 5 - Configuring a Security Gateway Object in SmartConsole

1. Connect with SmartConsole to the applicable Security Management Server / Domain Management Server that must manage this Security Group.

See the **Quantum Security Management Administration Guide** for your version.

- 2. Create a new Security Gateway and configure the required settings.
- 3. Configure the applicable rules in the Access Control Policy.
- Configure the applicable rules in the Threat Prevention Policy.
 See the <u>Threat Prevention Administration Guide</u> for your version.
- 5. Install the Access Control Policy on this Security Gateway object.
- 6. Install the Threat Prevention Policy on this Security Gateway object.

Part 6 - Monitoring the Security Group Members

1. Connect to the command line on the Security Group with an SSH client to:

```
<IPv4 Address of Security Group>
```

- 2. Run this command:
 - In the Orchestrator versions R82 and higher:

```
insights
```

See the R82 Scalable Platforms Administration Guide.

In the Orchestrator versions R80.20SP - R81.20:

asg monitor

3. Wait for each Security Group Members to show its state as "ACTIVE".



Hardware Components

This section provides a description of hardware components of Quantum Maestro Orchestrators.

Port Mapping for the Quantum Maestro Orchestrator MHO-175

)	3	4 5 6
1 3 5 7 9 41 *2 41 *1 41 *1 41 *1 41 *1 2 4 6 8 10	11 13 4040 4046 12 14 16 18 4040 5 4046 16 18	19 21 23 25 27 40148 40148 40148 40148 40148 20 22 24 25 28 20 22 24 25 28	29 31 4 497 4 497 2 30 32
2			

Item	Description	Item	Description
1	Port 1 is the Management port for Security Groups (leads to the Check Point Management Server). It is possible to use only this one port to manage the Security Groups.	8	RJ45 port for Console connection.
2	Ports 2 - 16 are the Uplink ports 25 Gbps / 40 Gbps / 100 Gbps (lead to external and internal data networks).	9	Reset button.
3	 Ports 17 - 30 are the Downlink ports (lead to Security Appliances). Important - It is not supported to configure these ports as Uplink. 	10	 Port 32 is the Internal Synchronization port that leads to the peer Orchestrator on the same Site. Important - It is not supported to change the default type of this port ("ssm_sync").

Item	Description	Item	Description
4	 Port 31 is the External Synchronization port in the Dual Site configuration. This port leads to the peer Orchestrator on another Site. In the Port Split mode (see "MHO-175 Splitting Options" on page 116): 1st, 2nd, and 3rd splits are Downlinks. 4th split is the External Sync. Important - It is not supported to configure this port as Uplink. 	11	Button to select indication states for the splitting control LEDs.
5	Micro USB 2.0 port.	12	 Splitting control LEDs that show the indication state for Port LEDs: State of which port to show (without a split cable). State of which split port to show (in 1-to-2 split, or 1-to-4 split). See "MHO-175 Splitting Options" on page 116.
6	System Health LEDs.	13	Port LEDs that show the status of all ports (including the split ports).
7	Management port (Mgmt1) for the Gaia OS on the Orchestrator.		

Port Mapping for the Quantum Maestro Orchestrator MHO-170



Item	Description	ltem	Description
1	Ports 1 - 2 are the Management port for Security Groups (lead to the Check Point Management Server). It is possible to use only these two ports to manage the Security Groups.	6	USB 2.0 port.
2	Ports 3 - 16 are the Uplink ports 25 Gbps / 40 Gbps / 100 Gbps (lead to external and internal data networks).	7	System Health LEDs.
3	Ports 17 - 30 are the Downlink ports (lead to Security Appliances).	8	Reset button with the label RST .
4	Port 31 is the External Synchronization port in the Dual Site configuration. This port leads to the peer Orchestrator on another Site. Note - In the R80.20SP version, Port 30 is the default External Synchronization port.	9	 Port 32 is the Internal Synchronization port that leads to the peer Orchestrator on the same Site. Important - It is not supported to change the default type of this port ("ssm_sync").
5	Management port (Mgmt1) for the Gaia OS on the Orchestrator.	10	RJ45 port for Console connection.

Port Mapping for the Quantum Maestro Orchestrator MHO-140



Item	Description	Item	Description
1	Ports 1 - 4 are the Management port for Security Groups (lead to the Check Point Management Server). It is possible to use only these four ports to manage the Security Groups.	7	 Port 48 is the Internal Synchronization port that leads to the peer Orchestrator on the same Site. Important - It is not supported to change the default type of this port ("ssm_sync").
2	System Health LEDs.	8	Port 56 is the External Synchronization port in the Dual Site configuration. This port leads to the peer Orchestrator on another Site. Note - In the R80.20SP version, Port 47 is the default External Synchronization port.)
3	Ports 5 - 26 are the Uplink ports 1 Gbps / 10 Gbps (lead to external and internal data networks).	9	Management port (Mgmt1) for the Gaia OS on the Orchestrator.

Item	Description	ltem	Description
4	Ports 27 - 47 are the Downlink ports (lead to Security Appliances).	10	Optional management port (Mgmt2) for the Gaia OS on the Orchestrator.
5	Ports 49 - 55 are the Uplink ports 25 Gbps / 40 Gbps / 100 Gbps (lead to external and internal data networks).	11	USB 2.0 port.
6	LEDs that show the state of the split ports when connecting Breakout cables.	12	RJ45 port for Console connection.

Changing the QSFP mode and the default type of an Orchestrator port

- 1. Connect to the command line on the first Orchestrator in your environment.
- 2. Log in to Gaia Clish.
- If you connected a breakout cable to a port, then configure the applicable QSFP mode:

```
set maestro port <Port ID> qsfp-mode {1G | 10G | 4x10G |
4x25G | 25G | 40G | 100G}
```

Notes:

- "<Port ID>" specifies the port to configure.
 The format is three numbers separated with a slash character:
 <Orchestrator ID>/<Port Label on Front Panel>/<Port
 Split ID>
- The 25 Gbps speed is available in:
 - Check Point R81.20 and higher
 - <u>R81.10 Jumbo Hotfix Accumulator</u> Take 110 and higher (MBS-14158)

You can configure only these QSFP modes:

Orchestrator	Ports	Supported QSFP Modes
MHO-175	All ports	 4x10G 4x25G 25G 40G 100G
MHO-170	Ports with odd < <i>Port Label on Front</i> <i>Panel</i> > numbers (1, 3, 5, and so on)	 4x10G 4x25G 25G 40G 100G
	Ports with even < <i>Port Label on Front</i> <i>Panel</i> > numbers (2, 4, 6, and so on)	■ 25G ■ 40G ■ 100G
MHO-140	Ports with the < <i>Port Label on Front</i> <i>Panel</i> > numbers from 1 to 48	■ 1G ■ 10G ■ 25G

Orchestrator	Ports	Supported QSFP Modes
	Ports with the < <i>Port Label on Front</i> <i>Panel</i> > numbers 49, 51, 53, and 55	 4x10G 4x25G 25G 40G 100G
	Ports with the < <i>Port Label on Front</i> <i>Panel</i> > numbers 50, 52, 54, and 56	■ 25G ■ 40G ■ 100G

4. Configure the port type:

```
set maestro port <Port ID> type {downlink | uplink |
management | site_sync | ssm_sync}
```

You can configure only these port types:

Orchestrator	Port Number	Supported Port Types	Description of Port Types
MHO-175	1	management (a)	Connects to a Management Server to manage the Security Groups
		downlink	Connects to Security Appliances
	2 - 16	uplink	Connects to data networks
		downlink	Connects to Security Appliances
		site_sync	External sync between Maestro Sites
		ssm_sync	Internal sync on the same Maestro Site
	17 - 31	downlink	Connects to Security Appliances

Orchestrator	Port Number	Supported Port Types	Description of Port Types
		site_sync	External sync between Maestro Sites
		ssm_sync	Internal sync on the same Maestro Site
	32	ssm_sync(b)	Internal sync on the same Maestro Site
MHO-170	1, 2	management (a)	Connects to a Management Server to manage the Security Groups
		downlink	Connects to Security Appliances
	3 - 31	uplink	Connects to data networks
		downlink	Connects to Security Appliances
		site_sync	External sync between Maestro Sites
		ssm_sync	Internal sync on the same Maestro Site
	32	ssm_sync(b)	Internal sync on the same Maestro Site
MHO-140	1, 2, 3, 4	management (a)	Connects to a Management Server to manage the Security Groups
		downlink	Connects to Security Appliances
	5 - 47	uplink	Connects to data networks
		downlink	Connects to Security Appliances

Orchestrator	Port Number	Supported Port Types	Description of Port Types
		site_sync	External sync between Maestro Sites
		ssm_sync	Internal sync on the same Maestro Site
	48	ssm_sync(b)	Internal sync on the same Maestro Site

Important:

- a. It is possible to use only these ports to manage the Security Groups.
- b. It is not supported to change the port type (ssm_sync) of the default Internal Synchronization port:
 - MHO-175 Port 32
 - MHO-170 Port 32
 - MHO-140 Port 48

5. Save the configuration:

save config

6. Examine the port configuration:

```
show maestro port <Port ID> qsfp-mode
show maestro port <Port ID> type
```

MHO-175 Front Panel

)	3	4 5 6	
1 3 5 7 9 4 7 41	11 13 40742 40244 12 14 16 18	19 21 23 25 27 40720 40720 40720 40720 40720 20 22 24 26 28	29 31 30 32	7
2				13

Important - This section describes the default configuration. It is possible to change the port type (Management, Uplink, and Downlink) in the Gaia Operating System on the Quantum Maestro Orchestrator. See the <u>Maestro Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port Settings.

Legend	
ltem	Description
1	Port 1 (colored green), through which you manage the Security Groups. To this port you connect:
	 Check Point Management Servers. Clients, from which you configure the Gaia Operating System (Gaia Portal and Gaia Clish) on the Security Appliances connected to the Downlink ports (3).
	 Important - It is possible to use only this one port to manage the Security Groups. Only this port supports the Gaia Clish command "show maestro port <id> type management".</id>
2	 Ports 2 - 16 (colored gray) are the Uplink ports 25 Gbps / 40 Gbps / 100 Gbps. To these ports you connect your external traffic and internal traffic networks. You use DAC or Fiber cables (with transceivers). Note - The 25 Gbps speed is available in:
	 Check Point R81.20 and higher <u>R81.10 Jumbo Hotfix Accumulator</u> Take 110 and higher (MBS-14158)

Item	Description
3	Ports 17 - 30 (colored orange) are the Downlink ports. To these ports you connect your Check Point Security Appliances. You use DAC or Fiber cables (with transceivers).
	Important - It is not supported to configure these ports as Uplink.
4	 Port 31 (colored yellow) is the External Synchronization port in the Dual Site configuration. You connect a DAC cable between ports 31 on two Quantum Maestro Orchestrators MHO-175 for redundancy between different sites. In the Port Split mode (see "MHO-175 Splitting Options" on page 116):
	 1st, 2nd, and 3rd splits are Downlinks. 4th split is the External Sync.
	Important - It is not supported to configure this port as Uplink.
5	Micro USB 2.0 port. See "USB Port" on page 78.
6	LEDs. See "LEDs" on page 61.
7	RJ45 port with the label B . See " <i>MGMT Ports</i> " on page 76. To this port you connect a client, from which you configure the Gaia Operating System on the Quantum Maestro Orchestrator (in Gaia Portal, or Gaia Clish).
8	RJ45 port with the label IOIOI. See <i>"Console Port" on page 79</i> . To this port you connect a client, from which you configure the Gaia Operating System on the Quantum Maestro Orchestrator (in Gaia Clish).
9	Reset button with the label (R). See "Reset Button" on page 81.
10	 Port 32 (colored blue) is the Internal Synchronization port. You connect a DAC cable between ports 32 on two Quantum Maestro Orchestrators MHO-175 for redundancy on the same site. Important - It is not supported to change the default type of this port ("ssm_sync").
11	Button to select indication states for the splitting control LEDs. See "MHO-175 Splitting Options" on page 116.

Item	Description
12	Splitting control LEDs that show the indication state for Port LEDs:
	 State of which port to show (without a split cable). State of which split port to show (in 1-to-2 split, or 1-to-4 split).
	See "MHO-175 Splitting Options" on page 116.
13	Port LEDs that show the status of all ports (including the split ports).
Note:	5:
-	It is possible to connect DAC or Fiber cable (with transceivers) to each port (from 1 to 32).

 It is possible to connect Breakout cables to each port. See "MHO-175 Splitting Options" on page 116.

Warning - Only ports 1, 2, 31, and 32 support transceivers that require more than 5W (for example, CPAC-TR-100ERL4).

MHO-175 Rear Panel



Item	Description
1	First Power Supply Unit. See "Replacing Power Supply Units" on page 82.
2	Fan Units 1, 2, 3, 4, 5, and 6 (from left to right). See <i>"Replacing Fan Units" on page 84</i> .
3	Second Power Supply Unit. See "Replacing Power Supply Units" on page 82.

MHO-170 Front Panel



Important - This section describes the default configuration. It is possible to change the port type (Management, Uplink, and Downlink) in the Gaia Operating System on the Quantum Maestro Orchestrator. See the <u>Maestro Administration Guide for your</u> <u>version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port Settings.

Item	Description
1	Ports 1 - 2 (colored green), through which you manage the Security Groups. To these ports you connect:
	 Check Point Management Servers. Clients, from which you configure the Gaia Operating System (Gaia Portal and Gaia Clish) on the Security Appliances connected to the Downlink ports (4).
	 Important - It is possible to use only these two ports to manage the Security Groups. Only these ports support the Gaia Clish command "show maestro port <id> type management".</id>
2	 Ports 3 - 16 (colored gray) are the Uplink ports 25 Gbps / 40 Gbps / 100 Gbps. To these ports you connect your external traffic and internal traffic networks. You use DAC or Fiber cables (with transceivers). Note - The 25 Gbps speed is available in:
	 Check Point R81.20 and higher <u>R81.10 Jumbo Hotfix Accumulator</u> Take 110 and higher (MBS-14158)
3	Ports 17 - 30 (colored orange) are the Downlink ports. To these ports you connect your Check Point Security Appliances. You use DAC or Fiber cables (with transceivers).

Item	Description		
4	Port 31 (colored yellow) is the External Synchronization port in the Dual Site configuration. You connect a DAC cable between ports 31 on two Quantum Maestro Orchestrators MHO-170 for redundancy between different sites. Note - In the version R80.20SP, the default External Sync was Port 30.		
5	RJ45 port with the label MGMT . See "MGMT Ports" on page 76. To this port you connect a client, from which you configure the Gaia Operating System on the Quantum Maestro Orchestrator (in Gaia Portal, or Gaia Clish).		
6	USB 2.0 port. See "USB Port" on page 78.		
7	System Health LEDs. See "LEDs" on page 61.		
8	Reset button with the label RST . See "Reset Button" on page 81.		
9	 Port 32 (colored blue) is the Internal Synchronization port. You connect a DAC cable between ports 32 on two Quantum Maestro Orchestrators MHO-170 for redundancy on the same site. Important - It is not supported to change the default type of this port ("ssm_sync"). 		
10	RJ45 port with the label CONSOLE . See " <i>Console Port</i> " on page 79. To this port you connect a client, from which you configure the Gaia Operating System on the Quantum Maestro Orchestrator (in Gaia Clish).		
Notes (from Warn -	 Notes - It is possible to connect DAC or Fiber cable (with transceivers) to each port (from 1 to 32). Warnings: 		
-	It is possible to connect Breakout cables only to the top (odd) ports.		

- It is possible to connect Breakout cables only to the top (odd) ports. In this case, the bottom ports are disabled.
 See "MHO-170 Splitting Options" on page 120.
- Only ports 1, 2, 31, and 32 support transceivers that require more than 5W (for example, CPAC-TR-100ERL4).

MHO-170 Rear Panel



Item	Description
1	First Power Supply Unit. See "Replacing Power Supply Units" on page 82.
2	Fan Units 1, 2, 3 and 4 (from left to right). See "Replacing Fan Units" on page 84.
3	Second Power Supply Unit. See "Replacing Power Supply Units" on page 82.

MHO-140 Front Panel

	2)	3		4	5 6
	⁵⁶ 700 701 701 704 70 9 11 13 1	4 124 124 124 124 124 124 124 124 124 12	254 274 276 314 334 354 125 27 29 31 33 35	³⁷² ³⁸⁴ ⁴¹⁴ ⁴¹⁴ ⁴¹⁴ ⁴¹⁴ ⁴¹⁴ ⁴¹⁴ ³⁷ 39 41 43 45 47	11. 11.
2 4 6 8	10 12 14 1	.6 18 20 22 24	26 28 30 32 34 36	38 40 42 44 46 44	50 52 54 56
				7	

Important - This section describes the default configuration. It is possible to change the port type (Management, Uplink, and Downlink) in the Gaia Operating System on the Quantum Maestro Orchestrator. See the <u>Maestro Administration Guide for your</u> <u>version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port Settings.

Item	Description
1	Ports 1 - 4 (colored green), through which you manage the Security Groups. To these ports you connect:
	 Check Point Management Servers. Clients, from which you connect to the Gaia Operating System (Gaia Portal and Gaia Clish) on the Security Appliances connected to the Downlink ports (4).
	 Important - It is possible to use only these four ports to manage the Security Groups. Only these ports support the Gaia Clish command "show maestro port <id> type management".</id>
2	LEDs. See "LEDs" on page 61.
3	 Ports 5 - 26 (colored gray) are the Uplink ports 1 Gbps / 10 Gbps. To these ports you connect your external traffic and internal traffic networks. You use DAC or Fiber cables (with transceivers). Note - The 25 Gbps speed is available in:
	 Check Point R81.20 and higher <u>R81.10 Jumbo Hotfix Accumulator</u> Take 110 and higher (MBS-14158)

Item	Description
4	Ports 27 - 47 (colored orange) are the Downlink ports. To these ports you connect your Check Point Security Appliances. You use DAC or Fiber cables (with transceivers).
5	 Ports 49 - 55 (colored dark red) are the Uplink ports 25 Gbps / 40 Gbps / 100 Gbps. To these ports you connect your external traffic and internal traffic networks. You use DAC or Fiber cables (with transceivers). Note - The 25 Gbps speed is available in: Check Point R81.20 and higher R81.10 Jumbo Hotfix Accumulator Take 110 and higher (MBS-14158)
6	LEDs that show the state of the split interfaces when you connect with Breakout cables to the $40 / 100$ GbE Uplink ports (5).
7	 Port 48 (colored blue) is the Internal Synchronization port. You connect a DAC cable between ports 48 on two Quantum Maestro Orchestrators MHO-140 for redundancy on the same site. Important - It is not supported to change the default type of this port ("ssm_sync").
8	 Port 56 (colored yellow) is the External Synchronization port in the Dual Site configuration. You connect a DAC cable between ports 56 on two Quantum Maestro Orchestrators MHO-140 for redundancy between different sites. Note - In the R80.20SP version, Port 47 is the default External Synchronization port.
Note (from	- It is possible to connect DAC or Fiber cable (with transceivers) to each port 1 to 56).
Warn and 5	ing - It is possible to connect Breakout cables only to the top ports 49, 51, 53, 5. s case, the bottom ports 50, 52, 54, and 56 are disabled.

See "MHO-140 Splitting Options" on page 121.

MHO-140 Rear Panel



Item	Description
1	First Power Supply Unit. See "Replacing Power Supply Units" on page 82.
2	Fan Units 1, 2, 3 and 4 (from left to right). See "Replacing Fan Units" on page 84.
3	Second Power Supply Unit. See "Replacing Power Supply Units" on page 82.
4	RJ45 port labeled 0 , through which you configure the Gaia Operating System on the Quantum Maestro Orchestrator (Gaia Portal and Gaia Clish).
5	RJ45 port labeled 1 , through which it is also possible to configure the Gaia Operating System on the Quantum Maestro Orchestrator (Gaia Portal and Gaia Clish).
6	Reset button labeled R . See "Reset Button" on page 81.
7	RJ45 port with the label CONSOLE . See <i>"Console Port" on page 79</i> . To this port you connect a client, from which you connect to the Gaia Operating System on the Quantum Maestro Orchestrator (in Gaia Clish).
8	"System Status LED" on page 62.

Item	Description
9	"Fan Status LED" on page 64.
10	USB 2.0 port. See "USB Port" on page 78.

For more information about the RJ45 ports labeled **0** and **1**, see "*MGMT Ports*" on page 76.

In This Section:

LED Notifications	61
System Status LED	62
Fan Status LED	64
Power Supply Unit Status LEDs	
Bad Port LED	
Port LEDs	70

LED Notifications

The LEDs are an important tool for hardware event notification and troubleshooting.

Symbol	LED Name	Instructions	Normal Condition
\bigtriangleup	<i>"System Status LED" on the next page</i>	Shows the health of the Quantum Maestro Orchestrator.	Steady green or flashing green during boot.
5	"Fan Status LED" on page 64	Shows the health of the Fan Units.	Steady green.
	<i>"Power Supply Unit Status LEDs" on page 66</i>	Shows the health of the Power Supply Units.	Steady green.
<u>.</u>	"Bad Port LED" on page 70	Lights up when the Quantum Maestro Orchestrator detects an error with one of the ports. Exists only in MHO-170 and MHO- 140.	Off.
	Unit Identifier	Not supported by Check Point Gaia OS.	Off.

System Status LED

System Status LED Location

Orchestrator	Location of the System Status LED		
Model	On the front panel	On the rear panel	
MHO-175		N/A	
MHO-170		N/A	
MHO-140 [*]			

*Note - On MHO-140, this LED is located on the front panel and the rear panel.

System Status LED Behavior

LED Behavior	Instructions	Action Required
Steady green	The Orchestrator is up and running normally.	None.
Flashing green	The Orchestrator is booting up.	Wait for up to five minutes for the end of the booting process.
Steady red	Major error occurred. For example, the Orchestrator overheated, has a corrupted firmware, there is a CPU error.	Check environmental conditions (room temperature). It may take up to five minutes to power on the Orchestrator. If the System Status LED is lit steady red for five minutes after you started the Orchestrator, unplug the Orchestrator and contact <u>Check Point Support</u> .
Flashing for more than five minutes	Software did not boot properly, and only firmware is running.	Connect to the Orchestrator through the console port and check the software status.

Fan Status LED

Fan Status LED Location

Orchestrator	Location of the Fan Status LED		
Model	On the front panel	On the rear panel	
MHO-175		N/A	
MHO-170		N/A	
MHO-140			

Fan Status LED Behavior - Front Panel

Important - FAN LEDs are always off.

LED Behavior	Instructions	Action Required
Steady green	All fans are up and running normally.	None.
Steady red or amber	Error. One or more fan units are not operating properly.	Replace the faulty fan units.
Off	The Orchestrator boots.	None.

Fan Status LED Behavior - Rear Panel

Important - FAN LEDs are always off.

LED BehaviorInstructionsAction RequiredSteady greenA specific fan unit is operating.None.Steady red or
amberA specific fan unit is missing, or not operating
properly.Replace the faulty fan
unit.OffThe Orchestrator boots.None.

1 Important - With the fan unit removed, power pins are accessible within the module cavity. Do **not** insert tools or body parts into the fan unit cavity.

Power Supply Unit Status LEDs

Power Supply Units LED shows the health of the Power Supply Units.

Power Supply Unit LED on the Front Panel

The Power Supply Units LED on the front panel shows the health of the Power Supply Units.

To provide power redundancy, there are two power supply inlets in Quantum Maestro Orchestrators.

A Quantum Maestro Orchestrator can operate with only one PSU connected.

In case the PSU is faulty, it is possible to add a second PSU to support hot-swap ability.

Each PSU has a single two-color LED on the right side of the PSU that indicates the status of the PSU.



