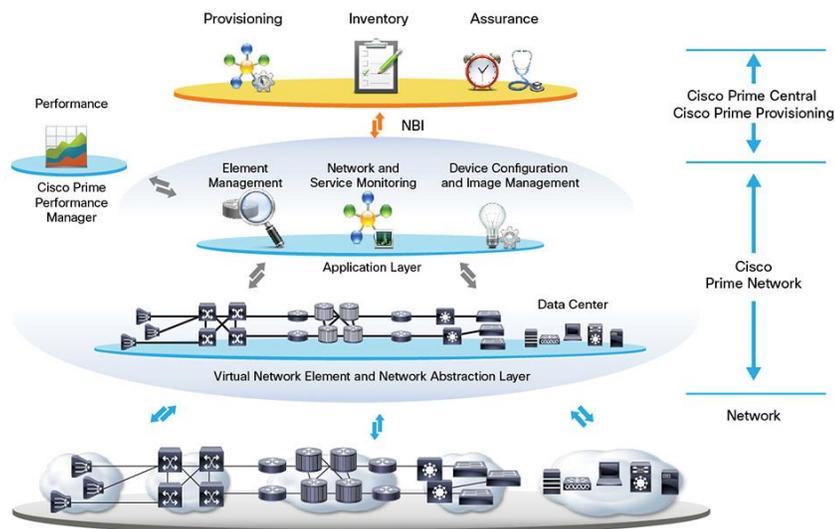# Cisco Prime Network

Cisco Prime™ Network is a comprehensive and cost-effective device operation, administration, and network fault-management solution for today's complex networks.

Product Overview

Networks are becoming ever more complex in the era of virtualization, consisting of both physical and virtual infrastructures. Service providers are faced with the task of realigning network and data center operations with existing operations support systems (OSSs) to enhance the efficiency, agility, and cost-effectiveness of operations. Today's management systems are point products that are not integrated, complex to administer, and inefficient.

Cisco Prime™ Network addresses this challenge by providing a single solution for device operation and fault management - supporting both the traditional physical network components along with virtual elements and compute resources (Figure 1).

Figure 1.   Centralized Management and Service Assurance for the Entire Network

Benefits

- Increased operational scale and efficiency through simplified and automated network discovery, configuration, and change management
- Proactive service assurance in combination with Cisco Prime Performance Manager; highly effective postevent fault management and trend information to help providers avoid future service disruptions
- Lower costs through preintegration with the other components of the Cisco Prime Carrier Management suite and through standards-based northbound interfaces (NBIs) to third-party OSSs

Features

- Comprehensive, graphical views of the entire network from topology down to the device level with centralized inventory, status, and fault information (Figures 2 and 3)
- GUI-based device component configuration with more than 200 prebuilt and downloadable configuration plug-ins
- Automated discovery, device configuration, and change management with up-to-date displays of network events, states, and changes
- Automatic root-cause identification, alarm reduction through de-duplication, and topology-guided troubleshooting
- Optimized for multilayer, multitechnology networks and, through Advanced Services engagement, enabled for multivendor network scenarios

