

# Calypso

Networks Association

An aerial night view of a city, likely Singapore, showing a complex network of roads and buildings. The image is overlaid with a network diagram consisting of glowing white nodes and connecting arcs, symbolizing connectivity and technology. The sky is a mix of blue and orange, suggesting a sunset or sunrise.

Open Tech Day

November 2023

# AGENDA

- **Technical updates:**
  - Calypso products range
  - Mobile ticketing
  - Card functional certification
  - Keyple and Terminal Certification
  - Open SAM
- **Some Calypso key figures**
- **Membership fees 2024**
- **A few words about Calypso vs Open Payment**
- **3 workshops to attend:**

**Open SAM**

**ABT**

**Eclipse Keyple and  
Terminal certification**



A blurred photograph of a high-speed train at a modern station platform. The train is moving from left to right, creating a sense of motion. The platform has a white, slatted roof structure supported by white pillars. In the background, a city skyline is visible under a bright sky. The overall color palette is light and airy, with a warm orange glow on the right side.

# Calypso

Networks Association

Technical updates

# 1

## Product Range





# Calypso Product Range

Calypso



**PRIME**

LIGHT

basic

**APPLET**

HCE □

## Calypso<sup>®</sup> basic

**IS AVAILABLE!!**

Certified Components\*



RFID Certified products



\* Functional & Security certification

# 2

## Mobile Ticketing

Applet & HCE



# Applet on Secure Elements

## For eSE and Java Card

### Java Card and GP compliant

- Similar to a Calypso Prime native card
- Generic
- Maintenance to follow GP and Java Card evolutions
- Adaptation to customer needs
- For mobiles and Java Cards

## Free licence

### For CNA Members

- Free licence
- Certification Prime
- 30 products certified since 2016
- 2 in 2023

## Latest news

### v 1.3.x versions last few years

- provides the features of Calypso Prime Regular

### v 1.3.10 (01/2022)

- support of GlobalPlatform predictive challenge then regular publication of new features

### v 2.0 in progress (January 2024)

- Prime Regular fully compliant with Calypso REV3.3 ed 2 spec
- Full support of Calypso Prime Extended & PKI modes

Calypso® APPLLET





# Calypso HCE

2016 to 2018– Calypso HCE Specifications

2018 – Calypso HCE Guidelines

From 2021 – Calypso HCE SDK Certification Process  
This process is a tool at the attention of the PTO which would like to have a formal insurance of an acceptable level of security of their Calypso HCE solution

## Latest news

### Calypso HCE v1.5 launched

- Reference specification is Calypso Prime Revision 3.3 Edition 2
- Support of PKI mode added
- Editorial evolutions

### Calypso HCE functional certification process

- Postponed 2024

# 3

## Card Functional Certification



# 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**



# Calypso Test Suite for Light

## Version 1.2.0

- Full compliant with the Calypso Light 1.2 specification
- Bug correction

**Released in November 2022**

# 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**

# Calypso Test Suite for HCE

## Version 1.0.0

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

**Expected in 2024**



# 4

## Eclipse Keyple & Terminal certification



# 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.

# Terminal certification steps

Since December 2020 – Terminal requirements and recommendations published

Since 1<sup>er</sup> 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



# 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

# 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 Ticketing Layer
		Reader Layer	Calypso Layer	
Hardware without Calypso library	√	√		
Hardware with Calypso library	√	√	√	
Equipment integrating the network's ticketing application	√	√	√	√
Calypso library only			√	
Ticketing application only				√