Power Supply Unit LED on the Rear Panel

The primary PSU is located on the left side, and the secondary PSU is located on the right side of the Quantum Maestro Orchestrator.

The PSU Status LEDs are located on the PSUs themselves.

Each PSU has one LED of its own.

Power Supply Unit LED - Rear Panel in MHO-175



Power Supply Unit LED - Rear Panel in MHO-170



Power Supply Unit LED - Rear Panel in MHO-140



Power Supply Unit LED Behavior - Front Panel

LED Behavior	Instructions	Action Required
Steady green	All units are connected and running normally.	None.
Steady red or amber	A PSU is faulty or disconnected.	Make sure the AC cable is plugged in to the PSU. Make sure there is the AC power. If the problem persists, replace the faulty PSU.
Off	N/A	None.

Power Supply Unit LED Behavior - Rear Panel

LED Behavior	Instructions	Action Required
Steady green	The PSU is connected and running normally.	None.
Flashing green at 1Hz	AC is present, only 12VSB on (PSU off), or PSU in Smart-On state.	Contact <u>Check Point</u> <u>Support</u> .
Steady read or amber	AC cord is unplugged, or AC power is lost, while the second PSU still has AC input power.	Plug in the AC cord to the faulty PSU. Make sure there is the AC power.
	PSU failure - voltage, current, temperature, or fan.	Check the voltage of your AC power. If voltage is OK, contact <u>Check Point</u> <u>Support</u> .
Flashing read or amber at 1Hz	PSU warning events, where the PSU continues to operate; high temperature, high power, high current, slow fan.	Contact <u>Check Point</u> <u>Support</u> .
Off	No input AC power at all PSUs.	Make sure there is the AC power. Plug in the AC cords. If the AC power is OK, contact <u>Check Point</u> <u>Support</u> .

Bad Port LED

The Bad Port LED in MHO-170 and MHO-140 models shows errors in one or more ports:



Bad Port LED Behavior

LED Configuration	Instructions	Action Required
Off	No errors were received in the last few seconds (normal condition).	None.
Flashing amber	Error. One or more ports received errors. Possible causes are: Bad cable Bad connection Bad connector	Check error counters to identify the ports. For more information, see the <u>Maestro</u> <u>Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish. Replace the cables connected to these ports.

Port LEDs

Port LEDs on are located on the front panel.

Port LEDs on MHO-175

In MHO-175, all port LEDs are located on the right side.

There are 32 LEDs that correspond to the 32 physical ports.

You can connect 1-to-4 breakout cables to physical ports and get a maximum of 128 logical ports.



After you connect a breakout cable to a physical port, you get *four* additional interfaces starting from the original interface name. You assign these interfaces to Security Groups.

Example - When you connect a breakout cable to the top port 8 (interface "eth1-29"), you get:

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
8	eth1-29	Port 1/8/1
	eth1-30	Port 1/8/2
	eth1-31	Port 1/8/3
	eth1-32	Port 1/8/4

Note - For more information about the ports and interface names in Gaia, see *"Quantum Maestro Orchestrator Ports and Gaia OS Interfaces" on page 222.*

To see the state of split ports, it is necessary to use the control button to select the LED indication mode.

The control button (item 1) selects one of the five available LED indication modes in a cycle.

The four LEDs in the section **SPLIT /1 /2 /3 /4** (item **2**) show the current LED indication mode.

The port LEDs (item 3) show the port state - link (up or down) and traffic (flowing or not).

Indication Mode	LEDs in the section "SPLIT"	Description
0	All LEDs are off	Port LEDs show the state of physical ports. Use this indication mode when no breakout cables are connected.
/1	Only the first LED from the left is lit (/1)	Port LEDs show the state of the first split port of the physical port. Example: If you connect a breakout cable to port 8 (interface eth1-29), then in this LED indication mode /1, the port LED 8 shows the state of the interface eth1-29 (Port 1/8/1).
/2	Only the second LED from the left is lit (/2)	Port LEDs show the state of the second split port of the physical port. Example: If you connect a breakout cable to port 8 (interface eth1-29), then in this LED indication mode /2, the port LED 8 shows the state of the interface eth1-30 (Port 1/8/2).
/3	Only the third LED from the left is lit (/3)	Port LEDs show the state of the third split port of the physical port. Example: If you connect a breakout cable to port 8 (interface eth1-29), then in this LED indication mode /3, the port LED 8 shows the state of the interface eth1-31 (Port 1/8/3).
Indication Mode	LEDs in the section "SPLIT"	Description
--------------------	--	--
/4	Only the fourth LED from the left is lit (/4)	Port LEDs show the state of the fourth split port of the physical port. Example: If you connect a breakout cable to port 8 (interface eth1-29), then in this LED indication mode /4, the port LED 8 shows the state of the interface eth1-32 (Port 1/8/4).

Port LED Behavior in the LED Indication Mode 0:

LED Behavior	Port State	Action Required
Off	Link is down.	None.
Steady green	 If a breakout cable is not connected: The link is up. If a breakout cable is connected: The link is up for at list one of the split ports. 	None.
Flashing green	 If a breakout cable is not connected: The traffic is flowing. If a breakout cable is connected: The traffic is flowing in at list one of the split ports. 	None.
Flashing amber	Undetermined state.	Select another LED Indication Mode - 1, 2, 3, or 4.

LED Behavior	Port State	Action Required
Off	Link is down.	Check the cable.
Steady green	Link is up in the corresponding split port, but the traffic is not flowing in that split port.	None.
Flashing green	Link is up in the corresponding split port, and the traffic is flowing in that split port.	None.
Flashing amber	A problem with the link in the corresponding split port.	Check the cable, and replace if needed.

Port LED Behavior in the LED Indication Modes 1, 2, 3, or 4:

Port LEDs on MHO-170

In MHO-170, the status of each pair of adjacent ports is indicated by two LEDs:

Example:



Port LED Behavior:

LED Behavior	Port State	Action Required
Off	Link is down.	Check the cable.
Steady green	Link is up, but there is no traffic.	None.
Flashing green	Link is up, and the traffic is flowing.	None.
Flashing amber	A problem with the link.	Check the cable, and replace if needed.

Port LEDs on MHO-140

In MHO-140, the status of each pair of adjacent ports 1 to 48 is indicated by two LEDs.

Example:



In MHO-140, the status of each pair of adjacent QSFP28 ports 49 to 56 is indicated by four LEDs:

- While the bottom LEDs signify the port status in regular condition, the upper LEDs operate only when the port is split with a breakout cable.
- When the upper port is split to four interfaces, its bottom port is disabled.
- If the ports run at a 100 GbE or 40 GbE speed each, the two lower LEDs (2 and 4) light in green.



Port LED Behavior:

LED Behavior	Port State	Action Required
Off	Link is down.	Check the cable.
Steady green	Link is up, but there is no traffic.	None.
Flashing green	Link is up, and the traffic is flowing.	None.
Flashing amber	A problem with the link.	Check the cable, and replace if needed.

Ports

This section described different hardware ports.

MGMT Ports

The RJ45 Ethernet ports with the label **MGMT** or **B** provide access to the Gaia OS on the Quantum Maestro Orchestrator.

By default, this port is configured with these settings:

- IP address 192.168.1.1 and Net Mask 255.255.255.0
- Auto-negotiation capabilities (100 MbE to 1 GbE)

Notes:

- For more information, see the:
 - Quantum Maestro Quick Start Guide for MHO-175 and MHO-140.
 - Quantum Maestro Quick Start Guide for MHO-170 and MHO-140.
- In MHO-140, the second **MGMT** port is not configured with an IP address.
- To change the default IP address:
 - 1. Connect to the Quantum Maestro Orchestrator over the RJ45 console port.
 - 2. Log in to Gaia Clish.
 - 3. Configure the applicable IPv4 settings on the interface Mgmt1.

In MHO-140, the interface Mgmt2 is optional.

Make sure to use only FCC-compliant Ethernet cables.

Orchestrator	Location of the MGMT Port	
Model	On the front panel	On the rear panel
MHO-175	A # 0 1 5 9 13 17 21 25 29 4 8 12 16 20 24 28 32	N/A
MHO-170		N/A
MHO-140	N/A	

USB Port

The USB interface is USB 2.0 compliant (USB 1.0 is not supported).

It is possible to connect to this interface an external USB storage device for software upgrade or file management.

Do not use excessive force, when inserting or removing the USB storage device to and from the connector.

Orchestrator	Location of the USB Port		
Model	On the front panel	On the rear panel	
MHO-175	A * @ T A * @ T O TOIO O TOIO O TOIO O TOIO I 5 9 1 5 9 1 5 9 1 5 9 1 1 1 1 1 <t< td=""><td>N/A</td></t<>	N/A	
MHO-170		N / A	
MHO-140	N/A		

Console Port

The port with the label **IOIOI** or **CONSOLE** is an RJ45 console port that provides access to the Gaia OS on the Quantum Maestro Orchestrator.

Orchestrator	Location of the RS232 (Console) Port		
Model	On the front panel	On the rear panel	
MHO-175	A # @ T FOID FOI	N/A	
MHO-170		N/A	
MHO-140	N / A		

You use this port for initial configuration and debugging.

Use a Terminal application, such as PuTTY, SecureCRT, MobaXterm, and so on.

Use these settings to connect a PC to the RJ45 console port:

Parameter	Setting
Baud Rate	9600
Data bits	8
Stop bits	1

Parameter	Setting
Parity	None
Flow Control	None

Reset Button

To perform a power cycle (cold reboot) of the Quantum Maestro Orchestrator, use a flat object to push the reset button.

Do not use a sharp pointed object, such as a needle or a push pin to press the reset button.

Orchestrator	Location of the Reset Button		
Model	On the front panel	On the rear panel	
MHO-175	A ★ @ T 0000 SPLIT 71 / 2 /3 /4 1 5 9 13 17 21 25 29 4 8 12 16 20 24 28 32	N/A	
MHO-170		N / A	
MHO-140	N/A		

Replacing Power Supply Units

Quantum Maestro Orchestrators are equipped with two replaceable Power Supply Units (PSUs). The PSUs in these systems can work in a redundant configuration. It is possible to remove one of the PSUs without the need to bring down the Quantum Maestro Orchestrator.

Important - PSUs have directional air flows similar to the fan module. The fan module airflow must coincide with the airflow of all of the PSUs. If the PSU airflow direction is different from the fan module airflow direction, it affects the Quantum Maestro Orchestrator's internal temperature.

See:

- "Airflow in MHO-175" on page 87
- "Airflow in MHO-170 and MHO-140" on page 102

Removing a Power Supply Unit

Important:

- Before you remove one of the PSUs, make sure that:
 - 1. The **System Status LED** is lit in steady green (see "System Status LED" on page 62).
 - 2. The **Power Supply Unit Status LEDs** on the PSU that you **leave** in the Orchestrator are lit in steady green (see *"Power Supply Unit Status LEDs" on page 66*).
- To ensure proper cooling, do not leave the PSU slots of a Quantum Maestro Orchestrator empty for more than five minutes.

To remove a PSU:

Step	Instructions
1	Disconnect the power cord from the PSU.
2	Grasp and hold the PSU handle with your hand.
3	Push the latch release with your thumb.
4	Pull out the PSU from the Quantum Maestro Orchestrator. As you pull out the PSU, its status LEDs turn off.

PSU pulled out:



Installing a Power Supply Unit

0	Important - Do not insert a PSU with a power cord connected to it.
---	--

Step	Instructions
1	Make sure the mating connector of the new PSU is free of any dirt and obstacles.
2	Insert the PSU end into the opening.
3	Slide in the PSU until you feel a slight resistance.
4	Continue to press the PSU until it seats completely. The PSU latch snaps into place. This confirms the proper installation.
5	Connect the power cord to the PSU connector.
6	Insert the other end of the power cord into an outlet of the correct voltage.
7	These should light up in green color:
	 a. The indicator on the PSU b. The Power Supply Unit Status LED (see "Power Supply Unit Status LEDs" on page 66)
	If either the indicator, or the LED does not light up in green color, repeat the whole procedure to remove the PSU and insert it again.

Replacing Fan Units

The Quantum Maestro Orchestrators are equipped with four replaceable fan units. They can fully operate, if one fan unit failed.

Important:

- It is not supported to operate a Quantum Maestro Orchestrator, if two or more fan units failed.
- Make sure that the fans have the air flow that matches the model number. An air flow opposite to the Quantum Maestro Orchestrator design causes the Quantum Maestro Orchestrator to operate at a higher (less than optimal) temperature.

See:

- "Airflow in MHO-175" on page 87
- "Airflow in MHO-170 and MHO-140" on page 102
- See "Fan Status LED" on page 64.

Removing a Fan Unit

Step	Instructions
1	Grasp and hold the fan unit's handle with your hand.
2	Push the latch release with your thumb.
3	Pull out the fan unit from the Quantum Maestro Orchestrator. As you pull out the fan unit, its status LEDs turns off (see <i>"Fan Status LED" on page 64</i>).

Installing a Fan Unit

Step	Instructions
1	Make sure the mating connector of the new fan unit is free of any dirt and obstacles.
2	Insert the fan unit end into the opening.
3	Slide in the fan unit until you feel a slight resistance.
4	Continue to press the fan unit until it seats completely. The fan unit latch snaps into place. This confirms the proper installation.
5	 These should light up in green color: 1. The indicator on the fan unit 2. The Fan Status LED (see "Fan Status LED" on page 64) If either the indicator, or the LED does not light up in green color, repeat the whole procedure to remove the fan unit and insert it again. After two unsuccessful attempts to install the fan unit, power off the Quantum Maestro Orchestrator before you attempt any hardware troubleshooting.

Mounting the Quantum Maestro Orchestrator MHO-175 in a Rack

This section provides the information necessary to mount the Quantum Maestro Orchestrator MHO-175 in a rack.

Installation and Initialization

Installation and initialization of the Quantum Maestro Orchestrator requires attention to the normal mechanical, power, and thermal precautions for rack-mounted equipment.

Important:

- The rack mounting holes conform to the EIA-310 standard for racks with length 50-60 cm (19.7-23.6 inches).
 Take precautions to guarantee proper ventilation to maintain good airflow at ambient temperature.
- Unless otherwise specified, Check Point products are designed to work in an environmentally controlled data center with low levels of gaseous and dust (particulate) contamination.

The installation procedure for the Quantum Maestro Orchestrator involves these phases:

Phase	Instructions
1	Make sure that none of the shipping carton contents is missing or damaged. See "Shipping Carton Contents" on page 12.
2	Follow the "Safety Warnings" on page 15.
3	Pay attention to the airflow consideration within the Quantum Maestro Orchestrator and rack. See " <i>Airflow in MHO-175" on the next page</i> .
4	Mount the Quantum Maestro Orchestrator into a rack enclosure. See "Static Rail Kit for MHO-175" on the next page.
5	Power on the Quantum Maestro Orchestrator. See "Step 7: Cable Installation" on page 99.

Airflow in MHO-175

The fan units in the Quantum Maestro Orchestrator generate the airflow from the front panel (intake) to the rear panel:



Important:

- All systems in the same rack should be planned with the same airflow direction.
- All fan units in the same rack need to have the same air flow direction.
 A mismatch in the air flow affects the heat dissipation in the rack.

Static Rail Kit for MHO-175

The Quantum Maestro Orchestrators are sold with the static rail kit.

Important - At least two people are required to mount the Quantum Maestro Orchestrator safely in the rack.

Installation Rail Kit:

Rack Size and Rack Depth Range	Comments
43 - 80 cm (16.9 - 31.4 inches)	Supplied by default

Parts in the static rail kit:

Legend

Item	Description
Α	2 x Rack mount rails
В	2 x Rack mount blades
С	2 x Rack mount rail ears
D	8 x M6 standard cage nuts
Е	8 x M6 standard Phillips pan-head screws
F	4 x Phillips flat-head screws with a round patch, Head 100 Degree, Type I, Size 6-32, Length 1/4 inch

Notes:

- You use the Phillips flat head screws (F) to secure the rack mount rails (A) to the Quantum Maestro Orchestrator.
- You use the Phillips flat head screws (F) to secure the rack mount rail ears (C) to the Quantum Maestro Orchestrator.
- You use the cage nuts (D) and Phillips pan-head screws (E) to secure the rack mount rails (A) to the rack.
- You use the cage nuts (D) and Phillips pan-head screws (E) to secure the rack mount rail ears (C) to the rack.

Before you mount the Quantum Maestro Orchestrator to the rack, plan the way you wish to place it:

Pay attention to the airflow within the rack cooling, connector, and cabling options.

While you plan how to place the Quantum Maestro Orchestrator, review these points:

 Make sure the Quantum Maestro Orchestrator air flow is compatible with your installation selection.

It is important to keep the airflow within the rack in the same direction.

Note that the part of the Quantum Maestro Orchestrator, to which you choose to attach the rails, determines the Quantum Maestro Orchestrator's adjustable side.

The Quantum Maestro Orchestrator's part, to which the blades are attached, should be adjacent to the cabinet.

Installation Option 1 - Attaching the mount rail ears (C) near the rear panel



Installation in short racks (43 - 58 cm / 16.9 - 22.8 inches):





Installation in standard racks (58 - 80 cm / 19.6 - 31.5 inches):

Installation Option 2 - Attaching the mount rail ears (C) near the front panel



Installation in short racks (43 - 58 cm / 16.9 - 22.8 inches):





Installation in standard racks (58 - 80 cm / 19.6 - 31.5 inches):

- In case there are cables that cannot bend within the rack, or in case more space is needed for cable bending radius, it is possible to recess the connector side or the rear panel side by 8.9 cm (3.5 inches), by optional placement of the Quantum Maestro Orchestrator's rails.
- If you mount the rack blades as depicted in *Installation Option 2* above, it lets you slide the PSUs and Fan Units in and out easier.

Step 1: Attaching the Rack Mount Rails

Step	Instructions
1	Attach the left and right rack mount rails (A) to the left and right sides of the Quantum Maestro Orchestrator.
2	 Gently push the pins on the sides through the slider key holes, until the rails lock. Important - In short racks (430-580 mm), the designated windows in the rack mount rails must align with the ventilation openings on the sides of the Quantum Maestro Orchestrator.
2	Use the Phillips flat-head screws (F) to secure each rack mount rail (A) to each side of the Quantum Maestro Orchestrator. Important - You must use one screw on each side.
3	Tighten the screws with a torque of 1.5±0.2 Nm.

Step 2: Attaching the Rack Mount Ears

Step	Instructions
1	Attach the left and right rack mount rail ears (\mathbf{C}) to the left and right sides of the Quantum Maestro Orchestrator.
2	 Gently push the pins on the sides through the slider key holes, until the rack mount rail ears lock. Important - In short racks (430-580 mm), the designated windows in the rack mount rails must align with the ventilation openings on the sides of the Quantum Maestro Orchestrator.
2	Use the Phillips flat-head screws (F) to secure each rack mount rail ear (C) to each side of the Quantum Maestro Orchestrator. Important - You must use one screw on each side.
3	Tighten the screws with a torque of 1.5 ± 0.2 Nm.

Step 3: Installing the Cage Nuts

Install eight cage nuts (D) in the desired 1U slots of the rack.



Notes:

- The red frame on the image denotes the Quantum Maestro Orchestrator inside the rack.
- Install four cage nuts on each side of the Quantum Maestro Orchestrator.
- Each rack 1U (unit) consists of three holes.

Install the cage nuts vertically, so that its ears engage the top and bottom holes only. Example:



Step 4: Attaching the Rack Mount Blades to the Rack

While your installation partner is supporting the Quantum Maestro Orchestrator, perform these steps:

Step	Instructions
1	Attach the rack mount blades (\mathbf{B}) to the back side (FRU side) of the rack at the level of the designated cage nuts.
2	Insert four Phillips pan-head screws (E) in the designated cage nuts.
3	Do not tighten the screws yet.

Example:



Step 5: Sliding the Blades in the Rails

While your installation partner is supporting the Quantum Maestro Orchestrator, perform these steps:

Step	Instructions
1	Slide each rack mount rails (A) into the corresponding rack mount blade (B). Note - Make sure the rack mount rail ears (C) face the rack's posts correctly.
2	Slide the rack mount rails (A) inside the rack mount blades (B) to fit your rack's depth.
3	Attach the rack mount rail ears (C) to the rack's posts.
4	Use the four Phillips pan head screws (E) to secure each rack mount rail ear (C) to each side of the rack.
5	Do not tighten the screws yet.

Example:



Step 6: Tightening the Screws

While your installation partner is supporting the Quantum Maestro Orchestrator, tighten the eight Phillips pan-head screws (E) you inserted in the previous steps.

To tighten the screws, use a torque of 4.5±0.5 Nm.

Step 7: Cable Installation

6

It is possible to insert or remove all network cables while the Quantum Maestro Orchestrator is powered on.

To insert a cable, press the connector into the port receptacle until the connector is firmly seated. The LED indicator, corresponding to each data port, light up when the physical connection is established. When a logical connection is made, the relevant port LED lights up.

To remove a cable, disengage the locks and slowly pull the connector away from the port receptacle. The LED indicator for that port turns off, when the cable is unplugged.

Note - For more information about Port LEDs, see "*Port LEDs*" on page 70.

Do not force the cable into the cage with more than 40 Newtons (4 kilogram-force / 9.0 pound-force). Greater insertion force may damage the cable, or the cage.



Step 8: Initial Power On

The power cords should be standard 3-wire AC power cords including a safety ground and rated for 15A or higher.

Check all boards, power supplies, and fan tray modules for proper insertion before plugging in a power cable.

The Quantum Maestro Orchestrator powers on automatically, when an AC power is applied.

Step	Instructions
1	Plug in the first power cable to the first PSU.
2	Plug in the second power cable to the second PSU.
3	 Wait for the System Status LED to turn green (see "System Status LED" on page 62). It can take up to five minutes to power on the Quantum Maestro Orchestrator. If after five minutes the System Status LED is lit in red color, unplug the power cords and contact <u>Check Point Support</u>.
4	Check the status of the Quantum Maestro Orchestrator LEDs (see "LED Notifications" on page 61). All of the LEDs must show status lights that are consistent with normal operation (initially flashes, and then lights in a steady color). Example:
🔒 Impo	rtant:

- After you insert a power cable and confirm the System Status LED is lit in steady green color, make sure that the Fan Status LED is also lit in steady green color.
- If the Fan Status LED is not green (see "Fan Status LED" on page 64):
 - 1. Unplug the power cable.
 - 2. Make sure that the mating connector of the fan unit is free of any dirt and obstacles.
 - Make sure that the fan unit is inserted properly.
 If no obstacles were found, and the problem persists, contact <u>Check</u> <u>Point Support</u>.

Mounting the Quantum Maestro Orchestrator MHO-140 and MHO-170 in a Rack

This section provides the information necessary to mount the Quantum Maestro Orchestrator MHO-140 or MHO-170 in a rack.

Installation and Initialization

Installation and initialization of the Quantum Maestro Orchestrator requires attention to the normal mechanical, power, and thermal precautions for rack-mounted equipment.

Important:

The rack mounting holes conform to the EIA-310 standard for racks with length 50-60 cm (19.7-23.6 inches).

Take precautions to guarantee proper ventilation to maintain good airflow at ambient temperature.

 Unless otherwise specified, Check Point products are designed to work in an environmentally controlled data center with low levels of gaseous and dust (particulate) contamination.

The installation procedure for the Quantum Maestro Orchestrator involves these phases:

Phase	Instructions
1	Make sure that none of the shipping carton contents is missing or damaged. See "Shipping Carton Contents" on page 12.
2	Follow the "Safety Warnings" on page 15.
3	Pay attention to the airflow consideration within the Quantum Maestro Orchestrator and rack. See "Airflow in MHO-170 and MHO-140" on the next page.
4	Mount the Quantum Maestro Orchestrator into a rack enclosure. See "Static Rail Kit for MHO-170 and MHO-140" on the next page.
5	Power on the Quantum Maestro Orchestrator. See "Step 7: Initial Power On" on page 112.

