Overview: Cisco Administrative Policy Engine

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Overview

Cisco Administrative Policy Engine (Cisco APE) is a security system that provides the following features:

- Provides authentication, role-based authorization, and auditing services for managing Cisco IOS devices and network elements attached to Cisco IOS devices.
- Addresses the security and management needs of the Data Communications Network (DCN) solution.
- Provides an upgrade path for managing devices with CiscoSecure.
- Provides a platform for enabling security.
- Provides a platform to integrate other Cisco technologies for configuring and provisioning devices.

With Cisco APE, you can centrally manage access to Cisco IOS devices. You can also control access to reverse Telnet to non-Cisco IOS devices that are serially connected to Cisco IOS devices. With Cisco APE you can also authorize operators to enter Cisco IOS commands within Cisco IOS devices.

The Cisco IOS device contacts Cisco APE to perform password authentication, authorization, and (optionally) accounting (AAA) through TACACS+. Cisco APE authenticates the operators, and then provides the operators with a hierarchy of devices they are allowed to access. The operators can select a device and start a Telnet session to that device.

Through the web-based management interface, Cisco APE authenticates the system administrator and allows the administration of the local system in addition to managing users, devices, groups and policies within the system.

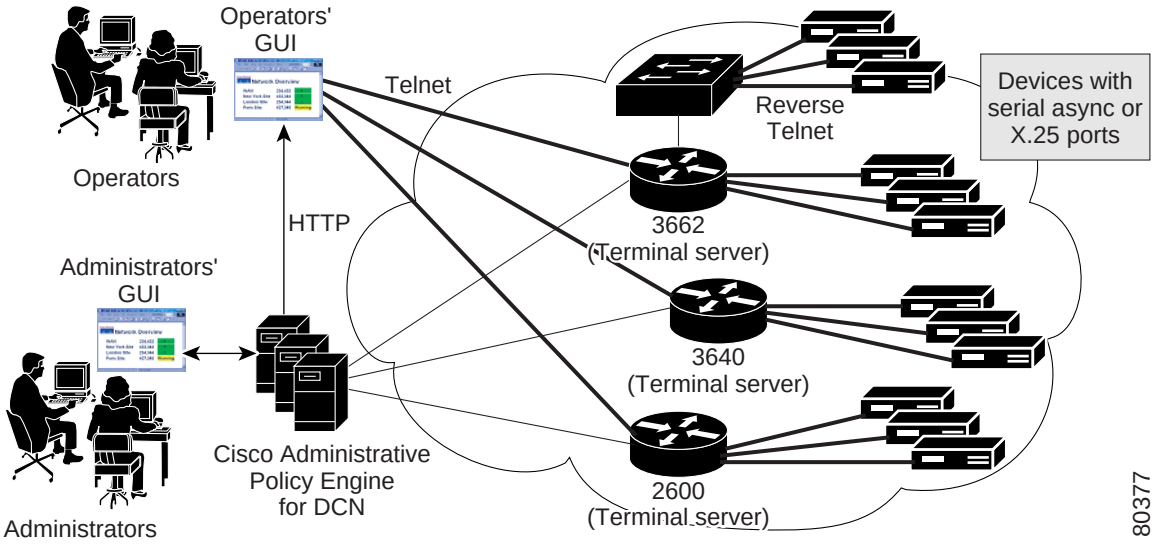
With Cisco APE you can:

- Manage operators.
- Manage access to network devices.

- Authorize the tasks an operator can perform on Cisco IOS devices by using the Role-Based Access Control (RBAC) management portion of the Management UI.
- Authenticate devices by using the integrated TACACS+ server.
- Filter, organize, and classify devices by using the RBAC mechanism built in to Cisco APE.

Figure 1-1 gives an overview of how you can use Cisco APE to access services and Cisco IOS devices through the administrators'and the operators' interfaces.

Figure 1-1 Overview of the Cisco Administrative Policy Engine Architecture



Additionally, Cisco APE provides the following features:

- Data Replication
- Generating accounting log files

About Data Replication

Replication is the process of keeping a copy of data. Cisco APE allows you to replicate data among multiple instance of Cisco APE so that all Cisco APE services can provide the same AAA services.

About Accounting Log Files

The Cisco APE TACACS+ server records TACACS+ accounting messages to an accounting log file. The accounting log file uses the same format as the AcctExport CSU Utility.

