



Calypso

Networks Association

ECLIPSE KEYPLE CONTACTLESS ACCESS CONTROL

OPEN SOURCE SDK

ECLIPSE IOT DAY – 19TH FEBRUARY 2019
OLIVIER DELCROIX – SOFTWARE ENGINEER



Calypso

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ACCESS CONTROL IN PARIS METRO

CALYPSO PROTOCOL

ECLIPSE KEYPLE

DEMO

Public transport in Paris Some numbers

Peak hours :

- La Défense : 1 passenger per second
- Les Halles : 60k passengers in one hour



Issues to be addressed

- Validation should be very fast (<100ms)
- Validation should work with low connectivity
(autobus)
- Fraud detection should be fast



INTRODUCING CALYPSO

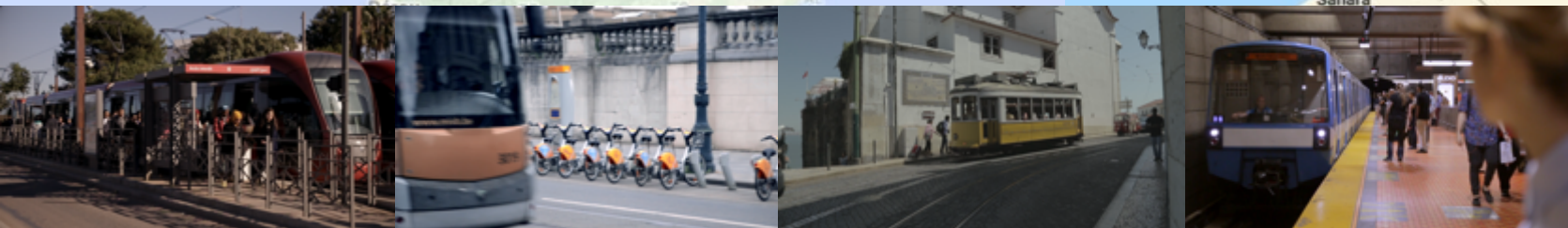
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Calypso deployed in 2000

- Transactions are offline, access control data is stored into a Smartcard (or a phone)
- Never been hacked
- Validation takes less than 100ms

