IMPLEMENTATION GUIDE



CONFIGURING AND IMPLEMENTING A10 NETWORKS LOAD BALANCING SOLUTION WITH JUNIPER'S SSL VPN APPLIANCES

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Introduction

The combined solution of Juniper Networks[®] SA Series SSL VPN Appliances and the A10 Networks AX Series Advanced Traffic Manager provides an enhanced SSL VPN service. The access and security features of the SA Series are easily extended as needed by deploying AX Series server load-balancing functionality for additional security, availability, and capacity.

AX Series load balancers add the following benefits to an SA Series solution:

- Intelligent, flexible load-balancing algorithms to select the best SA Series node for each session
- Industry-leading connection speed, supporting greater than 500,000 new TCP connections per second
- Customizable health monitors to ensure service availability
- Stickiness options, such as persistence based on client source IP address
- Hardware-based protection against distributed denial of service (DDoS) attacks
- One virtual VPN server to provide a single point of access for all users in all locations
- High availability (HA) AX redundancy with session synchronization to eliminate single point of failure



Figure 1: Logical topology overview



Figure 2: Logical topology overview with the IP addresses used in this example

Scope

The deployment guide is intended to describe the installation steps necessary to implement the A10 Networks AX Series load balancer with the Juniper Networks SA Series SSL VPN Appliances solution. The guide is intended to provide detailed configuration information for organizations' system engineers and technical staff.

Design Considerations

AX Series Appliances

Firmware: AX Series version 2.x or later

Platform: Any

Performance: AX Series appliances are high-performance systems, and characteristics vary by platform. Performance examples are provided in various third-party performance reports at http://www.a10networks.com. Sample figures:

- >500,000 new connections per second (CPS)
- Millions of concurrent sessions
- 1-9+ million hardware SYN/sec for DDoS
- Multi-Gb throughput

Juniper Networks IC Series Unified Access Control Appliances

- Software: 6.0R3.1 (build 12507) or later
- Platform: Juniper Networks SA6500 SSL VPN Appliance
- Performance: 5,000 simultaneous users per appliance

Description and Deployment Scenario

This section enables solution implementation, detailing device configuration for all relevant protocols and interfaces.

The following procedures show you how to configure a pair of AX load balancers to provide HA and load balancing for a Juniper SA Series cluster. The configuration for the SA Series cluster follows.

Configure AX

First, AX1 will be configured, and then its configuration will be synchronized to AX2.

Add the IP Address to the Interface

- 1. Select Config Mode > Network > Interface.
- 2. In the Interface column, click on "e1."
- 3. Expand the IPv4 tab.
- 4. Enter the IP address and mask in the IP Address and Mask fields. In this example, enter 172.16.0.11 and 255.255.255.0.
- 5. Click OK at the bottom of the window. The interface list reappears.

Monitor Mode Config Mode	LAN	Management
Service 🕨	Interface	IP Address
Network 🖤	□ e1	0.0.0/0
	Ľ₂ □	0.0.0/0
es Interface	🗌 e3	0.0.0/0
» Trunk	🗌 e4	0.0.0/0
» VLAN	e5	0.0.0.0/0
» ACL	🗖 e6	0.0.0/0
» ARF	e7	0.0.0.0/0
» DNS	🗖 e8	0.0.0/0
» ICMP Rate Limiting	e9	0.0.0.0/0
» STP	🗌 e10	0.0.0/0

Figure 3: Select the interface

Interface >> LAN >> ethernet1

General				
Port Number:	1			
Туре:	ethernet			
Status:	O Enabled	Oisabled		
MAC Address:	0090.0B0B.94	4F6		
Name:				
Speed:	Auto		*	
Duplex:	Auto		*	
Flow-Control:	O Enabled	Oisabled		
CPU Process:	O Enabled	Oisabled		
ICMP Rate Limiting:				
O IPv4				
IP Address:	172.16.0.11			
Mask:	255.255.255.0			
	IP Address:		Mask:	O Add
	IP Address		Mask	Delete

Secondary IP List:	I Address	musk	Contraction of the second seco
Access List:		~	
O IPv6			
© VIP			
⊙ на			
≪ OK X Cancel			

Figure 4: Enter the IP address and mask for e1

Add the Default Gateway

- 1. Select Config Mode > Network > Route.
- 2. Click Add.
- 3. In the IP Address Prefix field, enter 0.0.0.0.
- 4. In the Netmask field, enter 0.0.0.0.
- 5. In the Gateway field, enter 172.16.0.1.
- 6. Click OK. The default route appears in the route table.