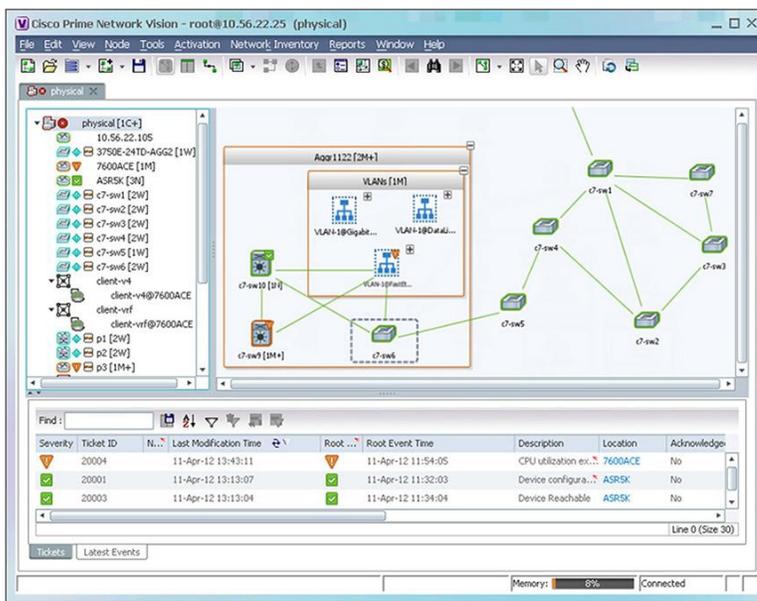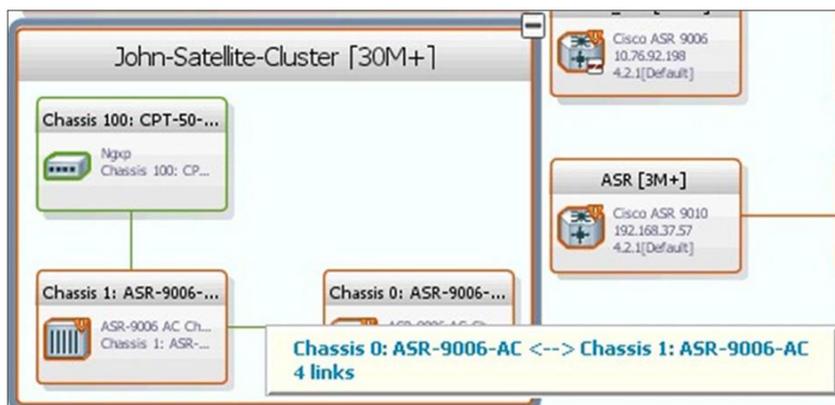**Figure 2.**   Cisco Prime Network Vision Window Displaying Physical Topology

Figure 3.   Cisco Prime Network Vision Map with Network Virtualization and Link Information

Detailed Features and Benefits

Table 1 provides details on the features and benefits of Cisco Prime Network.

Table 1. Cisco Prime Network Features and Benefits

Feature	Description	Benefit
EPN network scope	• Device operation, administration, and network fault management for EPN (Ethernet, IPv4/IPv6, IP/Multiprotocol Label Switching [MPLS], MPLS Transport Profile [MPLS-TP], MPLS Traffic Engineering [MPLS-TE], MPLS VPN, Carrier Ethernet/VPLS), Cisco® ASR 9000 Aggregation Services Routerbased Broadband Network Gateway (BNG), and network virtualization (nV) configurations • Support for cable access infrastructures consisting of Cable Modem Termination Systems (CMTSs) and RF Gateway devices	• Investment protection through a single solution for the entire network
Mobility network scope	• Device operation, administration, configuration, and network fault management for mobility networks, including Radio Access Network (RAN) backhaul, Cisco Virtualized Packet Core (VPC), Cisco ASR 5000 Series mobility gateway functions deployed for long-term evolution (LTE), Code Division Multiple Access (CDMA), or Universal Mobile Telecommunications System (UMTS) services	• Investment protection through a single solution for EPN transport and mobility networks
Data center scope and virtual networking applications	• Support for data center configurations consisting of Cisco Unified Computing System (Cisco UCS®) servers along with virtual machines instantiated on these servers, Cisco MDS 9000 Series Multilayer SAN Switches, Cisco Nexus® switches, and virtual elements such as VMware vCenter and virtual machines controlled through vCenter. Virtual networking applications are part of the data center scope as well, including Cisco Cloud Services Router 1000V (CSR 1000V), Cisco Nexus 1000V Switch, and Virtual Security Gateway	• Investment protection through a single solution for EPN transport, mobility networks, and data center environments • Extend common network element (NE) operation and network fault management to data center environment (For example, common device operation and network management for mobile network deployments from RAN backhaul to Evolved Packet Core to data centers that host mobility services applications)
Autonomous discovery of the network, device configurations, and changes	• Automatic discovery of devices that exist in the network for import and creation of virtual network elements (VNEs) for each discovered device to be managed with Cisco Prime Network • Detailed visibility of devices with customization tools to extend scope of discoverable device configurations • GUI- and NBI-accessible device feature configuration option with more than 200 prebuilt configuration plug-ins. The number of prebuilt plug-ins increases with device driver updates • Automatic capture and display of configuration changes	• Helps enable increased operational efficiencies for faster time to market of services • Reduces costs by reducing operational overhead for otherwise manually intensive tasks
Discovery and representation of virtual network (service) connectivity	• Detailed and automatic representation of virtual network (service) connectivity including MPLS VPNs, Ethernet virtual connections (EVCs), VPLS, pseudowire connections, pseudowire headend (PW-HE) configurations, and MPLS-TP tunnels • Virtual connection views showing routing/switching functions with interconnecting links • Support for standards-based APIs to facilitate external applications to access any virtual network (service) connectivity information	• Assists in network troubleshooting through easy access to virtual connectivity information • Lowers operational costs by eliminating manual tracing of complex Ethernet virtual connections from device configuration data
Management and control of evolving devices	• Support for VNEs with event-based polling. VNEs are independent software processes that run on the Cisco Prime Network unit servers. Each VNE is assigned to manage a single network element using the management interfaces of the network element (for example, Simple Network Management Protocol [SNMP], XML, or Telnet). • Adaptive polling to gracefully respond to device CPU load conditions • VNE driver update packs for Cisco devices published bimonthly[*] • Installation of VNE driver packs without requiring Cisco Prime Network software upgrades	• Eliminates delays associated with network conditions and upgrades, maintaining continuous operations and network availability • Investment protection by keeping device operation and network fault management functions aligned with the evolving network

