Calypso
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Eclipse Keyple & Terminal certification

November 2023

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Card Functional Certification

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Calypso Test Suite for Basic

Version 1.2.1

- First version validated

- Full compliant with the Calypso Basic 1.1 specification

- Bug correction

Released in November 2022

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Calypso Test Suite for Light

Version 1.2.0

- Full compliant with the Calypso Light 1.2 specification

- Bug correction

Released in November 2022

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Calypso Test Suite for Prime

Version 3.1.0

- Full compliant with the Calypso Prime Revision 3.3 Edition 2 specification

- For Calypso Prime Native & Calypso Prime Applet

- Allows certification with all or a subset of modes (PKI, Extended, Regular)

Released in November 2022

Version 3.2.0

- Improved test coverage

- Bug correction

- Will be applicable for all new certifications as soon as it is released

Expected in January 2024

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CalypsoTest Suite for HCE

Version 1.0.0

- Will be compliant with the new version 1.5 of Calypso HCE specification

Expected in 2024

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Terminal specifications

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Terminal Requirements

Management proposed to STA

Reader Layer Requirements

Version 2 available since September 2023

Requirements of the lowest level of the transaction related to the management of all types of cards and SAMs by a smartcard reader.

Calypso Layer Requirements

Version 2 available since May 2023

Specific requirements for the management of Calypso cards and SAMs in strict compliance with Calypso specifications.

Ticketing Layer Requirements

Version 2 available since May 2023

Requirements on the use of the Calypso high-level API.

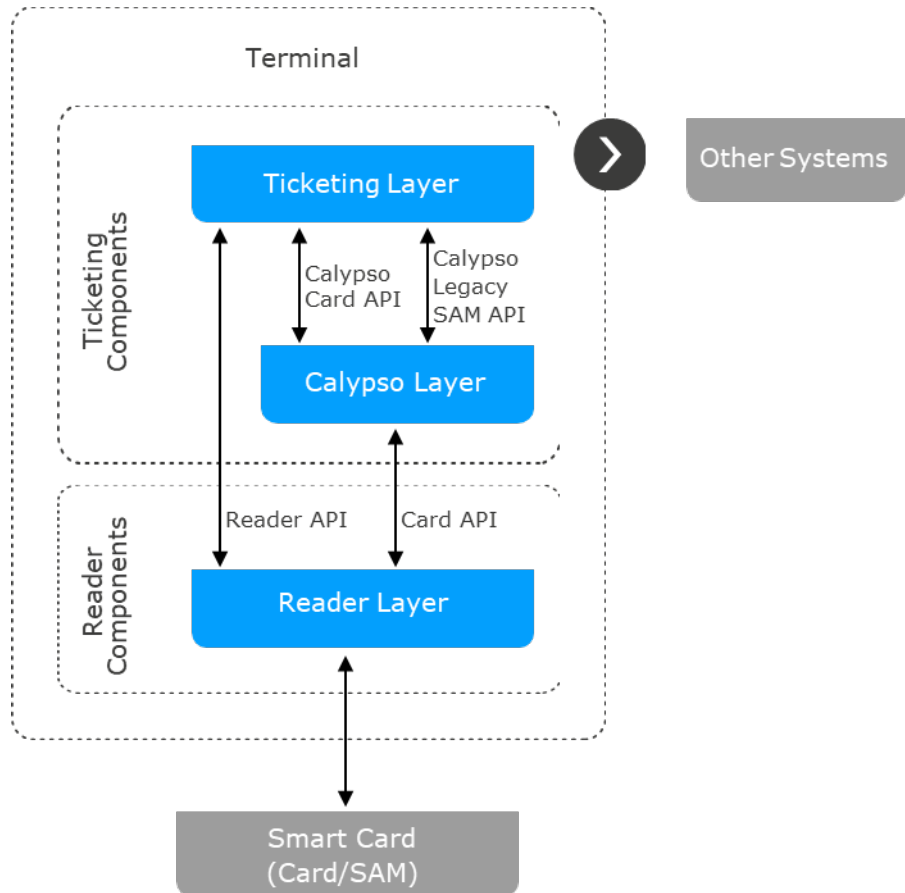Best practices to follow in a Calypso ticketing system.