Set up HA

- 1. Select Config Mode > HA > Setting.
- 2. On the General tab, select "1" from the Identifier drop-down list.
- 3. Click Enabled next to HA Status.
- 4. Click Enabled next to Preempt Status.
- 5. In the HA Mirroring IP Address field, enter the IP address of AX2 (172.16.0.12 in this example).
- 6. Enter Group parameters:
 - a. Expand the Group tab.
 - b. Select "1" from the Group Name drop-down list.
 - c. In the Priority field, enter 100.
 - d. Click Add.
- 7. Click OK at the bottom of the page.
- 8. Enable SSH access on the HA interface:
 - a. Select Config Mode > System > Access Control.
 - b. Select the SSH checkbox in the row for ethernet1.

General		
dentifier:*	1 v Set ID:	
HA Status:	Enabled Disabled	
Preempt Status:	Enabled Disabled	
Time Interval:	2 100ms	
A Mirroring IP Address:	172.16.0.12	
limeout Retries:	5 Seconds	
ARP Retry:	4	
100		
loating IP Address		
loating IP Address tatus Check		
loating IP Address itatus Check		

Figure 5: Set up HA

Set up a Service Group for the SA Series Cluster

- 1. Select Config Mode > Service > SLB.
- 2. On the menu bar, select Service Group.
- 3. Click Add.
- 4. For the Name, enter "sa_group."
- 5. For the Type, leave "TCP" selected.
- 6. For the load-balancing Algorithm, select Least Connection.
- 7. Configure an HTTPS health monitor:
 - a. In the Health Monitor drop-down list, select "create." The configuration tabs for configuring a health monitor appear.
 - b. In the Name field, enter "sa_monitor."
 From the Type drop-down list, select HTTPS.
 - c. Click OK. The service group configuration tabs reappear.
- 8. Add the SA Series servers:
 - a. On the Server tab, in the Server field, enter the IP address of an SA Series server. (In this example, enter 172.16.0.61.)
 - b. In the Port field, enter 0.
 - c. Click Add.
 - d. Repeat for the second SA Series server, but enter IP address 172.16.0.62.
- 9. Click OK at the bottom of the page to finish creating the service group.

Service Group			
Name: *	sa_group		
Туре:	TCP		
Algorithm:	Least Connection	×.	
Health Monitor:		~	
Min Active Members:	ning		
Description:	create		< >
rvice Group >> Health M	Ionitor /		
Health Monitor	*		
Name: *	sa_monitor		
Retry:	3		
Consec Pass Req'd:	1		
Interval:	30	Seconds	
Timeout:	5	Seconds	
Method			
Override IPv4:			
Override IPv6:			
Override Port:			
Method:	Internal O External	1	
Туре:	HTTPS	✓	
Port:	443		
Host:			
URL:	GET 📝 /		
User:			
Password:			

Figure 6: Configure the health monitor

SLB >> <u>Service Group</u> >> Cre	ate				
Service Group					
Name: *	sa_group				
Туре:	TCP		*		
Algorithm:	Least Connec	tion	*		
Health Monitor:	sa_monitor		*		
Min Active Members:					
Description:					~ ~
Server IPv4/IPv6: Server: *	IPv4 OIP 172.16.0.62 default	0v6	Port: *	0	DbA ①
Server	Por	rt SPT	Priority.	Priority	Delete
172.16.0.61	0	defa	ult	1	© Enable
172.16.0.62	0	defa	ult	1	O Disable
✓ OK 🛛 🗶 Cancel					

