Oracle® Communications IP Service Activator

Juniper JUNOS Cartridge Guide

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This guide provides detailed technical information about the Oracle Communications IP Service Activator Juniper JUNOS cartridge, including supported features, options, device configuration information, and a sample device configuration.

About This Guide

This guide consists of the following sections:

- Cartridge Overview
- IP Service Activator Juniper JUNOS Cartridge Features
- Installing the Cartridge
- Device Configuration

Audience

This guide is intended for network managers and technical consultants responsible for implementing IP Service Activator within a network using Juniper routers.

Accessing Oracle Communications Documentation

IP Service Activator for Oracle Communications documentation and additional Oracle documentation is available from Oracle Help Center:

http://docs.oracle.com

Related Documents

For more information, see the following documents in the IP Service Activator documentation set:

- See *IP Service Activator Installation Guide* for system requirements and information on installing, upgrading and uninstalling IP Service Activator.

- See *IP Service Activator System Administrator's Guide* for information and procedures related the duties a system administrator performs in monitoring and managing IP Service Activator.

Cartridge Overview

Oracle Communications IP Service Activator cartridges enable you to support the existing services, and also evolve to support emerging services and business needs.

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The cartridges operate in conjunction with IP Service Activator core product. For more information, see *IP Service Activator Concepts*.

IP Service Activator Juniper JUNOS Cartridge Features

The following tables list the features and services supported by the IP Service Activator Juniper JUNOS cartridge.

General IP Service Activator Features

Table 1 lists the support for general IP Service Activator features on the Juniper JUNOS cartridge.

Table 1   General IP Service Activator Features

Area	IP Service Activator Feature	Supported on Juniper JUNOS Cartridge
Configuration Protocol Support	Telnet	Yes
Configuration Protocol Support	Secure Shell (SSH)	Yes
Configuration Protocol Support	Simple Network Management Protocol (SNMP)	No
Configuration Protocol Support	Vendor Proprietary	No
Device Discovery	SNMP	Yes
Device Discovery	Discovery Module	No
Device Configuration	Configuration Audit	Yes
Device Configuration	Command Re-issue	Yes
Device Configuration	Auto ID Migration	Yes
Device Configuration	Save Running Configuration	Yes
Device Configuration	Configuration Version	No
Device Configuration	Configuration Options	Yes
Device Configuration	Synonyms	Yes
Device Configuration	Command Thresholding	Yes
Device Configuration	Threshold Activated Configuration Control	Yes
Supported Services	Transparent Local Area Network (LAN) Service	No
Supported Services	Interface Configuration Management	Yes
Supported Services	Quality of Service (QoS)	No
Supported Services	Layer 3 Multiprotocol Label Switching (MPLS) VPN	Yes
Supported Services	Service Assurance Agent (SAA)	No
Supported Services	Netflow	No

Table 1   (Cont.) General IP Service Activator Features

Area	IP Service Activator Feature	Supported on Juniper JUNOS Cartridge
Supported Services	Dynamic User VPN	No
Supported Services	IPsec	No
Supported Services	Virtual Routing and Forwarding (VRF)-Aware IPsec	No
Supported Services	Label Switched Path (LSP)	No
Supported Services	VLAN	No
Supported Services	Base Configuration Policies	No
Supported Services	Layer 2 QoS	No
Supported Services	QoS Attachment	No
Supported Services	VRF Route Maps	No
Supported Services	Virtual Customer Edge (CE)	No
Supported Services	VPN and IP Multicast Module	No
Supported Services	Configuration Template Manager	Yes
Supported Services	QoS with Hierarchical Queuing Framework	No
Supported Services	QoS on ASR Devices	No
Configuration Management	Configuration Archiving and Versioning	Yes
Configuration Management	Configuration Restore	Yes
Configuration Management	Service Configuration Auditing	Yes
Configuration Management	Service Configuration Traceability	Yes
Configuration Management	Service Repair	Yes
Configuration Management	Real-time Configuration Change Tracking	No
SDK	Service Cartridge Software Development Kit (SDK)	Yes
SDK	Configuration Policy SDK	Yes

Layer 3 MPLS VPN

Table 2 lists the Layer 3 MPLS VPN support on the Juniper JUNOS L3 VPN cartridge.