The reference documents for developers of the different components of a Terminal.

A developer no longer needs to start from the card specifications to develop a Terminal.

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Terminal API

https://terminal-api.calypsonet.org/

Calypso Card API

Used by the application layer that uses Calypso library.

It defines the interfaces needed to:

- Operate a Calypso transaction

- Recover a Calypso card image

Reader API

Used by the application layer that implements reader management.

It defines the interfaces needed to:

- Manage readers

- Manage reader events

- Manage selection mechanisms

Calypso Legacy SAM API

Used by the application layer that uses Calypso library.

It defines the interfaces needed to:

- operate management transaction with a legacy SAM

- Recover a Calypso SAM image

Card API

Link between the layer dedicated to the functional processing of cards and the layer of communication with the readers.

It defines the interfaces needed to:

- Communicate with the cards

- Specify the card selection data

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Terminal certification

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Terminal certification steps

Since December 2020 – Terminal requirements and recommendations published

Since 1er September 2021 – Declarative procedure available

Expected 2024 – Terminal certification
Certification of the Reader based on the Reader Layer Requirements
Certification of the Calypso Library based on the Calypso Layer Requirements

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Declarative Procedure

Not a certification.

Provides a guarantee that the vendor has read the documents concerning the terminal requirements and has undertaken to comply with them.

CNA sends to the vendor.

- A registration form
- An ICS (Implementation Conformance Statement) to complete
  - Product definition
  - Requirements declaration Check list with comments

Evaluation Committee reviews the ICS

- Analysis of discrepancies (m, M or C)
- Refining process with the Vendor

Registration on the CNA website

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Registered Products

Registered Readers
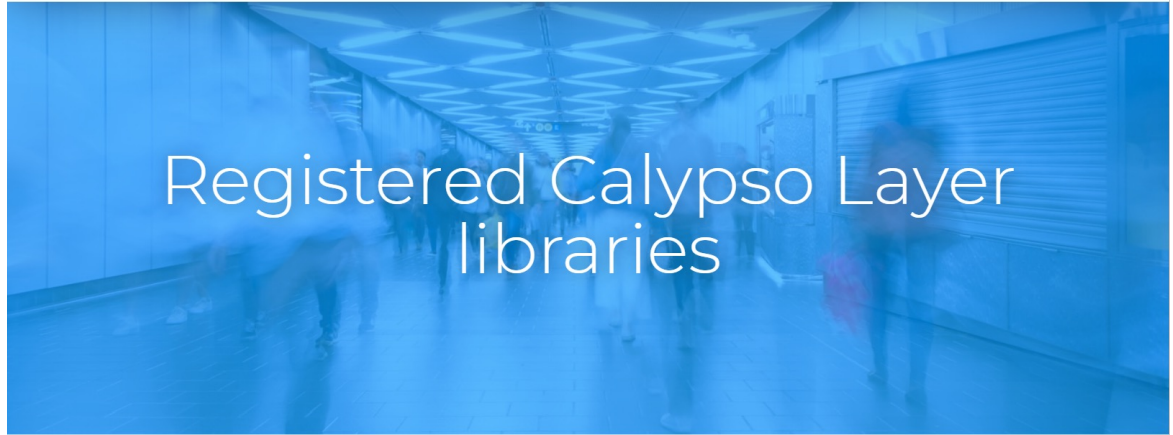
CNA has put in place a declaratory procedure where the vendor undertakes compliance with the Reader Layer Requirements

The following list identifies the registered Readers. This registration procedure is not a certification but a simple validation by CNA that the Vendor's declaration is consistent.

Learn more about the declarative process for the Reader Layer.

Vendor	Product Name	Record	Approval Date
ASIS Elektronik	VAL8	CNA-221125-RLDP-A1	14/03/2023

Registered Calypso Layer libraries

CNA has put in place a declaratory procedure where the vendor undertakes compliance with the Calypso Layer Requirements. The following list identifies the registered Calypso Layer libraries. This registration procedure is not a certification but a simple validation by CNA that the Vendor's declaration is consistent.