A WORDWILDE DEPLOYMENT





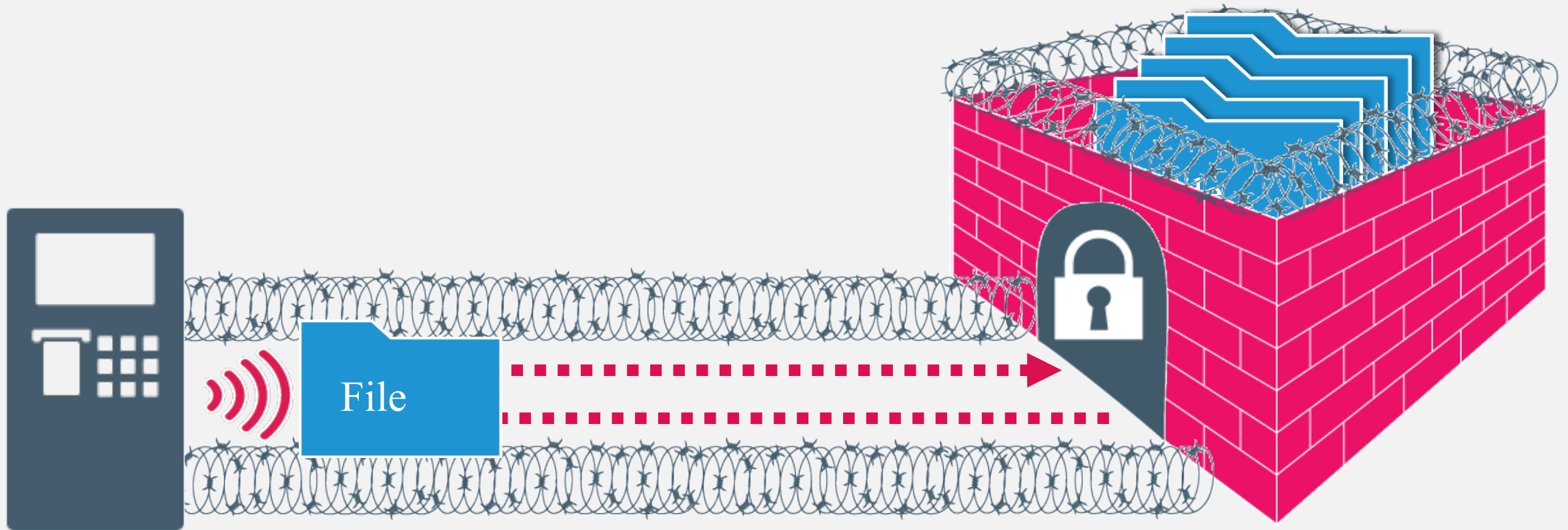
Calypso

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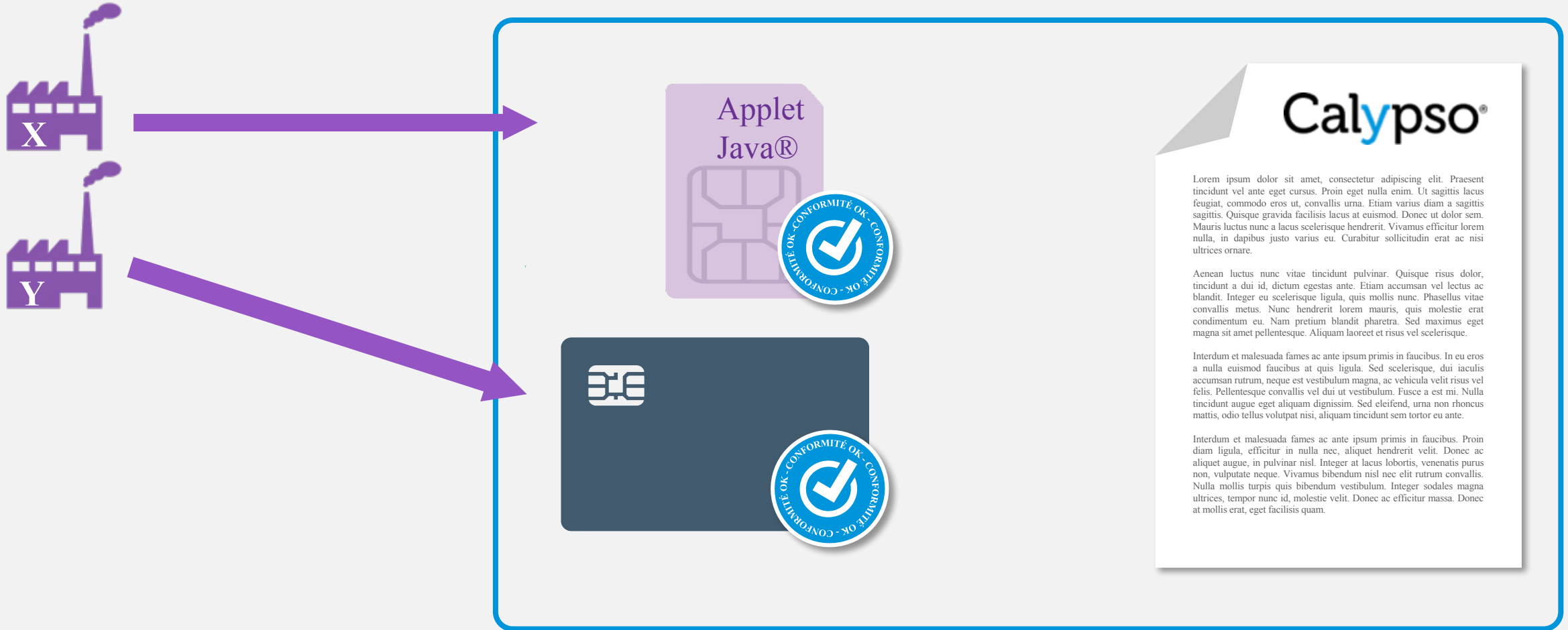
ACCESS CONTROL
CALYPSO PROTOCOL
ECLIPSE KEYPLE
DEMO

INTRODUCING : CALYPSO PORTABLE OBJECT OR "PO"