Table 2   Layer 3 MPLS VPN Support

Area	IP Service Activator Feature	Supported on Juniper JUNOS Cartridge
Layer 3 MPLS VPN Support	**Layer 3 MPLS VPN Support**	Yes
Topology	Mesh	Yes

Table 2   (Cont.) Layer 3 MPLS VPN Support

Area	IP Service Activator Feature	Supported on Juniper JUNOS Cartridge
Topology	Hub and Spoke	Yes
Topology	Management	Yes
Addressing	Public IP (IPv4 and IPv6)	Yes
Addressing	Private IP (IPv4 and IPv6	Yes
Addressing	Unnumbered	No
Addressing	Interface Description	Yes
VRF Table	Virtual Routing and Forwarding (VRF) Export Map Reference	Yes
VRF Table	VRF Import Map Reference	Yes
VRF Table	VRF Dynamic Host Configuration Protocol (DHCP) Helper	No
VRF Table	VRF Description	Yes
VRF Table	VRF Label	Yes
VRF Table	VRF Route Targets	Yes
VRF Table	VRF Table Name	Yes
VRF Table	VRF Route Distinguisher	Yes
VRF Table	VRF Route Limit (Max Routes) (IPv4 and IPv6)	Yes
VRF Table	EIBGP Multipath Load Sharing	Yes
VRF Table	External Border Gateway Protocol (EBGP) Multipath Load Sharing	Yes
VRF Table	Enhanced Interior Gateway Routing Protocol (EIGRP) Multipath Load Sharing	No
VRF Table	Internal Border Gateway Protocol (IBGP) Multipath Load Sharing	No
VRF Table	IBGP Unequal-cost	No
VRF Table	VRF Import (Max Paths)	No
VRF Table	VRF Target	No
VRF Table	VRF Reduction	Yes
VRF Table	Force Install	Yes
VRF Table	Shareable	Yes
VRF Table	Open Shortest Path First (OSPF) Router ID	No
VRF Table	Interface-less VRF	No
Routing Options	Routing Options	Yes

Table 2   (Cont.) Layer 3 MPLS VPN Support

Area	IP Service Activator Feature	Supported on Juniper JUNOS Cartridge
Routing Options	Autonomous System (AS)	Yes
Routing Options	Autonomous System Number (ASN) Loops	Yes
Routing Options	Independent Domain	Yes
Routing Options	Load Balancing	Yes
Routing Options	IPv4 Multipath	Yes
Routing Options	IPv4 Multipath Unequal Cost	Yes
Routing Options	IPv4 Multipath External and Internal BGP Paths	Yes
Routing Options	IPv6 Multipath	Yes
Routing Options	IPv6 Multipath Unequal Cost	Yes
Routing Options	IPv6 Multipath External and Internal BGP Paths	Yes
Static Routing	Static Global Routes	Yes
Static Routing	Static Local Routes (Redistribution)	Yes
Static Routing	Static Permanent Routes	Yes
Static Routing	Static Tag Value	Yes
Static Routing	Static Next Hop IP Address (IPv4 and IPv6)	Yes
Static Routing	Static Next Hop Interface	Yes
Static Routing	Static Next Hop IP and Interface	Yes
Static Routing	Static Route to Null0	Yes
BGP	BGP Network Statements (IPv4 and IPv6)	No
BGP	BGP Aggregate Statements (IPv4 and IPv6)	No
EBGP	EBGP AS Override	Yes
EBGP	EBGP Site of Origin	No
EBGP	Remove Private AS	Yes
EBGP	EBGP Update Source	No
EBGP	EBGP Multihop	Yes
EBGP	EBGP Bidirectional Forwarding Detection (BFD)	Yes
EBGP	EBGP Allow AS in	No
EBGP	EBGP Provider Edge (PE)-Customer Edge (CE) MD5 Authentication	Yes
EBGP	EBGP Local AS	No