Learn more about the declarative process for the Calypso Layer.

Vendor	Product Name	Record	Approval Date
HID Global	CalypsoLib 1.4	CNA-211119-CLDP-29M1	22/02/2023

Calypso Tender

Guide for tenders available !

Call for tenders for cards, NFC mobile ticketing and terminals based on the Calypso standard

How to guarantee the complete opening of your ticketing system during a call for tenders

Hardware/Software Type	Certification to be required ISO/IEC TS 24192	Registration letter to be required		Commitment letter to be required
		Reader Layer	Calypso Layer	Ticketing Layer
Hardware without Calypso library	√	√		
Hardware with Calypso library	√	√	√	
Equipment integrating the network's ticketing application	√	√	√	√
Calypso library only			√	
Ticketing application only				√

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Terminal Approval

The terminal approval will include:

- ISO/IEC TS 24192 certificate
  (formerly named CEN/TS 16794)

- Reader Layer certificate

- Calypso Layer certificate

CNA site will highlight these approvals, while keeping information on the basic certificates.

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Terminal Certification - Next Steps

The target is a certification based on a technical evaluation made by an independent laboratory.

Next steps

- Development of test tools with the following principle:
  Availability and ease of use
    - Open-source software
    - Compatible with any type of terminal
    - Use of emulator and spy

Postponed in 2024

- Need for a terminal API evolution

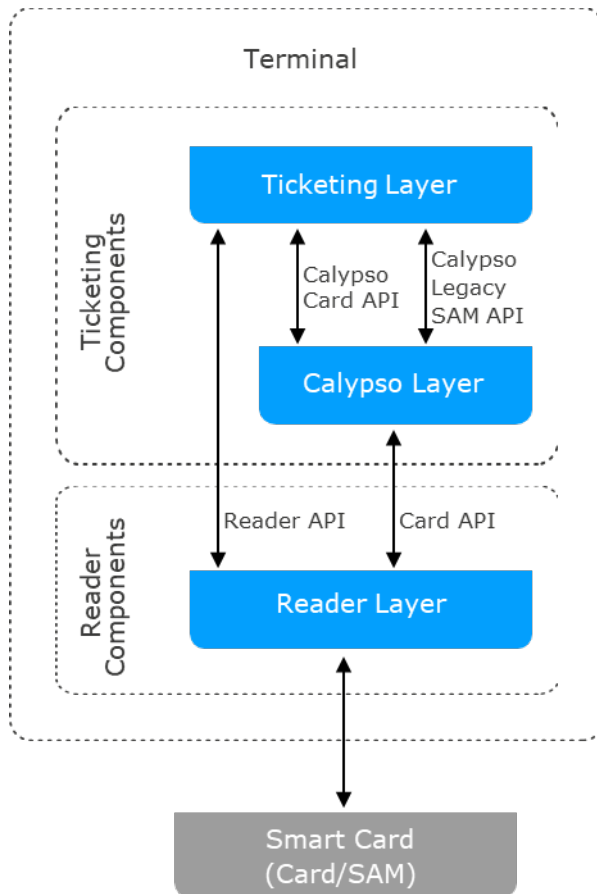 **Eclipse Keypop**, new ECLIPSE open-source project

- Update test plans

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Eclipse Keypop

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Eclipse **Keypop** – Java & C++ Terminal API

https://terminal-api.calypsonet.org/   http://keypop.org/

new Eclipse open-source project to host Java & C++ code of the Terminal API defined by CNA

- Keypop code hosted by the Eclipse foundation but licensed under the "MIT license" → offers the widest licensing flexibility for any solution implementing Keypop interfaces

first Keypop release October 2023 → first <u>major</u> evolution of the terminal API to manage cryptographic processing through the use of <u>extensions</u>

- From the start - API extension for symmetric crypto based on the Calypso Legacy SAM (C1)

Coming soon

- API extension for asymmetric crypto to support "Calypso Prime PKI" (to perform dynamic card authentication without SAM)

