



# Open Connection Manager API Architecture

Candidate Version 1.0 – 01 Nov 2011

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**Open Mobile Alliance**

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# 1. Scope (Informative)

This document provides the architecture for the OpenCMAPI Enabler. This architecture is based on the requirements as listed in the OpenCMAPI Requirement Document [OpenCMAPI-RD].

The objective of the OpenCMAPI Enabler is to define the OpenCMAPI Connection Management component and the interfaces exposed by this component to applications (CM applications or non CM applications) that rely on OpenCMAPI Enabler to work or to provide additional functionalities.

The OpenCMAPI Enabler architecture is designed to support the core functionalities related to connection management, in particular Cellular network connection management, Wi-Fi management, PIN/PUK management, Information Status and call backs.

## 2. References

### 2.1 Normative References

- [OSE] “OMA Service Environment”, Open Mobile Alliance™,  
URL:<http://www.openmobilealliance.org/>
- [RFC2119] “Key words for use in RFCs to Indicate Requirement Levels”, S. Bradner, March 1997,  
URL:<http://www.ietf.org/rfc/rfc2119.txt>
- [OpenCMAPI-RD] “OpenCMAPI Requirements”, Open Mobile Alliance™, OMA-RD-OpenCMAPI-V1\_0-20110630-D.doc,  
URL:<http://www.openmobilealliance.org/>

### 2.2 Informative References

- [OMADICT] “Dictionary for OMA Specifications”, Version x.y, Open Mobile Alliance™,  
OMA-ORG-Dictionary-Vx\_y, URL:<http://www.openmobilealliance.org/>

## 3. Terminology and Conventions

### 3.1 Conventions

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119].

All sections and appendixes, except “Scope” and “Introduction”, are normative, unless they are explicitly indicated to be informative.

### 3.2 Definitions

- Asynchronous Interface** Is an interface that allows transfer of information, i.e. requests and responses, between entities e.g. applications and OpenCMAPI connection management component, without having to synchronize (e.g. with a controlling clock). The requested action may be started in a separate thread of execution and called party, in this case OpenCMAPI connection management component, may respond to the caller usually immediately but anyway before the requested action is complete.
- Synchronous Interface** Is an interface which requires synchronization (e.g. with a controlling clock) and is dependent on the completion of the interaction. Called party, in this case OpenCMAPI connection management component, will keep the caller waiting until the transaction is complete.

### 3.3 Abbreviations

API	Application Programming Interface
CM	Connection Manager
GPS	Global Positioning System
OMA	Open Mobile Alliance
OpenCMAPI	Open Connection Manager (CM) Application Programming Interface (API)
PIN	Personal Identification Number
PLMN	Public Land Mobile Network
PUK	Pin Unlocking Key
SIM	Subscriber Identity Module
SMS	Short Message Service
UICC	Universal Integrated Circuit card
Wi-Fi	Wireless Fidelity
WLAN	Wireless Local Area Network

## 4. Introduction

**(Informative)**

This document defines the architecture of the OpenCMAPI Enabler based on the OpenCMAPI Requirement Document [OpenCMAPI-RD].

The focus of the OpenCMAPI v1.0 is the standardization of functional interfaces for access to connection management.

In this context, this Architecture Document defines functional component and interfaces related to the connection management aspects.

### 4.1 Version 1.0

This architecture document covers the requirements of OpenCMAPI 1.0 [OpenCMAPI-RD].

The document aims to cover architectural aspects related to the interfaces for the following areas:

- Security and concurrency control function , e.g. access control and authorization
- Cellular Network Connection Management,
- Wi-Fi connection management,
- Statistics handling
- Information Status handling
- GPS handling
- Power management
- SMS&USSD management
- PIN/PUK handling
- UICC Interaction
- Push Data service management,

## 5. Architectural Model

The OpenCMAPI architecture supports all function as specified in [OpenCMAPI-RD].

Following sections will describe OpenCMAPI architecture diagram, functional components and interfaces.

### 5.1 Dependencies

There are no dependencies.