Airflow in MHO-170 and MHO-140

The fan units in the Quantum Maestro Orchestrator generate the airflow from the front panel (intake) to the rear panel:



Important:

- All systems in the same rack should be planned with the same airflow direction.
- All fan units in the same rack need to have the same air flow direction.
 A mismatch in the air flow affects the heat dissipation in the rack.

Static Rail Kit for MHO-170 and MHO-140

The Quantum Maestro Orchestrators are sold with the static rail kit.

Important - At least two people are required to mount the Quantum Maestro Orchestrator safely in the rack.

Installation Rail Kit:

Rack Size and Rack Depth Range	Comments
60 to 80 cm (23.6 - 31.5 inches)	When installed in the rack before shipping
61 to 86.3 cm (24 - 34 inches)	When installed in the rack at the customer site

Parts in the static rail kit:



Legend

Item	Description
А	2 x Rack mount rails
В	$2 ext{x}$ Rack mount blades that slide into the rack mount rails (A)
С	$8 \times M6$ standard cage nuts, and $8 \times M6$ standard Phillips pan-head screws
D	4 x Phillips flat-head screws with a round patch, Head 100 Degree, Type I, Size 6-32, Length 1/4 inch
Е	Rack mount rail ears
F	Rack mount blade ears

Notes:

 You use the Phillips flat head screws (D) to secure the rack mount rails (A) to the Quantum Maestro Orchestrator.

You must use at least two of these screws on each side.

- You use the cage nuts and Phillips pan-head screws (C) to secure the rack mount rail ears (E) to the rack.
- You use the cage nuts and Phillips pan-head screws (C) to secure the rack mount blade ears (F) to the rack.

Before you mount the Quantum Maestro Orchestrator to the rack, plan the way you wish to place it:

Pay attention to the airflow within the rack cooling, connector, and cabling options.

While you plan how to place the Quantum Maestro Orchestrator, review these points:

 Make sure the Quantum Maestro Orchestrator air flow is compatible with your installation selection.

It is important to keep the airflow within the rack in the same direction.

Note that the part of the Quantum Maestro Orchestrator, to which you choose to attach the rails, determines the Quantum Maestro Orchestrator's adjustable side.

The Quantum Maestro Orchestrator's part, to which the blades are attached, should be adjacent to the cabinet.

Installation Option 1 - Attaching the mount rail ears (E) near the rear panel

Installation Option 2 - Attaching the mount rail ears (E) near the front panel



- In case there are cables that cannot bend within the rack, or in case more space is needed for cable bending radius, it is possible to recess the connector side or the rear panel side by 8.9 cm (3.5 inches), by optional placement of the Quantum Maestro Orchestrator's rails.
- If you mount the rack blades as depicted in *Installation Option 2* above, it lets you slide the PSUs and Fan Units in and out easier.

Step 1: Installing the Cage Nuts

Install eight cage nuts (C) in the desired 1U slots of the rack.



Notes:

- The red frame on the image denotes the Quantum Maestro Orchestrator inside the rack.
- Install four cage nuts on each side of the Quantum Maestro Orchestrator.
- Each rack 1U (unit) consists of three holes.

Install the cage nuts vertically, so that its ears engage the top and bottom holes only. Example:



Step 2: Attaching the Rack Mount Rails

Step	Instructions
1	Attach the left and right rack mount rails (A) to the left and right sides of the Quantum Maestro Orchestrator.
2	Use the Phillips flat-head screws (D) to secure each rack mount rail (A) to each side of the Quantum Maestro Orchestrator. Important - You must use at least two of these screws on each side.
3	Tighten the screws with a torque of 1.5±0.2 Nm.

Example (the mount rail ears are near the front panel):



Step 3: Attaching the Rack Mount Rails to the Rack

While your installation partner is supporting the Quantum Maestro Orchestrator, perform these steps:

Step	Instructions
1	Mount the Quantum Maestro Orchestrator into the rack enclosure.
2	Attach the mount rail ears (E) to the rack's posts at the level of the designated cage nuts.
3	Secure the mount rail ears (E) to the rack's posts with four Phillips pan-head screws (C) in the designated cage nuts.
4	Do not tighten the screws yet.

Example:


Step 4: Sliding the Blades in the Rails

While your installation partner is supporting the Quantum Maestro Orchestrator, perform these steps:

Step	Instructions
1	Slide each rack mount blade (B) into the corresponding rack mount rail (A). Note - Make sure the mount blade ears (F) face the rack's posts correctly.
2	Slide the rack mount blades (B) inside the rack mount rails (A) to fit your rack's depth.
3	Attach the mount blade ears (F) to the rack's posts.
4	Use the four Phillips pan head screws (C) to secure each mount blade ear (F) to each side of the rack.
5	Do not tighten the screws yet.

Example:



Step 5: Tightening the Screws

While your installation partner is supporting the Quantum Maestro Orchestrator, tighten the eight Phillips pan-head screws (**C**) you inserted in the previous steps.

To tighten the screws, use a torque of 4.5±0.5 Nm.

Step 6: Cable Installation

G

It is possible to insert or remove all network cables while the Quantum Maestro Orchestrator is powered on.

To insert a cable, press the connector into the port receptacle until the connector is firmly seated. The LED indicator, corresponding to each data port, light up when the physical connection is established. When a logical connection is made, the relevant port LED lights up.

To remove a cable, disengage the locks and slowly pull the connector away from the port receptacle. The LED indicator for that port turns off, when the cable is unplugged.

Note - For more information about Port LEDs, see "Port LEDs" on page 70.

Do not force the cable into the cage with more than 40 Newtons (4 kilogram-force / 9.0 pound-force). Greater insertion force may damage the cable, or the cage.

The MHO-170 and MHO-140 include ports of different types. The two images below for cable orientation do not apply to the SFP28 ports.

MHO-170 Cable Orientation



MHO-140 Cable Orientation



Step 7: Initial Power On

The power cords should be standard 3-wire AC power cords including a safety ground and rated for 15A or higher.

Check all boards, power supplies, and fan tray modules for proper insertion before plugging in a power cable.

The Quantum Maestro Orchestrator powers on automatically, when an AC power is applied.

Step	Instructions		
1	Plug in the first power cable to the first PSU.		
2	Plug in the second power cable to the second PSU.		
3	 Wait for the System Status LED to turn green (see "System Status LED" on page 62). It can take up to five minutes to power on the Quantum Maestro Orchestrator. If after five minutes the System Status LED is lit in red color, unplug the power cords and contact <u>Check Point Support</u>. 		
4	Check the status of the Quantum Maestro Orchestrator LEDs (see "LE Notifications" on page 61).All of the LEDs must show status lights that are consistent with normal operation (initially flashes, and then lights in a steady color).OrchestratorExpected State of System LEDs Five Minutes After Power On		
	MHO-170		
	MHO-140		

Important:

- After you insert a power cable and confirm the System Status LED is lit in steady green color, make sure that the Fan Status LED is also lit in steady green color.
- If the Fan Status LED is not green (see "Fan Status LED" on page 64):
 - 1. Unplug the power cable.
 - 2. Make sure that the mating connector of the fan unit is free of any dirt and obstacles.
 - Make sure that the fan unit is inserted properly.
 If no obstacles were found, and the problem persists, contact <u>Check</u> <u>Point Support</u>.

Connecting Cables to Quantum Maestro Orchestrators

This section describes how to connect cables to Quantum Maestro Orchestrators.

It is possible to deploy Quantum Maestro Orchestrators in these ways:

- On a single site (see "Single Site" on page 122).
- On two different sites (see "Dual Site" on page 173).

It possible to use breakout cables to split the supported 100 / 40 GbE port into four 10 GbE ports (see "*Splitting the Ports with Breakout Cables*" on page 115).



It is critical to protect the Maestro Sites against both malicious and unintentional threats:

- On each Security Appliance, each required network port must connect to Maestro Orchestrators with a direct able (without intermediate devices).
- On the same Maestro site, the internal synchronization ports on both Orchestrators must connect to each other with a direct cable or must connect to an isolated dedicated network.
- On the different Maestro sites, the external synchronization ports on the corresponding Orchestrators must connect to each other with a direct cable or must connect to an isolated dedicated network.

Splitting the Ports with Breakout Cables

In This Section:

Breakout Cables	
MHO-175 Splitting Options	
MHO-170 Splitting Options	
MHO-140 Splitting Options	

Breakout Cables

Quantum Maestro Orchestrators have 100 / 40 GbE ports.

With a breakout cable, it is possible to split the supported 100 / 40 GbE port into four 10 GbE ports.

Insert the splitter cables to convert each applicable QSFP28 100 GbE port into four SFP28 10 GbE ports.

Important - The breakout cable that splits 100 GbE port into four 25 GbE ports is not supported.

Example of a breakout cable:



MHO-175 Splitting Options

Explanations

It is possible to split each of the QSFP28 ports 1 to 32 (colored green) into four SFP28 ports.



In MHO-175, all port LEDs are located on the right side.

There are 32 LEDs that correspond to the 32 physical ports.

You can connect 1-to-4 breakout cables to physical ports and get a maximum of 128 logical ports.



After you connect a breakout cable to a physical port, you get *four* additional interfaces starting from the original interface name. You assign these interfaces to Security Groups.

Example - When you connect a breakout cable to the top port 8 (interface "eth1-29"), you get:

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
8	eth1-29	Port 1/8/1
	eth1-30	Port 1/8/2
	eth1-31	Port 1/8/3
	eth1-32	Port 1/8/4

Note - For more information about the ports and interface names in Gaia, see *"Quantum Maestro Orchestrator Ports and Gaia OS Interfaces" on page 222.*

To see the state of split ports, it is necessary to use the control button to select the LED indication mode.

The control button (item 1) selects one of the five available LED indication modes in a cycle.

The four LEDs in the section **SPLIT /1 /2 /3 /4** (item **2**) show the current LED indication mode.

The port LEDs (item 3) show the port state - link (up or down) and traffic (flowing or not).

Indication Mode	LEDs in the section "SPLIT"	Description
0	All LEDs are off	Port LEDs show the state of physical ports. Use this indication mode when no breakout cables are connected.
/1	Only the first LED from the left is lit (/1)	Port LEDs show the state of the first split port of the physical port. Example: If you connect a breakout cable to port 8 (interface eth1-29), then in this LED indication mode /1, the port LED 8 shows the state of the interface eth1-29 (Port 1/8/1).
/2	Only the second LED from the left is lit (/2)	Port LEDs show the state of the second split port of the physical port. Example: If you connect a breakout cable to port 8 (interface eth1-29), then in this LED indication mode /2, the port LED 8 shows the state of the interface eth1-30 (Port 1/8/2).
/3	Only the third LED from the left is lit (/3)	Port LEDs show the state of the third split port of the physical port. Example: If you connect a breakout cable to port 8 (interface eth1-29), then in this LED indication mode /3, the port LED 8 shows the state of the interface eth1-31 (Port 1/8/3).

Indication Mode	LEDs in the section "SPLIT"	Description
/4	Only the fourth LED from the left is lit (/4)	Port LEDs show the state of the fourth split port of the physical port. Example: If you connect a breakout cable to port 8 (interface eth1-29), then in this LED indication mode /4, the port LED 8 shows the state of the interface eth1-32 (Port 1/8/4).

Important:

- After you connect a breakout cable to port 31, the Dual Site External Synchronization works on the 4th split of this port:
 - On the first Orchestrator Port 1/31/4
 - On the second Orchestrator Port 2/31/4
- After you connect a breakout cable to port 32, the Single Site Internal Synchronization works on the 4th split of this port:
 - On the first Orchestrator Port 1/32/4
 - On the second Orchestrator Port 2/32/4

MHO-170 Splitting Options

Explanations

It is possible to split only the **top** QSFP28 odd ports 1 to 29 (colored green) into four SFP28 ports, each.

When the top odd ports 1 to 29 (colored green) are in split mode, the corresponding bottom QSFP28 even ports 2 to 30 are **disabled** (colored red).



Important - It is not supported to connect a breakout cable to Port **31** because it disables the dedicated synchronization Port **32**.

After you connect breakout cables to the top ports, you get *four* additional interfaces starting from the original interface name. You assign these interfaces to Security Groups.

Example - When you connect a breakout cable to the top port 15 (interface "eth1-29"), you get:

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
15	eth1-29	Port 1/15/1
	eth1-30	Port 1/15/2
	eth1-31	Port 1/15/3
	eth1-32	Port 1/15/4

Note - For more information about the ports and interface names in Gaia, see "*Quantum Maestro Orchestrator Ports and Gaia OS Interfaces*" on page 222.

MHO-140 Splitting Options

Explanations

It is possible to split only the **top** QSFP28 ports 49, 51, 53, and 55 (colored green) into four SFP28 ports, each.

When the top ports (colored green) are in a split mode, the corresponding bottom QSFP28 ports 50, 52, 54, and 56 are **disabled** (colored red).



After you connect breakout cables to the supported top ports, you get *four* additional interfaces starting from the original interface name. You assign these interfaces to Security Groups.

Example - When you connect a breakout cable to the top port 49 (eth1-49), you get:

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
49	eth1-49	Port 1/49/1
	eth1-50	Port 1/49/2
	eth1-51	Port 1/49/3
	eth1-52	Port 1/49/4

Note - For more information about the ports and interface names in Gaia, see "*Quantum Maestro Orchestrator Ports and Gaia OS Interfaces*" on page 222.

Single Site

This section describes how to connect cables to Quantum Maestro Orchestrators on the same site.

Connecting Two Quantum Maestro Orchestrators for Redundancy

In This Section:

This section describes the connection of two Quantum Maestro Orchestrators for Redundancy on the same site.

Best Practice - For redundancy, install and connect two Quantum Maestro Orchestrators on the same site.

- Warning It is critical to protect the Maestro Sites against both malicious and unintentional threats:
 - On each Security Appliance, each required network port must connect to Orchestrators with a direct able (without intermediate devices).
 - On the same Maestro site, the internal synchronization ports on both Orchestrators must connect to each other with a direct cable or must connect to an isolated dedicated network.

Diagram

- R Important It is possible to connect only two Quantum Maestro Orchestrators of the same model (see MBS-5038).
- Best Practice Connect cables to the same Uplink and Downlink ports on the two Quantum Maestro Orchestrators (for example, if you connected to an Uplink port 4 on one Quantum Maestro Orchestrator, then you must connect to an Uplink port 4 on the other Quantum Maestro Orchestrator).

Notes:

- This logical diagram is based on MHO-170, but applies equally to all Quantum Maestro Orchestrator models.
- This logical diagram shows two example Security Groups that contain two Security Appliances and two Uplink ports each.

Example for MHO-170:



Explanations

Table: Explanations

ltem	Description
1	Network 1 connected to ports on the Networking Device (3).
2	Network 2 connected to ports on the Networking Device (3).
3	Networking Device (router or switch) that connects your Network 1 and Network 2 to the Quantum Maestro Orchestrators (15 and 16) with Bond interfaces (Link Aggregation).

Table: Ex	planations	(continued)

ltem	Description
4	Bond interface that connects Network 1 to the Quantum Maestro Orchestrators (15 and 16). This Bond interface provides a redundant Uplink connection for the traffic inspected by the Security Appliances (29 and 30) in the applicable Security Group (31).
5	Bond interface that connects Network 2 to the Quantum Maestro Orchestrators (15 and 16). This Bond interface provides a redundant Uplink connection for the traffic inspected by the Security Appliances (26 and 27) in the applicable Security Group (28).
6	SmartConsole Client that connects to the Management Server (7).
7	Management Server that manages Security Groups configured on the Quantum Maestro Orchestrators (15 and 16).
8	Layer 2 switch.
9	 A Breakout cable connected to the Management port 1. See "Splitting the Ports with Breakout Cables" on page 115. Note - You assign this Management port (or these split interfaces) to the applicable Security Groups. Shared Management feature allows to assign the same Management port (interface ethX-MgmtY) on a Quantum Maestro Orchestrator to different Security Groups. The assigned Management port has a different IP address and a different MAC address in each Security Group, to which this port is assigned.
10	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a first slave of the first Bond (4) on the Networking Device (3) to the first Quantum Maestro Orchestrator (15).
11	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a second slave of the first Bond (4) on the Networking Device (3) to the second Quantum Maestro Orchestrator (16).
12	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a first slave of the second Bond (5) on the Networking Device (3) to the first Quantum Maestro Orchestrator (15).
13	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a second slave of the second Bond (5) on the Networking Device (3) to the second Quantum Maestro Orchestrator (16).

Table: Explanations ((continued)
-----------------------	-------------

ltem	Description	
14	Client you can use to configure the Gaia Operating System on the Security Appliances in Security Groups. You connect:	
	 Over SSH to the command line (Gaia Clish) of Security Groups. With a web browser to the Gaia Portal of Security Groups. 	
15	First Quantum Maestro Orchestrator:	
	 Connects Network 1 and Network 2 to the Security Appliances (26, 27, 29, and 30). 	
	 Distributes the traffic between the Security Appliances in the Security Groups. 	
16	Second Quantum Maestro Orchestrator:	
	 Connects Network 1 and Network 2 to the Security Appliances (26, 27, 29, and 30). 	
	 Distributes the traffic between the Security Appliances in the Security Groups. 	
17	A DAC that connects the dedicated Synchronization ports on the Quantum Maestro Orchestrators (15 and 16). important:	
	 This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators. MHO-175 and MHO-170 require a 100 GbE DAC or 40 GbE DAC cable 	
	 MHO-140 requires a 10 GbE DAC cable. 	
18	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a Downlink port on the <i>first</i> Quantum Maestro Orchestrator (15) to the Security Appliance (30).	
19	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a Downlink port on the <i>second</i> Quantum Maestro Orchestrator (16) to the Security Appliance (30).	
20	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a Downlink port on the <i>first</i> Quantum Maestro Orchestrator (15) to the Security Appliance (29).	

Table:	Exp	lanations (continued)
		ana ano no y	

ltem	Description
21	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a Downlink port on the <i>second</i> Quantum Maestro Orchestrator (16) to the Security Appliance (29).
22	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a Downlink port on the <i>first</i> Quantum Maestro Orchestrator (15) to the Security Appliance (27).
23	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a Downlink port on the <i>second</i> Quantum Maestro Orchestrator (16) to the Security Appliance (27).
24	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a Downlink port on the <i>first</i> Quantum Maestro Orchestrator (15) to the Security Appliance (26).
25	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a Downlink port on the <i>second</i> Quantum Maestro Orchestrator (16) to the Security Appliance (26).
26	Security Appliance 2 in the Security Group 2 (28).
27	Security Appliance 1 in the Security Group 2 (28).
28	All Security Appliances assigned to the Security Group 2.
29	Security Appliance 2 in the Security Group 1 (31).
30	Security Appliance 1 in the Security Group 1 (31).
31	All Security Appliances assigned to the Security Group 1.



- Both Quantum Maestro Orchestrators work together (Active / Active).
- Cables colored red show management traffic flow.
- Cables colored green (solid lines) show connections to the first Quantum Maestro Orchestrator (15).
- Cables colored blue (dash lines) show connections to the second Quantum Maestro Orchestrator (16).
- When you assign a Security Appliance to a Security Group, the Quantum Maestro Orchestrators determine the applicable Downlink ports automatically.
- The Quantum Maestro Orchestrators create Link Aggregation for the applicable Downlink ports automatically.
- Security Group 1 contains:
 - Applicable Uplink ports, to which the cables **10** and **11** are connected.
 - Security Appliances **30** and **29**.
 - Applicable management port (or split interface), to which the Management Server **7** is connected.
- Security Group 2 contains:
 - Applicable Uplink ports, to which the cables **12** and **13** are connected.
 - Security Appliances **27** and **26**.
 - Applicable management port (or split interface), to which the Management Server **7** is connected.

Important:

- See the <u>Release Notes for your version</u> for the list of the required Check Point cards on the Security Appliances.
- You must connect the same number of cables from each Quantum Maestro Orchestrator to all Security Appliances in the same Security Group.
 Otherwise, the Quantum Maestro Orchestrators are not able to distribute the traffic equally between the Security Appliances in the same Security Group.
- It is possible to connect a maximum of two Downlink ports from each Quantum Maestro Orchestrator to each Security Appliance.

Connecting cables between the Quantum Maestro Orchestrators and Security Appliances

Connecting cables between Downlink ports on each Quantum Maestro Orchestrator and 2 ports on the Dual Port Card on each Security Appliance

Illustration	Instructions
	 On each Security Appliance (C) in the Security Group: 1. Connect a cable from Port 1 on the Dual Port Card to a Downlink port on the first Orchestrator (A). 2. Connect a cable from Port 2 on the Dual Port Card to a Downlink port on the second Orchestrator (B).

Connecting cables between Downlink ports on each Quantum Maestro Orchestrator and 1 out of 4 ports on the Quad Port Card on each Security Appliance



Connecting cables between Downlink ports on each Quantum Maestro Orchestrator and 2 out of 4 ports on the Quad Port Card on each Security Appliance



Legend

Item	Description
A	First Orchestrator.
В	Second Orchestrator.
С	Security Appliances in Security Groups.
	A DAC cable connected to the dedicated Synchronization ports on the Orchestrators.
	Cables that connect odd ports on the Quad Port Card to the first Orchestrator.
	Cables that connect even ports on the Quad Port Card to the second Orchestrator.
Best Practice for Security Appliances 23000 series: Install the expansion cards in this order:	

- 1. Expansion Slot 3
- 2. Expansion Slot 4
- 3. Expansion Slot 5
- 4. Expansion Slot 1
- 5. Expansion Slot 2

Use Slots 1 and 2 only after all other slots are populated. Overview of the expansion slots on the <u>front panel</u>:

LCD	Slot 4	Slot 5	Storage Devices
Slot 1	Slot 2	Slot 3	Appliance Ports

Workflow

Table: Workflow

Step	Device	Instructions
1	On the Networking Device (3)	 Perform these steps (refer to the device vendor documentation): Configure a first Bond interface (4) on two slave ports. This Bond interface connects Network 1 to the Quantum Maestro Orchestrators. Configure the applicable settings, so that the traffic from and to Network 1 passes only on this Bond interface. Configure a second Bond interface (5) on two slave ports. This Bond interface connects Network 2 to the Quantum Maestro Orchestrators. Configure the applicable settings, so that the traffic from and to Network 2 passes only on this Bond interface. Configure the applicable settings, so that the traffic from and to Network 2 passes only on this Bond interface. With a cable (10), connect the first slave interface of the first Bond (4) interface to an Uplink port (in our example, Port 3) on the <i>first</i> Quantum Maestro Orchestrator (15). With a cable (11), connect the second slave interface of the first Bond (4) interface to an Uplink port (in our example, Port 3) on the <i>second</i> Quantum Maestro Orchestrator (16). With cable (12), connect the first slave interface of the second Bond interface (5) to an Uplink port (in our example, Port 9) on the <i>first</i> Quantum Maestro Orchestrator (15). With cable (13), connect the second slave interface of the second Bond interface (5) to an Uplink port (in our example, Port 9) on the <i>second</i> Quantum Maestro Orchestrator (16).