Figure 7: Add the servers

Set up the Source NAT Pool

- 1. Select Config Mode > Service > SNAT.
- 2. Click Add.
- 3. In the Name field, enter "sa_snat."
- 4. In both IP Address fields, enter 172.16.0.51.
- 5. In the Netmask field, enter 255.255.255.0.
- 6. From the HA Group drop-down list, select "1."
- 7. Click OK.

ame: *	sa_snat	
tart IP Address: *	172.16.0.51	
End IP Address: *	172.16.0.51	
letmask: *	255.255.255.0	
Gateway:		
HA Group:	1 👻	

Figure 8: Configure the source NAT pool

Set up the Virtual Server

- 1. Select Config Mode > Service > SLB.
- 2. On the menu bar, select Virtual Server.
- 3. Click Add.
- 4. In the Name field, enter "sa_vip."
- In the IP Address field, enter the IP address at which clients will request the SA Series service. This is the IP address that DNS should send when replying to client queries for the SA Series service. In this example, enter 172.16.0.50.
- 6. From the HA Group drop-down list, select the HA group configured previously (group ID "1").
- 7. Configure a virtual port:
 - a. On the Port tab, click Add. The Virtual Server Port tab appears.
 - b. From the Type drop-down list, select TCP if not already selected.
 - c. In the Port field, enter "443."
 - d. From the Service Group drop-down list, select "sa_group."
 - e. Select Enabled next to HA Connection Mirror.
 - f. From the Source NAT Pool drop-down list, select "sa_snat."
 - g. From the Persistence Template Type drop-down list, select Source IP Persistence Template.
 - h. From the Source IP Persistence Template field, select "create." The configuration tab for the template appears.
 - i. In the Name field, enter " sa_source."
 - j. In the Timeout, change the value to 20.
 - k. Click OK to return to the Virtual Server Port tab. The port appears on the Port tab.
- 8. Click Add again to configure another virtual port. For this port, use the following settings:
 - Type Others
 - Port 0
 - Service Group sa_group
 - Source NAT Pool sa_snat
 - Source IP Persistence Template sa_source
- 9. Click OK.

10. Click OK again to finish creating the virtual server.

neral					
ame: *		sa_vip	[Wildcard	
Address: *		172.16.0.50	(DIPv4 OIPv6	
tatus:		Enabled	O Disabled		
RP Status:		Enabled	O Disabled		
HA Group:		1	Y Dynamic Se	erver Weight	
Virtual Server Templ	ate:	default	*		
Description:					<
Port					
Status	Port	Туре	Service Grou	р	🕀 Add 🕞
					🖉 Edit 🖤
					Delete
					🖉 Enable

	DeleteEnableDisable
✓ OK 🛛 🗶 Cancel	



SLB >>	Virtual	Server	>>	Port	>>	Create	
--------	---------	--------	----	------	----	--------	--

Name:	sa_vip			
Туре: *	TCP	*		
Port: *	443			
Service Group:	sa_group	*		
Connection Limit:	1000000 O	rop 🔿 Reset		
	Use default server sele	Use default server selection when preferred method fails		
	Use received hop for re	esponse		
Status:	Enabled O Disa	abled		
HA Connection Mirror:	Enabled O Disa	abled		
Direct Server Return:	O Enabled			
SYN Cookie:	O Enabled O Disa	abled		
Virtual Server Port Template:	default	*		
Access List:		*		
Source NAT Pool:	sa_snat	*		
aFleX:		*		
TCP Template:		*		
Persistence Template Type:	Source IP Persistence	Template 🗸		
Source IP Persistence Template:	sa_source	*		
Policy Template:		*		
	Access List:	1	*	O Add
	Source NAT Pool:	sa_snat	*	🖉 Update
	Access List	Source N	IAT Pool	Delete
ACL-SNAT Binding:				

Figure 10: Configure port settings (settings for port 443 shown)

ame: *	sa_source
latch Type:	Port 🗸
meout:	20 Minutes
on't Honor Conn Rules:	
etmask:	

