Cisco Nexus Dashboard Orchestrator Verified Scalability Guide, Release 4.1(2)

Revised: February 14, 2024

New and Changed Information

The following table provides an overview of the significant changes to the organization and features in this guide from the time the guide was first published to the latest update.

Table 1: Latest Updates

Date	Changes
December 05, 2023	Clarified the "Service Graph nodes per Service Graph" scale to differentiate between Multi-Site and Autonomous templates.
July 12, 2023	Updated Autonomous site scale for virtual Nexus Dashboard clusters.
April 14, 2023	First release of this document.

Overview

This guide contains the maximum verified scalability limits for Cisco Multi-Site.

These values are based on a profile where each feature was scaled to the numbers specified in the tables. These numbers do not represent the theoretically possible scale.

Note The total number of objects within each site must not exceed the maximum verified scalability limit for that fabric version. For more information on site-specific scalability limits, see the Cisco ACI Verified Scalability Guide, Cisco Cloud Network Controller Verified Scalability Guide, or Cisco NDFC Verified Scalability Guide for your fabric type and release.

ACI Fabrics Scalability Limits

This release supports managing only NDFC fabrics or only ACI fabrics by the same Nexus Dashboard Orchestrator. The following scale limits apply when managing ACI fabrics.

Table 2: General Scalability Limits

Object	Scale
Sites	Up to 100 sites total on-boarded in Nexus Dashboard and managed by Nexus Dashboard Orchestrator. Up to 14 of those sites can be Multi-Site-enabled with EVPN sessions between them. For specific details about template object scale, which depends on the type of the templates you deploy (Multi-Site vs Autonomous), see the Table 6: NDO-Deployed Logical Objects Scale for Multi-Site Templates, on page 6 and Table 7: NDO-Deployed Objects Scale for Autonomous Templates, on page 7 tables below.
Pods per site	12 or 25, depending on the Cisco APIC release managing the site. For more information, see the Cisco APIC Verified Scalability Guide for your release.
Leaf switches per site	400 in a single pod 500 across all pods in Multi-Pod fabrics Number of leaf switches supported within each fabric depends on the Cisco APIC release managing that fabric. For more information, see the Cisco APIC Verified Scalability Guide for your release.
Total leaf switches across all sites	`(max number of sites) * (max number of leaf switches per site)`, for example: • For Multi-Site deployments, if every site is deployed as a Multi-Pod fabric, then maximum number of leaf switches is `(14 sites) * (500 switches) = 7000`. • For Autonomous site deployments, if Orchestrator is deployed in a physical Nexus Dashboard cluster, then maximum number of leaf switches is `(100 sites) * (500 switches) = 50,000` • For Autonomous site deployments, if Orchestrator is deployed in a virtual Nexus Dashboard cluster, then maximum number of leaf switches is `(20 sites) * (500 switches) = 10,000` Note that specific objects' scale (such as VRFs, BDs, EPGs, etc.) still applies, as described in the template-specific sections below.

Object	Scale
Endpoints per site	The NDO endpoint scale for each site is the same as the scale supported by the site's APIC. For detailed information, see the Cisco APIC Verified Scalability Guide for the APIC release version managing each site. **Note** If the site is part of a Multi-Site domain, the total number of endpoints is the sum of local and remote endpoints.

Note If a specific object's scale (such as contracts, filters, or VRFs) is not included in the following table, that object does not have a unique scale limit and the general "Policy Objects per Schema" and "Policy Objects per Template" limits apply. If any such objects were explicitly listed in previous releases, those limitations have been lifted and removed from the list.

Table 3: Application Templates Scale

Object	Scale
Schemas	1000
Templates per Schema	30
Service Graphs per Schema	500
Service Graph nodes per Service Graph	5 for Autonomous templates 2 for Multi-Site templates
Policy Objects per Schema	2000
Policy Objects per Template	2000
Contract Preferred Group (BD/EPG combinations)	5000

Note The following table applies to the Tenant Policies, Fabric Policies, Fabric Resource Policies, and Monitoring Policies templates introduced in Release 4.0(1). For Application template scalability information, see the previous tables in this document.

Table 4: Tenant Policies, Fabric Policies, Fabric Resource Policies, and Monitoring Policies Templates Scale

Object	Scale
Policy Objects per Template	500
Monitoring Policy Scale	
ERSPAN Sessions	20 per site

Object	Scale
Fabric SPAN Sessions	30 per site

Note The following table applies to the L3Out templates introduced in Release 4.1(1). For Application template scalability information, see the previous tables in this document.

Table 5: L3Out Templates Scale

Object	Scale
IP L3Outs per Template	100
SR-MPLS L3Outs per Template	100
All other objects scale	The scale for other L3Out template objects that are not explicitly listed in this table is the same as the scale supported by the site's APIC. For detailed information, see the Cisco APIC Verified Scalability Guide for the APIC release version managing each site.

NDO-Deployed Objects Scale

To better understand the scalability values captured in the following table for traditional Multi-Site deployments, it is important to clarify that there are three kind of NDO-deployed objects:

- Site local objects—these are the objects defined in templates associated to a single site, which get deployed by NDO only in that specific site.
- Shadow objects—these are the objects deployed by NDO in a site as a result of a contract established between site local and remote objects, they are the representation ("shadow)" of the remote object in the local site.
- Stretched objects—these are the objects defined in templates that are associated to multiple sites, which get deployed by NDO concurrently on all those sites.

