



Verified Scalability Guide for Cisco APIC, Release 1.1(1j) and Cisco Nexus 9000 Series ACI-Mode Switches, Release 11.1(1j)

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Overview

This guide contains the maximum verified scalability limits for ACI parameters for the Cisco APIC Release 1.1(1j) and Cisco Nexus 9000 Series ACI-Mode Switches, Release 11.1(1j). 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 ACI fabric scale.

General Scalability Limits

- **L2 Fabric:** There is no routing, L3 context, nor contract enabled in the L2 fabric profile. A tenant in this profile does not need to be mapped to one dedicated ACI tenant. A tenant can be represented by a set of EPGs instead. To improve the load sharing among APIC controller nodes, you must distribute EPGs and BDs across an ACI tenant.
- **L3 Fabric:** The ACI L3 fabric solution provides a feature-rich highly scalable solution for public cloud and large enterprise. With this design, almost all supported features are deployed at the same time and are tested as a solution. The scalability numbers listed in this section are multi-dimensional scalability numbers. The fabric scalability numbers represent the overall number of objects created on the fabric. The per-leaf scale numbers are the objects created and presented on an individual leaf switch. The fabric level scalability numbers represent APIC cluster scalability and the tested upper limits. Some of the per-leaf scalability numbers are subject to hardware restrictions. The per-leaf scalability numbers are the maximum limits tested and supported by leaf switch hardware. This does not necessarily mean that every leaf switch in the fabric was tested with maximum scale numbers.

Feature	L2 Fabric	L3 Fabric	Large L3 Fabric
Number of APIC controllers	3	3	5
Number of leaves	80	80	200
Number of spines	6	6	6
Number of FEXs	N/A	8 per leaf, 120 per fabric	N/A
Number of tenants	N/A	1K	3K
Number of Layer 3 (L3) contexts	N/A	1K	3K
Number of contracts/filters	N/A	<ul style="list-style-type: none"> • 1K contracts • 10K filters 	<ul style="list-style-type: none"> • 1K contracts • 10K filters
Number of endpoint groups (EPGs)	21K (500 maximum per tenant)	15K (500 maximum per tenant)	15K (500 maximum per tenant)
Number of endpoints (EPs)	180K	180K	180K
Number of bridge domains (BDs)	21K	15K	15K
Number of ports, VLANs	per leaf 48 X 3,500 = 168K	64K	64K
Number of IP longest prefix matches (IP LPMs) (for external connection)	N/A	<ul style="list-style-type: none"> • IPv4 ; 40K • IPv6 ; 20K • IPv4 ; 10K, IPv6 ; 10K 	<ul style="list-style-type: none"> • IPv4 ; 40K • IPv6 ; 20K • IPv4 ; 10K, IPv6 ; 10K
Note This limit exists across all protocols/transit scenarios			

Feature	L2 Fabric	L3 Fabric	Large L3 Fabric
Number of BGP + number of OSPF sessions + EIGRP (for external connection)	N/A	1,200	1,200
Number of Multicast groups	N/A	8K	8K
Number of vCenters	N/A	5	5
Number of Service Chains	N/A	600	1K
Number of L4 - L7 devices	N/A	30 physical, 1,200 virtual (1,200 maximum per fabric)	30 physical, 1,200 virtual (1,200 maximum per fabric)
Number of ESX hosts - VDS	N/A	3,200	3,200
Number of ESX hosts - AVS	N/A	3,200 (Only 1 AVS instance per host)	3,200 (Only 1 AVS instance per host)
Number of VMs	N/A	Depends upon server scale	Depends upon server scale

Fabric Topology, SPAN, Tenants, Contexts, External EPGs, Bridge Domains, Endpoints, and Contracts Scalability Limits

Configurable Options	Per Leaf Scale	Per Fabric Scale
Fabric Topology		
Maximum number of vPCs	320 (hif vPC with FEX)	(Number of leafs /2) X 48
Maximum number of encaps per vPC	1,750 (ports X encap < 64K) If the BD is in classic mode, 48 X 3,500 = 168k port-VLAN combination is supported in the L2 Fabric mode. Note With EPG deployed on FEX : port-VLAN combination is restricted to 10K.	N/A
Maximum number of Member Links per vPC	8	N/A
Maximum number of PCs	48	(Number of leafs) X 48
Maximum number of encaps per PC	1,750 (ports X encap < 64K)	N/A
Maximum number of Member Links per PC	8	N/A
Maximum number of PCs, access ports	48	(Number of leafs) X 48
Maximum number of encaps per access port	1,750 (ports X encap < 64K)	N/A