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[*] Please contact your regional Cisco representative.

Feature	Description	Benefit
Change and configuration management	• Backup, versioning, and restoration of device configuration files • Configuration baseline capture ("last-known-good-configuration") • Verification of network operating systems loaded and executing on each device; management and distribution of device images • Ability to compare configuration files using color codes highlighting added or removed configuration elements • Configuration audit - the ability to audit one or more device configuration files against a specified baseline configuration policy file • Scheduled distribution and activation of network operating system images to one or more devices • In-Service Software Upgrade (ISSU) support for Cisco ASR 903 and Carrier Routing System (CRS) network elements • Image management for ASR 9000V satellite devices in nV configurations • Configuration file and image file management for ASR 5000 Series systems	• Accelerated restoration of service through reduction/elimination of system downtime while errors are located and corrected • Reduced cost and time associated with network software upgrades • Improved productivity through automation of manual, error-prone tasks
Cisco Prime Network configuration compliance	• Audit of configurations on a network element against a specified configuration policy file • Configuration compliance audits performed for Cisco IOS® Software, Cisco IOS XR Software, Cisco IOS XE Software, NXOS, and StarOS configuration files • User-specified scheduling of compliance audits. The user selects configuration files from a set of network elements • User-defined templates invoked to fix compliance violations	• Customers can quickly identify devices with configuration violations that may pose a security risk or do not meet internal configuration standards • Automated configuration compliance audit across the wide range of network element operating systems (Cisco IOS Software, Cisco IOS XE Software, Cisco IOS XR Software, NXOS, StarOS) provides a common compliance audit process • Ability to fix compliance violations offers a significant productivity gain over script-based audit applications often found in network operations centers • The configuration compliance audit function is a built-in and integral part of Cisco Prime Network, which allows for much simpler deployment and easier use of audit functions for day-to-day network-element operation than separate, independent compliance audit applications allow
Cisco Prime Network operations reports	• Extensive set of preconfigured reports • Drag-and-drop creation of custom reports • Scheduling of reports • Reports combining archived events by event source, severity, time • Generic events including traps and syslogs	• Network-operations-center planners, analysts, and administrators can obtain "big picture" information to recognize and manage megatrends, such as event patterns or equipment type distribution, that are otherwise invisible in day-to-day operations
Network monitoring, diagnosis, and repair	• Automated fault to root-cause identification spanning detailed significant events and status information for each device, topology, and virtual network connection • Archival of history of events and communication of data to external fault management or work-center trouble-ticketing applications • Event troubleshooting information report that provides probable cause and troubleshooting information for mobile packet core (ASR 5000 Series) events • Extensibility of fault-management features into network operations by embedding additional, work-center-specific troubleshooting and device configuration methods and sequences • Customization tools for command sequences, automatically integrated into Cisco Prime Network's user interface and API structure • Access to network performance trend information and threshold crossing events when combined with Cisco Prime Network	• Shorter service interruptions, greater efficiency for operators, and overall cost savings for the business • Comprehensive problem identification and isolation of network problems without disrupting work center operation • Prevention of service disruptions through proactive network/service assurance