Step	Device	Instructions
2	On the first Quantum Maestro Orchestrator (15)	 Perform these steps: 1. With cable (18), connect a Downlink port (in our example, Port 18) to the applicable port on the first Security Appliance (30) in the Security Group 1 (31). 2. With cable (20), connect a Downlink port (in our example, Port 22) to the applicable port on the second Security Appliance (29) in the Security Group 1 (31). 3. With cable (22), connect a Downlink port (in our example, Port 26) to the applicable port on the first Security Appliance (27) in the Security Group 2 (28). 4. With cable (24), connect a Downlink port (in our example, Port 30) to the applicable port on the second Security Appliance (26) in the Security Group 2 (28). See these sections: <i>"Connecting cables between Downlink ports on each Quantum Maestro Orchestrator and 2 ports on the Dual Port Card on each Security Appliance" on page 129</i> <i>"Connecting cables between Downlink ports on each Quantum Maestro Orchestrator and 1 out of 4 ports on the Quad Port Card on each Security Appliance" on page 129</i>

Step	Device	Instructions
3	On the second Quantum Maestro Orchestrator (16)	 Perform these steps: 1. With cable (19), connect a Downlink port (in our example, Port 18) to the applicable port on the first Security Appliance (30) in the Security Group 1 (31). 2. With cable (21), connect a Downlink port (in our example, Port 22) to the applicable port on the second Security Appliance (29) in the Security Group 1 (31). 3. With cable (23), connect a Downlink port (in our example, Port 26) to the applicable port on the first Security Appliance (27) in the Security Group 2 (28). 4. With cable (25), connect a Downlink port (in our example, Port 30) to the applicable port on the second Security Appliance (26) in the Security Group 2 (28). See these sections: <i>"Connecting cables between Downlink ports on each Quantum Maestro Orchestrator and 2 ports on the Dual Port Card on each Security Appliance" on page 129</i> <i>"Connecting cables between Downlink ports on each Quantum Maestro Orchestrator and 1 out of 4 ports on the Quad Port Card on each Security Appliance" on page 129</i>
4	On both Quantum Maestro Orchestrators (15 and 16)	Connect a DAC cable (17) between the dedicated synchronization port (in our example, Port 32) on the first Quantum Maestro Orchestrator (15) and the dedicated synchronization port (in our example, Port 32) on the second Quantum Maestro Orchestrator (16).

Step	Device	Instructions
5	On the first Quantum Maestro Orchestrator (15)	With cable (9), connect the Management Server to the Management port (in our example, Port 1). In our example, we used a Breakout cable because we have two Security Groups. For more information that applies to MHO-175, see:
		 "Connecting to the Management Port with DAC or Fiber Cables" on page 138 "Connecting to the Management Port with Breakout Cables" on page 140
		For more information that applies to MHO-170, see:
		 "Connecting to the Management Ports with DAC or Fiber Cables" on page 150 "Connecting to the Management Ports with Breakout Cables" on page 152
		For more information that applies to MHO-140, see:
		 "Connecting to the Management Ports with DAC or Fiber Cables" on page 163

Step Device Instructions 6 One of the two Perform these steps: Quantum 1. Connect to the Gaia Operating System on the Quantum Maestro Maestro Orchestrator. Orchestrators You connect through a dedicated port: (**15** or **16**) In MHO-175 and MHO-170 - the MGMT port on the front panel (top right corner). In MHO-140 - one of the ports **DD** on the rear panel. 2. Create the Security Group 1. Assign these: The two Security Appliances 30 and 29 The two applicable Uplink ports (in our example, Port 1/3/1 and Port 2/3/1) The applicable management port (or split interface) on the Quantum Maestro Orchestrator (in our example, the split Port 1/1/1) See the Maestro Administration Guide for your version > Chapter Configuring Security Groups. 3. Configure the Bond interfaces in the Security Group 1: a. Connect to the Gaia Operating System on the Security Group 1. b. Configure a Bond interface on the applicable two slave Uplink ports (in our example, Port 1/3/1 and Port 2/3/1). This Bond interface provides a redundant Uplink connection for the traffic inspected by the Security Appliances (30 and 29). See the Maestro Administration Guide for your version > Chapter *Configuring Security Groups* > Chapter Configuring Security Groups > Section Configuring Gaia Settings of a Security Group. For information about the configuration of Bond interfaces, see the Gaia Administration Guide for your version. 4. Repeat Steps 2 and 3 to create and configure the Security Group 2: Assign these: The two Security Appliances 27 and 26 The two applicable Uplink ports (in our example, Port 1/9/1 and Port 2/9/1)

Connecting Two Quantum Maestro Orchestrators for Redundancy

Step	Device	Instructions
		 The applicable management port (or split interface) on the Quantum Maestro Orchestrator (in our example, the split Port 1/1/2)

Connecting Cables to MHO-175

In This Section:

Notes:

- The different diagrams below show connections to different ports on the Quantum Maestro Orchestrators.
- It is possible to connect to the Quantum Maestro Orchestrator ports with a DAC cable, Fiber cable (with transceivers), or Breakout cable.
- The sections below provide a high-level description.
- Warning It is critical to protect the Maestro Sites against both malicious and unintentional threats:
 - On each Security Appliance, each required network port must connect to Orchestrators with a direct able (without intermediate devices).
 - On the same Maestro site, the internal synchronization ports on both Orchestrators must connect to each other with a direct cable or must connect to an isolated dedicated network.

Connecting to the Management Port with DAC or Fiber Cables

Important - When you connect two Quantum Maestro Orchestrators for redundancy, the Check Point Management Server connects only to one of the Quantum Maestro Orchestrators.

Example:



Explanations

Item	Description
1	SmartConsole Client for the Check Point Management Server (2).
2	Check Point Management Server.
3	Layer 2 switch.
4	 A DAC cable or Fiber cable (with transceivers) connected to the Management port 1. Note - You assign this Management port to the applicable Security Groups. Shared Management feature allows to assign the same Management port (interface ethX-Mgmt Y) on a Quantum Maestro Orchestrator to different Security Groups. The assigned Management port has a different IP address and a different MAC address in each Security Group, to which this port is assigned.
5	 Client you can use to configure the Gaia Operating System on the Security Appliances in Security Groups, which you manage through Port 1 with the Management Server (2). You connect: Over SSH to the command line (Gaia Clish) of a Security Group. With a web browser to the Gaia Portal of a Security Group.
6	The first Quantum Maestro Orchestrator.

Connecting to the Management Port with Breakout Cables

Important - When you connect two Quantum Maestro Orchestrators for redundancy, the Check Point Management Server connects only to one of the Quantum Maestro Orchestrators.

Example:



Explanations

Item	Description
1	Layer 2 switch. To this switch you connect the Check Point Management Server(s).
2	 A Breakout cable connected to the Management port 1. See "Breakout Cables" on page 115. Notes: This cable splits the Management port 1 into four interfaces. You assign these split Management interfaces to the applicable Security Groups. Shared Management feature allows to assign the same Management port (interface ethX-MgmtY) on a Quantum Maestro Orchestrator to different Security Groups. The assigned Management port has a different IP address and a different MAC address in each Security Group, to which this port is assigned.
3	The first Quantum Maestro Orchestrator.

Connecting to the Uplink Ports with DAC or Fiber Cables

Example of a connection to default Uplink ports 2 to 16:



Explanations

Item	Description
1	Network 1 connected to ports on the Networking Device (3) .
2	Network 2 connected to ports on the Networking Device (3) .
3	Networking Device (router or switch) that connects your Network 1 and Network 2 to the Quantum Maestro Orchestrators (10 and 12) with Bond interfaces (Link Aggregation).
4	Bond interface that connects Network 1 to the Quantum Maestro Orchestrators (10 and 12). This Bond interface provides a redundant Uplink connection for the traffic inspected by the Security Appliances in the applicable Security Group (31).
5	Bond interface that connects Network 2 to the Quantum Maestro Orchestrators (10 and 12). This Bond interface provides a redundant Uplink connection for the traffic inspected by the Security Appliances in the applicable Security Group (30).
6	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a first slave of the first Bond (4) on the Networking Device (3) to an Uplink port (in our example, Port 3) on the first Quantum Maestro Orchestrator (10).
7	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a second slave of the first Bond (4) on the Networking Device (3) to an Uplink port (in our example, Port 3) on the second Quantum Maestro Orchestrator (12).
8	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a first slave of the second Bond (5) on the Networking Device (3) to an Uplink port (in our example, Port 11) on the first Quantum Maestro Orchestrator (10).
9	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a second slave of the second Bond (5) on the Networking Device (3) to an Uplink port (in our example, Port 11) on the second Quantum Maestro Orchestrator (12).
10	First Quantum Maestro Orchestrator.
11	A 100 GbE or 40 GbE DAC cable connected to the dedicated Synchronization ports 32 on the Quantum Maestro Orchestrators. Important - This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators.
12	Second Quantum Maestro Orchestrator.



- Cables colored green (solid lines) show connections to the first Quantum Maestro Orchestrator (10).
- Cables colored blue (dash lines) show connections to the second Quantum Maestro Orchestrator (12).
- You assign the Uplink ports to the applicable Security Groups.
- It is possible to configure some of the Downlink ports as additional Uplink ports.

See the <u>Maestro Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port Settings.

Connecting to the Uplink Ports with Breakout Cables

Example:


ltem	Description
1	Network 1 connected to ports on the Networking Device (3).
2	Network 2 connected to ports on the Networking Device (3).
3	Networking Device (router or switch) that connects your Network 1 and Network 2 to the Quantum Maestro Orchestrators (6 and 8) with Bond interfaces (Link Aggregation).
4	Bond interface that connects Network 1 to the Quantum Maestro Orchestrators (8 and 10). This Bond interface provides a redundant Uplink connection for the traffic inspected by the Security Appliances in the applicable Security Group (31).
5	Bond interface that connects Network 2 to the Quantum Maestro Orchestrators (8 and 10). This Bond interface provides a redundant Uplink connection for the traffic inspected by the Security Appliances in the applicable Security Group (30).
6	A Breakout cable connected to an Uplink port (in our example, Port 3) on the first Quantum Maestro Orchestrator (8). See " <i>Breakout Cables</i> " on page 115. Note - This cable splits the Uplink port into four interfaces. You assign the new interfaces to the applicable Security Groups.
7	A Breakout cable connected to an Uplink port (in our example, Port 13) on the second Quantum Maestro Orchestrator (10). See <i>"Breakout Cables" on page 115</i> . Note - This cable splits the Uplink port into four interfaces. You assign the new interfaces to the applicable Security Groups.
8	First Quantum Maestro Orchestrator.
9	 A 100 GbE DAC cable connected to the dedicated Synchronization ports 32 on the Quantum Maestro Orchestrators. Important - This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators.
10	Second Quantum Maestro Orchestrator.



- Cables colored green (solid lines) show connections to the first Quantum Maestro Orchestrator (10).
- Cables colored blue (dash lines) show connections to the second Quantum Maestro Orchestrator (12).
- You assign the Uplink interfaces to the applicable Security Groups.
- It is possible to configure some of the Downlink ports as additional Uplink ports.

See the <u>Maestro Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port Settings.

Connecting to the Downlink Ports with DAC or Fiber Cables

Example of a connection to default Downlink ports 17 to 30:



Table: Explanations

ltem	Description
1	The first Quantum Maestro Orchestrator.
2	The second Quantum Maestro Orchestrator.
3	 A 100 GbE DAC cable connected to the dedicated Synchronization ports on the Quantum Maestro Orchestrators. Important - This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators.
4	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 20) on the <i>first</i> Quantum Maestro Orchestrator (1) and to the applicable port on the Expansion Line Card on the Security Appliance 16.
5	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 20) on the <i>second</i> Quantum Maestro Orchestrator (2) and to the applicable port on the Expansion Line Card on the Security Appliance 16 .
6	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 22) on the <i>first</i> Quantum Maestro Orchestrator (1) and to the applicable port on the Expansion Line Card on the Security Appliance 15.
7	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 22) on the <i>second</i> Quantum Maestro Orchestrator (2) and to the applicable port on the Expansion Line Card on the Security Appliance 15 .
8	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 24) on the <i>first</i> Quantum Maestro Orchestrator (1) and to the applicable port on the Expansion Line Card on the Security Appliance 13.
9	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 24) on the <i>second</i> Quantum Maestro Orchestrator (2) and to the applicable port on the Expansion Line Card on the Security Appliance 13 .
10	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 26) on the <i>first</i> Quantum Maestro Orchestrator (1) and to the applicable port on the Expansion Line Card on the Security Appliance 12.
11	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 26) on the <i>second</i> Quantum Maestro Orchestrator (2) and to the applicable port on the Expansion Line Card on the Security Appliance 12.
12	A Security Appliance that is assigned to the Security Group 2 (14).

Table: Explanations (continued)

Item	Description
13	A Security Appliance that is assigned to the Security Group 2 (14).
14	All Security Appliances assigned to the Security Group 2.
15	A Security Appliance that is assigned to the Security Group 1 (17).
16	A Security Appliance that is assigned to the Security Group 1 (17).
17	All Security Appliances assigned to the Security Group 1.

Notes:

- Port 32 (colored purple) is the dedicated synchronization port to connect two MHO-175 for redundancy on the same site.
- It is possible to configure some of the Uplink ports as additional Downlink ports.

See the <u>Maestro Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port Settings.

- The Quantum Maestro Orchestrators create Link Aggregation for the applicable Downlink ports automatically.
- See these sections:
 - "Connecting cables between Downlink ports on each Quantum Maestro Orchestrator and 2 ports on the Dual Port Card on each Security Appliance" on page 129
 - "Connecting cables between Downlink ports on each Quantum Maestro Orchestrator and 1 out of 4 ports on the Quad Port Card on each Security Appliance" on page 129

Connecting Cables to MHO-170

In This Section:

Notes:

- The different diagrams below show connections to different ports on the Quantum Maestro Orchestrators.
- It is possible to connect to the Quantum Maestro Orchestrator ports with a DAC cable, Fiber cable (with transceivers), or Breakout cable.
- The sections below provide a high-level description.
- Warning It is critical to protect the Maestro Sites against both malicious and unintentional threats:
 - On each Security Appliance, each required network port must connect to Orchestrators with a direct able (without intermediate devices).
 - On the same Maestro site, the internal synchronization ports on both Orchestrators must connect to each other with a direct cable or must connect to an isolated dedicated network.

Connecting to the Management Ports with DAC or Fiber Cables

Important - When you connect two Quantum Maestro Orchestrators for redundancy, the Check Point Management Server connects only to one of the Quantum Maestro Orchestrators.

Example:

Note - The default Management ports are Port 1 and Port 2. This diagram shows the connection to the Management port 1. The same applies to the Management port 2.



Item	Description
1	SmartConsole Client for the Check Point Management Server (2).
2	Check Point Management Server.
3	Layer 2 switch.
4	 A DAC cable or Fiber cable (with transceivers) connected to the Management port 1. Note - You assign this Management port to the applicable Security Groups. Shared Management feature allows to assign the same Management port (interface ethX-Mgmt Y) on a Quantum Maestro Orchestrator to different Security Groups. The assigned Management port has a different IP address and a different MAC address in each Security Group, to which this port is assigned.
5	 Client you can use to configure the Gaia Operating System on the Security Appliances in Security Groups, which you manage through Port 1 with the Management Server (2). You connect: Over SSH to the command line (Gaia Clish) of a Security Group. With a web browser to the Gaia Portal of a Security Group.
6	The first Quantum Maestro Orchestrator.

Connecting to the Management Ports with Breakout Cables

Important:

- When you connect two Quantum Maestro Orchestrators for redundancy, the Check Point Management Server connects only to one of the Quantum Maestro Orchestrators.
- It is possible to connect breakout cables only to the top odd ports 1 to 29. When the top ports are in a split mode, the bottom even ports 2 to 30 are disabled. The default Management ports are Port 1 and Port 2. When you connect a breakout cable, the Management port 2 is disabled. See "MHO-170 Splitting Options" on page 120.

Example:



Item	Description
1	Layer 2 switch. To this switch you connect the Check Point Management Server(s).
2	 A Breakout cable connected to the Management port 1. See "Breakout Cables" on page 115. Notes: This cable splits the Management port 1 into four interfaces. This connection disables the bottom Management port 2. You assign these split Management interfaces to the applicable Security Groups. Shared Management feature allows to assign the same
	Management port (interface ethX-MgmtY) on a Quantum Maestro Orchestrator to different Security Groups. The assigned Management port has a different IP address and a different MAC address in each Security Group, to which this port is assigned.
3	The first Quantum Maestro Orchestrator.

Connecting to the Uplink Ports with DAC or Fiber Cables

Example of a connection to default Uplink ports 3 to 16:



Item	Description
1	Network 1 connected to ports on the Networking Device (3).
2	Network 2 connected to ports on the Networking Device (3).
3	Networking Device (router or switch) that connects your Network 1 and Network 2 to the Quantum Maestro Orchestrators (10 and 12) with Bond interfaces (Link Aggregation).
4	Bond interface that connects Network 1 to the Quantum Maestro Orchestrators (10 and 12). This Bond interface provides a redundant Uplink connection for the traffic inspected by the Security Appliances in the applicable Security Group (31).
5	Bond interface that connects Network 2 to the Quantum Maestro Orchestrators (10 and 12). This Bond interface provides a redundant Uplink connection for the traffic inspected by the Security Appliances in the applicable Security Group (30).
6	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a first slave of the first Bond (4) on the Networking Device (3) to an Uplink port (in our example, Port 5) on the first Quantum Maestro Orchestrator (10).
7	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a second slave of the first Bond (4) on the Networking Device (3) to an Uplink port (in our example, Port 5) on the second Quantum Maestro Orchestrator (12).
8	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a first slave of the second Bond (5) on the Networking Device (3) to an Uplink port (in our example, Port 9) on the first Quantum Maestro Orchestrator (10).
9	A DAC cable, Fiber cable (with transceivers), or Breakout cable that connects a second slave of the second Bond (5) on the Networking Device (3) to an Uplink port (in our example, Port 9) on the second Quantum Maestro Orchestrator (12).
10	First Quantum Maestro Orchestrator.
11	 A 100 GbE or 40 GbE DAC cable connected to the dedicated Synchronization ports 32 on the Quantum Maestro Orchestrators. Important - This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators.
12	Second Quantum Maestro Orchestrator.



- Cables colored green (solid lines) show connections to the first Quantum Maestro Orchestrator (10).
- Cables colored blue (dash lines) show connections to the second Quantum Maestro Orchestrator (12).
- You assign the Uplink ports to the applicable Security Groups.
- It is possible to configure some of the Downlink ports as additional Uplink ports.

See the <u>Maestro Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port Settings.

Connecting to the Uplink Ports with Breakout Cables

Important - It is possible to connect breakout cables only to the top ports. When the specific top ports are in a split mode, the corresponding bottom ports are disabled.

Example:



Item	Description
1	Network 1 connected to ports on the Networking Device (3).
2	Network 2 connected to ports on the Networking Device (3) .
3	Networking Device (router or switch) that connects your Network 1 and Network 2 to the Quantum Maestro Orchestrators (6 and 8) with Bond interfaces (Link Aggregation).
4	Bond interface that connects Network 1 to the Quantum Maestro Orchestrators (8 and 10). This Bond interface provides a redundant Uplink connection for the traffic inspected by the Security Appliances in the applicable Security Group (31).
5	Bond interface that connects Network 2 to the Quantum Maestro Orchestrators (8 and 10). This Bond interface provides a redundant Uplink connection for the traffic inspected by the Security Appliances in the applicable Security Group (30).
6	 A Breakout cable connected to an Uplink port (in our example, Port 5) on the first Quantum Maestro Orchestrator (8). See "Breakout Cables" on page 115. Notes: This cable splits the Uplink port into four interfaces. You assign the new interfaces to the applicable Security Groups. This connection disables the bottom Uplink port (in our example, Port 6).
7	 A Breakout cable connected to an Uplink port (in our example, Port 13) on the second Quantum Maestro Orchestrator (10). See "Breakout Cables" on page 115. Notes: This cable splits the Uplink port into four interfaces. You assign the new interfaces to the applicable Security Groups. This connection disables the bottom Uplink port (in our example, Port 14).
8	First Quantum Maestro Orchestrator.
9	 A 100 GbE DAC cable connected to the dedicated Synchronization ports 32 on the Quantum Maestro Orchestrators. Important - This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators.

Item	Description
10	Second Quantum Maestro Orchestrator.
Notes	5:
•	Cables colored green (solid lines) show connections to the first Quantum Maestro Orchestrator (10). Cables colored blue (dash lines) show connections to the second Quantum Maestro Orchestrator (12). You assign the Uplink interfaces to the applicable Security Groups. It is possible to configure some of the Downlink ports as additional Uplink ports. See the <u>Maestro Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port

Connecting to the Downlink Ports with DAC or Fiber Cables

Example of a connection to default Downlink ports 17 to 30:



Table: Explanations

ltem	Description
1	The first Quantum Maestro Orchestrator.
2	The second Quantum Maestro Orchestrator.
3	 A 100 GbE DAC cable connected to the dedicated Synchronization ports on the Quantum Maestro Orchestrators. Important - This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators.
4	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 20) on the <i>first</i> Quantum Maestro Orchestrator (1) and to the applicable port on the Expansion Line Card on the Security Appliance 16.
5	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 20) on the <i>second</i> Quantum Maestro Orchestrator (2) and to the applicable port on the Expansion Line Card on the Security Appliance 16 .
6	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 22) on the <i>first</i> Quantum Maestro Orchestrator (1) and to the applicable port on the Expansion Line Card on the Security Appliance 15.
7	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 22) on the <i>second</i> Quantum Maestro Orchestrator (2) and to the applicable port on the Expansion Line Card on the Security Appliance 15 .
8	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 24) on the <i>first</i> Quantum Maestro Orchestrator (1) and to the applicable port on the Expansion Line Card on the Security Appliance 13.
9	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 24) on the <i>second</i> Quantum Maestro Orchestrator (2) and to the applicable port on the Expansion Line Card on the Security Appliance 13 .
10	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 26) on the <i>first</i> Quantum Maestro Orchestrator (1) and to the applicable port on the Expansion Line Card on the Security Appliance 12.
11	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 26) on the <i>second</i> Quantum Maestro Orchestrator (2) and to the applicable port on the Expansion Line Card on the Security Appliance 12.
12	A Security Appliance that is assigned to the Security Group 2 (14).

Table: Explanations (continued)

Item	Description
13	A Security Appliance that is assigned to the Security Group 2 (14).
14	All Security Appliances assigned to the Security Group 2.
15	A Security Appliance that is assigned to the Security Group 1 (17).
16	A Security Appliance that is assigned to the Security Group 1 (17).
17	All Security Appliances assigned to the Security Group 1.

Notes:

- Port 32 (colored purple) is the dedicated synchronization port to connect two MHO-170 for redundancy on the same site.
- It is possible to configure some of the Uplink ports as additional Downlink ports.

See the <u>Maestro Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port Settings.

- The Quantum Maestro Orchestrators create Link Aggregation for the applicable Downlink ports automatically.
- See these sections:
 - "Connecting cables between Downlink ports on each Quantum Maestro Orchestrator and 2 ports on the Dual Port Card on each Security Appliance" on page 129
 - "Connecting cables between Downlink ports on each Quantum Maestro Orchestrator and 1 out of 4 ports on the Quad Port Card on each Security Appliance" on page 129

Connecting Cables to MHO-140

In This Section:

Notes:

- The different diagrams below show connections to different ports on the Quantum Maestro Orchestrators.
- It is possible to connect to the Quantum Maestro Orchestrator ports with a DAC cable, Fiber cable (with transceivers), or Breakout cable.
- The sections below provide a high-level description.
- The external synchronization port:
 - Port 56 in R81.10 and higher
 - Port 47 in R80.20SP
- Warning It is critical to protect the Maestro Sites against both malicious and unintentional threats:
 - On each Security Appliance, each required network port must connect to Orchestrators with a direct able (without intermediate devices).
 - On the same Maestro site, the internal synchronization ports on both Orchestrators must connect to each other with a direct cable or must connect to an isolated dedicated network.

Connecting to the Management Ports with DAC or Fiber Cables

Important - When you connect two Quantum Maestro Orchestrators for redundancy, the Check Point Management Server connects only to one of the Quantum Maestro Orchestrators.