### 5.2 Architectural Diagram

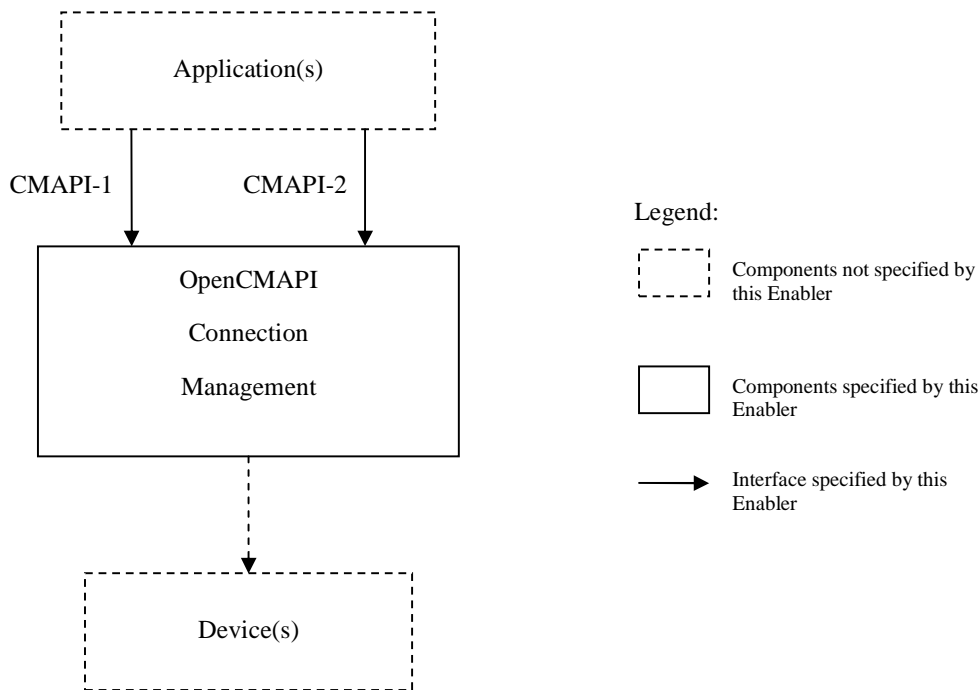


Figure 1: OpenCMAPI Architectural Diagram

## 5.3 Functional Components and Interfaces

### 5.3.1 OpenCMAPI Enabler Functional Components

#### 5.3.1.1 OpenCMAPI Connection Management component

The OpenCMAPI Connection Management component supports the following functions:

- Security and concurrency control functions, e.g. access control and authorization
- Registration management for notifications (i.e. callbacks)
- Notifications (i.e. callbacks)



- Cellular Network Connection Management,
- Wi-Fi connection management,
- Statistics handling
- Information Status handling
- GPS handling
- Power management
- SMS&USSD management
- PIN/PUK handling
- UICC Interaction
- Push Data service management,

Furthermore, on a given host, only one implementation of the OpenCMAPI connection management component SHALL be running at a time. Therefore, all applications, using the OpenCMAPI connection management component, SHALL use and register with this unique implementation and all compliant devices SHALL be registered with this unique instance.

This component exposes the CMAPI-1 and CMAPI-2 interfaces.

### **5.3.1.2 Entities external to the OpenCMAPI enabler (Informative)**

#### **5.3.1.2.1 Application(s)**

The application(s) use the functions exposed by the Open CMAPI.

Two types of applications will be able to use the OpenCMAPI enabler:

- The CM application with the capability to access to all functions provided by the OpenCMAPI enabler.
- The non-CM application is an external entity that has the capability to access to only a subset of functions provided by the OpenCMAPI enabler (information status and callback function).

#### **5.3.1.2.2 Device(s)**

The OpenCMAPI manages the network access connectivity through the device. The interface between the device and the OpenCMAPI Connection Management component is out of scope for the OpenCMAPI enabler and depends on what the device implementation provides (e.g. device driver calls, AT commands, messages).

When an application invokes an OpenCMAPI enabler function, the OpenCMAPI connection management component translates the function call into an operation on the device interface. The OpenCMAPI enabler facilitates the communication of information from the device to the application, such as success/failure codes, requested information, and asynchronous notifications.

It should be noted that the set of functions exposed by an implementation of the OpenCMAPI Connection Management component is subject to the capabilities of the device(s) being managed. For example, an implementation managing a device with only cellular connectivity and no Wi-Fi and/or GPS would support the OpenCMAPI APIs needed to manage the cellular connection, but would not support the APIs specific to Wi-Fi and GPS.