Table 2   (Cont.) Layer 3 MPLS VPN Support

Area	IP Service Activator Feature	Supported on Juniper JUNOS Cartridge
EBGP	Advertise Address Family (IPv4 and IPv6)	Yes
EBGP	EBGP Local AS No Prepend	No
EBGP	EBGP Neighbor Description	Yes
EBGP	EBGP Soft Reconfiguration	No
EBGP	EBGP Router as Next Hop	No
EBGP	EBGP Neighbor Weight	No
EBGP	EBGP Filters	Yes
EBGP	EBGP Default Route	No
EBGP	EBGP Prefix Limit (IPv4 and IPv6)	Yes
EBGP	EBGP Prefix Limit Restart (IPv4 and IPv6)	Yes
EBGP	EBGP Prefix Filters	Yes
EBGP	EBGP Standard Community Attributes	No
EBGP	EBGP Extended Community Attributes	No
EBGP	EBGP Timers	Yes
EBGP	Keep Alive	No
EBGP	Hold Timer	Yes
EBGP	EBGP Neighbor Advertisement Interval	No
EBGP	EBGP Inbound Route Map	No
EBGP	EBGP Neighbor Site of Origin (SOO)	No
EBGP	External Route Map	No
EBGP	Generated Route Map	Yes
EBGP	EBGP Local Preference	Yes
EBGP	EBGP Site of Origin Route Map	No
EBGP	Route Map Name	No
EBGP	EBGP Outbound Route Map	No
EBGP	External Route Map	No
EBGP	EBGP Route Dampening	Yes
EBGP	Redistribution into Border Gateway Protocol (BGP)	Yes
EBGP	BGP Redistribution Metric and Policy from Connected	Yes

Table 2 (Cont.) Layer 3 MPLS VPN Support

Area	IP Service Activator Feature	Supported on Juniper JUNOS Cartridge
EBGP	BGP Redistribution Metric and Policy from Static	Yes
EBGP	BGP Redistribution Metric and Policy from Routing Information Protocol (RIP)	Yes
EBGP	BGP Redistribution Metric and Policy from OSPF	Yes
EBGP	BGP Redistribution Metric and Policy from EIGRP	No
EBGP	EBGP Neighbor Transport Connection Mode Active/Passive	No
EBGP	EBGP Neighbor Transport PathMTUDiscovery	No
EBGP	EBGP Neighbor Transport Single Session/Multi Session	No
EBGP	EBGP Neighbor	Yes
EBGP	EBGP Log Updown	Yes
OSPF	OSPF Area	Yes
OSPF	OSPF Area Type	Yes
OSPF	OSPF not-so-stubby area (NSSA) Type 7 Redistribution	No
OSPF	OSPF Maximum Paths	No
OSPF	OSPF Cost	No
OSPF	OSPF Process ID	No
OSPF	OSPF BGP Redistribution Tag	No
OSPF	OSPF Distribute in Filter	No
OSPF	OSPF Distribute out Filter	No
OSPF	OSPF Shortest Path First (SPF) Throttling	No
OSPF	OSPF MD5 Authentication	No
OSPF	OSPF Summary Addresses	No
OSPF	Suppress Advertise	No
OSPF	Tag Value	Yes
OSPF	Redistribution into OSPF	Yes
OSPF	OSPF Redistribution Metric and Policy from Connected	Yes
OSPF	OSPF Redistribution Metric and Policy from Static	Yes
OSPF	OSPF Redistribution Metric and Policy from RIP	Yes

Table 2   (Cont.) Layer 3 MPLS VPN Support

Area	IP Service Activator Feature	Supported on Juniper JUNOS Cartridge
OSPF	OSPF Redistribution Metric and Policy from EIGRP	No
OSPF	Default Route	No
RIP	RIP Ignore Routes from Source	No
RIP	RIP Passive Interface	Yes
RIP	Redistribution into RIP	Yes
RIP	RIP Redistribution Metric and Policy from Connected	Yes
RIP	RIP Redistribution Metric and Policy from Static	Yes
RIP	RIP Redistribution Metric and Policy from OSPF	Yes
RIP	RIP Redistribution Metric and Policy from BGP	Yes
RIP	RIP Redistribution Metric and Policy from EIGRP	No
RIP	Default Route	No
EIGRP	EIGRP Device ASN	No
EIGRP	EIGRP Site ASN	No
EIGRP	EIGRP Site of Origin	No
EIGRP	EIGRP Route Map Name for SOO	No
EIGRP	EIGRP MD5 Authentication	No
EIGRP	EIGRP Maximum Paths	No
EIGRP	EIGRP Redistribution	No
EIGRP	EIGRP Redistribution Metrics and Policy from Connected	No
EIGRP	EIGRP Redistribution Metrics and Policy from BGP	No
EIGRP	EIGRP Redistribution Metrics and Policy from Static	No
EIGRP	EIGRP Redistribution Metrics and Policy from OSPF	No
EIGRP	EIGRP Redistribution Metrics and Policy from RIP	No

Layer 2 VPN

Table 3 lists the Layer 2 VPN support on the Juniper JUNOS L2 VPN cartridge.