Figure 11: Configure the source-IP persistence template

	ral				
m	e: *		sa_vip		
IP Address: * 172.16.0.50			172.16.0.50		
Status: O Enabled Disabled					
RP	Status:		Enabled	Disabled	
G	iroup:		1	Y Dynamic Server Weight	
rtu	ial Server Te	emplate:	default	*	
					~
SC	cription:				
rt					
	Status	Port	Туре	Service Group	O Add
	Status	Port 443	Type TCP	Service Group sa_group	O Add
	Status	Port 443 0	Type TCP Others	Service Group sa_group sa_group	Add Delete
	Status	Port 443 0	Type TCP Others	Service Group sa_group sa_group	Add Delete Senable
	Status	Port 443 0	Type TCP Others	Service Group sa_group sa_group	Add Delete Senable Objeable
	Status	Port 443 0	Type TCP Others	Service Group sa_group sa_group	Add Add Delete Senable Senable Senable
	Status	Port 443 0	Type TCP Others	Service Group sa_group sa_group	Add Delete Enable O Disable
	Status	Port 443 0	Type TCP Others	Service Group sa_group sa_group	Add Add Ø Edit Ø Delete Ø Enable Ø Disable
	Status	Port 443 0	Type TCP Others	Service Group sa_group sa_group	Add Delete Second Deletee Second Deletee

Figure 12: Virtual ports configured and listed on the Port tab

Configure AX2

Add the IP Address to the Interface

- 1. Select Config Mode > Network > Interface.
- 2. In the Interface column, click on "e1."
- 3. Expand the IPv4 tab.
- 4. Enter the IP address and mask in the IP Address and Mask fields. In this example, enter 172.16.0.12 and 255.255.255.0.
- 5. Click OK at the bottom of the window. The interface list reappears.

Add the Default Gateway

- 1. Select Config Mode > Network > Route.
- 2. Click Add.
- 3. In the IP Address Prefix field, enter 0.0.0.0.
- 4. In the Netmask field, enter 0.0.0.0.
- 5. In the Gateway field, enter 172.16.0.1.
- 6. Click OK. The default route appears in the route table.

Set up HA

- 1. Select Config Mode > HA > Setting.
- 2. On the General tab, select "2" from the Identifier drop-down list.
- 3. Click Enabled next to HA Status.
- 4. Click Enabled next to Preempt Status.
- 5. In the HA Mirroring IP Address field, enter the IP address of AX1 (172.16.0.11 in this example).
- 6. Enter Group parameters:
 - a. Expand the Group tab.
 - b. Select "1" from the Group Name drop-down list.
 - c. In the Priority field, enter 90.
 - d. Click Add.
- 7. Click OK at the bottom of the page.
- 8. Enable SSH access on the HA interface:
 - a. Select Config Mode > System > Access Control.
 - b. Select the SSH checkbox in the row for ethernet2.
 - c. Click OK.

Setting >> HA Global						
General						
Identifier:*	2 🗸 Set ID:					
HA Status:	Enabled Disabled					
Preempt Status:	Enabled Disabled					
Time Interval: 2 100ms						
HA Mirroring IP Address:	172.16.0.11					
Timeout Retries:	5 Seconds					
ARP Retry:	4					
© Group Group Name: 1 ♥ Priority: ① ④ Add Group Name Priority 1 90 Complete Comp						
© Floating IP Address						
Status Check						
≪∕ OK {h	≪ ok					

Figure 13: Set up HA (compare with the setup for AX1)

Synchronize the Load-Balancing Configuration from AX1 to AX2

- 1. Select Config Mode > HA > Config Sync.
- 2. Enter the admin username and password required for Enable access to AX1 (in this example, "admin" and "a10").
 3. Click OK.