Example:

Note - The default Management ports are Ports 1-4. This diagram shows the connection to the Management port 1. The same applies to the Management ports 2, 3 and 4.



Item	Description
1	SmartConsole Client for the Check Point Management Server (2).
2	Check Point Management Server.
3	Layer 2 switch.
4	 A DAC cable or Fiber cable (with transceivers) connected to the Management port 1. Note - You assign this Management port to the applicable Security Groups. Shared Management feature allows to assign the same Management port (interface ethX-Mgmt Y) on a Quantum Maestro Orchestrator to different Security Groups. The assigned Management port has a different IP address and a different MAC address in each Security Group, to which this port is assigned.
5	 Client you can use to configure the Gaia Operating System on the Security Appliances in Security Groups, which you manage through Port 1 with the Management Server (2). You connect: Over SSH to the command line (Gaia Clish) of a Security Group. With a web browser to the Gaia Portal of a Security Group.
6	The first Quantum Maestro Orchestrator.

Connecting to the Uplink Ports with DAC or Fiber Cables

Example of a connection to default Uplink ports 5 to 26:



Example of a connection to default Uplink ports 49 to 56:



ltem	Description
1	Production network 1 that communicates with production network 2 (5) through a Security Group configured on the Quantum Maestro Orchestrator.
2	Layer 2 switch.
3	A DAC or Fiber cable (with transceivers) connected to an Uplink port (in our example, Ports 7 and 49).
4	One of Quantum Maestro Orchestrators.
5	Production network 2 that communicates with production network 1 (1) through a Security Group configured on the Quantum Maestro Orchestrator.
6	A DAC or Fiber cable (with transceivers) connected to an Uplink port (in our example, Ports 16 and 56).
7	Layer 2 switch.
Note	s: You assign the Unlink ports to the applicable Security Group

- You assign the Uplink ports to the applicable Security Group.
- It is possible to configure some of the Downlink ports as additional Uplink ports.

See the <u>Maestro Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port Settings.

Connecting to the Uplink Ports with Breakout Cables

Important - It is possible to connect breakout cables only to the top ports 49, 51, 53, and 55. When the specific top ports are in a split mode, the corresponding bottom ports are disabled.

Example:



Item	Description		
1	Network 1 connected to ports on the Networking Device (3).		
2	Network 2 connected to ports on the Networking Device (3) .		
3	Networking Device (router or switch) that connects your Network 1 and Network 2 to the Quantum Maestro Orchestrators (6 and 8) with Bond interfaces (Link Aggregation).		
4	Bond interface that connects Network 1 to the Quantum Maestro Orchestrators (8 and 10). This Bond interface provides a redundant Uplink connection for the traffic inspected by the Security Appliances in the applicable Security Group (31).		
5	Bond interface that connects Network 2 to the Quantum Maestro Orchestrators (8 and 10). This Bond interface provides a redundant Uplink connection for the traffic inspected by the Security Appliances in the applicable Security Group (30).		
6	 A Breakout cable connected to an Uplink port (in our example, Port 49) on the first Quantum Maestro Orchestrator (8). See "Breakout Cables" on page 115. Notes: This cable splits the Uplink port into four interfaces. You assign the new interfaces to the applicable Security Groups. This connection disables the bottom Uplink port (in our example, Port 50) 		
7	 A Breakout cable connected to an Uplink port (in our example, Port 55) on the second Quantum Maestro Orchestrator (10). See "Breakout Cables" on page 115. Notes: This cable splits the Uplink port into four interfaces. You assign the new interfaces to the applicable Security Groups. This connection disables the bottom Uplink port (in our example, Port 56). 		
8	First Quantum Maestro Orchestrator.		
9	 A 10 GbE DAC cable connected to the dedicated Synchronization ports 48 on the Quantum Maestro Orchestrators. Important - This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators. 		

Item	Description	
10	Second Quantum Maestro Orchestrator.	
Notes:		
:	Cables colored green (solid lines) show connections to the first Quantum Maestro Orchestrator (10). Cables colored blue (dash lines) show connections to the second Quantum	
•	It is possible to configure some of the Downlink ports as additional Uplink ports.	
	See the <u>Maestro Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port	

Settings.

Connecting to the Downlink Ports with DAC or Fiber Cables

Example of a connection to default Downlink ports 27 to 47:



Table: Explanations

ltem	Description
1	The first Quantum Maestro Orchestrator.
2	The second Quantum Maestro Orchestrator.
3	 A 10 GbE DAC cable connected to the dedicated Synchronization ports on the Quantum Maestro Orchestrators. Important - This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators.
4	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 30) on the <i>first</i> Quantum Maestro Orchestrator (1) and to the applicable port on the Expansion Line Card on the Security Appliance 16.
5	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 30) on the <i>second</i> Quantum Maestro Orchestrator (2) and to the applicable port on the Expansion Line Card on the Security Appliance 16 .
6	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 34) on the <i>first</i> Quantum Maestro Orchestrator (1) and to the applicable port on the Expansion Line Card on the Security Appliance 15.
7	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 34) on the <i>second</i> Quantum Maestro Orchestrator (2) and to the applicable port on the Expansion Line Card on the Security Appliance 15 .
8	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 38) on the <i>first</i> Quantum Maestro Orchestrator (1) and to the applicable port on the Expansion Line Card on the Security Appliance 13.
9	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 38) on the <i>second</i> Quantum Maestro Orchestrator (2) and to the applicable port on the Expansion Line Card on the Security Appliance 13 .
10	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 42) on the <i>first</i> Quantum Maestro Orchestrator (1) and to the applicable port on the Expansion Line Card on the Security Appliance 12.
11	A DAC cable or Fiber cable (with transceivers) connected to a Downlink port (in our example, Port 42) on the <i>second</i> Quantum Maestro Orchestrator (2) and to the applicable port on the Expansion Line Card on the Security Appliance 12 .
12	A Security Appliance that is assigned to the Security Group 2 (14).

Table: Explanations (continued)

Item	Description
13	A Security Appliance that is assigned to the Security Group 2 (14).
14	All Security Appliances assigned to the Security Group 2.
15	A Security Appliance that is assigned to the Security Group 1 (17).
16	A Security Appliance that is assigned to the Security Group 1 (17).
17	All Security Appliances assigned to the Security Group 1.

Notes:

- Port 48 (colored purple) is the dedicated synchronization port to connect two MHO-140 for redundancy on the same site.
- It is possible to configure some of the Uplink ports as additional Downlink ports.

See the <u>Maestro Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port Settings.

- The Quantum Maestro Orchestrators create Link Aggregation for the applicable Downlink ports automatically.
- See these sections:
 - "Connecting cables between Downlink ports on each Quantum Maestro Orchestrator and 2 ports on the Dual Port Card on each Security Appliance" on page 129
 - "Connecting cables between Downlink ports on each Quantum Maestro Orchestrator and 1 out of 4 ports on the Quad Port Card on each Security Appliance" on page 129

Dual Site

This section describes the deployment of Quantum Maestro Orchestrators on two different physical sites while each site has two Quantum Maestro Orchestrators.



Note - Quantum Maestro Orchestrators with R80.20SP support the Dual Site deployment starting from R80.20SP Jumbo Hotfix Accumulator Take 163.

It is possible to deploy two Quantum Maestro Orchestrators on each physical site and connect the sites to each other.

The sites synchronize both connections and configuration.

There are three supported configurations for Dual Site:

Configuration	Brief Description
"Dual Site with Direct Connection" on page 174	 Direct connection between Quantum Maestro Orchestrators on both sites. Best Practice - Connect the Site Sync ports directly to avoid connectivity challenges and to avoid relying on configuration of 3rd-party network devices.
"Dual Site with two Switches" on page 193	Quantum Maestro Orchestrators on the same site connect to the same Layer 2 switch. The two Layer 2 switches on both sites connect directly.
"Dual Site with four Switches" on page 207	Every Quantum Maestro Orchestrator on the same site connects to its own Layer 2 switch. Every Layer 2 switch on every site connects directly to its counterpart Layer 2 switch on another site.

Warning:

It is critical to protect the Maestro Sites against both malicious and unintentional threats:

- On each Security Appliance, each required network port must connect to Maestro Orchestrators with a direct able (without intermediate devices).
- On the same Maestro site, the internal synchronization ports on both Orchestrators must connect to each other with a direct cable or must connect to an isolated dedicated network.
- On the different Maestro sites, the external synchronization ports on the corresponding Orchestrators must connect to each other with a direct cable or must connect to an isolated dedicated network.

Dual Site with Direct Connection

O Warning:

It is critical to protect the Maestro Sites against both malicious and unintentional threats:

- On each Security Appliance, each required network port must connect to Maestro Orchestrators with a direct able (without intermediate devices).
- On the same Maestro site, the internal synchronization ports on both Orchestrators must connect to each other with a direct cable or must connect to an isolated dedicated network.
- On the different Maestro sites, the external synchronization ports on the corresponding Orchestrators must connect to each other with a direct cable or must connect to an isolated dedicated network.

Diagram

This example is for MHO-140.

Description

- 1. On each site, two Quantum Maestro Orchestrators are connected for redundancy:
 - On each site, Port 48 on Quantum Maestro Orchestrators is for the internal synchronization.
 - On each site, Port 47 on Quantum Maestro Orchestrators is for the external synchronization between sites.

(Starting in R81.10, Port 56 is the external synchronization port.)

• On each site, each Security Appliance has an Expansion Line Card.

Downlink ports on different Quantum Maestro Orchestrators connect to odd and to even ports on the Expansion Line Card.

- 2. The first Orchestrator on the first site (Orchestrator ID 1_1) connects directly to the first Orchestrator on the second site (Orchestrator ID 2_1).
- 3. The second Orchestrator on the first site (Orchestrator ID 1_2) connects directly to the second Orchestrator on the second site (Orchestrator ID 2_2).

Diagram for MHO-140 with R80.20SP



Table: Explanations

Item	Description
1	DAC cables, Fiber cables (with transceivers), or Breakout cables that connect Downlink ports on the <i>first</i> Quantum Maestro Orchestrator (3) on the <i>first</i> site to the Security Appliance (17 , 19 and 22) on the <i>first</i> site. These cables connect to the <i>odd</i> port of an Expansion Line Card on Security Appliances.
2	The dedicated external synchronization port (Port 47) on the <i>first</i> Quantum Maestro Orchestrator (3) on the <i>first</i> site. This port connects with a DAC cable or Fiber cable (with transceivers) to the dedicated external synchronization port (5) on the <i>first</i> Quantum Maestro Orchestrator (6) on the <i>second</i> site.
3	The first Quantum Maestro Orchestrator on the first site.
4	DAC cables, Fiber cables (with transceivers), or Breakout cables that connect Downlink ports on the <i>first</i> Quantum Maestro Orchestrator (6) on the <i>second</i> site to the Security Appliance (18, 21 and 23) on the <i>second</i> site. These cables connect to the <i>odd</i> port of an Expansion Line Card on Security Appliances.
5	The dedicated external synchronization port (Port 47) on the <i>first</i> Quantum Maestro Orchestrator (6) on the <i>second</i> site. This port connects with a DAC cable or Fiber cable (with transceivers) to the dedicated external synchronization port (2) on the <i>first</i> Quantum Maestro Orchestrator (3) on the <i>first</i> site.
6	The first Quantum Maestro Orchestrator on the second site.
7	 The dedicated internal synchronization port (Port 48) on the <i>first</i> Quantum Maestro Orchestrator (3) on the <i>first</i> site. This port connects with a DAC cable to the dedicated internal synchronization port (15) on the <i>second</i> Quantum Maestro Orchestrator (11) on the <i>first</i> site. Important: This connection is only used to synchronize the configuration of
	 Security Groups between the Quantum Maestro Orchestrators. MHO-175 and MHO-170 require a 100 GbE DAC or 40 GbE DAC cable. MHO-140 requires a 10 GbE DAC cable.

Table: Explanations (continued)

Item	Description
8	 The dedicated internal synchronization port (Port 48) on the <i>first</i> Quantum Maestro Orchestrator (6) on the <i>second</i> site. This port connects with a DAC cable to the dedicated internal synchronization port (16) on the <i>second</i> Quantum Maestro Orchestrator (14) on the <i>second</i> site. Important: This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators. MHO-175 and MHO-170 require a 100 GbE DAC or 40 GbE DAC cable. MHO-140 requires a 10 GbE DAC cable.
9	DAC cables, Fiber cables (with transceivers), or Breakout cables that connect Downlink ports on the <i>second</i> Quantum Maestro Orchestrator (11) on the <i>first</i> site to the Security Appliance (17, 19 and 22) on the <i>first</i> site. These cables connect to the <i>even</i> port of an Expansion Line Card on Security Appliances.
10	The dedicated external synchronization port (Port 47) on the <i>second</i> Quantum Maestro Orchestrator (3) on the <i>first</i> site. This port connects with a DAC cable or Fiber cable (with transceivers) to the dedicated external synchronization port (13) on the <i>second</i> Quantum Maestro Orchestrator (14) on the <i>second</i> site.
11	The second Quantum Maestro Orchestrator on the first site.
12	DAC cables, Fiber cables (with transceivers), or Breakout cables that connect Downlink ports on the <i>second</i> Quantum Maestro Orchestrator (14) on the <i>second</i> site to the Security Appliance (18, 21 and 24). These cables connect to the <i>even</i> port of an Expansion Line Card on Security Appliances.
13	The dedicated external synchronization port (Port 47) on the <i>second</i> Quantum Maestro Orchestrator (14) on the <i>second</i> site. This port connects with a DAC cable or Fiber cable (with transceivers) to the dedicated external synchronization port (10) on the <i>second</i> Quantum Maestro Orchestrator (11) on the <i>first</i> site.
14	The second Quantum Maestro Orchestrator on the second site.

Table: Explanations (continued)

Item	Description		
15	The dedicated internal synchronization port (Port 48) on the <i>second</i> Quantum Maestro Orchestrator (3) on the <i>first</i> site. This port connects with a DAC cable to the dedicated internal synchronization port (7) on the <i>first</i> Quantum Maestro Orchestrator (3) on the <i>first</i> site. important:		
	 Security Groups between the Quantum Maestro Orchestrators. MHO-175 and MHO-170 require a 100 GbE DAC or 40 GbE DAC cable. MHO-140 requires a 10 GbE DAC cable. 		
16	The dedicated internal synchronization port (Port 48) on the <i>second</i> Quantum Maestro Orchestrator (14) on the <i>second</i> site. This port connects with a DAC cable to the dedicated internal synchronization port (7) on the <i>first</i> Quantum Maestro Orchestrator (6) on the <i>first</i> site. important:		
	 This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators. MHO-175 and MHO-170 require a 100 GbE DAC or 40 GbE DAC cable. MHO-140 requires a 10 GbE DAC cable. 		
17	Security Appliance 1 on the <i>first</i> site - member of the Security Group (20).		
18	Security Appliance 1 on the <i>second</i> site - member of the Security Group (20).		
19	Security Appliance 2 on the <i>first</i> site - member of the Security Group (20).		
20	Security Group that contains Security Appliances from both sites (17, 18, 19, 21, 22 and 23).		
21	Security Appliance 2 on the <i>second</i> site - member of the Security Group (20).		
22	Security Appliance 3 on the <i>first</i> site - member of the Security Group (20).		
23	Security Appliance 3 on the <i>second</i> site - member of the Security Group (20).		

Site	Orchestrator	Internal Sync Port	External Sync Port
1	Orchestrator ID 1_1	Port 48	Port 47
	(denoted as MHO 1_1)	IP 192.0.2.1	IP 203.0.113.1
1	Orchestrator ID 1_2	Port 48	Port 47
	(denoted as MHO 1_2)	IP 192.0.2.2	IP 203.0.113.2
2	Orchestrator ID 2_1	Port 48	Port 47
	(denoted as MHO 2_1)	IP 192.0.2.15	IP 203.0.113.15
2	Orchestrator ID 2_2	Port 48	Port 47
	(denoted as MHO 2_2)	IP 192.0.2.16	IP 203.0.113.16

Configuration of the synchronization ports:

Configuring Dual Site with Direct Connection

This procedure explains how to configure a new Security Group that contains Security Appliances from two sites in a new Dual Site configuration.

Important - Make sure to read the existing Known Limitations for Dual Site in <u>sk148074</u>.

Warning - This procedure interrupts the traffic. Schedule a maintenance window.

Step	Instructions		
1	On each site, install the Quantum Maestro Orchestrators in their racks. Follow the applicable instructions:		
	 "Mounting the Quantum Maestro Orchestrator MHO-175 in a Rack" on page 86 		
	 "Mounting the Quantum Maestro Orchestrator MHO-140 and MHO-170 in a Rack" on page 101 		
2	On each site, connect the cables between:		
	 The dedicated internal synchronization ports on the Quantum Maestro Orchestrators. 		
	The Security Appliances and the Downlink ports on the Quantum Maestro Orchestrators.		
	 The production traffic networks and the Uplink ports on the Quantum Maestro Orchestrators. 		
	Follow:		
	 "Connecting Two Quantum Maestro Orchestrators for Redundancy" on page 123. 		
	Connecting Cables to MHO-175" on page 138		
	 "Connecting Cables to MHO-1/0" on page 150. "Connecting Cables to MHO-140" on page 163. 		
Step	Instructions		
------	---	--	--
3	On each site, connect fiber cables (with transceivers) or DAC cables between the dedicated external synchronization ports on the Quantum Maestro Orchestrator.		
	Procedure		
	 You must connect fiber cables between ports with the same numbers on the Quantum Maestro Orchestrators on each site. Connect fiber cables between these pairs of Quantum Maestro Orchestrators: a. The first Orchestrator on the first site (Orchestrator ID 1_1). The first Orchestrator on the second site (Orchestrator ID 2_1). Connect ports with the same numbers. b. The second Orchestrator on the first site (Orchestrator ID 1_2). The second Orchestrator on the second site (Orchestrator ID 1_2). The second Orchestrator on the second site (Orchestrator ID 1_2). Connect ports with the same numbers. b. The second Orchestrator on the second site (Orchestrator ID 1_2). The second Orchestrator on the second site (Orchestrator ID 2_2). Connect ports with the same numbers. Sest Practice: On MHO-175 and MHO-170, use Ports 31 on the Quantum Maestro Orchestrators on each site. On MHO-140, use Ports 47 on the Quantum Maestro Orchestrators on each site. Do not use ports with the configured type "management". It is possible to use any port for external synchronization, except these ports: The ports already used for the internal synchronization. The disabled ports, if you used breakout cables. See "Splitting the Ports with Breakout Cables" on page 115. 		
4	Use an SSH Client or a Serial Console to connect to the command line on each Quantum Maestro Orchestrator on each site.		

Step	Instructions
5	On each site, configure the dedicated ports for the external synchronization on the Quantum Maestro Orchestrators.
	a. Configure the dedicated port
	You must connect to and configure ports with the same numbers on the Quantum Maestro Orchestrators on each site. Run this command in Gaia Clish:
	set maestro port < <i>Quantum Maestro Orchestrator</i> ID>/ <port label="">/<port id="" split=""> type site_sync</port></port>
	Example for MHO-140:
	Orch_1_1> set maestro port 1/47/1 type site_sync Orch_2_1> set maestro port 1/47/1 type site_sync Orch_1_2> set maestro port 2/47/1 type site_sync Orch_2_2> set maestro port 2/47/1 type site_sync
	 For information about this Gaia Clish command, see the <u>Maestro</u> <u>Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port Settings. b. Restart the 'orchd' daemon
	Log in to the Expert mode and run this command:
	orchd restart
	Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts.
6	On each site, configure the total number of Sites on each Quantum Maestro Orchestrator.
	Procedure
	Run this command in Gaia Clish:
	set maestro configuration orchestrator-site-amount 2
	For information about this Gaia Clish command, see the <u>Maestro</u> <u>Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Number of Maestro Sites.

Step	Instructions			
7	Configure the Site ID on each Quantum Maestro Orchestrator.			
	Configuring the Site ID on the first site			
	 Configure the same Site ID 1 on each Orchestrator. Run this command in Gaia Clish: 			
	set maestro configuration orchestrator-site-id 1			
	 For information about this Gaia Clish command, see the <u>Maestro</u> <u>Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Site ID in Dual Site Deployment. b. Restart the orchd daemon on each Orchestrator. 			
	Log in to the Expert mode and run this command:			
	Marrie Marrie Marrie			
	Orchestrator until this daemon restarts.			
	Configuring the Site ID on the second site			
	 a. Configure the same Site ID 2 on each Orchestrator. Run this command in Gaia Clish: 			
	set maestro configuration orchestrator-site-id 2			
	 b. Restart the orchd daemon on each Orchestrator. Log in to the Expert mode and run this command: 			
	orchd restart			
	Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts.			
8	Follow these configuration steps:			
	 a. Configure the applicable Security Groups on the Quantum Maestro Orchestrators. b. Configure the Gaia Operating System settings in the new Security Group. c. Configure the settings in SmartConsole. 			
	See the <u>Maestro Administration Guide for your version</u> > Chapter Configuring Security Groups.			



Step	Instructions		
	 To create a new Security Group when the SMO Image Cloning is disabled, follow the procedure below. 		
	Procedure		
	a. Create a new Security Group that contains interfaces and Security Appliances only from Site 1.		
	b. Connect to the command line of the Security Group over SSH at <ip address="" group="" of="" security="">.</ip>		
	When you log in, the Gaia gClish opens by default.		
	Important - This connection goes through the Quantum Maestro Orchestrator's management interface you assigned to this On south Orchestry		
	to this Security Group.		
	c. Configure the total number of Sites:		
	set smo security-group site-amount 2		
	d. Add to this Security Group the Security Appliances from Site 2.		

Migrating from Single Site to Dual Site

a

This procedure explains to change the configuration of an existing Security Group to contain Security Appliances from two sites.

Important - Make sure to read the existing Known Limitations for Dual Site in <u>sk148074</u>.

Warning - This procedure interrupts the traffic. Schedule a maintenance window.

Step	Instructions
1	On the new site , install the Quantum Maestro Orchestrators in their racks. Follow the applicable instructions:
	 "Mounting the Quantum Maestro Orchestrator MHO-175 in a Rack" on page 86 "Mounting the Quantum Maestro Orchestrator MHO-140 and MHO-170 in a Rack" on page 101

Step	Instructions		
2	On the new site , connect the cables between:		
	 The dedicated internal synchronization ports on the Quantum Maestro Orchestrators. The Security Appliances and the Downlink ports on the Quantum Maestro Orchestrators. The production traffic networks and the Uplink ports on the Quantum Maestro Orchestrators. 		
	Follow:		
	 "Connecting Two Quantum Maestro Orchestrators for Redundancy" on page 123. "Connecting Cables to MHO-175" on page 138 "Connecting Cables to MHO-170" on page 150 "Connecting Cables to MHO-140" on page 163. 		