Feature	Description	Benefit
Northbound interface for external OSS integrations	• Cisco Prime Network Integration Layer exposing network inventory data through standardized third-generation partnership program (3GPP) and Multitechnology Operations System Interface (MTOSI) web services for integration with external OSS • Detailed physical and logical inventory for every device to external OSSs such as inventory systems • XML-based interface for querying the information model, command execution, and notification • Event notification service for forwarding of SNMP and email notifications • Cross-launching of applications	• Reduced costs through standards-based interfaces

Product Specifications

Tables 2 through 6 outline the product specifications for each functional module in Cisco Prime Network.

Table 2.   Operation and Device Management

Product Specification	Description
VNE model and abstraction layer	• Common network element communication layer (Telnet, Secure Shell [SSH] Protocol, SNMP, XML through SSH) • Data abstraction layer providing a common information model across all applications (fault, inventory, configuration, service assurance, and performance) • Access to all lifecycle tasks from a single, centralized interface • Fully integrated data abstraction keeping device drivers up-to-date without requiring upgrades of Cisco Prime Network • Support for networks with devices sharing the same IP address
Inventory and topology management	• Discovery of network devices • Automatic discovery and ongoing synchronization of physical and software configurations of devices • Discovery of physical topology among devices • Topological views that identify the location and severity of alarms • Common launch point for the majority of element management operations • Supports threshold-based alarms for augmented model variables
Device configuration and administration	• GUI-based methods for device configuration processes • Centralized method for defining, editing, importing, exporting, organizing, and scheduling device configlets • Model-aware command definition and execution with extensible scripting engine • More than 200 built-in and downloadable configuration plug-ins for device configuration and administration, including configuration plug-ins for mobile gateway (ASR 5000 Series) LTE and Code Division Multiple Access (CDMA) features • Additional scripts added through device driver pack updates, such as configuration scripts to support cable technologies on Cisco uBR10000 series and RFGW10 devices • Cisco Prime Network Transaction Manager allows users to create configuration procedures that sequence two or more configlets into a configuration transaction
Compliance audit	• Auditing configurations on a network element against a specified configuration policy • Audits can be performed on Cisco IOS Software, Cisco IOS XR Software, Cisco IOS XE Software, NXOS, and StarOS configuration files • Schedule compliance audits of configuration files from a user-selected set of network elements at a user-specified schedule • User-defined templates that can be invoked to fix compliance violations

Product Specification	Description
Fault management	• Event detection using both active and passive monitoring • Event identification, association, and local correlation • Event reduction through de-duplication and alarm state management (alarm flapping) • Network-level correlation (without the need for creating and maintaining rules) • Alarm (referred to as ticket) creation, management, and archiving • Event and alarm reporting - ITU-T X.733 specifications, including information that simplifies event categorization • Event archiving • Specialized viewer application with navigation capabilities for selecting devices or interfaces and displaying corresponding status/fault information • Automated alarm and event filter by viewed network map, selected network element, or selected network-element component • Event export through EPM-NOTIFICATION-MIB traps, BQL/XML notifications, or email • Event export administration to define event receivers, event filters, and event export method
Operations reports	• Built-in component of Cisco Prime Network • A wide range of prepackaged reports • Drag-and-drop creation of custom reports • Generation of operations reports on large data sets (for example, distribution of archived events by event source, severity, time) • Scheduling of reports • Web-based GUI
Network-element (device) support	• Specialized device drivers based on device type and version • Automatic discovery of device type and association of appropriate driver for the device • Monthly device driver pack with hardware and software updates • Support for all major service provider devices, including VNEs, device drivers, more than 200 Cisco device types, modules, and plug-ins as well as 70 third-party device types • Built-in polling methods, including event-based updates and adaptive polling to manage timely updates in various network load conditions