## 5.3.2 Interfaces

Applied to all interfaces stated below, all memory is caller allocated, the callee SHALL NOT modify any memory unless otherwise noted.

### 5.3.2.1 CMAPI-1

This interface is exposed by the OpenCMAPI Connection Management component and supports the following functions:

- Cellular Network Connection Management,
- Wi-Fi connection management,
- Statistics handling,
- Information Status handling,
- GPS handling,
- Power management,
- SMS&USSD management,
- PIN/PUK handling,
- UICC Interaction,
- Push Data service management
- Security and concurrency control function.

This interface is a Synchronous Interface with maximum timeout and possibility of cancellation.

### 5.3.2.2 CMAPI-2

This interface is exposed by OpenCMAPI Connection Management component and supports the following:

- Registration to receive notifications (i.e. callbacks),
- Notifications (i.e. callbacks),
- Security and concurrency control function.

This interface is an Asynchronous Interface.

## 5.4 Security Considerations

The security considerations described in this section apply to any OpenCMAPI enabler implementation, and these considerations may result in different deployment models. Any particular security mechanism relevant to OpenCMAPI enabler is addressed in the [OpenCMAPI-TS].

Any deployment of OpenCMAPI enabler needs to ensure that all the applications requiring access to information provided via the specified API exposed by the OpenCMAPI connection management component are subject to the following security considerations:

- All applications should be authenticated and authorized
- OpenCMAPI implementation decides what level of access applications can have based on some policies, e.g. Service Provider policies.

## 5.5 Charging Considerations

Not applicable.

## Appendix A. Change History

(Informative)

### A.1 Approved Version History

Reference	Date	Description
n/a	n/a	No prior version –or- No previous version within OMA

### A.2 Draft Version 1.0 History

Document Identifier	Date	Sections	Description
Draft Versions OMA-AD-OpenCMAPI-V1_0	19 July 2011	Baseline	Incorporates input to committee: OMA-CD-OpenCMAPI-2011-0001-INP_Architecture_Baseline
	09 Sep 2011	3.3,5.2, 5.3	Incorporates input to committee: OMA-CD-OpenCMAPI-2011-0012-CR_AD_Abbreviations_Section OMA-CD-OpenCMAPI-2011-0017R02-CR_Architecture_Diagram OMA-CD-OpenCMAPI-2011-0019R02-INP_Architecture_Description
	22 Sep 2011	1, 4, 4.1,5.1,5.2,5. 3,5.5,Appendix B,Appendix C	Incorporates inputs to committee: OMA-CD-OpenCMAPI-2011-0023R01-CR_AD_Introduction_Scope OMA-CD-OpenCMAPI-2011-0024R01- CR_AD_Architectural_Model_Changes
	11 Oct 2011	All	Incorporated: OMA-CD-OpenCMAPI-2011-0027R01-CR_AD_Device_Text OMA-CD-OpenCMAPI-2011-0049R01- CR_Text_for_Security_Consideration_sections_in_CMAPI_AD Implemented the AD review comments resolutions according to OMA- ADRR-OpenCMAPI-V1_0-20111011-D
	13 Oct 2011	3.2, 5.2	Incorporated: OMA-CD-OpenCMAPI-2011-0050R01- CR_Definitions_for_Asynchronous_and_Synchronous_Interfaces
	19 Oct 2011	5.3	Incorporated: OMA-CD-OpenCMAPI-2011-0051- CR_Resolution_Orange_AD_Comments
Candidate Version OMA-AD-OpenCMAPI-V1_0	01 Nov 2011	All	Status changed to Candidate by TP input contribution: OMA-TP-2011-0361- INP_OpenCMAPI_1.0_AD_for_Candidate_approval_RD_for_notificati on

## Appendix B. Flows (informative)

Flows can be found in [OpenCMAPI-TS].

## Appendix C. Deployment Example (Informative)

The following diagram shows an example of a possible deployment of the OpenCMAPI.