Step	Instructions		
3	On each site, connect fiber cables (with transceivers) or DAC cables between the dedicated external synchronization ports on the Quantum Maestro Orchestrator.		
	Procedure		
	 You must connect fiber cables between ports with the same numbers on the Quantum Maestro Orchestrators on each site. Connect fiber cables between these pairs of Quantum Maestro Orchestrators: a. The first Orchestrator on the first site (Orchestrator ID 1_1). The first Orchestrator on the second site (Orchestrator ID 2_1). Connect ports with the same numbers. b. The second Orchestrator on the first site (Orchestrator ID 1_2). The second Orchestrator on the second site (Orchestrator ID 1_2). The second Orchestrator on the second site (Orchestrator ID 1_2). Connect ports with the same numbers. connect ports with the same numbers. Best Practice: On MHO-175 and MHO-170, use Ports 31 on the Quantum Maestro Orchestrators on each site. On MHO-140, use Ports 47 on the Quantum Maestro Orchestrators on each site. Do not use ports with the configured type "management". It is possible to use any port for external synchronization, except these ports: The ports already used for the internal synchronization. The disabled ports, if you used breakout cables. See "Splitting the Ports with Breakout Cables" on page 115. 		
4	Use an SSH Client or a Serial Console to connect to the command line on each Quantum Maestro Orchestrator on each site.		
5	On each site, configure the total number of Sites on each Quantum Maestro Orchestrator. Run this command in Gaia Clish: set maestro configuration orchestrator-site-amount 2		

Step	Instructions	
6	Configure the Site ID on each Quantum Maestro Orchestrator.	
	Configuring the Site ID on the first site	
	 Configure the same Site ID 1 on each Orchestrator: Run this command in Gaia Clish: 	
	set maestro configuration orchestrator-site-id 1	
	 b. Restart the orchd daemon on each Orchestrator. Log in to the Expert mode and run this command: 	
	orchd restart	
	Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts.	
	Configuring the Site ID on the second site	
	a. Configure the same Site ID 2 on each Orchestrator: Run this command in Gaia Clish:	
	set maestro configuration orchestrator-site-id 2	
	 b. Restart the orchd daemon on each Orchestrator. Log in to the Expert mode and run this command: 	
	orchd restart	
	Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts.	
7	Make sure the date and time are the same on all Quantum Maestro Orchestrators on both sites. Bun these commands in Gaia Clish:	
	show date	
	show time	
	show timezone	
	show ntp active	
	For more information, see the Gaia Administration Guide for your version.	

Step	Instructions	
8	On the existing site (Site ID 1), back up the current configuration on each Quantum Maestro Orchestrator (Orchestrator ID 1_1 and Orchestrator ID 1_2	
	Procedure	
	 a. Log in to the Expert mode. b. Back up the /etc/maestro.json file to some directory (for example, your home directory): 	
	cp -v /etc/maestro.json ~/maestro.json_BKP	
	c. Back up the /etc/maestro_full.json file to some directory (for example, your home directory):	
	cp -v /etc/maestro_full.json ~/maestro_full.json_ BKP	

Step	Instruc	tions
 8 On the new site (Site ID 2), configure the dedicated ports for the extern synchronization on the Quantum Maestro Orchestrators (Orchestrator and Orchestrator ID 2_2). Warning - You must perform this step on the Quantum Maestro Orchestrators on the new site <i>before</i> you perform this step on the Quantum Maestro Orchestrators on the existing site. This is to ma the current configuration is preserved on the new site. 		new site (Site ID 2), configure the dedicated ports for the external onization on the Quantum Maestro Orchestrators (Orchestrator ID 2_1 chestrator ID 2_2). arning - You must perform this step on the Quantum Maestro chestrators on the new site <i>before</i> you perform this step on the lantum Maestro Orchestrators on the existing site. This is to make sure a current configuration is preserved on the new site.
	a. b.	Log in to Gaia Clish. Configure the dedicated port. You must connect and configure ports with the same numbers on the Quantum Maestro Orchestrators on each site.
		<pre>set maestro port <quantum id="" maestro="" orchestrator="">/<port label="">/<port id="" split=""> type site_sync</port></port></quantum></pre>
		Example for MHO-140:
		Orch_2_1> set maestro port 2/47/1 type site_sync Orch_2_2> set maestro port 2/47/1 type site_sync
	c. d.	For information about this Gaia Clish command, see the <u>Maestro</u> <u>Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port Settings. Log in to the Expert mode. Restart the orchd daemon. orchd restart
		Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts.

Step	Instructions			
9	 On the existing site (Site ID 1), configure the dedicated ports for the external synchronization on the Quantum Maestro Orchestrators (Orchestrator ID 1_1 and Orchestrator ID 1_2). Warning - You must perform this step on the Quantum Maestro Orchestrators on the new site <i>before</i> you perform this step on the Quantum Maestro Orchestrators on the existing site. This is to make sure the current configuration is preserved on the new site. 			
	Procedure			
	 a. Log in to Gaia Clish. b. Configure the dedicated port. You must connect and configure ports with the same numbers on the Quantum Maestro Orchestrators on each site. 			
	<pre>set maestro port <quantum id="" maestro="" orchestrator="">/<port label="">/<port id="" split=""> type site_sync</port></port></quantum></pre>			
	Example for MHO-140:			
	Orch_1_1> set maestro port 1/47/1 type site_sync Orch_1_2> set maestro port 1/47/1 type site_sync			
	c. Log in to the Expert mode.d. Restart the orchd daemon.			
	orchd restart			
	Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts.			
10	On the new site (Site ID 2), restart the orchd daemon on each Quantum Maestro Orchestrator (Orchestrator ID 2_1 and Orchestrator ID 2_2). This forces the new site to synchronize the applicable configuration from the existing site.			
	Procedure			
	a. Log in to the Expert mode.b. Restart the 'orchd' daemon			
	orchd restart			
	Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts.			

Step	Instructions		
11	On the existing site (Site ID 1), apply the current configuration on the first Orchestrator (Orchestrator ID 1_1). It is possible to apply the current configuration in one of these ways:		
	In Gaia Portal		
	For information, see the <u>Maestro Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Portal.		
	a. With a web browser, connect to the Gaia Portal on the Quantum Maestro Orchestrator:		
	https:// <ip address="" mgmt="" of="" orchestrator's="" port=""></ip>		
	 b. Log in to the Gaia Portal. c. From the left navigation tree, click Orchestrator page. d. In the bottom left corner, click Apply. 		
	In Gaia Clish		
	For information, see the <u>Maestro Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish.		
	a. Connect to the command line on the Quantum Maestro Orchestrator.b. Log in to Gaia Clish.c. Apply the configuration:		
	set maestro security-group apply-new-config		
12	 Optional: Enable the SMO Image Cloning. See the <u>Gaia Administration Guide for your version</u> > Chapter Maintenance > Section Snapshot Management > Section SMO Image Cloning. Set Practice - Enable the SMO Image Cloning. Security Group Members use this feature to download automatically all Hotfixes installed on the SMO. 		
13	On the existing site (Site ID 1), add Security Appliances from the new site (Site ID 2) to this Security Group. It is possible to change the configuration in one of these ways: In Gaia Portal In Gaia Clish		
	See the <i>Maestro Administration Guide for your version</i> > Chapter Configuring Security Groups.		

Dual Site with two Switches

Warning - When you connect the external synchronization ports of Orchestrators on different Maestro Sites through switches (and not directly to each other), make sure your Layer 2 network between Orchestrators is secured.

Diagram

This example is for MHO-140.

Description

- 1. On each site, two Quantum Maestro Orchestrators are connected for redundancy:
 - On each site, Port 48 on Quantum Maestro Orchestrators is for the internal synchronization.
 - On each site, Port 47 on Quantum Maestro Orchestrators is for the external synchronization between sites.

This Port 47 on Quantum Maestro Orchestrators connects to the Layer 2 Switch on the site.

(Starting in R81.10, Port 56 is the external synchronization port.)

• On each site, each Security Appliance has an Expansion Line Card.

Downlink ports on different Quantum Maestro Orchestrators connect to odd and to even ports on the Expansion Line Card.

- 2. Port 47 on the first Orchestrator on the first site (Orchestrator ID 1_1) connects to the Layer 2 Switch (to Port 1) on the first site.
- 3. Port 47 on the second Orchestrator on the first site (Orchestrator ID 1_2) connects to the same Layer 2 Switch (to Port 2) on the first site.
- 4. Port 47 on the first Orchestrator on the second site (Orchestrator ID 2_1) connects to the Layer 2 Switch (to Port 1) on the second site.
- 5. Port 47 on the second Orchestrator on the second site (Orchestrator ID 2_2) connects to the same Layer 2 Switch (to Port 2) on the second site.
- 6. The Layer 2 Switch (Port 32) on the first site connects directly to the Layer 2 Switch (to Port 32) on the second site.



Diagram for MHO-140 with R80.20SP

Explanations

Table: Explanations

Item	Description
1	A port on the Layer 2 switch on the <i>first</i> site (3) that connects to a corresponding port (2) on the Layer 2 switch on the <i>second</i> site (5).
2	A port on the Layer 2 switch on the <i>second</i> site (5) that connects to a corresponding port (1) on the Layer 2 switch on the <i>first</i> site (3).
3	The Layer 2 switch on the <i>first</i> site.
4	Port on the Layer 2 switch on the <i>first</i> site that connects to the dedicated external synchronization port (10) on the <i>first</i> Quantum Maestro Orchestrator (11) on the <i>first</i> site.
5	The Layer 2 switch on the <i>second</i> site.
6	Port on the Layer 2 switch on the <i>second</i> site that connects to the dedicated external synchronization port (13) on the <i>first</i> Quantum Maestro Orchestrator (14) on the <i>second</i> site.
7	Port on the Layer 2 switch on the <i>first</i> site that connects to the dedicated external synchronization port (18) on the <i>second</i> Quantum Maestro Orchestrator (19) on the <i>first</i> site.
8	Port on the Layer 2 switch on the <i>second</i> site that connects to the dedicated external synchronization port (21) on the <i>second</i> Quantum Maestro Orchestrator (22) on the <i>second</i> site.
9	DAC cables, Fiber cables (with transceivers), or Breakout cables that connect Downlink ports on the <i>first</i> Quantum Maestro Orchestrator (11) on the <i>first</i> site to the Security Appliance (25 , 27 and 30) on the <i>first</i> site. These cables connect to the <i>odd</i> port of an Expansion Line Card on Security Appliances.
10	The dedicated external synchronization port (Port 47) on the <i>first</i> Quantum Maestro Orchestrator (11) on the <i>first</i> site. This port connects with a DAC cable or Fiber cable (with transceivers) to the Layer 2 switch (3 to port 4) on the <i>first</i> site.
11	The first Quantum Maestro Orchestrator on the first site.

Table: Explanations (continued)

ltem	Description
12	DAC cables, Fiber cables (with transceivers), or Breakout cables that connect Downlink ports on the <i>first</i> Quantum Maestro Orchestrator (14) on the <i>second</i> site to the Security Appliance (26, 29 and 31) on the <i>second</i> site. These cables connect to the <i>odd</i> port of an Expansion Line Card on Security Appliances.
13	The dedicated external synchronization port (Port 47) on the <i>first</i> Quantum Maestro Orchestrator (14) on the <i>second</i> site. This port connects with a DAC cable or Fiber cable (with transceivers) to the Layer 2 switch (5 to port 6) on the <i>first</i> site.
14	The first Quantum Maestro Orchestrator on the second site.
15	The dedicated internal synchronization port (Port 48) on the <i>first</i> Quantum Maestro Orchestrator (11) on the <i>first</i> site. This port connects with a DAC cable to the dedicated internal synchronization port (23) on the <i>second</i> Quantum Maestro Orchestrator (19) on the <i>first</i> site. Important:
	 This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators. MHO-175 and MHO-170 require a 100 GbE DAC or 40 GbE DAC cable. MHO-140 requires a 10 GbE DAC cable.
16	 The dedicated internal synchronization port (Port 48) on the <i>first</i> Quantum Maestro Orchestrator (14) on the <i>second</i> site. This port connects with a DAC cable to the dedicated internal synchronization port (24) on the <i>second</i> Quantum Maestro Orchestrator (22) on the <i>second</i> site. important:
	 This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators. MHO-175 and MHO-170 require a 100 GbE DAC or 40 GbE DAC cable. MHO-140 requires a 10 GbE DAC cable.
17	DAC cables, Fiber cables (with transceivers), or Breakout cables that connect Downlink ports on the <i>second</i> Quantum Maestro Orchestrator (19) on the <i>first</i> site to the Security Appliance (25 , 27 and 30) on the <i>first</i> site. These cables connect to the <i>even</i> port of an Expansion Line Card on Security Appliances.

Table: Explanations (continued)

ltem	Description	
18	The dedicated external synchronization port (Port 47) on the <i>second</i> Quantum Maestro Orchestrator (19) on the <i>first</i> site. This port connects with a DAC cable or Fiber cable (with transceivers) to the Layer 2 switch (3 to port 7) on the <i>first</i> site.	
19	The second Quantum Maestro Orchestrator on the first site.	
20	DAC cables, Fiber cables (with transceivers), or Breakout cables that connect Downlink ports on the <i>second</i> Quantum Maestro Orchestrator (22) on the <i>second</i> site to the Security Appliance (26 , 29 and 31) on the <i>second</i> site. These cables connect to the <i>even</i> port of an Expansion Line Card on Security Appliances.	
21	The dedicated external synchronization port (Port 47) on the <i>second</i> Quantum Maestro Orchestrator (14) on the <i>second</i> site. This port connects with a DAC cable or Fiber cable (with transceivers) to the Layer 2 switch (5 to port 8) on the <i>second</i> site.	
22	The second Quantum Maestro Orchestrator on the second site.	
23	The dedicated internal synchronization port (Port 48) on the <i>second</i> Quantum Maestro Orchestrator (19) on the <i>first</i> site. This port connects with a DAC cable to the dedicated internal synchronization port (15) on the <i>first</i> Quantum Maestro Orchestrator (11) on the <i>first</i> site. important:	
	 This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators. MHO-175 and MHO-170 require a 100 GbE DAC or 40 GbE DAC cable. MHO-140 requires a 10 GbE DAC cable. 	
24	The dedicated internal synchronization port (Port 48) on the <i>second</i> Quantum Maestro Orchestrator (22) on the <i>second</i> site. This port connects with a DAC cable to the dedicated internal synchronization port (16) on the <i>first</i> Quantum Maestro Orchestrator (14) on the <i>first</i> site. Important:	
	 This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators. MHO-175 and MHO-170 require a 100 GbE DAC or 40 GbE DAC cable. MHO-140 requires a 10 GbE DAC cable. 	

Table: Explanations	(continued)
---------------------	-------------

ltem	Description
25	Security Appliance 1 on the <i>first</i> site - member of the Security Group (28).
26	Security Appliance 1 on the <i>second</i> site - member of the Security Group (28).
27	Security Appliance 2 on the <i>first</i> site - member of the Security Group (28).
28	Security Group that contains Security Appliances from both sites (25, 26, 27, 29, 30 and 31).
29	Security Appliance 2 on the <i>second</i> site - member of the Security Group (28).
30	Security Appliance 3 on the <i>first</i> site - member of the Security Group (28).
31	Security Appliance 3 on the <i>second</i> site - member of the Security Group (28).

Configuration of the synchronization ports:

Site	Orchestrator	Internal Sync Port	External Sync Port
1	Orchestrator ID 1_1	Port 48	Port 47
	(denoted as MHO 1_1)	IP 192.0.2.1	IP 203.0.113.1
1	Orchestrator ID 1_2	Port 48	Port 47
	(denoted as MHO 1_2)	IP 192.0.2.2	IP 203.0.113.2
2	Orchestrator ID 2_1	Port 48	Port 47
	(denoted as MHO 2_1)	IP 192.0.2.15	IP 203.0.113.15
2	Orchestrator ID 2_2	Port 48	Port 47
	(denoted as MHO 2_2)	IP 192.0.2.16	IP 203.0.113.16

Requirements

1. Layer 2 switches must support VLAN Q-in-Q Tunneling (encapsulation of 802.1Q VLAN inside 802.1Q VLAN).

Site	Switch	Port	Port Configuration
1 and 2	SW 1 and SW 2	1	 VLAN Trunk that accepts these VLAN IDs: 3600[*] (used for a site internal synchronization) 3951 (used for external synchronization)
1 and 2	SW 1 and SW 2	2	 VLAN Trunk that accepts these VLAN IDs: 3601[*] (used for a site internal synchronization) 3952 (used for external synchronization)
1 and 2	SW 1 and SW 2	32	 VLAN Trunk that accepts these VLAN IDs: 3600[*] (used for a site internal synchronization) 3601[*] (used for a site internal synchronization) 3951 (used for external synchronization) 3952 (used for external synchronization)

You must configure VLAN Trunks and Q-in-Q exactly as described below:

Important:

- VLAN ID 3951 and VLAN ID 3952:
 - Starting from the version R81.10, it is possible to change the default VLAN IDs with this command:

set maestro configuration orchestrators basevlan <VLAN ID 1> <VLAN ID 2> ... <VLAN ID N>

- In the version R80.20SP, it is not possible to change these VLAN IDs.
- *The default Site Sync VLAN IDs are:
 - 3600 on Orchestrator ID 1_1 and Orchestrator ID 2_1
 - 3601 on Orchestrator ID 1_2 and Orchestrator ID 2_2

If these default Site Sync VLAN IDs conflict with the existing VLAN IDs in your environment, then it is possible to change the Base Site Sync VLAN IDs on Quantum Maestro Orchestrators.

- 2. Latency between the Layer 2 switches on different sites must be lower than 100ms.
- 3. Packet lost between the Layer 2 switches on different sites must be lower than 5%.

Configuring Dual Site with two Switches

This procedure explains how to configure a new Security Group that contains Security Appliances from two sites in a new Dual Site configuration.

Important - Make sure to read the existing Known Limitations for Dual Site in <u>sk148074</u>.

Warning - This procedure interrupts the traffic. Schedule a maintenance window.

Step	Instructions
1	On each site, install the Quantum Maestro Orchestrators in their racks. Follow the applicable instructions:
	 "Mounting the Quantum Maestro Orchestrator MHO-175 in a Rack" on page 86
	 "Mounting the Quantum Maestro Orchestrator MHO-140 and MHO-170 in a Rack" on page 101
2	On each site, connect the cables between:
	 The dedicated internal synchronization ports on the Quantum Maestro Orchestrators. The Security Appliances and the Downlink ports on the Quantum
	Maestro Orchestrators.
	 The production traffic networks and the Uplink ports on the Quantum Maestro Orchestrators.
	Follow:
	 "Connecting Two Quantum Maestro Orchestrators for Redundancy" on page 123.
	 "Connecting Cables to MHO-175" on page 138
	 "Connecting Cables to MHO-170" on page 150. "Connecting Cables to MHO 140" on page 163

Step	Instructions
3	On each site, connect fiber cables (with transceivers) or DAC cables between the dedicated external synchronization ports on the Quantum Maestro Orchestrator and the ports on the Layer 2 switch.
	 On MHO-175 and MHO-170, use Ports 31 on the Quantum Maestro Orchestrators on each site. On MHO-140, use Ports 47 on the Quantum Maestro Orchestrators on each site. Do not use ports with the configured type "management". On the Layer 2 switches on different sites, connect Quantum Maestro Orchestrators to ports with the same numbers: Connect Orchestrator ID 1_1 and Orchestrator ID 2_1 to port X on the switches Connect Orchestrator ID 1_2 and Orchestrator ID 2_2 to port Y on the switches
	It is possible to use any port for external synchronization, except these ports:
	 The ports already used for the internal synchronization. The disabled ports, if you used breakout cables. See "Splitting the Ports with Breakout Cables" on page 115.
4	Use an SSH Client or a Serial Console to connect to the command line on each Quantum Maestro Orchestrator on each site.

Step	Instructions
5	On each site, configure the dedicated ports for the external synchronization on the Quantum Maestro Orchestrators.
	a. Configure the dedicated port
	You must connect and configure ports with the same numbers on the Quantum Maestro Orchestrators on each site. Run this command in Gaia Clish:
	set maestro port < <i>Quantum Maestro Orchestrator</i> ID>/ <port label="">/<port id="" split=""> type site_sync</port></port>
	Example for MHO-140:
	Orch_1_1> set maestro port 1/47/1 type site_sync Orch_2_1> set maestro port 1/47/1 type site_sync Orch_1_2> set maestro port 2/47/1 type site_sync Orch_2_2> set maestro port 2/47/1 type site_sync
	 For information about this Gaia Clish command, see the <u>Maestro</u> <u>Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port Settings. b. Restart the 'orchd' daemon
	Log in to the Expert mode and run this command:
	orchd restart
	Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts.
6	On each site, configure the total number of Sites on each Quantum Maestro Orchestrator.
	Procedure
	Run this command in Gaia Clish:
	set maestro configuration orchestrator-site-amount 2
	For information about this Gaia Clish command, see the <u>Maestro</u> <u>Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Number of Maestro Sites.

Step	Instructions		
7	Configure the Site ID on each Quantum Maestro Orchestrator.		
	Configuring the Site ID on the first site		
	 a. Log in to Gaia Clish. b. Configure the same Site ID 1 on each Orchestrator: 		
	set maestro configuration orchestrator-site-id 1		
	 For information about this Gaia Clish command, see the <u>Maestro</u> <u>Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Site ID in Dual Site Deployment. c. Restart the orchd daemon on each Orchestrator. Log in to the Expert mode and run this command: orchd restart Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts. 		
	a. Log in to Gaia Clish.		
	b. Configure the same Site ID 2 on each Orchestrator:		
	set maestro configuration orchestrator-site-id 2		
	c. Restart the orchd daemon on each Orchestrator. Log in to the Expert mode and run this command:		
	orchd restart		
	Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts.		

Step	Instructions
8	Optional: Configure a new Base Site Sync VLAN ID on each Quantum Maestro Orchestrator. This step applies if the default Site Sync VLAN IDs 3600 and 3601 conflict with the existing VLAN IDs in your environment. For information about the Base Site Sync VLAN ID, see the <u>Maestro</u> <u>Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Base Site Sync VLAN ID in Dual Site Deployment.
	Explanation The default Site Sync VLAN IDs are:
	 3600 on Orchestrator ID 1_1 and Orchestrator ID 2_1 3601 on Orchestrator ID 1_2 and Orchestrator ID 2_2
	If you configure a new Base Site Sync VLAN ID, then Quantum Maestro Orchestrators assign the new Site Sync VLAN IDs in this way:
	 Orchestrator ID 1_1 and Orchestrator ID 2_1 use the Site Sync VLAN ID based on this formula: (Base Site Sync VLAN ID you configured) + 0 Orchestrator ID 1_2 and Orchestrator ID 2_2 use the Site Sync VLAN ID based on this formula: (Base Site Sync VLAN ID you configured) + 1
	Example: If you configure the Base Site Sync VLAN ID 4800 on all Quantum Maestro Orchestrators, then
	 Orchestrator ID 1_1 and Orchestrator ID 2_1 use the Site Sync VLAN ID 4800 Orchestrator ID 1_2 and Orchestrator ID 2_2 use the Site Sync VLAN ID 4801
	Procedure
	Warning - This procedure interrupts the traffic. Schedule a maintenance window.
	 a. Connect to the command line on each Quantum Maestro Orchestrator. b. Log in to Gaia Clish. c. Configure the same Base Site Sync VLAN ID on all Quantum Maestro Orchestrators: set maestro configuration orchestrator-site-vlan

Step	Instructions		
	d. Restart the orchd daemon on each Quantum Maestro Orchestrator. Log in to the Expert mode and run this command:		
	orchd restart		
	Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts.		
9	Follow these configuration steps:		
	 a. Configure the applicable Security Groups on the Quantum Maestro Orchestrators. b. Configure the Gaia Operating System settings in the new Security Group. 		
	c. Configure the settings in SmartConsole.		
	See the <i>Maestro Administration Guide for your version</i> > Chapter Configuring Security Groups.		
	Important Notes for configuring the applicable Security Groups:		
	 Perform the configuration of Security Groups only on one Quantum Maestro Orchestrator. 		
	The Quantum Maestro Orchestrators synchronize the configuration automatically on each site and between the sites.		