# 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

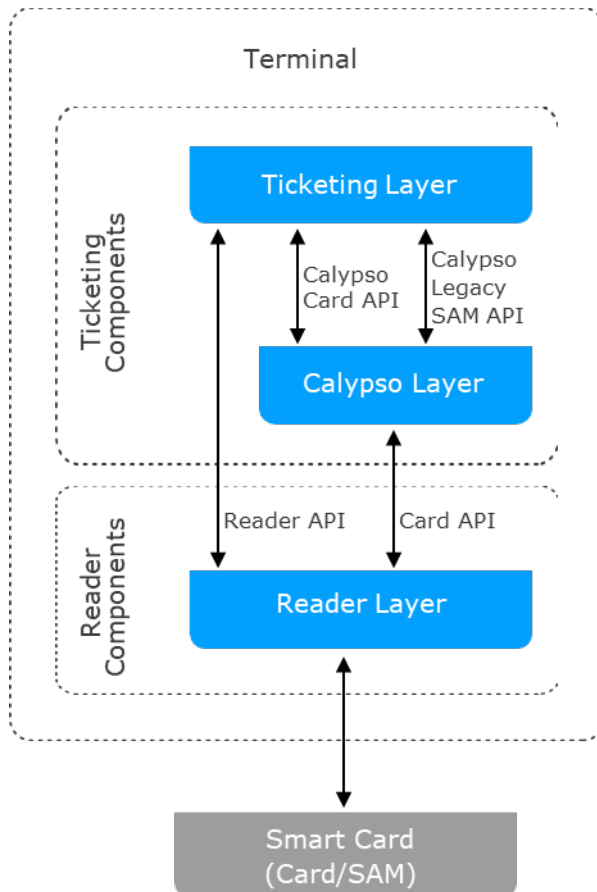
**Eclipse Keypop**, new ECLIPSE open-source project

- Update test plans

# 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 November 2023** → major evolution of the terminal API to manage cryptographic processing through the use of extensions

- 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 independent of the SAM solution

→ proposal of PKI extension for **December 2023**

**Keypop API ready for the coming Calypso Terminal Certification**



# 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**

# Keyple Java – new features

## Latest news

### 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

# 5

## OpenSAM



# Calypso OpenSAM Status

## Card Transaction

Draft of the Specification available since 31<sup>st</sup> July 2023.

Open for **feedback!**

## Initialization & Management

Draft of the Specification coming early 2024

## Certification

Definition of the certification scheme began in October 2023



A blurred high-speed train is moving through a modern station platform. The platform has a white, ribbed ceiling and glass railings. The background shows a cityscape with buildings and trees. The overall image has a warm, golden-yellow tint.