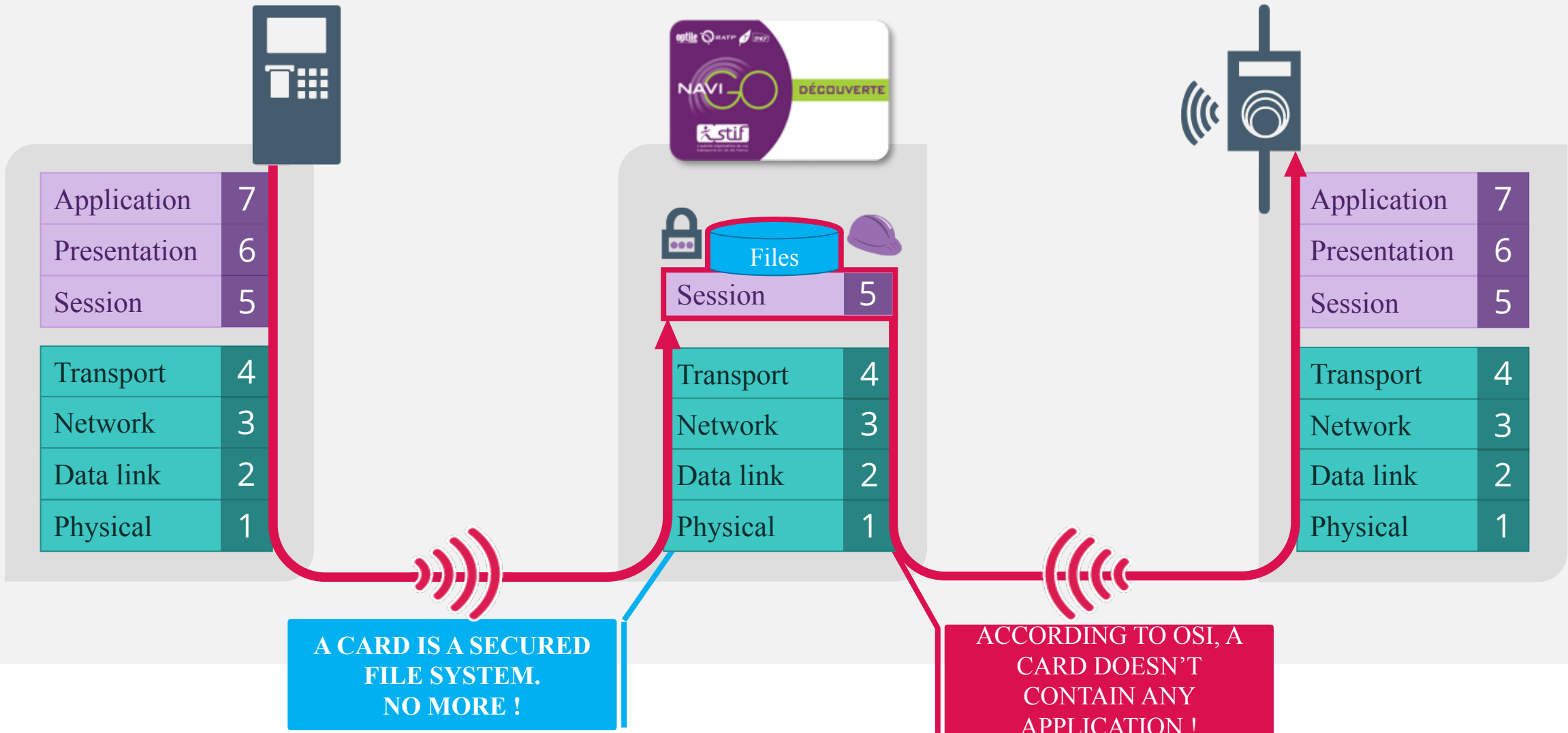
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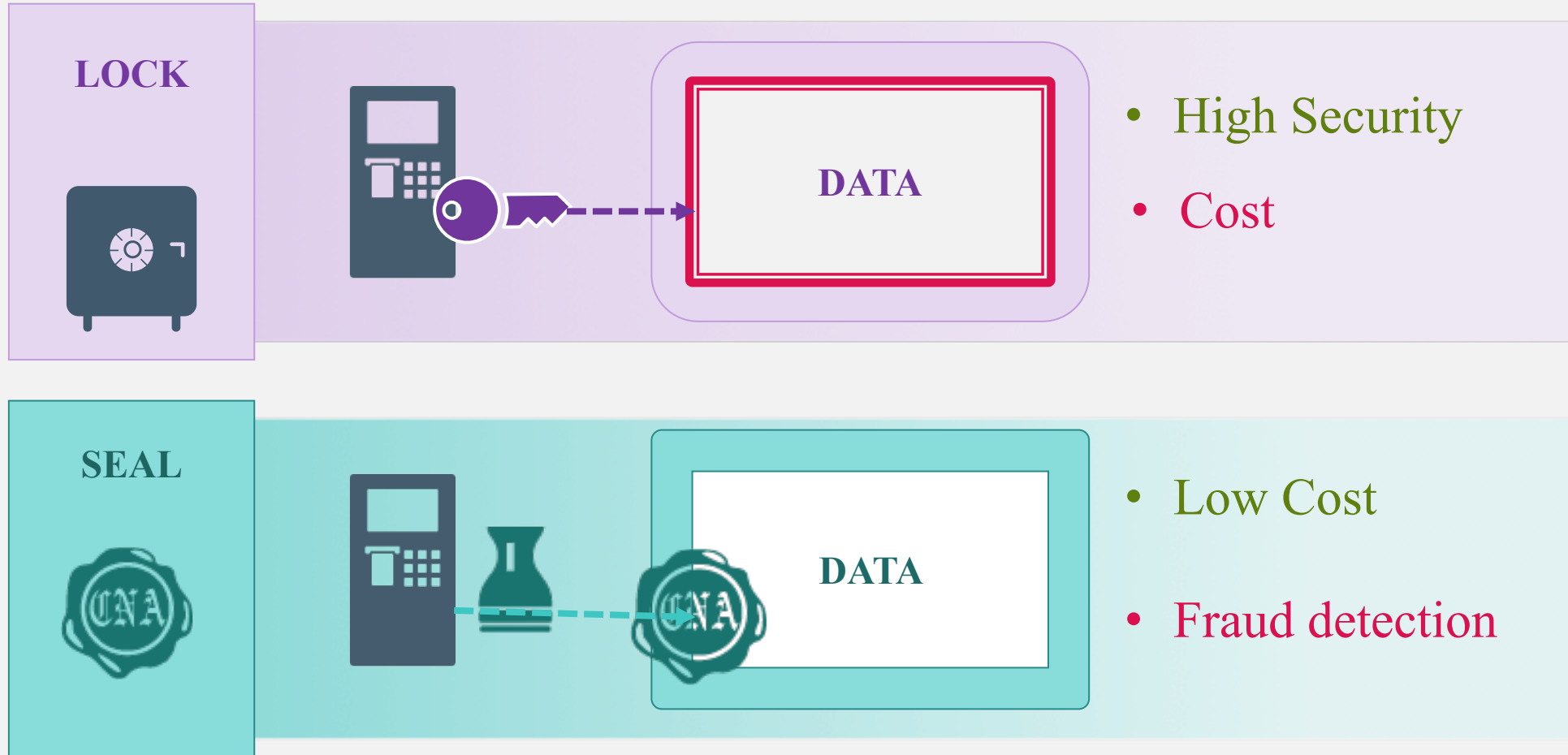
CALYPSO PO