 To create a new Security Group when the SMO Image Cloning is enabled, follow the procedure below. 	
Best Practice - Enable the SMO Image Cloning. Security Group Members use this feature to download automatically all Hotfixes installed on the SMO. See the <u>Gaia Administration Guide for yo</u> <u>version</u> > Chapter Maintenance > Section Snapshot Management Section SMO Image Cloning.	ur nt >
Procedure	
 a. Create a new Security Group that contains interfaces and Security Appliances only from Site 1. b. Connect to the command line of the Security Group over SSH <ip address="" group="" of="" security="">.</ip> When you log in, the Gaia gClish opens by default. important - This connection goes through the Quantum Maestro Orchestrator's management interface you assign to this Security Group. c. Configure the total number of Sites: set smo security-group site-amount 2 d. Add to this Security Group the Security Appliances from Site 2 	at
The Security Appliances on Site 2 automatically clone the software and the configuration from the SMO Security Appliar on Site 1.	ice
 To create a new Security Group when the SMO Image Cloning is disabled, follow the procedure below. Procedure 	
 a. Create a new Security Group that contains interfaces and Security Appliances only from Site 1. b. Connect to the command line of the Security Group over SSH <ip address="" group="" of="" security="">.</ip> When you log in, the Gaia gClish opens by default. important - This connection goes through the Quantum Maestro Orchestrator's management interface you assign to this Security Group. 	at
c. Configure the total number of Sites:	
d. Add to this Security Group the Security Appliances from Site 2	<u> </u>

Dual Site with four Switches

Warning - When you connect the external synchronization ports of Orchestrators on different Maestro Sites through switches (and not directly to each other), make sure your Layer 2 network between Orchestrators is secured.

Diagram

This example is for MHO-140.

Description

- 1. On each site, two Quantum Maestro Orchestrators are connected for redundancy:
 - On each site, Port 48 on Quantum Maestro Orchestrators is for the internal synchronization.
 - On each site, Port 47 on Quantum Maestro Orchestrators is for the external synchronization between sites.

This Port 47 on Quantum Maestro Orchestrators connects to the Layer 2 Switches on the site.

(Starting in R81.10, Port 56 is the external synchronization port.)

• On each site, each Security Appliance has an Expansion Line Card.

Downlink ports on different Quantum Maestro Orchestrators connect to odd and to even ports on the Expansion Line Card.

- 2. Port 47 on the first Orchestrator on the first site (Orchestrator ID 1_1) connects to the first Layer 2 Switch (to Port 1) on the first site.
- 3. Port 47 on the second Orchestrator on the first site (Orchestrator ID 1_2) connects to the second Layer 2 Switch (to Port 1) on the first site.
- 4. Port 47 on the first Orchestrator on the second site (Orchestrator ID 2_1) connects to the first Layer 2 Switch (to Port 1) on the second site.
- 5. Port 47 on the second Orchestrator on the second site (Orchestrator ID 2_2) connects to the second Layer 2 Switch (to Port 1) on the second site.
- 6. The first Layer 2 Switch (Port 32) on the first site connects directly to the first Layer 2 Switch (to Port 32) on the second site.
- 7. The second Layer 2 Switch (Port 32) on the first site connects directly to the second Layer 2 Switch (to Port 32) on the second site.



Diagram for MHO-140 with R80.20SP

Explanations

Table: Explanations

ltem	Description
1	A port on the <i>first</i> Layer 2 switch (5) on the <i>first</i> site that connects to a corresponding port (2) on the <i>first</i> Layer 2 switch (6) on the <i>second</i> site.
2	A port on the <i>first</i> Layer 2 switch (6) on the <i>second</i> site that connects to a corresponding port (1) on the <i>first</i> Layer 2 switch (5) on the <i>first</i> site.
3	A port on the <i>first</i> Layer 2 switch (5) on the <i>first</i> site that connects to the dedicated external synchronization port (14) on the <i>first</i> Quantum Maestro Orchestrator (15) on the <i>first</i> site.
4	A port on the <i>first</i> Layer 2 switch (6) on the <i>second</i> site that connects to the dedicated external synchronization port (17) on the <i>first</i> Quantum Maestro Orchestrator (18) on the <i>second</i> site.
5	The first Layer 2 switch on the first site.
6	The <i>first</i> Layer 2 switch on the <i>second</i> site.
7	A port on the <i>second</i> Layer 2 switch (11) on the <i>first</i> site that connects to the dedicated external synchronization port (22) on the <i>second</i> Quantum Maestro Orchestrator (23) on the <i>first</i> site.
8	A port on the <i>second</i> Layer 2 switch (11) on the <i>first</i> site that connects to a corresponding port (10) on the <i>second</i> Layer 2 switch (12) on the <i>second</i> site.
9	A port on the <i>second</i> Layer 2 switch (12) on the <i>second</i> site that connects to the dedicated external synchronization port (25) on the <i>second</i> Quantum Maestro Orchestrator (26) on the <i>second</i> site.
10	A port on the <i>second</i> Layer 2 switch (12) on the <i>second</i> site that connects to a corresponding port (8) on the <i>second</i> Layer 2 switch (11) on the <i>first</i> site.
11	The second Layer 2 switch on the first site.
12	The second Layer 2 switch on the second site.
13	DAC cables, Fiber cables (with transceivers), or Breakout cables that connect Downlink ports on the <i>first</i> Quantum Maestro Orchestrator (11) on the <i>first</i> site to the Security Appliance (29 , 31 and 34) on the <i>first</i> site. These cables connect to the <i>odd</i> port of an Expansion Line Card on Security Appliances.

Table: Explanations (continued)

ltem	Description
14	The dedicated external synchronization port (Port 47) on the <i>first</i> Quantum Maestro Orchestrator (15) on the <i>first</i> site. This port connects with a DAC cable or Fiber cable (with transceivers) to the <i>first</i> Layer 2 switch (5 to port 3) on the <i>first</i> site.
15	The first Quantum Maestro Orchestrator on the first site.
16	DAC cables, Fiber cables (with transceivers), or Breakout cables that connect Downlink ports on the <i>first</i> Quantum Maestro Orchestrator (14) on the <i>second</i> site to the Security Appliance (30, 33 and 35) on the <i>second</i> site. These cables connect to the <i>odd</i> port of an Expansion Line Card on Security Appliances.
17	The dedicated external synchronization port (Port 47) on the <i>first</i> Quantum Maestro Orchestrator (18) on the <i>second</i> site. This port connects with a DAC cable or Fiber cable (with transceivers) to the <i>first</i> Layer 2 switch (6 to port 4) on the <i>first</i> site.
18	The first Quantum Maestro Orchestrator on the second site.
19	The dedicated internal synchronization port (Port 48) on the <i>first</i> Quantum Maestro Orchestrator (15) on the <i>first</i> site. This port connects with a DAC cable to the dedicated internal synchronization port (27) on the <i>second</i> Quantum Maestro Orchestrator (23) on the <i>first</i> site. Important:
	 This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators. MHO-175 and MHO-170 require a 100 GbE DAC or 40 GbE DAC cable. MHO-140 requires a 10 GbE DAC cable.

Table: Explanations (continued)

ltem	Description
20	 The dedicated internal synchronization port (Port 48) on the <i>first</i> Quantum Maestro Orchestrator (18) on the <i>second</i> site. This port connects with a DAC cable to the dedicated internal synchronization port (28) on the <i>second</i> Quantum Maestro Orchestrator (26) on the <i>second</i> site. Important: This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators. MHO-175 and MHO-170 require a 100 GbE DAC or 40 GbE DAC cable
	 MHO-140 requires a 10 GbE DAC cable.
21	DAC cables, Fiber cables (with transceivers), or Breakout cables that connect Downlink ports on the <i>second</i> Quantum Maestro Orchestrator (23) on the <i>first</i> site to the Security Appliance (29 , 31 and 34) on the <i>first</i> site. These cables connect to the <i>even</i> port of an Expansion Line Card on Security Appliances.
22	The dedicated external synchronization port (Port 47) on the <i>second</i> Quantum Maestro Orchestrator (23) on the <i>first</i> site. This port connects with a DAC cable or Fiber cable (with transceivers) to the <i>second</i> Layer 2 switch (11 to port 7) on the <i>first</i> site.
23	The second Quantum Maestro Orchestrator on the first site.
24	DAC cables, Fiber cables (with transceivers), or Breakout cables that connect Downlink ports on the <i>second</i> Quantum Maestro Orchestrator (26) on the <i>second</i> site to the Security Appliance (30 , 33 and 35) on the <i>second</i> site. These cables connect to the <i>even</i> port of an Expansion Line Card on Security Appliances.
25	The dedicated external synchronization port (Port 47) on the <i>second</i> Quantum Maestro Orchestrator (26) on the <i>second</i> site. This port connects with a DAC cable or Fiber cable (with transceivers) to the <i>second</i> Layer 2 switch (12 to port 9) on the <i>second</i> site.
26	The second Quantum Maestro Orchestrator on the second site.

Table: Explanations (continued)

ltem	Description
27	The dedicated internal synchronization port (Port 48) on the <i>second</i> Quantum Maestro Orchestrator (23) on the <i>first</i> site. This port connects with a DAC cable to the dedicated internal synchronization port (19) on the <i>first</i> Quantum Maestro Orchestrator (15) on the <i>first</i> site. Important:
	 This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators. MHO-175 and MHO-170 require a 100 GbE DAC or 40 GbE DAC cable. MHO-140 requires a 10 GbE DAC cable.
28	 The dedicated internal synchronization port (Port 48) on the <i>second</i> Quantum Maestro Orchestrator (26) on the <i>second</i> site. This port connects with a DAC cable to the dedicated internal synchronization port (20) on the <i>first</i> Quantum Maestro Orchestrator (18) on the <i>first</i> site. Important: This connection is only used to synchronize the configuration of Security Groups between the Quantum Maestro Orchestrators.
	 MHO-175 and MHO-170 require a 100 GbE DAC or 40 GbE DAC cable. MHO-140 requires a 10 GbE DAC cable.
29	Security Appliance 1 on the <i>first</i> site - member of the Security Group (32).
30	Security Appliance 1 on the <i>second</i> site - member of the Security Group (32).
31	Security Appliance 2 on the <i>first</i> site - member of the Security Group (32).
32	Security Group that contains Security Appliances from both sites (29, 30, 31, 33, 34 and 35).
33	Security Appliance 2 on the <i>second</i> site - member of the Security Group (32).
34	Security Appliance 3 on the <i>first</i> site - member of the Security Group (32).
35	Security Appliance 3 on the <i>second</i> site - member of the Security Group (32).

Site	Orchestrator	Internal Sync Port	External Sync Port
1	Orchestrator ID 1_1	Port 48	Port 47
	(denoted as MHO 1_1)	IP 192.0.2.1	IP 203.0.113.1
1	Orchestrator ID 1_2	Port 48	Port 47
	(denoted as MHO 1_2)	IP 192.0.2.2	IP 203.0.113.2
2	Orchestrator ID 2_1	Port 48	Port 47
	(denoted as MHO 2_1)	IP 192.0.2.15	IP 203.0.113.15
2	Orchestrator ID 2_2	Port 48	Port 47
	(denoted as MHO 2_2)	IP 192.0.2.16	IP 203.0.113.16

Configuration of the synchronization ports:

Requirements

1. Layer 2 switches must support VLAN Q-in-Q Tunneling (encapsulation of 802.1Q VLAN inside 802.1Q VLAN).

You must configure VLAN Trunks and Q-in-Q exactly as described below:

Site	Switch	Port	Port Configuration
1 and 2	SW 1	1 and 32	 VLAN Trunk that accepts these VLAN IDs: 3600[*] (used for a site internal synchronization) 3951 (used for external synchronization)
1 and 2	SW 2	1 and 32	 VLAN Trunk that accepts these VLAN IDs: 3600[*] (used for a site internal synchronization) 3952 (used for external synchronization)

Important:

- VLAN ID 3951 and VLAN ID 3952:
 - Starting from the version R81.10, it is possible to change the default VLAN IDs with this command:

```
set maestro configuration orchestrators base-
vlan <VLAN ID 1> <VLAN ID 2> ... <VLAN ID N>
```

- In the version R80.20SP, it is not possible to change these VLAN IDs.
- *The default Site Sync VLAN IDs are:
 - 3600 on Orchestrator ID 1_1 and Orchestrator ID 2_1
 - 3601 on Orchestrator ID 1_2 and Orchestrator ID 2_2

If these default Site Sync VLAN IDs conflict with the existing VLAN IDs in your environment, then it is possible to change the Base Site Sync VLAN IDs on Quantum Maestro Orchestrators.

- 2. Latency between the Layer 2 switches on different sites must be lower than 100ms.
- 3. Packet lost between the Layer 2 switches on different sites must be lower than 5%.

Configuring Dual Site with four Switches

This procedure explains how to configure a new Security Group that contains Security Appliances from two sites in a new Dual Site configuration.

Important - Make sure to read the existing Known Limitations for Dual Site in <u>sk148074</u>.

Warning - This procedure interrupts the traffic. Schedule a maintenance window.

Step	Instructions
1	On each site, install the Quantum Maestro Orchestrators in their racks. Follow the applicable instructions:
	 "Mounting the Quantum Maestro Orchestrator MHO-175 in a Rack" on page 86
	 "Mounting the Quantum Maestro Orchestrator MHO-140 and MHO-170 in a Rack" on page 101
2	On each site, connect the cables between:
	 The dedicated internal synchronization ports on the Quantum Maestro Orchestrators.
	 The Security Appliances and the Downlink ports on the Quantum Maestro Orchestrators.
	 The production traffic networks and the Uplink ports on the Quantum Maestro Orchestrators.
	Follow:
	 "Connecting Two Quantum Maestro Orchestrators for Redundancy" on page 123.
	 "Connecting Cables to MHO-175" on page 138
	 "Connecting Cables to MHO-170" on page 150. "Connecting Cables to MHO 140" on page 163.
	- Connecting Cables to WHO-140 on page 163.

Step	Instructions									
3	On each site, connect fiber cables (with transceivers) or DAC cables between the dedicated external synchronization ports on the Quantum Maestro Orchestrator and the ports on the Layer 2 switch.									
	 On MHO-175 and MHO-170, use Ports 31 on the Quantum Maestro Orchestrators on each site. On MHO-140, use Ports 47 on the Quantum Maestro Orchestrators on each site. Do not use ports with the configured type "management". On the Layer 2 switches on different sites, connect Quantum Maestro Orchestrators to ports with the same numbers. 									
	It is possible to use any port for external synchronization, except these ports:									
	 The ports already used for the internal synchronization. The disabled ports, if you used breakout cables. See "Splitting the Ports with Breakout Cables" on page 115. 									
4	Use an SSH Client or a Serial Console to connect to the command line on each Quantum Maestro Orchestrator on each site.									
Step	Instructions									
------	--	--	--	--	--	--	--	--	--	--
5	On each site, configure the dedicated ports for the external synchronization on the Quantum Maestro Orchestrators.									
	a. Configure the dedicated port									
	You must connect and configure ports with the same numbers on the Quantum Maestro Orchestrators on each site. Run this command in Gaia Clish:									
	set maestro port < <i>Quantum Maestro Orchestrator</i> ID>/ <port label="">/<port id="" split=""> type site_sync</port></port>									
	Example for MHO-140:									
	Orch_1_1> set maestro port 1/47/1 type site_sync Orch_2_1> set maestro port 1/47/1 type site_sync Orch_1_2> set maestro port 2/47/1 type site_sync Orch_2_2> set maestro port 2/47/1 type site_sync									
	For information about this Gaia Clish command, see the <u>Maestro</u> <u>Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Port Settings.									
	Log in to the Expert mode and run this command:									
	orchd restart									
	Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts.									
6	On each site, configure the total number of Sites on each Quantum Maestro Orchestrator.									
	Procedure									
	Run this command in Gaia Clish:									
	set maestro configuration orchestrator-site-amount 2									
	For information about this Gaia Clish command, see the <u>Maestro</u> <u>Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Number of Maestro Sites.									

Step	Instructions									
7	Configure the Site ID on each Quantum Maestro Orchestrator.									
	Configuring the Site ID on the first site									
	 Configure the same Site ID 1 on each Orchestrator: Run this command in Gaia Clish: 									
	set maestro configuration orchestrator-site-id 1									
	 For information about this Gaia Clish command, see the <u>Maestro</u> <u>Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Site ID in Dual Site Deployment. b. Restart the orchd daemon on each Orchestrator. Log in to the Expert mode and run this command: orchd restart Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts. 									
	a. Configure the same Site ID 2 on each Orchestrator: Run this command in Gaia Clish:									
	set maestro configuration orchestrator-site-id 2									
	 b. Restart the orchd daemon on each Orchestrator. Log in to the Expert mode and run this command: 									
	orchd restart									
	Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts.									

Step	Instructions						
8	Optional: Configure a new Base Site Sync VLAN ID on each Quantum Maestro Orchestrator. This step applies if the default Site Sync VLAN IDs 3600 and 3601 conflict with the existing VLAN IDs in your environment. For information about the Base Site Sync VLAN ID, see the <u>Maestro</u> <u>Administration Guide for your version</u> > Chapter Configuring Security Groups > Section Configuration Procedure > Section Configuring Security Groups in Gaia Clish > Section Configuring the Base Site Sync VLAN ID in Dual Site Deployment.						
	Explanation						
	The default Site Sync VLAN IDs are:						
	 3600 on Orchestrator ID 1_1 and Orchestrator ID 2_1 3601 on Orchestrator ID 1_2 and Orchestrator ID 2_2 						
	If you configure a new Base Site Sync VLAN ID, then Quantum Maestro Orchestrators assign the new Site Sync VLAN IDs in this way:						
	 Orchestrator ID 1_1 and Orchestrator ID 2_1 use the Site Sync VLAN ID based on this formula: (Base Site Sync VLAN ID you configured) + 0 Orchestrator ID 1_2 and Orchestrator ID 2_2 use the Site Sync VLAN ID based on this formula: (Base Site Sync VLAN ID you configured) + 1 						
	Example: If you configure the Base Site Sync VLAN ID 4800 on all Quantum Maestro Orchestrators, then						
	 Orchestrator ID 1_1 and Orchestrator ID 2_1 use the Site Sync VLAN ID 4800 Orchestrator ID 1_2 and Orchestrator ID 2_2 use the Site Sync VLAN 						
	ID 4801						
	Procedure						
	Warning - This procedure interrupts the traffic. Schedule a maintenance window.						
	 a. Connect to the command line on each Quantum Maestro Orchestrator. b. Log in to Gaia Clish. c. Configure the same Base Site Sync VLAN ID on all Quantum Maestro Orchestrators: 						
	<pre>set maestro configuration orchestrator-site-vlan <number></number></pre>						

Step	Instructions					
	d. Restart the orchd daemon on each Quantum Maestro Orchestrator. Log in to the Expert mode and run this command:					
	orchd restart					
	Warning - No traffic flows through the Quantum Maestro Orchestrator until this daemon restarts.					
9	Follow these configuration steps:					
	 a. Configure the applicable Security Groups on the Quantum Maestro Orchestrators. b. Configure the Gaia Operating System settings in the new Security Group 					
	c. Configure the settings in SmartConsole.					
	See the <u>Maestro Administration Guide for your version</u> > Chapter Configuring Security Groups.					
	Important Notes for configuring the applicable Security Groups:					
	 Perform the configuration of Security Groups only on one Quantum Maestro Orchestrator. 					
	The Quantum Maestro Orchestrators synchronize the configuration automatically on each site and between the sites.					

Step	Instructions								
	 To create a new Security Group when the SMO Image Cloning is <i>enabled</i>, follow the procedure below. Best Practice - Enable the SMO Image Cloning. Security Group Members use this feature to download automatically all Hotfixes installed on the SMO. See the <i>Gaia Administration Guide for your version</i> > Chapter Maintenance > Section Snapshot Management > Section SMO Image Cloning. 								
	Procedure								
	 a. Create a new Security Group that contains interfaces and Security Appliances only from Site 1. b. Connect to the command line of the Security Group over SSH at <i><ip address="" group="" of="" security=""></ip></i>. When you log in, the Gaia gClish opens by default. important - This connection goes through the Quantum Maestro Orchestrator's management interface you assigned to this Security Group. c. Configure the total number of Sites: 								
	set smo security-group site-amount 2								
	 d. Add to this Security Group the Security Appliances from Site 2. The Security Appliances on Site 2 automatically clone the software and the configuration from the SMO Security Appliance on Site 1. 								
	 To create a new Security Group when the SMO Image Cloning is disabled, follow the procedure below. 								
	Procedure								
	a. Create a new Security Group that contains interfaces and Security Appliances only from Site 1.								
	 b. Connect to the command line of the Security Group over SSH at <<i>IP</i> Address of Security Group>. When you log in, the Gaia gClish opens by default. important - This connection goes through the Quantum Maestro Orchestrator's management interface you assigned to this Security Group. 								
	c. Configure the total number of Sites:								
	set smo security-group site-amount 2								
	d. Add to this Security Group the Security Appliances from Site 2.								

Quantum Maestro Orchestrator Ports and Gaia OS Interfaces

The tables below show how the Gaia Operating System on the Quantum Maestro Orchestrator assigns the interface names to the ports on the Quantum Maestro Orchestrator's front panel (the default configuration).

Important - The Gaia Operating System on the Quantum Maestro Orchestrator does not let you configure the network settings for the Uplink or Downlink ports. You configure all the applicable network settings for the Uplink ports in the Gaia Operating System of the applicable Security Group (for example, IP addresses, Bond interfaces). There are no network settings for the Downlink ports.

MHO-175 ports on the front panel and their default names in Gaia

First MHO-175 Quantum Maestro Orchestrator

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS	Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
1	eth1- Mgmt1	Port 1/1/1	17	dl65	Port 1/17/1
2	eth1-05	Port 1/2/1	18	dl69	Port 1/18/1
3	eth1-09	Port 1/3/1	19	dl73	Port 1/19/1
4	eth1-13	Port 1/4/1	20	dl77	Port 1/20/1
5	eth1-17	Port 1/5/1	21	dl81	Port 1/21/1
6	eth1-21	Port 1/6/1	22	dl85	Port 1/22/1
7	eth1-25	Port 1/7/1	23	dl89	Port 1/23/1
8	eth1-29	Port 1/8/1	24	dl93	Port 1/24/1
9	eth1-33	Port 1/9/1	25	dl97	Port 1/25/1
10	eth1-37	Port 1/10/1	26	dl101	Port 1/26/1
11	eth1-41	Port 1/11/1	27	dl105	Port 1/27/1
12	eth1-45	Port 1/12/1	28	dl109	Port 1/28/1
13	eth1-49	Port 1/13/1	29	dl113	Port 1/29/1

Table: First MHO-175 ports and default interfaces

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS	Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
14	eth1-53	Port 1/14/1	30	dl117	Port 1/30/1
15	eth1-57	Port 1/15/1	31	SYNC-INT	Port 1/31/1
16	eth1-61	Port 1/16/1	32	SYNC-EXT	Port 1/32/1

Table: First MHO_175	norts and default interfaces	(continued)
	ports and default interfaces	(continueu)

Second MHO-175 Quantum Maestro Orchestrator

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS	Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
1	eth2- Mgmt1	Port 2/1/1	17	dl65	Port 2/17/1
2	eth2-05	Port 2/2/1	18	d169	Port 2/18/1
3	eth2-09	Port 2/3/1	19	dl73	Port 2/19/1
4	eth2-13	Port 2/4/1	20	dl77	Port 2/20/1
5	eth2-17	Port 2/5/1	21	dl81	Port 2/21/1
6	eth2-21	Port 2/6/1	22	dl85	Port 2/22/1
7	eth2-25	Port 2/7/1	23	d189	Port 2/23/1
8	eth2-29	Port 2/8/1	24	dl93	Port 2/24/1
9	eth2-33	Port 2/9/1	25	dl97	Port 2/25/1
10	eth2-37	Port 2/10/1	26	dl101	Port 2/26/1
11	eth2-41	Port 2/11/1	27	dl105	Port 2/27/1
12	eth2-45	Port 2/12/1	28	dl109	Port 2/28/1
13	eth2-49	Port 2/13/1	29	dl113	Port 2/29/1

Table: Second MHO-175 ports and default interfaces

Port Number on the	Interface Name	Port Name in Gaia	Port Number on the	Interface Name	Port Name in Gaia
Front Panel	in Gaia OS	OS	Front Panel	in Gaia OS	OS
14	eth2-53	Port 2/14/1	30	dl117	Port 2/30/1
15	eth2-57	Port 2/15/1	31	SYNC-INT	Port 2/31/1
16	eth2-61	Port 2/16/1	32	SYNC-EXT	Port 2/32/1

Table: Second MHO-175 ports and default interfaces (continued)

Notes

- When you connect two Quantum Maestro Orchestrators MHO-175 for redundancy, Gaia OS shows:
 - eth1-XX and Port 1/X/X for the first Quantum Maestro Orchestrator.
 - eth2-XX and Port 2/X/X for the second Quantum Maestro Orchestrator.
- The tables above show the default configuration *before* you connect breakout cables.

