Calypso
Networks Association

2021 Training Programme

How to get the most out of Calypso technology

Training with CNA

Calypso Networks Association (CNA) delivers a comprehensive, year-round training programme to promote industry best practice and support the future development of the industry.

Training provides an opportunity to learn new skills, share experiences, and gain a deeper level of knowledge on how to get the most out of Calypso technology. On the next page, recent participants have shared their feedback on CNA's training and how it has added value to their organisation.

All training is tailored to industry requirements, including dedicated sessions for transport and mobility authorities and operators, as well as technology manufacturers and transport consultants. CNA can also tailor its training modules to specific requirements on request.

To discuss your training requirements further, please get in touch by emailing Manon Chaix via manon.chaix@calypsonet.org

All training can take place in-person or virtually via video conference as required.

CNA adheres to all Covid-19 safety guidelines and the wellbeing of attendees is of the highest priority.
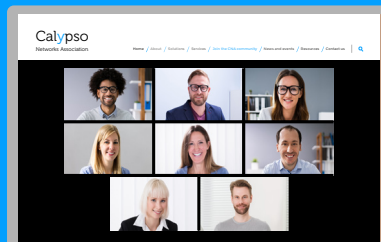
Feedback from participants

"We would like to thank CNA for the warm welcome and high quality training which was very useful for us. We intend to put the modules studied into practice to benefit both our current and future projects. We look forward to continuing to work closely with CNA in the future."

Khadim Cissé, Director of Learning and Strategy, Executive Council of Dakar Urban Transport (CETUD)

"The Calypso training was an immersive exploration of every aspect needed to implement a resilient transport fee system based on Mexico City's security needs. The CNA consultants were able to shape a functional team from previously unknown and non-communicated transport organisms, which now operate as a single figure (Movilidad Integrada), bigger than the sum of its individual parts."

Arturo Sánchez Navarro, Sector Logistics and Information Integrator at SEMOVI, Mexico City

"As many of our customers have Calypso ticketing systems, it is essential that we keep an in depth and up to date knowledge of the Calypso technology and are trained on the latest improvements of this technology that evolves with time to adapt to requirements and environments. CNA organised a training session for key people involved in projects which meant they could reach a high standard in a very short time. CNA understood our needs perfectly and tailored the training session accordingly.

The session was much appreciated, thanks both the actual on-site training and to the training material. The interactions between CNA experts and attendees were also essential in reaching a high level of competence in record time, thus enabling us to put our skills to good use in ongoing projects immediately."

Emmanuel Jammes, Systems Architect at RATP Smart Systems

2021 training programme

CNA offers a diverse selection of training programmes which can be delivered in-person or virtually via video conference. Each session is focused on delivering value and working with attendees to reach their objectives.

All CNA training sessions can be adapted as required to meet professional priorities and varying levels of technical knowledge. CNA's trainers are skilled at adapting the content of specific sessions to participant interests and knowledge levels accordingly.

How is the training delivered?

CNA adopts a modular approach to training in order to facilitate maximum flexibility and encourage learning. Modules can be tailored to requirements, but on average each module takes approximately 90 minutes to complete.

All training is designed to be interactive and engaging, with useful images and diagrams in order to support learning. All participants are provided with a written PDF summary of the key information to takeaway for future reference.

Who is the training for?

CNA training is relevant to transport and mobility authorities and operators, as well as technology manufacturers and transport consultants. The contactless ticketing community is diverse and CNA can tailor training to specific requirements and varying levels of background knowledge.

Recent sessions have been attended by a wide range of professionals including those working in leadership roles, project management, technical development and technical support.

CNA's trainers

CNA's training programme is led by highly experienced and energetic trainers:

Philippe Guillaumin

Philippe Guillaumin is a highly experienced trainer with extensive knowledge of transport ticketing and technical requirements. Philippe is the Technical Manager at CNA, managing technical developments within the association including the writing of technical specifications, certification processes and coordination of working groups.

Ludovic Teixeira Costa

Ludovic Teixeira Costa leads a number of CNA's training modules and has in-depth knowledge of the transport and mobility sector, with strong expertise across Calypso and NFC technologies. In his role at CNA, Ludovic focuses on certification and mobile products, having previously spent eight years at SNCF.

Paulo Barreto

Paulo Barreto is an experienced trainer with extensive knowledge and experience of the Calypso portfolio. He spent over fifteen years working with transport networks, first as a consultant and then as member of OTLIS. Paulo is highly knowledgeable within the industry and works closely with members of the contactless ticketing community to promote the benefits of open standards.

Pierre Terree

Pierre Terree is a longstanding trainer at CNA and works with many organisations on their training requirements. Since 2004, he has supported CNA partners for Calypso implementations including RATP and Ixxi, and also managed the Calypso specifications, security topics and their evolutions. He is in charge of the development of the Calypso Java Card applet, and the Keyple terminal library. He also provides technical support to CNA members.