Table 3.   Change and Configuration Management

Product Specification	Description
Change Detection and Control	
Automatic change detection	• Timely change detection with reduced processing overhead • Fast change isolation and restoration
Automatic change notification	• Real-time configuration visibility for operators • Rapid alerts of configuration changes and deviations from the "last-known-good-configuration" also known as "gold standard"
Automatic configuration backup	• Automatic upload and archive of configuration files for audit and rollback purposes • Ability to roll back configurations to previous configurations when required • Unique ability to back up Cisco IOS XR Software devices with Secure Domain Router (SDR) configurations
Configuration Archive Management	
Configuration view and archive management	• A complete and detailed view of the configuration change history of all devices in the network, enabling network operators to make informed decisions about unplanned changes and take appropriate action
Configuration benchmarking	• Detection of unintended deviations from the "gold standard" established for each network element
Configuration restore	• Restoration of the configuration of a device or a group of devices to any operational baseline within just a few clicks • Innovative ability to fully restore policy map settings for Cisco IOS XR Software devices
Configuration synchronization	• Synchronization of changes to an active ("running") device configuration with the boot ("startup") configuration to help ensure that changes are retained across device reboots
On-demand or scheduled operations	• Ability to allow the configuration archive and restoration tasks to take place ad hoc, at a scheduled time, or at regular intervals, as appropriate for the scenario

Product Specification	Description
Software Image Management	
Image repository	• Catalog of all required software images and packages for easy access
Automatic image upgrade	• Automated software image deployment, reducing errors due to manual operations • Fast image file transfers to a large number of devices • A common software base for the network • Simplified software image-upgrade process with a few mouse clicks, reducing deployment time from days to hours or minutes
Pre- and postupgrade verification	• Ability to help ensure that only compatible software images can be selected for deployment • Confirmation of successful deployment
Automated Cisco IOS XR Software package management process	• Ability to select features to run on the router • Support for Cisco IOS XR Software devices configured with SDR • Innovative capabilities to manage Cisco IOS XR Software packages
On-demand or scheduled operations	• Ability to schedule software deployments for large deployments or run ad hoc as needed

Table 4.   Network and Service Monitoring

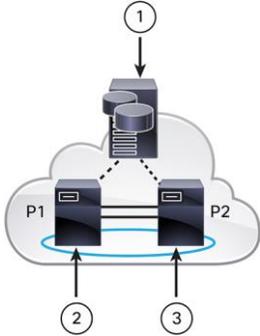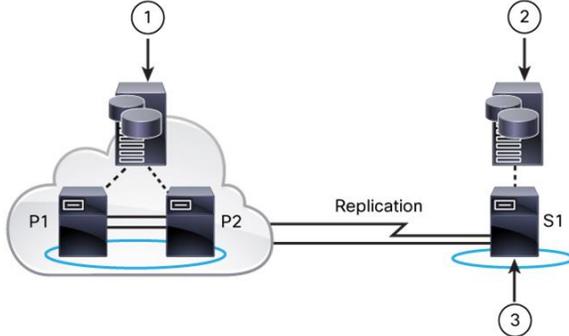| Product Specification	Description
Monitoring and representation of physical, virtual, and service connection topologies	• Autodiscovery and topological views for physical (for example, Ethernet links), virtual (for example, pseudowire), and service (for example, EVC) connections, as well as the multilayer associations between these connections • Physical, virtual, and service connection representation: Link/connection inventory, topology views, and overlay of virtual and service connections on physical topologies • Support for Carrier Ethernet, MPLS/IP, MPLS VPN, MPLS-TP, RAN backhaul, ASR 9000 satellite linear and ring topologies and service connections • Unmanaged network segment support • Network-level fault correlation and root-cause analysis • Monitoring and alarm tracking of virtual and service connection events, including Ethernet Connectivity Fault Management (CFM) events • Support for Remote Loop Free Alternate (LFA) which enables a quick reroute and recovery in case of network failure, including modeling and new service events • Ability to locate and view Layer 2 and Layer 3 EVCs related to an Ethernet or Link Aggregation Group (LAG) port
Network troubleshooting	• Identification of event and alarm location down to the alarmed device component • Event and alarm association with virtual and service connections • Event troubleshooting information report that provides probable cause and troubleshooting information for mobile packet core (ASR 5000 Series) events • Detailed device configuration representation to aid in navigating along an affected path with event/alarm overlays and hyperlinks among related device components; to enable web-based device configuration browsing to greatly speed up troubleshooting • GUI-based representation of topology and device configurations to assist in isolating fault and configuration errors to the root-cause device and particular device component (when available) • Path trace, Ethernet Operations, Administration, and Maintenance (E-OAM) troubleshooting tools, with access to device-resident troubleshooting commands • Integration with Cisco Prime Performance Manager for context-sensitive launch of performance reports from within the Cisco Prime Network user interface