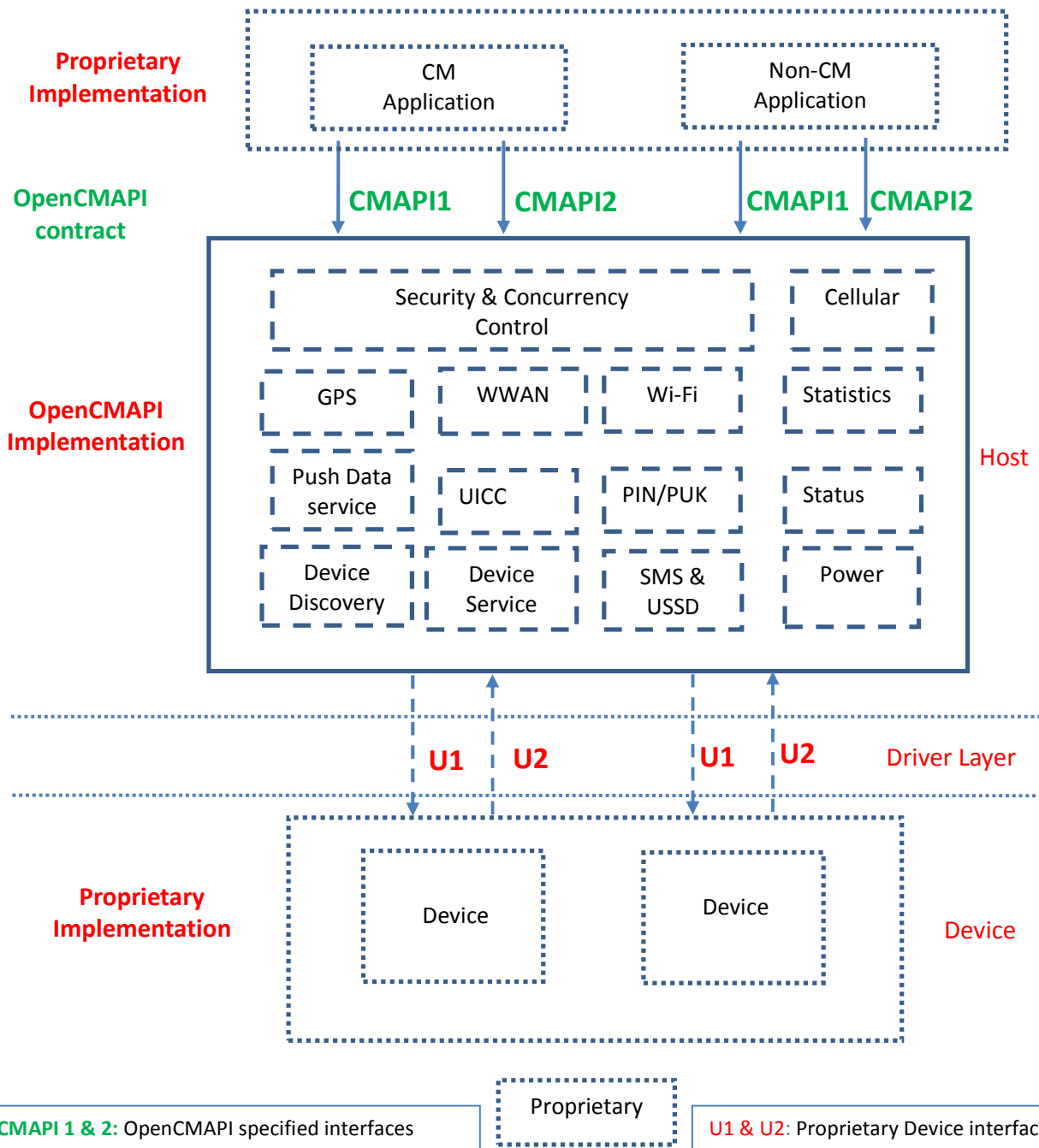


Figure 2: OpenCMAPI Deployment Example

In the diagram, the term “Device” could represent different types of devices (such as cellular, Wi-Fi, USB modem, embedded modem ...) through which the CMAPI provides network connectivity to the “Host”.

The OpenCMAPI connection management component is the OpenCMAPI implementation on the device side.

The OpenCMAPI connection management component could be logically decomposed in two high level internal functions as follows:

- OpenCMAPI security and concurrency control function

The security and access control function controls the interaction between OpenCMAPI Functional layer and the application layer. It grants full access to connection manager applications and grants only (read only) access to a subset of functions to non-CM applications.

- OpenCMAPI sub functions

The OpenCMAPI sub functions include: cellular network connection management, Wi-Fi management, PIN/PUK management, etc which can be derived from [OpenCMAPI-RD].