2021 training modules

Introduction to CNA and Calypso

A short module introducing CNA and the Calypso standard. Relevant to all audiences.

Topics:

• *The Calypso portfolio*
• *The role of CNA*
• *CNA's objectives and guidelines*

Contactless ticketing best practice

This module explores best practices for installing a contactless ticketing system, or adapting an existing system, to meet the challenges of sustainable mobility. Suitable for all audiences.

Topics:

• *Benefits of a contactless ticketing system*
• *Economic and industrial considerations for transport operators*
• *Considerations for controlling your ticketing system*
• *Value of open and standardised solutions.*

Calypso specifications

The most common entry point to CNA's technical training plan, providing trainees with a common framework and vocabulary for understanding CNA solutions and how they interact with ticketing stack software.

Topics:

• *Defining 'Calypso Portable Objects'*
• *Calypso specifications: role and purpose*
• *Locating the Calypso Specification in Ticketing*

*N.B. CNA trainers use the OSI model to map the components of the ticketing system.*

From chip card to Java card:

This module helps participants understand the physical and electronic principles of the smart card.

Topics:

• *Mechanics and electronics of a smart card*
• *Physical principles (power supply, communication) of the contactless card*
• *Card design*
• *Applicable standards and actors*
• *The role of the Java card*

N.B. this module is relevant to multiple audiences and can be adapted to participant interests and knowledge level accordingly.
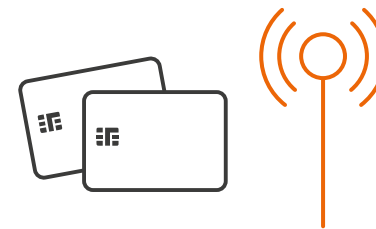
Calypso certification

This module explores the benefits and importance of a standardised, international certification policy. It provides an overview to CNA's certification process and rationale.

Topics:

• *How to adhere to international standards*
• *The necessity of a certification policy*
• *Contactless communication layers*
• *Solutions for ticketing equipment*

Calypso and NFC mobile

Overview of mobile ticketing market and Calypso's solutions to managing mobile phones as a ticketing medium. Suitable for all audiences.

Topics:

• *Security model and major players*
• *Mobile phones and market evolution*
• *SIM solution*
• *eSE (Embedded Secure Element) solution*
• *HCE (Host Card Emulation) solution*

2021 training modules

Calypso session layer

Follows the overview offered in the 'Calypso Specifications' module to review the specific features and advantages of Calypso portable objects in more technical detail.

Topics:

- *The role of the session layer*
- *The Calypso file system*
- *Calypso security*
- *The secure Calypso session*

N.B. Although this module has a more technical focus, it is accessible to multiple audiences and can be adapted to participant interests and knowledge level accordingly.

Calypso PO application

Overview of the main technical features of the Calypso Operating System (OS). Participants will gain an understanding of the possibilities for implementing their own data model within a Calypso structure.

Topics:

- *Overview*
- *Data organisation and file parameters*
- *Calypso functionalities*
- *Optional features*
- *Application lifecycle*

N.B. The technical content of this module means that it is only suitable for audiences with some existing technical knowledge.

Calypso Light technical presentation

This technical presentation overviews the main characteristics of the Calypso Light Application (CLAP), the operating system (OS) for portable objects specified by CNA.

Topics:

- *Objectives*
- *Main characteristics*
- *Reference structure*
- *Classic structure*
- *Main differences with rev 3.2*
- *List of commands*

Hoplink and its use cases

An introduction to Hoplink, its importance for ticketing interoperability and key use-cases. The module includes technical discussion of slot release mechanisms.

Topics:

- *The limits of current containers*
- *Technical features of Hoplink*
- *Simple support sharing (multi-regionality)*
- *Title sharing (inter-regionality)*
- *Slot release mechanisms*
- *The Hoplink files system and its configurations*

N.B. Some content in this session will be adapted for less technical audiences.

Functional and technical principles

Introduction to Eclipse Keyple

This module overviews the importance of an open source approach to ticketing, and introduces Keyple, CNA's open source SDK for contactless ticketing. The session includes discussion of Keyple's architecture and its software integration.

Suitable for all audiences.

Topics:

- *A truly open system for cards and portable objects*
- *Ticketing equipment and MaaS issues*
- *Keyple, an SDK for all needs*
- *Keyple in the OSI model*
- *Architecture and software integration*

## SAM and Keys in Calypso security

Introduction to electronic security keys and how they are created and stored. Participants will learn how to assess and avoid the key risks encountered in managing a SAM.

Participants may find attending the "Calypso session layer" and "Hoplink, role and use case" modules prior to this session helpful.

Relevant to all groups. Content may be modified according to participant knowledge level and interests.