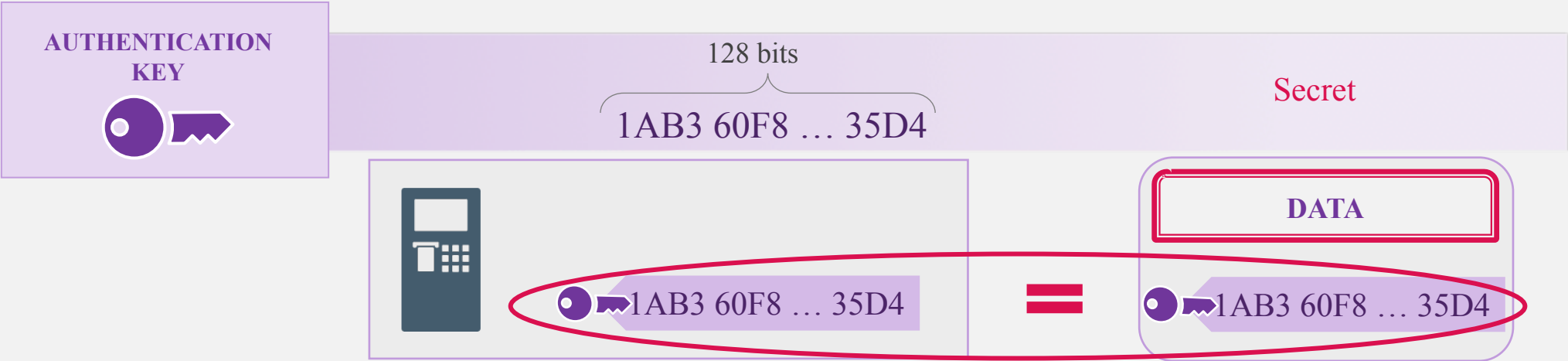
CALYPSO : PO IN OSI MODEL



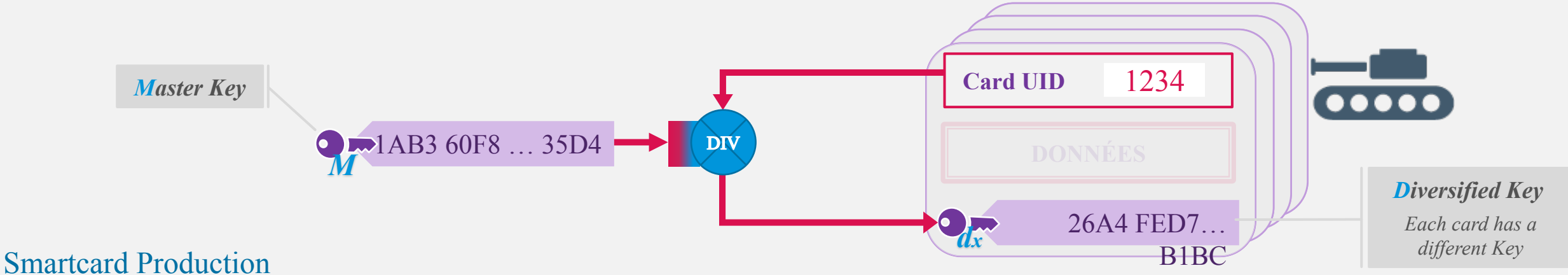
SECURITY OF ACCESS CONTROL DATA



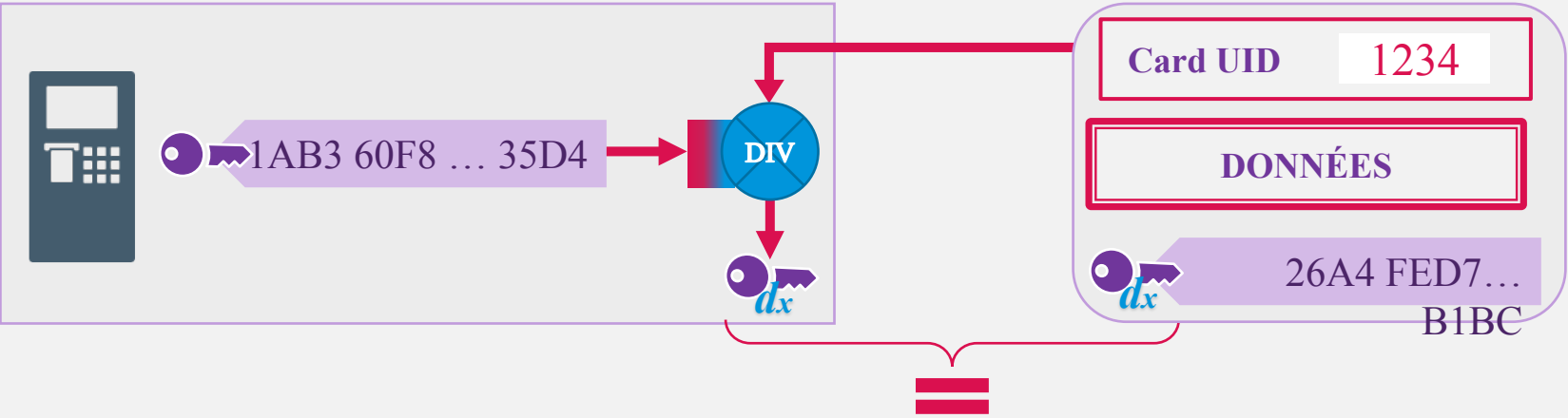
HOW TO SECURE DATA



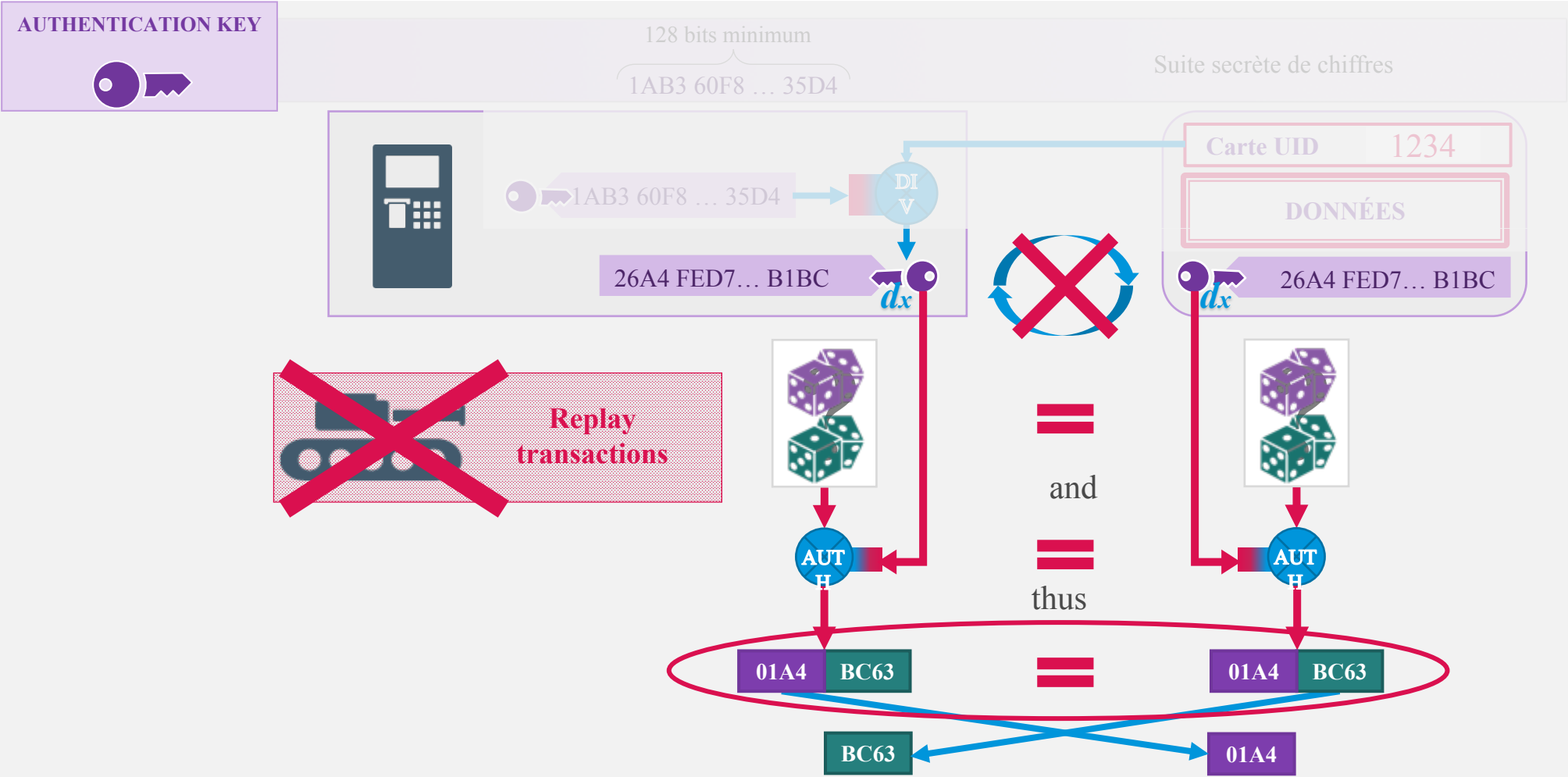
DIVERSIFY KEY FOR SMARTCARDS



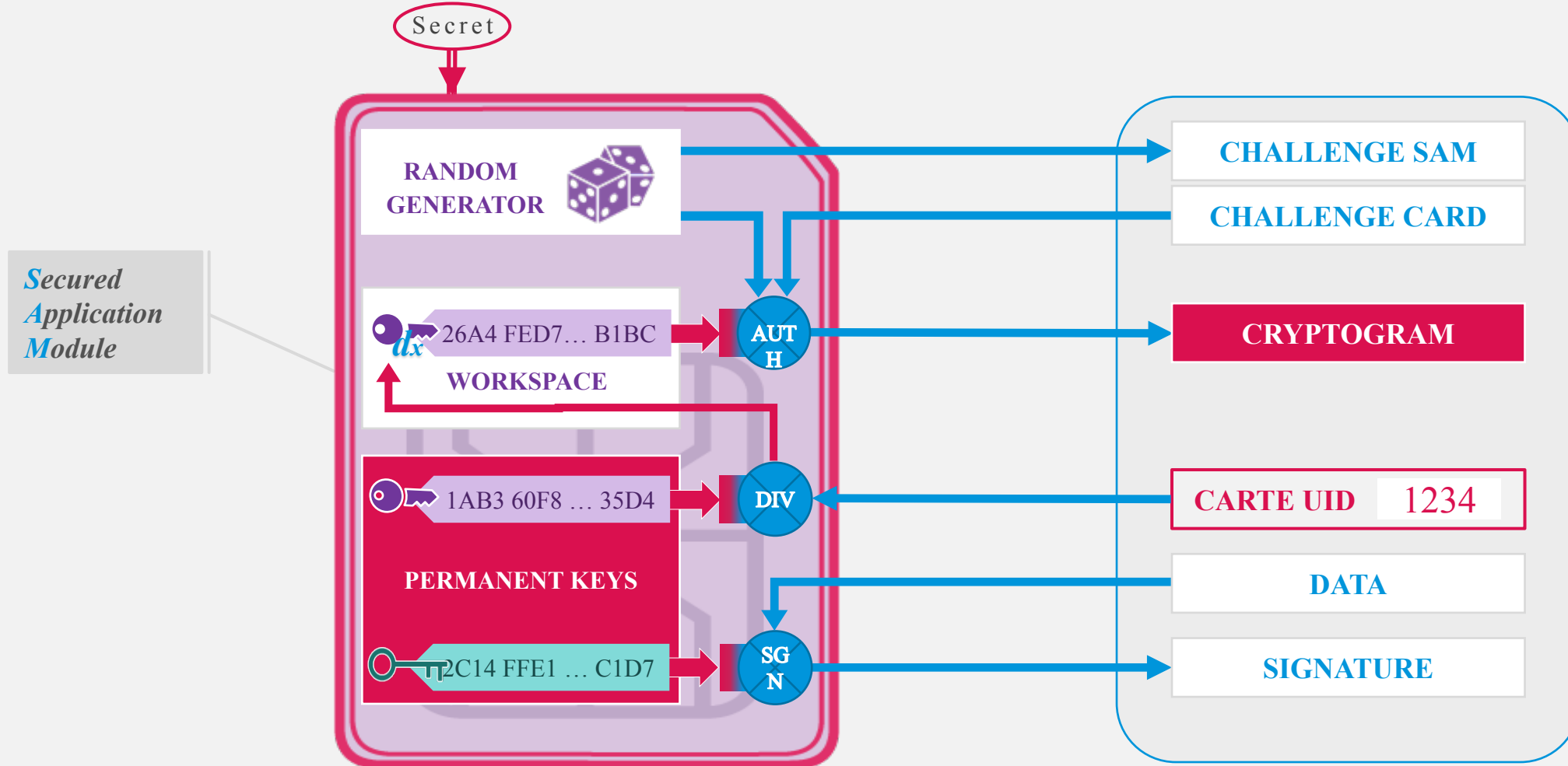
Use



AUTHENTICATION PREVENTS « YES CARD »



SECURED APPLICATION MODULE : SAM



WHAT ARE THE TRANSPORT COMPATIBLE?

Application	7