After you connect breakout cables to the upper ports, you get *four* additional interfaces starting from the original interface name.

• The port type "management" is supported only for Port 1.

See the summary table in "Changing the QSFP mode and the default type of an Orchestrator port" on page 46.

MHO-170 ports on the front panel and their default names in Gaia

First MHO-170 Quantum Maestro Orchestrator

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS	Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
1	eth1- Mgmt1	Port 1/1/1	17	dl33	Port 1/17/1
2	eth1- Mgmt3	Port 1/2/1	18	dl35	Port 1/18/1
3	eth1-05	Port 1/3/1	19	dl37	Port 1/19/1
4	eth1-07	Port 1/4/1	20	dl39	Port 1/20/1
5	eth1-09	Port 1/5/1	21	dl41	Port 1/21/1
6	eth1-11	Port 1/6/1	22	dl43	Port 1/22/1
7	eth1-13	Port 1/7/1	23	dl45	Port 1/23/1
8	eth1-15	Port 1/8/1	24	dl47	Port 1/24/1
9	eth1-17	Port 1/9/1	25	dl49	Port 1/25/1
10	eth1-19	Port 1/10/1	26	dl51	Port 1/26/1
11	eth1-21	Port 1/11/1	27	dl53	Port 1/27/1
12	eth1-23	Port 1/12/1	28	dl55	Port 1/28/1
13	eth1-25	Port 1/13/1	29	dl57	Port 1/29/1

Table: First MHO-170 ports and default interfaces

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS	Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
14	eth1-27	Port 1/14/1	30	dI59	Port 1/30/1
15	eth1-29	Port 1/15/1	31	SYNC-INT	Port 1/31/1
16	eth1-31	Port 1/16/1	32	SYNC-EXT	Port 1/32/1

Table First MHO-170	norts and default interfaces	(continued)
	ports and default interfaces	(continueu)

Second MHO-170 Quantum Maestro Orchestrator

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS	Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
1	eth2- Mgmt1	Port 2/1/1	17	dl33	Port 2/17/1
2	eth2- Mgmt3	Port 2/2/1	18	dl35	Port 2/18/1
3	eth2-05	Port 2/3/1	19	dl37	Port 2/19/1
4	eth2-07	Port 2/4/1	20	dl39	Port 2/20/1
5	eth2-09	Port 2/5/1	21	dl41	Port 2/21/1
6	eth2-11	Port 2/6/1	22	dl43	Port 2/22/1
7	eth2-13	Port 2/7/1	23	dl45	Port 2/23/1
8	eth2-15	Port 2/8/1	24	dl47	Port 2/24/1
9	eth2-17	Port 2/9/1	25	dl49	Port 2/25/1
10	eth2-19	Port 2/10/1	26	dl51	Port 2/26/1
11	eth2-21	Port 2/11/1	27	dl53	Port 2/27/1
12	eth2-23	Port 2/12/1	28	dl55	Port 2/28/1
13	eth2-25	Port 2/13/1	29	dl57	Port 2/29/1

Table: Second MHO-170 ports and default interfaces

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS	Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
14	eth2-27	Port 2/14/1	30	dl59	Port 2/30/1
15	eth2-29	Port 2/15/1	31	SYNC-INT	Port 2/31/1
16	eth2-31	Port 2/16/1	32	SYNC-EXT	Port 2/32/1

Table: Second MHO-170 ports and default interfaces (continued)

Notes

- When you connect two Quantum Maestro Orchestrators MHO-170 for redundancy, Gaia OS shows:
 - eth1-XX and Port 1/X/X for the first Quantum Maestro Orchestrator.
 - eth2-XX and Port 2/X/X for the second Quantum Maestro Orchestrator.
- The tables above show the default configuration *before* you connect breakout cables.

After you connect breakout cables to the upper ports, you get *four* additional interfaces starting from the original interface name.

• The port type "management" is supported only for Ports 1 and 2.

See the summary table in "Changing the QSFP mode and the default type of an Orchestrator port" on page 46.

MHO-140 ports on the front panel and their default names in Gaia

First MHO-140 Quantum Maestro Orchestrator

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS	Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
1	eth1- Mgmt1	Port 1/1/1	29	ethsBP1-01	Port 1/29/1
2	eth1- Mgmt2	Port 1/2/1	30	dl30	Port 1/30/1
3	eth1- Mgmt3	Port 1/3/1	31	ethsBP1-01	Port 1/31/1
4	eth1- Mgmt4	Port 1/4/1	32	dl32	Port 1/32/1
5	eth1-05	Port 1/5/1	33	dl33	Port 1/33/1
6	eth1-06	Port 1/6/1	34	dl34	Port 1/34/1
7	eth1-07	Port 1/7/1	35	dl35	Port 1/35/1
8	eth1-08	Port 1/8/1	36	dl36	Port 1/36/1
9	eth1-09	Port 1/9/1	37	dl37	Port 1/37/1
10	eth1-10	Port 1/10/1	38	dl38	Port 1/38/1
11	eth1-11	Port 1/11/1	39	dl39	Port 1/39/1
12	eth1-12	Port 1/12/1	40	dl40	Port 1/40/1
13	eth1-13	Port 1/13/1	41	dl41	Port 1/41/1

Table: First MHO-140 ports and default interfaces

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS	Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
14	eth1-14	Port 1/14/1	42	dl42	Port 1/42/1
15	eth1-15	Port 1/15/1	43	dl43	Port 1/43/1
16	eth1-16	Port 1/16/1	44	dl44	Port 1/44/1
17	eth1-17	Port 1/17/1	45	dl45	Port 1/45/1
18	eth1-18	Port 1/18/1	46	dl46	Port 1/46/1
19	eth1-19	Port 1/19/1	47	dl47	Port 1/47/1
20	eth1-20	Port 1/20/1	48	SYNC-INT	Port 1/48/1
21	eth1-21	Port 1/21/1	49	eth1-49	Port 1/49/1
22	eth1-22	Port 1/22/1	50	eth1-51	Port 1/50/1
23	eth1-23	Port 1/23/1	51	eth1-53	Port 1/51/1
24	eth1-24	Port 1/24/1	52	eth1-55	Port 1/52/1
25	eth1-25	Port 1/25/1	53	eth1-57	Port 1/53/1
26	eth1-26	Port 1/26/1	54	eth1-59	Port 1/54/1

Table: First MHO-140 ports and default interfaces (continued)

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS	Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
27	ethsBP1-01	Port 1/27/1	55	eth1-61	Port 1/55/1
28	ethsBP1-01	Port 1/28/1	56	SYNC-EXT	Port 1/56/1

Table: First MHO-140 ports and default interfaces (continued)

Note - In the R80.20SP version, Port 47 is the default External Synchronization port.

Second MHO-140 Quantum Maestro Orchestrator

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS	Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
1	eth2- Mgmt1	Port 2/1/1	29	ethsBP2-01	Port 2/29/1
2	eth2- Mgmt2	Port 2/2/1	30	dl30	Port 2/30/1
3	eth2- Mgmt3	Port 2/3/1	31	ethsBP2-01	Port 2/31/1
4	eth2- Mgmt4	Port 2/4/1	32	dl32	Port 2/32/1
5	eth2-05	Port 2/5/1	33	dl33	Port 2/33/1
6	eth2-06	Port 2/6/1	34	dl34	Port 2/34/1
7	eth2-07	Port 2/7/1	35	dl35	Port 2/35/1
8	eth2-08	Port 2/8/1	36	dl36	Port 2/36/1
9	eth2-09	Port 2/9/1	37	dl37	Port 2/37/1
10	eth2-10	Port 2/10/1	38	dl38	Port 2/38/1
11	eth2-11	Port 2/11/1	39	dl39	Port 2/39/1
12	eth2-12	Port 2/12/1	40	dl40	Port 2/40/1
13	eth2-13	Port 2/13/1	41	dl41	Port 2/41/1

Table: Second MHO-140 ports and default interfaces

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS	Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
14	eth2-14	Port 2/14/1	42	dl42	Port 2/42/1
15	eth2-15	Port 2/15/1	43	dl43	Port 2/43/1
16	eth2-16	Port 2/16/1	44	dl44	Port 2/44/1
17	eth2-17	Port 2/17/1	45	dl45	Port 2/45/1
18	eth2-18	Port 2/18/1	46	dl46	Port 2/46/1
19	eth2-19	Port 2/19/1	47	dl47	Port 2/47/1
20	eth2-20	Port 2/20/1	48	SYNC-INT	Port 2/48/1
21	eth2-21	Port 2/21/1	49	eth2-49	Port 2/49/1
22	eth2-22	Port 2/22/1	50	eth2-51	Port 2/50/1
23	eth2-23	Port 2/23/1	51	eth2-53	Port 2/51/1
24	eth2-24	Port 2/24/1	52	eth2-55	Port 2/52/1
25	eth2-25	Port 2/25/1	53	eth2-57	Port 2/53/1
26	eth2-26	Port 2/26/1	54	eth2-59	Port 2/54/1

Table: Second MHO-140 ports and default interfaces (continued)

Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS	Port Number on the Front Panel	Interface Name in Gaia OS	Port Name in Gaia OS
27	ethsBP2-01	Port 2/27/1	55	eth2-61	Port 2/55/1
28	ethsBP2-01	Port 2/28/1	56	SYNC-EXT	Port 2/56/1

Table: Second MHO-140 ports and default interfaces (continued)

Note - In the R80.20SP version, Port 47 is the default External Synchronization port.

Notes

- When you connect two Quantum Maestro Orchestrators MHO-140 for redundancy, Gaia OS shows:
 - eth1-XX and Port 1/X/X for the first Quantum Maestro Orchestrator.
 - eth2-XX and Port 2/X/X for the second Quantum Maestro Orchestrator.
- The tables above show the default configuration *before* you connect breakout cables.

After you connect breakout cables to the upper ports, you get *four* additional interfaces starting from the original interface name.

• The port type "management" is supported only for Ports 1, 2, 3 and 4.

See the summary table in "Changing the QSFP mode and the default type of an Orchestrator port" on page 46.

Additional Information

This section provides some additional information for Quantum Maestro Orchestrators.

Internal IP Addresses

Maestro configuration uses these IP addresses for internal communication:

Network	Default IP Address	How to Change
Internal IP addresses of Security Group Members. This network is called "Chassis Internal Network" (CIN).	Default IP Address: 198.51.10 <id of="" security<br="">Group>.0 / 24 Examples: 198.51.101.0 / 24 198.51.102.0 / 24 198.51.103.0 / 24</id>	Follow <u>sk179028</u>
Internal Sync between Orchestrators on the same Site	192.0.2.0 / 24	Not needed
External Sync between Orchestrators on the different Sites	203.0.113.0/24	Not needed

MHO-175 Specifications

Feature	Parameter	Value
Mechanical	Dimensions	Height - 44 mm (1.72 inches) Width - 428 mm (16.84 inches) Depth - 559 mm (22 inches)
	Enclosure	1RU
	Mounting	48 cm (19 inches) rack mount
	Weight	With two PSUs - 12.488 kg (27.5 lbs)
Environmental	Temperature	Operational: 0 to 40 °C Non-Operational: -40 to 70 °C
	Humidity	Operational: 10% to 85% non-condensing Non-operational: 10% to 90% non-condensing
	Altitude	3050 m
	Noise level	Contact Check Point Support
Power	Input voltage	100-127 VAC, 50/60 Hz, 3.5 A 200-240 VAC, 50/60 Hz, 2.9 A
	Global Power Consumption	242 W
Hardware	CPU	Intel x86 2.20GHz Dual Core
	RAM	32 GB DDR4
	Storage	120 GB SSD
	Connector cage	32 x QSFP28
	Packet Buffer	42 MB
	Hot-Swap PSU	2 (1+1 redundant)
	Hot-Swap Fans	6 (N+1 redundant)
Interface Speeds		40 / 100 GbE for ports 1-32 4x10 GbE for ports 1-32 (see "MHO-175 Splitting Options" on page 116)

MHO-175 Specifications

Feature	Parameter	Value
Throughput		3.2 Tbit/sec

MHO-170 Specifications

Feature	Parameter	Value
Mechanical	Dimensions	Height - 43.8 mm (1.72 inches) Width - 427.83 mm (16.84 inches) Depth - 686 mm (27 inches)
	Enclosure	1RU
	Mounting	48 cm (19 inches) rack mount
	Weight	With two PSUs - 11.1 kg (24.5 lbs)
Environmental	Temperature	Operational: 0 to 40 °C Non-Operational: -40 to 70 °C
	Humidity	Operational: 10% to 85% non-condensing Non-operational: 10% to 90% non-condensing
	Altitude	3050 m
	Noise level	71.6 dB(A)
Power	Input voltage	100-127 VAC, 50/60 Hz, 3.5 A 200-240 VAC, 50/60 Hz, 2.9 A
	Global Power Consumption	150 W - Typical power with passive cables (ATIS) 335 W - Max power with optical cables (assuming 3.5W for each port)
Hardware	CPU	Intel x86 2.40 GHz Quad Core
	RAM	32 GB DDR3
	Storage	120 GB SSD
	Connector cage	32 x QSFP28
	Packet Buffer	16 MB
	Hot-Swap PSU	2 (1+1 redundant)
	Hot-Swap Fans	4 (N+1 redundant)

Feature	Parameter	Value
Interface Speeds		40 / 100 GbE for ports 1-32 4x10 GbE for ports 1-32 (see <i>"MHO-170 Splitting</i> <i>Options" on page 120</i>)
Throughput		6.4 Tbit/sec

MHO-140 Specifications

Feature	Parameter	Value	
Mechanical	Dimensions	Height - 43.8 mm (1.72 inches) Width - 438 mm (17.24 inches) Depth - 436 mm (17 inches)	
	Enclosure	1RU	
	Mounting	48 cm (19 inches) rack mount	
	Weight	With two PSUs - 8.52 kg (18.8 lbs)	
Environmental	Temperature	Operational: 0 to 40 °C Non-Operational: -40 to 70 °C	
	Humidity	Operational: 10% to 85% non-condensing Non-operational: 10% to 90% non-condensing	
	Altitude	3050 m	
	Noise level	70.9 dB(A)	
Power	Input voltage	100-127 VAC, 50/60 Hz, 4.5 A 200-240 VAC, 50/60 Hz , 2.9 A	
	Global Power Consumption	165 W - Typical power with passive cables (ATIS) 265 W - Max power with optical cables (assuming 3.5W for each QSFP28 port, and 1.5W for each SFP28 port)	
Hardware	CPU	Intel x86 1.40 GHz Dual Core	
	RAM	16 GB DDR3	
	Storage	120 GB SSD	
	Connector cage	48 x SFP28 8 x QSFP28	
	Packet Buffer	16 MB	
	Hot-Swap PSU	2 (1+1 redundant)	
	Hot-Swap Fans	4 (N+1 redundant)	

Feature	Parameter	Value
Interface Speeds		10 GbE for ports 1-48 100 GbE for ports 49-56 4x10 GbE for ports 49,51,53, and 55 (see " <i>MHO-140</i> <i>Splitting Options</i> " on page 121
Throughput		4 Tbit/sec

Thermal Threshold Definitions

There are three thermal threshold definitions for the Quantum Maestro Orchestrator, which impact the overall operation state:

Threshold	Temperature	Instructions
Critical	120°C	When the Quantum Maestro Orchestrator crosses this temperature, the firmware automatically shuts down the Quantum Maestro Orchestrator.
Emergency	130°C	In case the firmware fails to shut down the Quantum Maestro Orchestrator upon crossing the Critical threshold, the Quantum Maestro Orchestrator automatically shuts down upon crossing the Emergency threshold.

1 Note - This is the temperature of the internal Ethernet switch integrated circuit.

RJ45 to DB9 Harness Pinout

To connect a host PC to the Console RJ45 port on the Quantum Maestro Orchestrator, an RS232 harness cable (DB9 to RJ45) is supplied.



Declaration of Conformity

Name and address of the authorized trademark:	Check Point Software Technologies Ltd. 5 Shlomo Kaplan Street, Tel Aviv 6789159, Israel
Brand name:	Check Point
Marketing models:	MHO-175, MHO-170, MHO-140
Regulated models:	SN3700C, SN2740, SN2410
Manufacturer's name:	Mellanox Technology, Ltd
Manufacturer's address:	Beit Mellanox, Yokneam 20692, Israel

The models of the declaration described above have been tested by Mellanox EMC Laboratory and were found to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility Directive (2014/30/EU) & Low Voltage Directive (LVD) (2014/35/EU):

MHO-175

EMC / EMI	CE EN 55032:2015 Class A EN 61000-3-2:2014 EN 61000-3-3:2013 EN 55024:2010 + A1:2015	Electromagnetic Compatibility, Emissions requirements for information technology equipment. Immunity characteristics. Limits and methods of measurement.
	FCC/IC CFR 47 FCC Part 15 Subpart B:2019 (using ANSI 63.4:2014), Class A ICES-003:2016, Issue 6, Class A	Information Technology Equipment - Radio Disturbance Characteristics.
	VCCI-¦CISPR 32: 201 6, Class A	Information Technology Equipment - Radio Disturbance Characteristics.
	AS/NZS RCM AS/NZS CISPR 32:2015, Class A	Information Technology Equipment - Radio Disturbance Characteristics.
Safety	CE LVD/ Global Safety EN [609]50-[1:2]006 [+ [A2:]201]3 IEC [609]50-[1:2]005 [+ [AMD1:]200]9 + [AMD2:]201]3 UL/[CSA [609]50-[1] ² EN [623]68-[1] ² IEC[623]68-[1] ²	Information technology equipment. Electrical Safety requirements, Low Voltage Directive (LVD).

Detailed Test Report Number: MLNX23-1091224069-6860 Rev 3.00

Certificate Number: MLNX23-EMCCERT4069-6860 Rev 3.00

MHO-170 and MHO-140

EMC / EMI	CE EN 55032:2012 Class A EN 61000-3-2:2014 EN 61000-3-3:2013 EN 55024:2010	Electromagnetic Compatibility, Emissions requirements for information technology equipment. Immunity characteristics. Limits and methods of measurement.
	FCC/IC CFR 47 FCC Part 15 Subpart B (using ANSI C63.4:2014), Class A ICES-003, Issue 6, Class A	Information Technology Equipment - Radio Disturbance Characteristics.
	VCCI V-3/2015.04 Class A	Information Technology Equipment - Radio Disturbance Characteristics.
	AS/NZS RCM AS/NZS CISPR22:2009 + A1(10)	Information Technology Equipment - Radio Disturbance Characteristics.
Safety	CE LVD/ Global Safety EN 60950-1:2006 + A2:2013 IEC 60950-1:2005 + AMD1:2009 + AMD2:2013	Information technology equipment. Electrical Safety requirements, Low Voltage Directive (LVD).

Detailed Test Report Number: MLNX23-1091224069-310

Certificate Number: MLNX23-1091224069-1633

What is the Next Step?

Follow the chapter **Configuring Security Groups** in the Administration Guide for your Orchestrator version:

- <u>R82 Scalable Platforms Administration Guide</u>
- <u>R81.20 Quantum Maestro Administration Guide</u>
- <u>R81.10 Quantum Maestro Administration Guide</u>
- <u>R81 Quantum Maestro Administration Guide</u>
- <u>R80.30SP Quantum Maestro Administration Guide</u>
- <u>R80.20SP Quantum Maestro Administration Guide</u>

To configure the Gaia settings, see the Gaia Administration Guide for your Orchestrator version / your Security Group version:

- <u>R82 Gaia Administration Guide</u>
- R81.20 Gaia Administration Guide
- <u>R81.10 Gaia Administration Guide</u>
- <u>R81 Gaia Administration Guide</u>
- R80.30SP Quantum Maestro Gaia Administration Guide
- R80.20SP Quantum Maestro Gaia Administration Guide

Glossary

В

Breakout Cable

An optical fiber cable that contains several jacketed simplex optical fibers that are packaged together inside an outer jacket. Synonyms: Fanout cable, Fan-Out cable, Splitter cable.

D

DAC Cable

Direct Attach Copper cable. A form of the high-speed shielded twinax copper cable with pluggable transceivers on both ends. Used to connect to network devices (switches, routers, or servers).

Downlink Ports

Interfaces on the Quantum Maestro Orchestrator used to connect to Check Point Security Appliances. You use DAC cables, Fiber cables (with transceivers), or Breakout cables to connect between the Downlink ports and Security Appliances. The Check Point Management traffic (policy, logs, synchronization, and so on) co-exists with the data (user) traffic on the Downlink ports. Bandwidth is guaranteed for the Check Point Management traffic (portion of the downlink bandwidth). These ports form the system backplane (management, data plane, synchronization).

G

Gaia gClish

The name of the global command line shell in Check Point Gaia operating system for Security Appliances connected to Check Point Quantum Maestro Orchestrators. Commands you run in this shell apply to all Security Appliances in the Security Group.

Η

HyperSync

Check Point patented technology that makes sure that active connections are only synchronized to backup Security Appliances in the Security Group. HyperSync makes sure each connection flow has a backup within the Security Group.

Glossary

Μ

Maestro Orchestrator

A scalable Network Security System that connects multiple Check Point Security Appliances into a unified system. Synonyms: Orchestrator, Quantum Maestro Orchestrator, Maestro Hyperscale Orchestrator. Acronym: MHO.

0

Orchestrator

See "Maestro Orchestrator".

S

Security Group

A logical group of Security Appliances that provides Active/Active cluster functionality. A Security Group can contain one or more Security Appliances. Security Groups work separately and independently from each other. To the production networks, a Security Group appears a single Security Gateway. Every Security Group contains: (A) Applicable Uplink ports, to which your production networks are connected; (B) Security Appliances (the Quantum Maestro Orchestrator determines the applicable Downlink ports automatically); (C) Applicable management port, to which the Check Point Management Server is connected.

SGM

Role of a Security Appliance (Security Gateway Module). Part of the Security Group that contains the assigned Security Appliances. A Security Appliance in a Security Group has one IPv4 address and represents all assigned Security Appliances as one entity.

Shared Management

Feature that allows to assign the same Management Port (interface ethX-MgmtY) on a Quantum Maestro Orchestrator to different Security Groups. The assigned Management Port has a different IP address and a different MAC address in each Security Group, to which this port is assigned.

Single Management Object

Single Security Gateway object in SmartConsole that represents a Security Group configured on Quantum Maestro Orchestrator. Acronym: SMO.

SMO Master

The physical Security Appliance in a Security Group that handles management tasks for all Security Appliances in the Security Group. By default, this role is assigned to the Security Appliance with the lowest Member ID in the Security Group.

SSM

Role of the Quantum Maestro Orchestrator (SSM) that manages the flow of network traffic to and from the Security Groups.

U

Uplink Ports

Interfaces on the Quantum Maestro Orchestrator used to connect to external and internal networks. Gaia operating system shows these interfaces in Gaia Portal and in Gaia Clish. SmartConsole shows these interfaces in the corresponding SMO Security Gateway object.