Table 3   Layer 2 VPN Support

Area	IP Service Activator Feature	Supported on Juniper JUNOS Cartridge
Layer 2 VPN Support	**Layer 2 VPN Support**	Yes
Topology	Mesh	Yes
Topology	Hub and Spoke	Yes
Topology	Point-to-point	Yes
Topology	H-VPLS	Yes
Signaling	BGP	Yes
Signaling	LDP	Yes
Discovery	Auto-discovered	Yes
Discovery	Explicit	Yes
MAC Table	Table size	Yes
MAC Table	Limit action	No
MAC Table	Limit notification	No
MAC Table	Aging time	Yes
MAC Table	Aging type	No
VSI	Profile	Yes
VSI	Route distinguisher: explicit	Yes
VSI	Route distinguisher: auto	Yes
VSI	Bridge domain	No
VSI	Bridge group	No
VSI	Ve range	No
VSI	VeID	No
VSI	VPN ID	No
Cross-connect	Group name	No
Cross-connect	Virtual circuit ID	Yes
Cross-connect	Point-to-point name	No
Cross-connect	Pseudowire name	No
Neighbor	IP Address (IPv4)	Yes
Neighbor	Pseudowire class	No
Neighbor	Pseudowire ID	No

Interface Configuration Management

Table 4 lists the Interface Configuration Management support on the Juniper JUNOS cartridge.

Table 4   Interface Configuration Management Support

Area	IP Service Activator Feature	Supported on Juniper JUNOS Cartridge
Backup Interface	Backup Interface Policy	No
Channelized Interface Creation	E1 Channelized Interface	No
Channelized Interface Creation	E1 Controller	No
Channelized Interface Creation	E3 Controller	No
Channelized Interface Creation	E3 Channelized Interface	No
Channelized Interface Creation	Synchronous Transport Module level-1 (STM1) Channelized Interface	No
Channelized Interface Creation	STM1 Controller	No
Channelized Interface Creation	T1 Channelized Interface	No
Channelized Interface Creation	T1 Controller	No
Channelized Interface Creation	T3 Channelized Interface	No
Channelized Interface Creation	T3 Controller	No
Cisco	Cisco Ethernet Port	No
Cisco	Cisco Universal Interface	No
DialerList	DialerList	No
DLSW	Data-Link Switching (DLSW) Device	No
DLSW	DLSW Ethernet Interface	No
DLSW	DLSW Token Ring Interface	No
HSRP	Hot Standby Router Protocol (HSRP)	No
Interface Creation	Basic Rate Interface (BRI)	No
Interface Creation	Dialer Interface	No
Interface Creation	Loopback Interface	No
Interface Creation	Multilink Interface	No
Interface Creation	Virtual Template Interface	No
Interface Decoration	POS Interface	No
Interface Decoration	Serial Interface	No
Multicast Interface	Multicast Interface	No
PPP Multilink	PPP Multilink	No
SGBP	Stack Group Bidding Protocol (SGBP)	No
Sub Interface Creation	Asynchronous Transfer Mode (ATM) Sub Interface	Yes
Sub Interface Creation	Frame Relay Sub Interface	Yes
Sub Interface Creation	Virtual Local Area Network (VLAN) Sub Interface	Yes

> **Note:** All supported interface configuration management
> configuration policies support IPv4 and IPv6 addresses.

Configuring Juniper JUNOS L3 VPN Options

The L3 VPN options framework in the IP Service Activator Juniper JUNOS cartridge controls the configuration of Layer 3 VPN. The L3 VPN sample registry file is installed to the following location:

install_dir/**samples/junosL3VpnSampleRegistry/junosL3Vpn.xml**

The L3 VPN sample (default) options file is installed to the following location:

install_dir/**samples/junosL3VpnSampleRegistry/options/**

where *install_dir* is the directory where you installed IP Service Activator.