Presentation	6
Session	5

ticketing processing functions

ITSO
-5 to -10

Transport	4
Network	3
Data link	2
Physical	1

A MULTIPROVIDER ECOSYSTEM



Supplier	SELP	Gemalto	HID Global	Watchdata	Paragon	Any embedder	
Product	CLAP V1	Celego Calypso G1 Rev 2.4/3.1/3.2	SOMA Atlas Rev 2.4/3.1/3.2 CLAP V1	Calypso TimeCOS Rev 2.4/3.1/3.2	TanGo Calypso Rev 2.4/3.1/3.2	CD21 by ST Rev 2.4/3.1/3.2	
Chip RF	NXP ISO 14443 A	Infineon ISO 14443 A & B		ST Microelectronics ISO 14443 B			

Certified Calypso native cards

A MULTIPROVIDER ECOSYSTEM



Supplier	Athena	Gemalto	Idemia	Any Embedder		Gemalto	Idemia Oberthur	Idemia Morpho	G & D
Product	IDProject	Optelio	Cosmo Fly	JCOP By NXP		UpTeq NFC SIM	DragonFly NFC SIM	SIMply NFC Evolution	SkySIM CX (*)
Chip	Atmel	Infineon		NXP	SWP link NFC mobile CLF NXP, Infineon, STMicroelectronics				
RF	ISO 14443 B	ISO 14443B A & B		ISO 14443 A	ISO 14443B A & B				