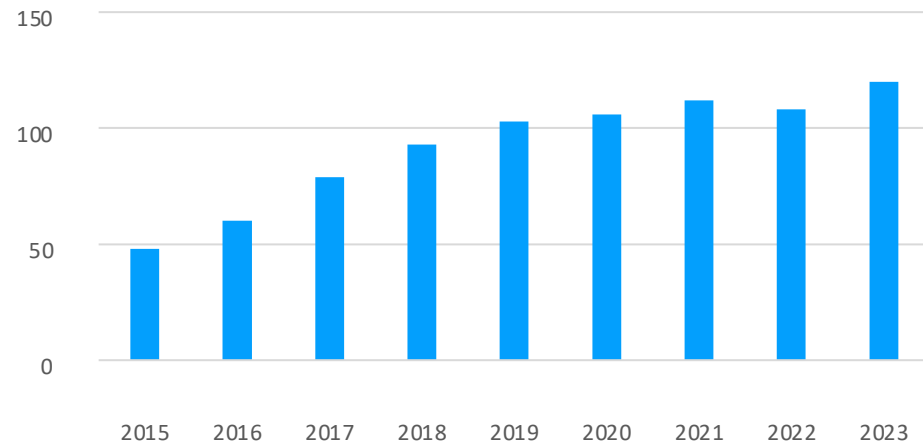
# Calypso

Networks Association

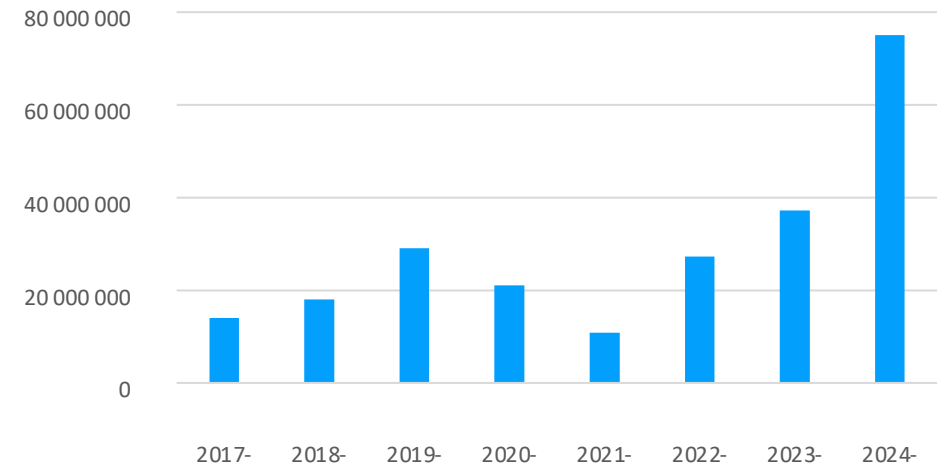
## Some Calypso key figures

# Calypso and CNA health

### Members evolution

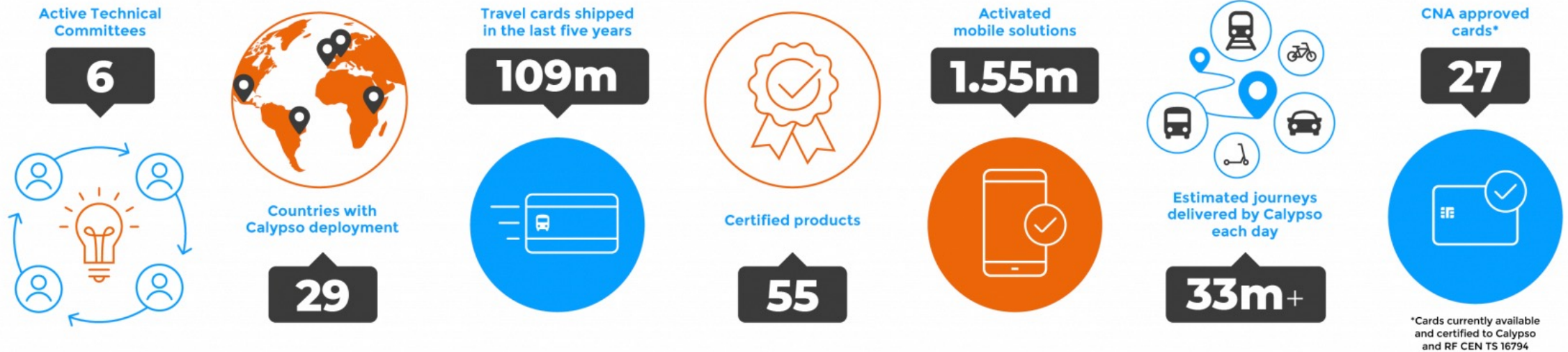


### Calypso cards shipped





# Some key figures





# Calypso

Networks Association

Alignment of  
membership fees



# Evolution of membership fees

- The membership fees have not been increased since 2018.
- The bylaws of CNA precise at the article 6.4.2

*“The amount of the membership fee is determined each year by the board of directors [and notified to the Members and Adhering Members at the beginning of each fiscal year].”*

*“In any event, the membership fee for Members with standard status may not exceed five thousand euros (EUR 5,000.00), subject to annual indexation, and the membership fee for Members with gold status may not exceed thirty thousand euros (EUR 30,000.00), subject to annual indexation”*

- Consequently the Board members have validated the following membership fees for 2024 onwards
- Membership fee levels to be maintained for the next three years

# Membership fees 2024

Member category	Present fee	Proposed fee
Transit authority, association	€300	€350
Transport or service operators with revenue of less than €1bn per year	€1,000	€1,200
Transport or service operators with revenue greater than €1bn per year	€3,000	€3,500
Manufacturers, integrators, and providers	€3,000	€3,500
Consulting companies and software providers with less than 10 employees	€600	€700
Consulting companies and software providers with 10-50 employees	€1,000	€1,200
Consulting companies and software providers with more than 50 employees	€3,000	€3,500
Gold member	€25,000	€28,000





# Calypso

Networks Association

A few words about Calypso vs  
Open Payment





# Calypso

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And now ...  
the 3 workshops

**Open SAM**

**ABT**

**Eclipse Keyple & Terminal  
certification**