Configurable Options	Per Leaf Scale	Per Fabric Scale
STP	All VLANs	N/A
Maximum number of endpoints (EPs)	<ul style="list-style-type: none"> • IPv4 ; 12K or • IPv6 ; 6K or • IPv4 ; 4K, IPv6 ; 4K 	180K
Number of Multicast Groups	8K	8K
Number of IPs per MAC	256	256
SPAN	<ul style="list-style-type: none"> • 4 infra/tenant sessions • 4 fabric sessions (VXLAN is carried in the SPAN) 	8 fabric sessions per fabric
Number of ports per SPAN session	<ul style="list-style-type: none"> • All leaf access ports could be in one session • All leaf fabric ports could be in one session 	N/A
Number of source EPG/BDs per SPAN session	280	N/A
Syslog server as Monitoring Station per fabric	8 supported	N/A
SNMP managers as Monitoring Stations per fabric	10 supported	N/A
Tenants		
Number of Contexts per tenant	8	8
Number of application profiles per tenant (or per Context)	N/A	N/A
Contexts (All numbers applicable to dual stack unless explicitly called out)		
Maximum number of Context	100	N/A
Maximum number of BDs per Context	100	N/A
Border Leafs per Context	N/A	4
Maximum number of LPM Prefixes for External EPG Classification	1K IPv4	N/A
Maximum number of vzAny Provided Contracts	16 per Ctx	N/A
Maximum number of vzAny Consumed Contracts	16 per Ctx	N/A
Maximum number of L3Outs per Context	3	3

Configurable Options	Per Leaf Scale	Per Fabric Scale
Maximum number of Routed, Routed Sub-interface, or SVIs per L3Out	<ul style="list-style-type: none"> • 8 for Routed and Routed sub-interface • 2 for SVI 	<ul style="list-style-type: none"> • 8 for Routed and Routed sub-interface • 2 for SVI
Maximum number of Dynamic Routing protocol peers (OSPF, NSSA, or iBGP)	100	N/A
Maximum number of Static Routes	<ul style="list-style-type: none"> • IPv4 ; 10K or • IPv6 ; 6K or • IPv4 ; 4K, IPv6 ; 4K 	<ul style="list-style-type: none"> • IPv4 ; 40K or • IPv6 ; 20K or • IPv4 ; 10K, IPv6 ; 10K
Maximum number of External Routes	<ul style="list-style-type: none"> • IPv4 ; 10K or • IPv6 ; 6K or • IPv4 ; 4K, IPv6 ; 4K 	<ul style="list-style-type: none"> • IPv4 ; 40K or • IPv6 ; 20K or • IPv4 ; 10K, IPv6 ; 10K
Maximum number of Secondary (VIP) addresses per L3out	1	1
Maximum number of L3 interfaces per Context (SVIs and sub-interfaces)	32	N/A
External EPGs		
Number of External EPGs per L3 out	16	N/A
Bridge Domain		
Maximum amount of BDs	1,750 ; if legacy mode, 3,500 ; if Multicast optimized mode then 50	15K
Maximum number of subnets per BD	16 (cannot be for all BDs)	16 per BD
Maximum number of EPGs per BD	3,499 (cannot exceed 3,500 total) 3499 is supported in hardware but please refer to the per fabric scale for the effective software support for this release.	N/A
Number of L2 Outs per BD	1	1
Number of BDs with Custom MAC Address	1,750 If Multicast optimized mode is used, then 50	1,750 If Multicast optimized mode is used, then 50
Number of Multicast groups	8K	8K

Configurable Options	Per Leaf Scale	Per Fabric Scale
Maximum number of L3Outs per BD	4	N/A
Number of DHCP relay labels per BD	2	2
DHCP relay for secondary subnets in a BD	No	No
Number of external EPGs per L2 out	1	1
Endpoint Groups (Under App Profiles)		
Maximum amount of EPGs	Normally 1,750 ; if legacy mode 3,500	15K
Maximum amount of encaps per EPG	1 Static leaf binding, plus 1 Dynamic VMM	N/A
Maximum Path encap binding per EPG	Equals to number of ports on the leaf	N/A
Maximum amount of encaps per EPG per port	One (path or leaf binding)	N/A
Maximum number of domains (physical, L2, L3 or VMM)	2 (1 static (L2, L3, physical), 1 dynamic)	N/A
Maximum amount of native encaps	<ul style="list-style-type: none"> • 1 per port (if a VLAN is used as a native VLAN) • If there is a different native VLAN per port then it equals the number of ports 	Applicable to each leaf independently
Maximum amount of 802.1p encaps	<ul style="list-style-type: none"> • 1, if path binding then equals number of ports • If there is a different native VLAN per port then it equals the number of ports 	Applicable to each leaf independently
Can encap be tagged and untagged?	No	N/A
Maximum number of Static endpoints per EPG	Maximum endpoints	N/A
Maximum number of Subnets for Inter-context access per tenant	8	N/A
Maximum number of Taboo Contracts per EPG	2	N/A
Contracts		
Security TCAM size	<ul style="list-style-type: none"> • 4K (for ALE v1) • 32K (for ALE v2) <p>Note For TOR to ALE mapping, see the reference table below.</p>	N/A