The following example from the sample registry file illustrates how to point to the location of the options file:

```
<options>
  <optionsEntry>
  <optionsfile>/junosL3Vpn/options/test_options.xml</optionsfile>
   <appliesTo>
     <deviceTypes useRegex="true">Juniper.*</deviceTypes>
     <osVersions useRegex="true">.*</osVersions>
   </appliesTo>
  </optionsEntry>
</options>
```

> **Note:** The paths that are shown in the examples in this section are
> relative to the *Service_Activator_install_
> home*/**Config/networkProcessor** directory. Absolute paths are not
> valid.

To configure Juniper JUNOS L3 VPN options:

1. Edit the sample option file to create a custom options file.

   For example, if your operation requires that you use maximum prefixes, you can rename the sample options file to **juniper_options.xml** and edit the JUNOSL3Vpn cartridge by changing the value of the **cartridge.juniper.junos.UseMaxPrefixes** option to **true**.

2. Create a new directory at the following location:

   install_home/ **Config/NetworkProcessor/Custom/Registries**

   For example, you might create the a directory called **JUNOSL3Vpn**.

3. Create an **options** directory in the new directory and copy your custom options file into the directory.

   For example:

   install_home/
   **Config/NetworkProcessor/Custom/Registries/JUNOSL3Vpn/options/juniper_
   options.xml**

4. Edit the sample registry file to create a custom registry file and change the options file path to the directory that you created in step 2.

For example:

*install_home***/Config/NetworkProcessor/Custom/Registries/JUNOSL3Vpn**

Ensure that the directory maps the location of the options file to the device type and operating system. For example:

```
<options>
  <optionsEntry>
<optionsFile>/junosL3Vpn/options/juniper_options.xml</optionsFile>
    <appliesTo>
      <deviceTypes useRegex="true">Juniper JuniperM5</deviceTypes>
      <osVersions useRegex="true">13.2R3.7</osVersions>
    </appliesTo>
  </optionsEntry>
</options>
```

Table 5 lists the options that you can set in the Juniper JUNOS L3 VPN cartridge file. The default value is used if an option is not defined.

Table 5   Juniper JUNOS L3 VPN Options

Options	Default Value	Possible Values	Description
cartridge.juniper.junos.UseMaxPrefixes	false	true false	Sets maximum prefixes when this option is set to true. Otherwise uses the default, which is maximum routes.
cartridge.juniper.junos.UseRIBGroup	false	true false	Sets routing table group. Uses RIB groups when this option is set to true.
cartridge.juniper.junos.EnableMPLS	true	true false	Enables the interface: "family mpls" if this option is set to true.
cartridge.juniper.junos.OverwriteInterfaceDescription	false	true false	Overwrites the interface description, if this option is set to true.
cartridge.juniper.junos.RemoveInterfaceDescription	false	true false	Removes the interface description when none is provisioned and this option is set to true.
cartridge.juniper.junos.UseSystemForIp	true	true false	Uses system group instead of the chosen configuration group for IP addresses and the interface description when this option is set to true. Uses the configuration group when this option is set to false.

Table 5   (Cont.) Juniper JUNOS L3 VPN Options

Options	Default Value	Possible Values	Description
cartridge.juniper.junos.ImportFromCommunityCommandFormat	multiLine	multiLine singleLine	Indicates which command format to use: singleLine: uses single line format multiLine (default): uses multiple line format This option is applicable only for "set policy-options policy-statement {policy-name} term import from community {community-name}" command.
cartridge.juniper.junos.VrfExportImportCommandFormat	multiLine	multiLine singleLine	Indicates which command format to use: singleLine: uses single line format multiLine (default): uses multiple line format This option is applicable only for "set routing-instances {vrf-name} (vrf-export|vrf-import) {map-name}" command.
cartridge.juniper.junos.RedistFromProtocolCommandFormat	multiLine	multiLine singleLine	Indicates which command format to use: singleLine: uses single line format multiLine (default): uses multiple line format This option is applicable only for "set policy-options policy-statement {policy-name} [term {term-name}] from protocol {protocol(s)}" command.
cartridge.juniper.junos.MaximumRoutesCommandFormat	multiLine	multiLine singleLine	Indicates which command format to use: singleLine: uses single line format multiLine (default): uses multiple line format This option is applicable only for "set routing-instances {vrf-name} routing-options (maximum-prefixes|maximum-routes) {value} [log-only|threshold {value}]" command.