Topics:

- *The two types of security used in transportation*
- *What is a key?*
- *Diversification: a primordial precaution*
- *How is a key protected?*
- *SAMs of a typical ticketing project*
- *The Key ceremony*
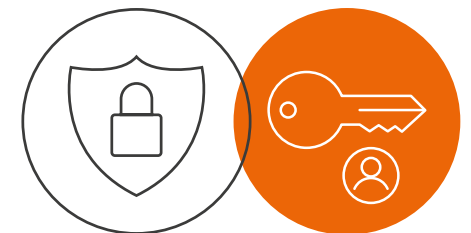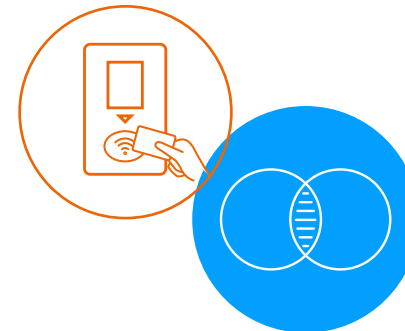
2021 training modules

Functional and technical principles continued...

Public key cryptography

A concise overview of the two major forms of cryptographic algorithm: public key cryptography and secret key cryptography. The module aims to provide a helpful general background for participants, rather than discussion of specific Calypso products.

Topics:

- *The main principles of cryptography*
- *Public key cryptography and secret key cryptography*
- *The RSA algorithm: a practical example.*

N.B. Although technical in focus, this module can be adapted for broader audiences.

A technical overview of Hoplink

This technical module covers the mechanisms required to protect each user's assets during the secure sharing of an application and its keys.

Topics:

- *Overview of the Hoplink file system*
- *Data model of the Hoplink container*
- *CAAD Hoplink*
- *Sequencing of Hoplink transactions*

N.B. This module requires at least intermediate technical knowledge.

Calypso additional security mechanisms

Calypso has additional security mechanisms based on SAM. This is the traceability of SAM and CAAD.

Topics:

- *CAAD*
- *Traceability of the SAMs*

FAQs

Do I need to be a member of CNA to participate in training?

No. Anyone can participate in training organised by CNA, although members receive preferential rates.

Can CNA offer training in other languages?

Yes, this is possible depending on requirements. Most training can be delivered in English, French, and Spanish, with plans for training in Portuguese in future. Please get in touch to discuss requirements.

Is there a maximum number of attendees for a CNA training?

As a best practice, we recommend there are a maximum of eight participants in each training session.

FAQs

Is there a risk that my training session will be impacted by Covid-19 restrictions?

CNA follows all Covid-19 guidelines closely to ensure training is delivered safely. When booking a training session, the latest Covid-19 policy will be outlined clearly. Training sessions can be conducted remotely via video-conferencing.

I'm interested in training on a specific topic which is not listed in the programme – can CNA help?

Yes, absolutely. Please get in touch using the contact details in the box below.

Where can I learn more about pricing?

Please contact Manon Chaix via manon.chaix@calypsonet.org to discuss requirements and associated pricing. Members of CNA receive a preferential rate.

Get in touch
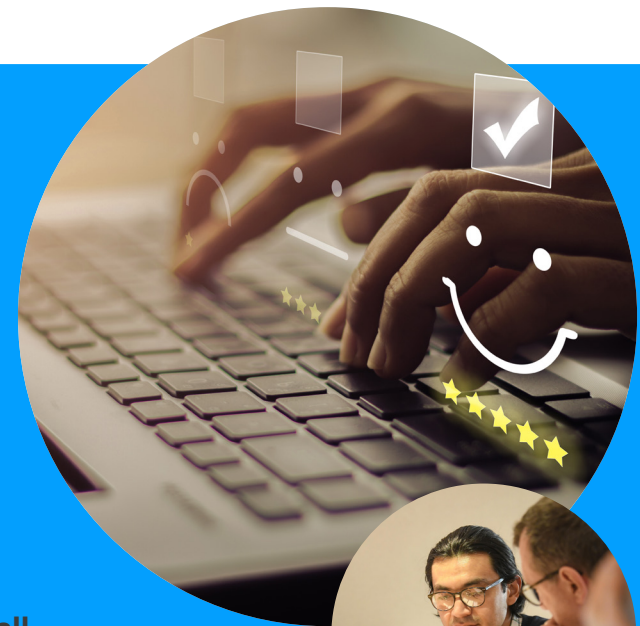
We welcome all feedback on CNA's 2021 training programme and would love to hear from you.

To discuss your requirements or to book an upcoming training, please get in touch by emailing Manon Chaix via ✉ manon.chaix@calypsonet.org

Calypso

Networks Association

Calypso Networks Association /
Tour de Lyon,
185 rue de Bercy,
75012 Paris
France

Tél : +33 (0)1 85 73 49 82 /