Certified CNA Applet on Javacard platforms

CNA MEMBERS

2003

6
members



2018

100+
members





Interoperability

- Car sharing
- Parking services
- Bike sharing

Digital key

- Personal Vehicle or House digital key

Sensitive data

- Biometric information in Passport



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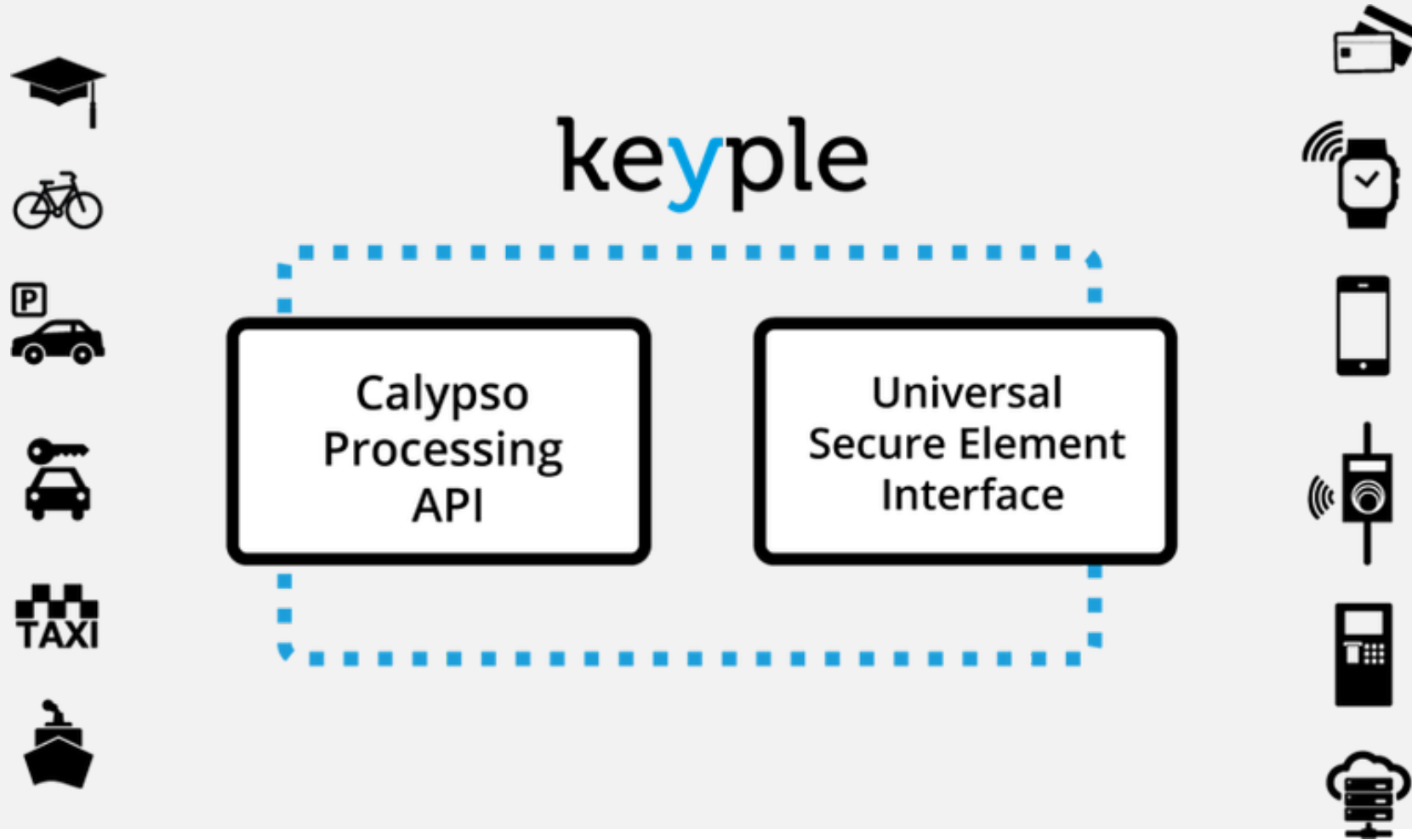
ECLIPSE KEYPLE : A REFERENCE LIBRARY FOR CALYPSO



- ◆ An open source library available in **Java, C++ & C**
- ◆ Compatible with any **terminal architecture** : mobile - embedded - server
- ◆ Interoperable with **any smart card reader** solution: standard - proprietary, local - remote
- ◆ Managing **the advanced security** features of **Calypso**

AN EXTENSIBLE SDK

Calypso®



- Implementation started in 2017
- Eclipse Incubation project since 2018
- Sample smartcards available : Calypso Test Kit
- Eclipse Keyple Java
 - Available on Eclipse Github
 - Official release 1.0.0 will be available on Maven Central
 - Artifacts are light (3 jar, 2 aar)
 - Plenty of examples on how to implements standard use cases

ECLIPSE APPLICATION KEYPLE ARCHITECTURE



UI

keyple

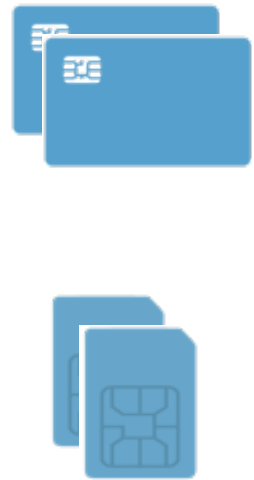
Physical Reader

Calypso PO

Access Control Application
--
Validator Ticket Shop

Smartcard protocols	Reader plugins
Calypso API PO commands SAM commands	Plugin SmartCardIO - PCSC
Mifare Felica	Android NFC HSM sam
	Android Open Mobile API
	Wizway your card reader