- API extension for symmetric crypto based on the Calypso OpenSAM → use of the Calypso API for card transactions will be <u>independent</u> of the SAM solution

  → proposal of PKI & OpenSAM API extension for December 2023

Keypop API ready for the coming Calypso Terminal Certification

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Eclipse Keyple

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Eclipse **Keyple** - key strengths

Keyple, a set of libraries to operate Calypso processing in a ticketing terminal

- truly **open-source**

- strongly **supported** by terminal solutions

- really **user-friendly** for ticketing terminal developers

- highly **interoperable** with Calypso ticketing systems

- widest **coverage** of Calypso features

- rapidly & simply **upgradeable** and **maintainable**

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Keyple – truly **open-source**

Hosted by Eclipse, a major Open-Source foundation

offers strong guarantees of

- openness in project management

- respect for intellectual property rights

code released under 'Eclipse Public License' (version 2.0)

- gives ticketing integrators great flexibility in implementing their solutions

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Keyple – strongly **supported**

designed to fit **any embedded or distributed architecture**

- whether local or remote from the terminal, smart card readers are operated in a generic & optimized way

thanks to a plug-in mechanism, **any smart card reader solution** can be integrated into Keyple

- all standard solutions are natively supported (PC/SC, Android NFC, Android OMAPI)

- many proprietary solutions currently integrated (e.g. SpringCard, Coppernic, Famoco, Flowbird, Bluebird, Asis, Calypso HSM …)

2 implementations (Java & C++) are available

- enables Keyple processing to be supported on most ticketing terminal solutions

Keyple-less terminal

- using the Keyple Distributed JSON protocol → ability to operate a smart card reader on a terminal not running a Keyple library (e.g. Keyple-less mobile app in a NFC iPhone operated by a ticketing server)

current challenge – integration in EMV certified payment terminals

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Keyple – really **user-friendly**

Keyple is based on high-level interfaces: the Calypso terminal APIs (provided by Keypop)

- The solution is divided in separate software layers (reader layer, Calypso layer & ticketing)

- The Reader API & Calypso API are designed to be easily used by developers, non-expert of Calypso and smart cards solutions

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Keyple – highly **interoperable**

Keyple fully follow all the terminal requirements defined by CNA for the Reader layer and the Calypso layer

- based on Keypop API → Keyple is ready to be evaluated for the coming terminal certification

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Keyple – wide Calypso features' **coverage**

Calypso card processing

- Support of all features of Calypso Prime Regular & Prime Extended (including Calypso Basic, Light & HCE)

- prototype for Prime PKI scheduled for December 2023

Calypso legacy SAM processing

- Support of all SAM features involved in Calypso card transaction

- main SAM features for SAM management transaction (perso, settings, ceilings)

Calypso OpenSAM processing

- support for SAM functionalities involved in Calypso card transaction planned for the first quarter of 2024

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Keyple – rapidly/simply **upgradeable** & **maintainable**

maybe the most important & unique ability of Keyple

- for early versions of Keyple, the time required for a fix was up to 1 year

- from Keyple 2.0 (October 2021), proven ability to develop and distribute a fix within a week

by isolating software layers and limiting dependencies between components

- extraction of the 3 terminal interfaces (now Keypop components)

- split of Keyple into 18 components (Service Lib, Plugin API, Common API, Util Lib, Service Resource Lib, Calypso Card Lib, Generic. Card Lib, Distributed libraries, plugins' libraries)

In less than 2 years, release of:

- 17 minor upgrades to Calypso terminal APIs

- 56 minor upgrades to Keyple components

(for most Calypso feature additions and fixes, 100% backwards compatible, which can be transparently deployed)

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Keyple Java – new features

Calypso card processing

- Support of all features of Calypso Prime Regular & Prime Extended (including Calypso Basic, Light & HCE)

- prototype for Prime PKI scheduled for beginning 2024

Calypso legacy SAM processing

- Support of all SAM features involved in Calypso card transaction

- main SAM features for SAM management transaction (perso, settings, ceilings)

Calypso OpenSAM processing

- support for SAM functionalities involved in Calypso card transaction planned for the first quarter of 2024

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Title
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