Configurable Options	Per Leaf Scale	Per Fabric Scale
Approximate TCAM calculator given contracts and their use by EPGs	Number of entries in a contract X Number of Consumer EPGs X Number of Provider EPGs X 2	N/A
Maximum number of EPGs providing the same contract	10	10
Maximum number of EPGs consuming the same contract	10	10
FEX VPC		
Maximum EPGs behind FEX VPC port	20	N/A

ALE Type	ACI-Supported TORs
ALE v1	<ul style="list-style-type: none"> • N9K-C9396PX + N9K-M12PQ • N9K-C93128TX + N9K-M12PQ • N9K-C9396TX + N9K-M12PQ
ALE v2	<ul style="list-style-type: none"> • N9K-C9396TX + N9K-M6PQ • N9K-C93128TX + N9K-M6PQ • N9K-C9396PX + N9K-M6PQ • N9K-C9372TX 64K • N9K-C9332PQ • N9K-C9372PX

VMM Scalability Limits

Configurable Options	Per Leaf Scale	Per Fabric Scale
VMware		
Number of vCenters	N/A	5
Datacenters in a vCenter	N/A	2
Combination of (VMM domain, VMM controller (vCenter/vShield))	N/A	5
Number of ESX hosts per AVS	240	N/A
Number of EPGs per vCenter/vDS	N/A	5K
Number of EPGs to VMware domains/vDS	N/A	5K
Number of EPGs per vCenter/AVS	N/A	3,500
Number of EPGs to VMware domains/AVS	N/A	3,500

Configurable Options	Per Leaf Scale	Per Fabric Scale
Number of endpoints (EPs) per AVS	10K	10K
Number of endpoints per vDS	10K	10K
Number of endpoints per vCenter	10K	10K
Support RBAC for AVS	N/A	Yes
Support RBAC for vDS	N/A	Yes
Microsegmentation/DFW with AVS		
Number of ESX hosts per AVS	100	N/A
Number of Microsegment EPGs	1K	N/A
Number of DFW flows per vEth	10K	N/A
Number of DFW flows per ESX host	200K	N/A
Number of VMM domains per Microsegment EPG	N/A	1
Microsoft		
Number of controllers per SCVMM domain	N/A	5
Number of SCVMM domains	N/A	4
VMM domains for Microsoft (in addition to that of VMware)	N/A	5
EPGs per Microsoft VMM domain	N/A	3K
EPGs per all Microsoft VMM domains	N/A	9K
EP/VNICs per HyperV host	N/A	100
EP/VNICs per SCVMM	N/A	3K
Number of logical switch per host	N/A	1
Number of uplinks per logical switch	N/A	4
Number of Azurepack instances	N/A	2
Number of Azurepack subscriptions	N/A	1K
Number of Azurepack users	N/A	1K
Number of plans per Azurepack instance	N/A	6
Number of users per plan	N/A	200
Number of subscriptions per user	N/A	3

Configurable Options	Per Leaf Scale	Per Fabric Scale
VM networks per Azurepack user	N/A	100
VM networks per Azurepack instance	N/A	3K
Security rules per Azurepack user	N/A	6
Security rules per Azurepack instance	N/A	6
Number of tenant shared services/providers	N/A	40
Number of consumers of shared services	N/A	40
Number of VIPs (Citrix)	N/A	50
Number of VIPs (F5)	N/A	50

Layer 4 - Layer 7 Scalability Limits

Configurable Options (L4-L7 Configurations)	Per Leaf Scale	Per Fabric Scale
Maximum number of L4-L7 logical device clusters	N/A	1,200
Maximum number of graph instances	N/A	600
Maximum number of VIPs per graph instance	N/A	1
Number of device clusters per tenant	N/A	30
Number of interfaces per device cluster	N/A	Any
Number of graph instances per device cluster	N/A	100
Deployment scenario for ASA (transparent or routed)	N/A	Yes
Deployment scenario for Citrix - One arm with SNAT/etc.	N/A	Yes
Deployment scenario for F5 - One arm with SNAT/etc.	N/A	Yes

AD, TACACS, RBAC Scalability Limits

Configurable Options	Per Leaf Scale	Per Fabric Scale
Number of ACS/AD/LDAP authorization domains	N/A	4 tested (16 maximum /server type)
Number of login domains	N/A	15 (can go beyond)
Number of security domains/APIC	N/A	15 (can go beyond)
Number of security domains in which the tenant resides	N/A	4 (can go beyond)

Configurable Options	Per Leaf Scale	Per Fabric Scale
Number of priority	N/A	4 tested (16 per domain)
Number of shell profiles that can be returned	N/A	4 tested (32 domains total)
Number of users	N/A	8K local / 8K remote
Number of simultaneous logins	N/A	500 connections / NGNIX simultaneous REST logins



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