Cisco APE also logs error messages to a log file. You can view the trace debug output by changing the logging level in the Device Access Management (DAM) server

About Role-Based Access Control

With Role-Based Access Control (RBAC) you can:

- Model complex access control policies
- Reduce the cost of administration
- Reduce administrative errors

RBAC determines if you can be granted a specific type of access to a resource. In an RBAC system, you are granted or denied access to a device or service based on the role that you have as part of an organization. You can assign and are assigned roles and access rights that are defined in an organizational structure. Privileges or access rights are then associated with these roles based on the tasks that you assign to a user in that position.

Role Hierarchies

Role hierarchies define roles that have unique attributes and can contain other roles; that is, one role can include the tasks and permissions that are associated with another role. Tasks and roles depend on organizational policies. When tasks overlap, you can establish hierarchies of roles.

Role hierarchies help in organizing roles to reflect authority and responsibility. Roles can have overlapping responsibilities and privileges. Users belonging to different roles may need to perform common tasks. In these cases, RBAC provides an efficient way to avoid specifying common tasks for the roles.

Separation of Roles

Organizational policy determines how roles are separated. RBAC allows you to split administration of the role-user relationship from that of the role-permission relationship. Since many users in an organization typically perform similar functions and have similar access rights, user functions are separated by role.

For example, making a bank payment and authorizing the payment require separate transactions. Two roles are needed to perform the two transactions. You can separate roles both horizontally and vertically in a hierarchical distribution.

Users and Roles

In an RBAC system, an administrator can grant users membership into roles based on users' responsibilities in an organization. The tasks that you can allow a user to perform are based on the user's role. You can add or delete memberships within roles based on job requirements. In the same way, you can establish role mapping when you set up new tasks and delete old tasks as responsibilities change. This simplifies the administration and management of privileges; you can update roles without updating the privileges for every user on an individual basis.

A properly administered RBAC system enables users to:

- Perform a broad range of authorized tasks.
- Control access at a level conducive to the way enterprises do business.
- Statically and dynamically regulate users' actions through establishing and defining roles, role hierarchies, relationships, and constraints.

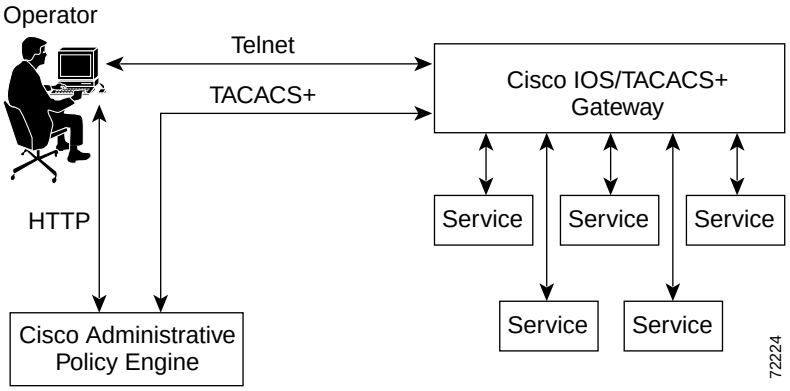
Cisco APE Operator Flow

The Cisco APE authorization service separates the application level authorization logic from the business logic. The authorization service works with the authorization logic. The services provided by this authorization service can be used by multiple applications, thereby achieving a common authorization model across multiple applications.

A common global policy defines the authorization policies. Cisco APE allows you to define a global policy that applies to multiple applications within an administrative domain. The applications themselves act as enforcement points for the policy decisions. The application makes a request to the authorization service before allowing access to a client for a requested application. Access is then allowed or denied based on a decision returned by the authorization service.

Figure 1-2 shows how the operator uses Cisco APE to access a device or service.

Figure 1-2 Cisco APE Operator Flow



1. Operators browse the Cisco APE Operations UI (through HTTP) to find the service they wish to connect to.
2. Operators Telnet to a service that provides the gateway with authentication credentials (username and password).
3. The gateway issues TACACS+ requests to the Cisco APE AAA server to authenticate the operators and determine if they are authorized to access the service.
4. The Cisco APE AAA server authenticates the operators based on the password the operators provide to the gateway, and authorizes the operators based upon the operators' roles, the service they are accessing, and the type of access requested.
5. The Cisco APE AAA issues a TACACS+ response indicating that the operators are authorized to access the service.
6. The gateway connects the operators' Telnet session to the service.