Windows
Linux
Macos
Android
USB
--
Contact
Contactless



FIRST INTERESTED PARTIES

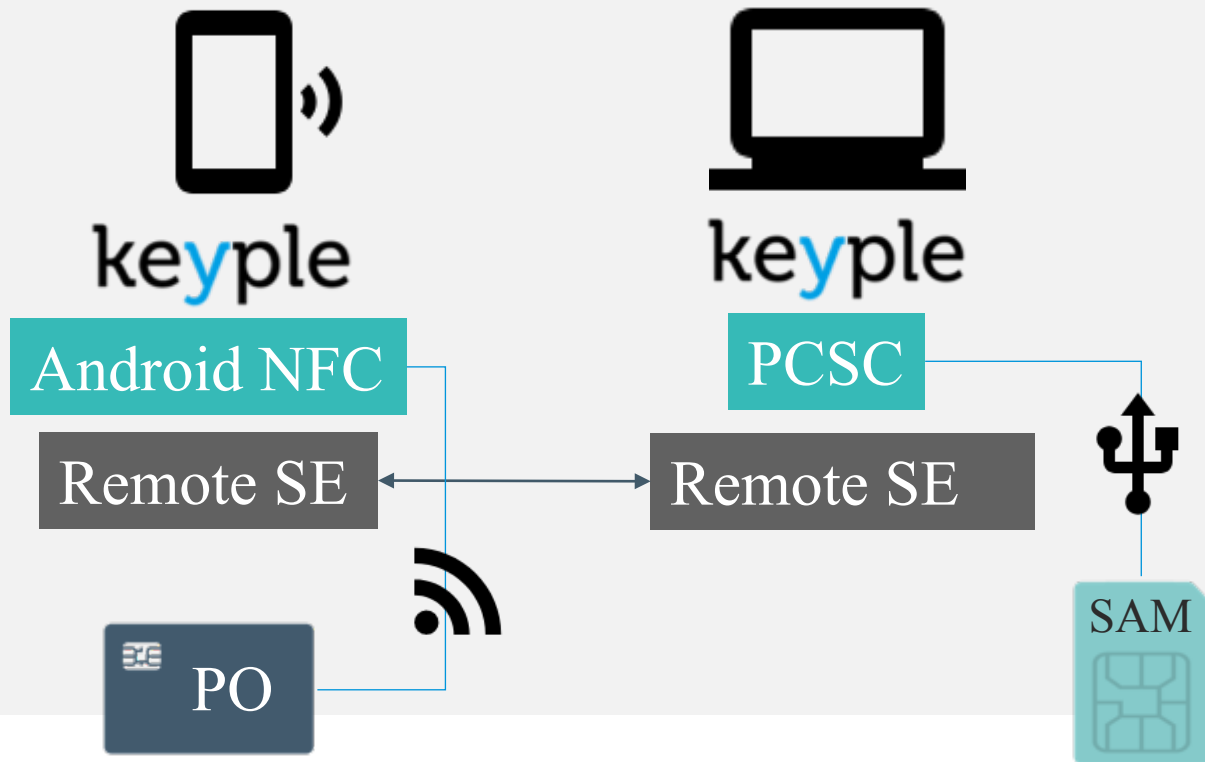
Calypso®



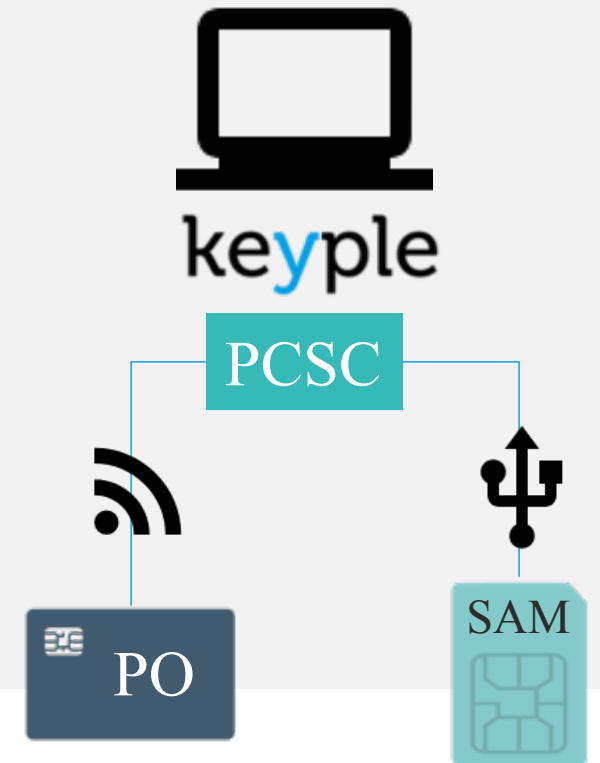
DEMO



Distributed architecture



Standalone architecture





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THANK YOU

Olivier Delcroix