



Converged Policy and Charging

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CPC overview

Converged Policy and Charging (CPC) is a cloud-native network function (CNF) that provides unified, 3GPP-compliant policy control for both 4G and 5G networks. It integrates subscriber authentication, authorization, accounting (AAA), and policy management into a single, streamlined solution.

Benefits:

- **Simplified Migration:** CPC eliminates the need for manual migration of user subscriptions or reconfiguration of policy and charging functions (CPC) during the transition from 4G to 5G.
- **Reduced Network Complexity:** It supports incremental deployment of Standalone (SA) 5G networks by removing the requirement for complex inter-circle mesh connectivity, thus facilitating smoother network evolution.

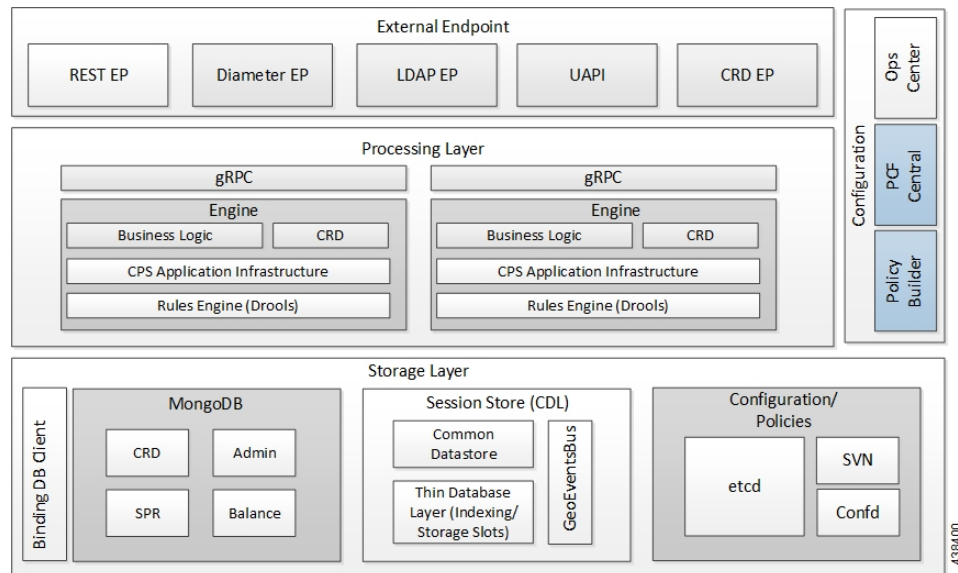
System Composition:

- CPC offers a containerized, cloud-native architecture based on a three-tier microservices framework.
- It supports AAA components using Diameter servers for subscriber management, with protocol, service, and session tiers managing authentication, authorization, accounting, and data persistence.
- The solution includes operational tools such as Policy Builder and Ops-Center for configuration and management, integrated with Cisco Cloud Native Data Plane (CNDP) services for logging, metrics, and alerts.

CPC architecture

The CPC architecture is built on a multi-layer platform, which enables efficient policy control and management in the 5G Core network.

Figure 1: CPC Architecture



At a high level, the components in the architecture perform the following:

1. External Endpoint

- **REST-EP**—It is a RESTful interface, which provides a channel for the 5G inbound and outbound messages.
- **LDAP-EP, UAPI, and CRD API**—Provides interfaces for CPC communications.
- **Diameter-EP**—Responsible for routing the Diameter traffic.

2. Processing Layer

- **gRPC**—Provides a framework that enables the internal processes to communicate with each other and synchronize their events.
- **CPC-Engine**—Hosts the business logic of CPC and responsible for driving the rules engine for making crucial policy decisions.

3. Configurations

- **Policy Builder**—Allows configuration of the CPC cluster of virtual machines (VMs) and configuration of services and advanced policy rules.
- **CPC Central**—Provides a unified GUI that allows you to configure Policy Builder, manage custom reference table data, and start the Web-based applications and utilities.
- **Ops Center**—Allows you to configure and manage the applications and pods configuration.

4. Storage Layer

- **Binding Database Client**—Provisions the client to look up the PCRF Mongo Binding Database for information about the secondary key lookup across 4G and 5G.
- **MongoDB**—Preserves the subscriber-specific, balance data, and admin configuration data.

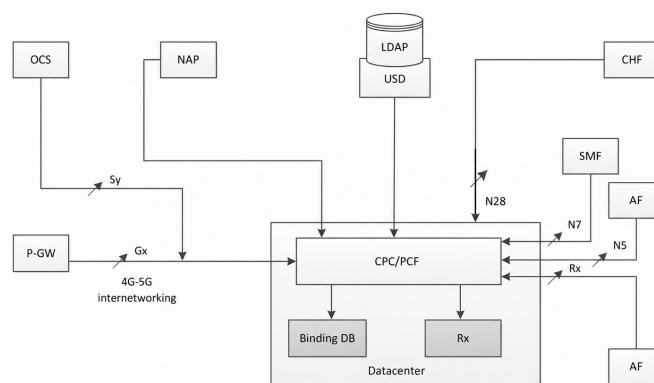
- Session store—Contains the data which CDL accesses for processing a session persistence activity. Stores the CPC sessions.
- Etc—Contains the Diameter endpoint configurations.

CPC deployment

The CPC reduces the deployment complexity by integrating CPC and PCF in a unified environment.

This figure illustrates the CPC deployment.

Figure 2: CPC architecture components



The CPC deployment architecture includes:

- One Region = Two sites. Each site has one cluster (total two clusters in a region).
- Noncloud-native deployment along with cloud-native 5G CPC.
- External binding database is the local database for PCRF.
- MongoDB is the dedicated session database for PCRF.

The CPC's deployment architecture includes:

- One Region = Two sites. Each site has one cluster (total two clusters in a region).
- Cloud-native deployment that deployed along with 4G PCRF.
- Cisco CDL is the dedicated session database for CPC.

Supported Interfaces

CPC and other NFs in 5GC use these:

- Rx— Reference point for interworking with AF, PCRF, and CPC
- N5— Reference point between CPC and AF
- N7— Reference point between CPC and SMF

- N15– Reference point between CPC and AMF
- N28– Reference point between CPC and CHF
- N36– Reference point between CPC and UDR
- LDAP– Reference point between CPC and external subscriber profile