Password :*	
ync All Partitions :	
peration:	
eer Option:	

Figure 14: HA Config Sync

SA6500 Active-Active Configuration

Table 1: License					
NODE	LICENSE	COMMENT			
sa6500-c	• Enables 5,000 simultaneous users of SA6500	• License for total concurrent users			
	 Enables Juniper Networks Secure Application Manager and Network Connect for SA6500 	• License to use Network Connect			
sa6500-d	• Enables clustering: Allows 5,000 additional users to be shared from another SA6500	• Clustering license for second node			

Creating a Cluster in sa6500-c

1. To create a new cluster, choose...

Type:	SA-6500	
Cluster Name:	sa-dcb	Name of the cluster to create. Must be alphanumeric, "-", or "_"; and must start with a letter.
Cluster Password:	áslakolakokak	Shared secret among the nodes in the cluster. Must be at least 6 characters long
Confirm Password:	adukukukuk	Shared secret among the nodes in the cluster. Must match the password you typed in the previous line
Member Name:	sa6500c	Name of this node in the duster

Are you sure you want to create a new cluster sa-dcb ?

Please click Create to create a new cluster and add this appliance with member name sa6000-c to the cluster. Click Cancel if you do not want to create a cluster.

Create Cancel

2. By default, a cluster is created in the active-active configuration. To modify the settings, choose **Clustering > Properties**. Then make your changes. For instance, you can select **disable external interface when internal interface fails** as shown here.

Clustering
Status Properties
Type: SA-6500
Cluster Name: sa-dcb
Cluster Password: automate
Confirm Password: Second
Configuration Settings
C Active (Passive configuration
This is a high-availability failover mode, in which one node is active while the other is held as backup.
Internal VIP:
External VIP:
Active/Active configuration
This mode requires an external load-balancer.
Synchronization Settings
Protocol: Onicast Omulticast OBroadcast
Synchronize log messages
WARNING: Enabling the cluster 'Synchronize log messages' feature results in large data transfers between bandwidth to support such transfers.
V Synchronize user sessions
✓ Synchronize last access time for user sessions
Network Healthcheck Settings
Number of ARP Ping failures before interface is disabled (should be greater than 0): 3
Disable external interface when internal interface fails
C Advanced Settings
Save Changes Delete Cluster

3. When you are finished making changes, click the **Save Changes** button.

Adding a Cluster Member in sa6500-c

4. Before a cluster member can join a cluster, you need to define it. Choose **Clustering > Status**. Two cluster members, sa6500-c and sa6500-d, are defined in the following screenshot.

Clus	tering						
Stat	tus Propertie:	5				-	
Clust Type Confi Add	er Name: sa-d :: SA-6 iguration: Activ I Members	cb 500 ve/Active Enable Disabl	e Remove				
	Member Name	Internal Addres	s External Address	Status	Notes	Sync Rank	Update
	sa6500-c	8.8.9.9/25	172.16.8.61/23	0	Leader	0	
	<u>sa6500-d</u>	8.8.9.8/25	172.16.8.62/23	٥	Enabled, Unreachable	0	
* Ind	licates the nod	e you are curren	tly using				

5. To add a member to the cluster, select the cluster on the **Status** tab.

Clustering		
Status Properties		
Cluster Name: sa-dcb Type: SA-6500 Configuration: Active/Active Add Members Enable Disable Remove		
Member Name Internal Address External Address Status	Notes	Sync Rank Lindate

6. Click the Add Members button. The following screenshot shows how to add sa6500-d as a cluster member.

7. Click the Add button to include the cluster member.

Joining a Cluster in sa6500-d

After cluster information has been defined for sa6500-c, it is time for sa6500-d to join the cluster. Log in
 sa6500-d admin URL and choose **Cluster > Join**. Enter the cluster name, cluster password, and existing member address (for example, the internal address of sa6500-c).