Table 5.   System Integration and Customization

Product Specification	Description
OSS integration	• Network inventory data through standardized 3GPP and MTOSI web services for integration with external OSS • Physical and logical inventory access to external OSSs to eliminate the cost of building and maintenance • Web service scheduling functions for generating 3GPP inventory files at regular intervals • Real-time inventory notifications that will enable OSS applications to receive notifications whenever inventory files are ready in 3GPP format for ASR 5000 and ASR 5500 devices • XML-based interface (queries, commands, notifications) • Event notification service for forwarding SNMP notifications and email notifications • Web services • Application cross-launch

Product Specification	Description
Solution integration	• Cisco Prime Network is part of the portfolio of Cisco Prime for EPN, Mobility, and Data Center Visibility solutions and fully integrated with Cisco Prime Carrier Management for A-to-Z fulfillment of lifecycle tasks, including design, fulfillment, assurance, and analysish
Customization and extension capabilities	• UI customization: Application cross-launch, maps layout • Command Builder: Create device command-line interface (CLI) scripts that can be embedded in and executed from the UI • Model extension: Soft properties to extend internal models • VNE Customization Builder (VCB): Customize and extend VNE driver support, including 　◦ Compilation of SNMP traps from Management Information Base (MIB) modules to extend trap support 　◦ Simulation of new or customized events from the VCB GUI • Business tags (searchable, user-defined tags that can be attached to device and device component objects, for example, to identify the name of a managed services customer associated with an access port) • Language support (multibyte language support) • Rule engine to customize alarm post processing • Registry Service facilitates extensive customization of Cisco Prime Network application behavior. Includes options for inserting custom-created applications into the Cisco Prime Network system. Implementing these customizations requires in-depth training. Alternatively, customization is available through Cisco Advanced Services
Cisco Developer Network	• Extensive SDK and developer support • Developer Forums supported by Cisco Prime Network subject-matter experts • Training videos on demand (VoDs) • Links for downloading utilities, extensions, scripts, and tools • Best Practices page containing recommendations, tips, and success stories • Up-to-date information about upcoming training events

Table 6.　System Deployment and Administration

Product Specification	Description
User security	• Support for local and external authentication using Lightweight Directory Access Protocol (LDAP) • Multiple methods for user access and security control: 　◦ Security access roles determine the actions each user can perform 　◦ Security scopes determine which devices each user can access and the actions that can be performed on these devices 　◦ Configurable option to execute user-selected device configuration commands with system ID and password or the user's login ID and password 　◦ Administration GUI with method for tracking and controlling active GUI and NBI user sessions
System administration	• Separate administrator login and user interfaces • Administer Cisco Prime Network software Image, features, and data backups • Administer Cisco Prime Network components: gateway applications, unit servers, and Agent Virtual Machines (AVMs) that operate on gateway and unit servers • Manage the Oracle database and system data • Install, remove, configure, and troubleshoot device drivers and data communication with managed devices • Administer data communication with managed devices, including adaptive polling groups that control the impact on device CPU, smart polling that avoids repetitive polling • Manage redundancy for unit servers, Agent Virtual Machines, and other application processes • Manage user accounts • Administer device access authorization using device scopes • Administer system security • Control event monitoring, systemwide filters • Configure Event Notification Service to export events to one or more external fault-management systems • Configure device configuration operations; for example, configure device configuration operation to pass the user's credentials to the device for authentication and authorization • Manage log files • Enhance installation mechanism to support multiple Cisco Prime Network Integration Layer instances in suite mode