Table 5   (Cont.) Juniper JUNOS L3 VPN Options

Options	Default Value	Possible Values	Description
cartridge.juniper.junos.EbgpNeighborExportImportCommandFormat	multiLine	multiLine singleLine	Indicates which command format to use: singleLine: uses single line format multiLine (default): uses multiple line format This option is applicable only for "set routing-instances {vrf-name} protocols bgp group {group-name} neighbor {IP} (export|import) {policy-name}" command.
cartridge.juniper.junos.PrefixLimitTeardownCommandFormat	multiLine	multiLine singleLine	Indicates which command format to use: singleLine: uses single line format multiLine (default): uses multiple line format This option is applicable only for "set routing-instances {vrf-name} protocols bgp group {group-name} neighbor {IP} family inet unicast prefix-limit teardown {value} idle-timeout {value}" command.
cartridge.juniper.junos.commit.sync	false	true false	When the value is set to true, the commit command is sent as the commit synchronize command.
cartridge.juniper.junos.vrf.reduction.strict	false	true false	If set to true, checks the EBGP redistribution parameters for the VRF reduction.
cartridge.juniper.junos.EnableRoutingInstancesProtocolsMpls	false	true false	Enables Protocols MPLS at routing-instances level. If set to true, configures "set groups {groupName} routing-instances {name} protocols mpls interfaces {interfaceName}" command.
cartridge.juniper.junos.vpls.DisableTunnelServices	false	false	If set to true, disables tunnel services for the VPLS instance.

Juniper Hardware and Software

For complete information about the Juniper platforms supported by the IP Service Activator Juniper JUNOS cartridge, see *IP Service Activator Installation Guide*.

Operating Systems

For complete information about the operating systems supported by the IP Service Activator Juniper JUNOS cartridge, see *IP Service Activator Installation Guide*.

Installing the Cartridge

For cartridge installation and un-installation procedures, see *IP Service Activator Installation Guide*.

Device Configuration

To configure Juniper devices, see the Juniper documentation:

http://www.juniper.net/techpubs/

Supported Authentication Methods

The IP Service Activator Juniper JUNOS cartridge supports the following authentication methods on all devices:

- Telnet with TACACS+
- SSH with password authentication

General Activation and Discovery

Identify the items that need to be configured on the device, for example: SNMP and Telnet. Refer to the appropriate Juniper documentation for configuration details.

Using the YANG Model to Edit and Send Configuration Policies to a Juniper Device

YANG is a data modeling language used to model configuration and state data manipulated by the Network Configuration Protocol (NETCONF). The IP Service Activator YANG import tool enables you to import configuration policies that use a device-specific YANG model. The IP Service Activator YANG import tool parses the YANG model and requires no coding in IP Service Activation.

To edit and send configuration policies to a Juniper device:

1. Install the YANG import tool.

   You install the YANG import tool when installing IP Service Activator.

   a. On the Installation Type page, select to install **All Components**, which is the default value. If you do not intend to install all components, ensure that you select the YANG component and the NETCONF Base Cartridge.

   b. Copy the **yangModel.jar** file to the **ServiceCartridges** directory in the NETCONF directory of the specific vendor.

   The **yangModel.jar** file is located here:

*IPServiceActivatorHome***/lib/yangImporter/yangModel.jar**

For example:

*IPServiceActivatorHome***/lib/java-lib/cartridges/netconfJunos/ServiceCartridges**

   c. Read the documentation in the **Readme.txt** file.

The **Readme.txt** file is located here:
*IPServiceActivatorHome***/bin/yangImporter1**.

2. Run the **yangImporter** command to import the YANG import tool.

3. Launch IP Service Activator.

4. Create a configuration policy in the following directory:

Policy/YANG/

See the IP Service Activator Help for information about creating configuration policies.

5. Commit the changes.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at
http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

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