The table below captures the maximum number of objects that NDO can deploy in a given site and includes the sum of all three kinds of objects described above.

For example, if you have two sites and you define three templates on NDO—`template-1` associated to `site-1`, `template-2` associated to `site-2`, and `template-stretched` associated to both `site-1` and `site-2`—then:

- If you configure and deploy `EPG-1` in `template-1`, this will count as one EPG towards maximum allowed for `site-1`.
- If you configure and deploy `EPG-2` in `template-2`, this will count as one EPG towards maximum allowed for `site-2`.
- If you apply a contract between `EPG-1` and `EPG-2` or add both EPGs to the Preferred Group), a shadow `EPG-2` will be created in `site-1` and a shadow `EPG-1` in `site-2`. As a result, two EPGs will now be counted towards maximum allowed in each site.
- Finally, if you configure and deploy `EPG-3` in `template-stretched`, it will count as another EPG in each site, bringing the total to 3 EPGs towards maximum allowed scale.

It is worth adding that the maximum number of objects supported in a given fabric (and captured in the Verified Scalability Guide for Cisco APIC) must not exceed the sum of objects locally defined on APIC plus the objects pushed from NDO to that site (NDO-deployed objects).

Note For maximum scale Nexus Dashboard Orchestrator configurations with many features enabled simultaneously, we recommend that those configurations be tested in a lab before deployment.

Table 6: NDO-Deployed Logical Objects Scale for Multi-Site Templates

Object	Maximum number of objects per site for up to 4 sites	Maximum number of objects per site for 5-14 sites
Tenants	1000	400
VRFs	2000	1000
BDs	6000	4000
Contracts	6000	4000
EPGs	6000	4000
Isolated EPGs	500	500
Microsegment EPGs	2000	500
L3Out external EPGs	500	500
Subnets	8000	8000
L4-L7 logical devices	400	400
Graph instances	250	250
Device clusters per tenant	10	10
Number of graph instances per device cluster	125	125

Beginning with Release 4.0(1), Nexus Dashboard Orchestrator adds support for autonomous sites. When creating Multi-Site application templates, you can now choose to designate the template as Autonomous. This allows you to associate the template to one or more sites that are operated independently and are not connected through an Inter-Site Network (no intersite VXLAN communication).

Because autonomous sites are by definition isolated and do not have any intersite connectivity, there is no shadow object configuration across sites and no cross-programming of pctags or VNIDs in the spine switches for intersite traffic flow.

The autonomous templates allow for significantly higher deployment scale as shown in the following table. Since there are no stretched objects or shadow objects, the scale values shown in the table below reflect the specific site-local objects that the Orchestrator deploys in each site. This is in contrast to the scale for Multi-Site templates listed above, where the numbers represent the maximum number of objects across all sites.

Table 7: NDO-Deployed Objects Scale for Autonomous Templates

Object	Maximum number of objects per site
Tenants	1000
VRFs	2000
BDs	6000
Contracts	6000
EPGs	6000
Isolated EPGs	500
Microsegment EPGs	2000
L3Out external EPGs	500
Subnets	8000
Number of L4-L7 logical devices	400
Number of graph instances	250
Number of device clusters per tenant	10
Number of graph instances per device cluster	125

SD-Access and Cisco ACI Integration Scale

Starting with Release 3.7(1), you can onboard a Cisco DNA Center (DNAC) to your Nexus Dashboard Orchestrator for SD-Access and ACI integration.

Note Cisco Nexus Dashboard and Cisco DNAC integration allows for automation of a subset of network connectivity and macro segmentation scenarios across Nexus and campus SDA fabric deployments. This integration is under limited availability. Please contact your Cisco representative for additional information

The following scale limits apply for this use case:

- Only a single DNAC can be onboarded to your Nexus Dashboard Orchestrator for SD-Access and ACI integration.
- Up to 2 Cisco ACI sites are supported for peering with SD-Access.

  Each ACI site can be a single Pod or a Multi-Pod fabric.
- Multiple SD-Access (campus) sites are supported if managed by a single DNAC.
- A virtual network (VN) can be mapped to a maximum of 10 ACI VRFs.
- Up to 32 virtual networks from the SD-Access domain can be extended into the ACI domain.

VRF/BD VNID Translation Scale

Table 8: VRF/BD VNID Translation Scale

Object	Scale
Fixed spines	21,000
Modular spines	42,000

NDFC Fabrics Scalability Limits

This release of Nexus Dashboard Orchestrator supports managing only NDFC fabrics or only ACI fabrics by the same Nexus Dashboard Orchestrator. The following scale limits apply when managing NDFC fabrics.

Table 9: General Scalability Limits

Object	Scale
Sites A "site" in NDO context is equivalent to an NDFC "fabric".	13
Fabrics per NDFC instance	5
Border Gateways per site	4

Table 10: Nexus Dashboard Orchestrator Objects Scale

Object	Scale
Schemas	80
Templates per Schema	10
Policy Objects per Schema	1000

Note When NDO manages NDFC fabrics, there is no concept of "shadow" objects. Hence, the scalability values captured in the table below only refer to the sum of site-local and stretched objects deployed by NDO in a given fabric.

Table 11: NDO-Managed Objects Scale

Object	Scale (Stretched)
VRFs	500
Networks	1000 (L3) 1500 (L2)

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