Join Existing Cluster		
Join		
Cluster Name:	sa-dcb	Name of the cluster to join
Cluster Password:	kolaisialaiak	
Existing Member Address:	8.8.9.9	Internal IP address of any existing cluster member
Join Cluster		
Confirm Join Cluster		
This node will next contact the clust member of the cluster.	ster member '8.8.9.9' an	d ask to join the cluster sa-dcb. If this succeeds, the node will join as
WARNING: This host's entire state netmask etc.	will be overwritten with	the current cluster configuration, including bookmarks, IP address,
Please click Join to join the cluster Click Cancel to return to the previo	ous page.	
Join Cancel		

Monitoring a Cluster

1. To display the status of the current cluster, choose Clustering > Status.

Clu	stering					
Sta	tus Properties					
Cluster Name: sa-dcb Type: SA-6500 Configuration: Active/Active Add Members Enable Disable Remove						
	Member Name	Internal Address	External Address	Status	Notes	Sync Rank Update
	* <u>sa6500-c</u>	8.8.9.9/25	172.16.8.61/23	٥	Leader	0
	<u>sa6500-d</u>	8.8.9.8/25	172.16.8.62/23	٥	Enabled	0

2. To display a dashboard showing the system status for all cluster members, choose System > Status.

System Status		
Overview Active Users Meeting Schedule		
I Critical Events	System Capacity Utilization	Graphs display last 1 hour
E Page Settings	Concurrent Users (<u>Edit</u> V Dovnload)	sa6500-c 💌
System Version 6.0R3.1 (build 12507) Download Package		
Last Reboot 3 days, 19 hours, 34 minutes, 44 seconds	2 12:40 13:00	13: 20
System Date & Time <u>Edit</u> 2008-03-10 01:36:07 PM	Concurrent Meeting Graph (Edit Povnload)	sa6500-c
Logging Disk: 0% Full	1.0	
Max Licensed Users: 5000		
Signed-In Users: 1	0.5	
Signed-In Mail Users: 0	0.0 12:40 13:00	13: 20
	Meetings	
Member Status		and 500 a
• 🥪 <u>sa6500-c</u> *	Hits Per Second (Edit Download)	saesoo-c
0 🥪 <u>sa6500-d</u>	0.3	J.
* Node currently used	0.2	/\ <u> </u> \]
	0.1	
	0.0 12:40 13:00	13:20
	■ Hits ■ Web Hits ■ File Hits ■ Clien	t-Server Hits
	CPU and Virtual (Swap) Memory Utilization (<u>Edi</u> <u>Download</u>)	sa6500-c 💌

SA Series Configuration References

- SA Series system software downloads: http://www.juniper.net/techpubs/software/ive/
- Juniper Networks Knowledge Base: http://kb.juniper.net/
- SSL VPN (IVE) Version 6.0 technical documents: http://www.juniper.net/techpubs/software/ive/6.x/6.0/

Summary

The SSL VPN solution consisting of Juniper Networks SA Series SSL VPN Appliances and A10 Networks AX Series provides one of the most reliable and scalable secure access solutions. New and existing SSL VPN deployments alike can benefit from AX Series features including configurable health monitors, flexible load balancing, and persistence ("stickiness") options—and HA. hardware-based DDoS protection detects and drops unfriendly TCP traffic while allowing legitimate user traffic to the SA Series nodes. HA eliminates service interruption due to AX or link unavailability. GSLB provides additional flexibility and ease of use, enabling a single-user access experience across multiple sites—regardless of user location—while transparently directing the user to the best site based on site health, user location, and other configurable metrics.

AX Series server load balancers allow SA Series deployments to scale in support of today's mobile workforce. Tomorrow's ever-increasing numbers of users—running increasingly bandwidth-intensive applications—continue to enjoy fast, reliable secured access without the need to manage and utilize multiple URLs due to user location or network load. For additional AX Series information, please visit **www.a10networks.com**.

About A10 Networks

A10 Networks was founded in Q4 2004 with a mission to provide innovative networking and security solutions. A10 Networks makes high-performance products that help organizations accelerate, optimize and secure their applications. A10 Networks is headquartered in Silicon Valley with offices in the United States, EMEA, Japan, China, Korea and Taiwan. For more information, visit **www.a10networks.com.**

About Juniper Networks

Juniper Networks, Inc. is the leader in high-performance networking. Juniper offers a high-performance network infrastructure that creates a responsive and trusted environment for accelerating the deployment of services and applications over a single network. This fuels high-performance businesses. Additional information can be found at **www.juniper.net**.

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