Product Specification	Description
System redundancy (Figure 4 and 5)	• Cisco Prime Network gateway server redundancy: 　◦ Local redundancy using Red Hat Cluster Suite for dual-node ((2) and (3)) installation with a disk resource that is mountable from both nodes Figure 4: Local Redundancy • Geographic redundancy for Linux platforms using Oracle Active Data Guard for installation in a primary location ((1)) and installation of a secondary server ((2)) and disk resource ((3)) in a different location Figure 5: Geographic Redundancy • Cisco Prime Network unit server redundancy and AVM process protection through watchdog processes within each unit server and gateway server 　◦ N + m warm standby protection for unit server groups 　◦ Watchdog protocol monitors and restarts failed AVM processes within each unit server • Users alerted through Cisco Prime Network system events and alarms • Hot revert from a backup site where the active, backup site does not need to be taken down. Operation can be switched back to the active site without any downtime

System Requirements

Distributed Architecture

Each Cisco Prime Network installation consists of unit servers hosting the VNEs, gateway server, embedded database or external Oracle database, and Windows-based clients. Depending upon the scale of the network, Cisco Prime Network unit and gateway server software can be deployed on a single server or across multiple servers for a distributed architecture.

Cisco Prime Network also allows gateway and unit servers to be deployed as virtual servers, using VMware for Linux. A wide variety of deployment configurations can be tailored to meet the needs of each customer environment.[*] Systems can also be configured in various standby/high-availability modes to help ensure business continuity.

Unit Servers

Interconnected unit servers can host up to thousands of individual VNEs, each representing a managed network element. As the managed network grows, VNEs can easily be moved from one unit to another, and additional units can be added to host additional VNEs.

For more detailed information on system requirements and technical specifications, please refer to the "Gateway and Unit Requirements" section of the Cisco Prime Network Quick Start Guide or Cisco Prime Network Installation Guide.

About Cisco Prime

The Cisco Prime portfolio of IT and service provider management offerings empowers IT organizations to more effectively manage their networks and the services they deliver. Built on a service-centered foundation, Cisco Prime supports integrated lifecycle management through an intuitive workflow-oriented user experience - providing A-to-Z management for EPNs, mobility, video, cloud, and managed services.

Services and Support

Cisco offers a wide range of services programs to accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. Cisco services help you to protect your network investment, optimize network operations, and prepare the network for new applications to extend network intelligence and the power of your business. For more information please visit the Cisco Services page on Cisco.com.

Ordering Information

Cisco Prime Network is available for purchase through regular Cisco sales and distribution channels worldwide. To place an order, visit the Cisco Ordering Homepage. Ordering Information for the latest release is shown in Table 7. Cisco Prime Network supports a right-to-manage (RTM) license model per device. For a complete list of devices available, please contact your sales representative. Cisco Prime Network, starting with Release 4.2, will no longer natively support third-party devices and their related services. If customers wish to manage third-party devices after transitioning to Version 4.2, customers will need to engage Cisco Advanced Services for support.

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[*] Support for Solaris has been discontinued. With Cisco Prime Network 4.0 and future versions, installation is supported only in Linux environments. Operations reports do not support IPv6. The gateway, database server (Oracle and Infobright), and the units should be installed with IPv4. Activation and workflow features are being replaced with Transaction Manager, a new component introduced in Release 4.0. Traditional activation and workflow features are available with upgrades to Cisco Prime Network 4.0 from earlier versions. Consult your local Cisco representative for details.

Table 7.   Ordering Information for Cisco Prime Network 4.2

Product ID	Description
NETWORK-4.2-K9	Cisco Prime Network 4 - Base Application
NETWORK-4-SBY	Cisco Prime Network 4 - SBY (Only for Standby enablement)
NETWORK-4.2-LAB-K9	Cisco Prime Network 4 - Lab Application (not for Production)
NETWORK-4-MTOSI	Cisco Prime Network 4 - MTOSI Northbound Interface
NETWORK-4-3GPP	Cisco Prime Network 4 - 3GPP Northbound Interface
<DEVICE>-NETW4RTM	Cisco Prime Network 4 - <Device> - Right To Manage

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For More Information

For more information about Cisco Prime Network, visit http://www.cisco.com/go/primenetwork, contact your local account representative, or send an email message to prime-network@cisco.com.

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