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EPAS FOR DUMMIES®

EPAS Org

William Vanobberghen

EPASOrg

The fragmented nature of today's local environments has resulted in barriers hampering the development of a competitive market for card payments. EPASOrg, an international non-profit organisation open to all stakeholders of the card payments industry – acquirers, processors, card schemes, payment service providers, retailers, and hardware and software suppliers – has been initiating the development of a new generation of common and universal card payment standards based on innovative and state-of-the-art technologies. This book outlines the state of affairs as regards the standardisation work achieved by this association in card payment protocols.

EPAS Standards

EPASOrg developed EPAS standards with the goal of providing universal card payment specifications that address the business requirements of most stakeholders of the industry.

The EPAS portfolio is composed today of three main standards:

- The EPAS Acquirer Protocol (ISO 20022 CAPE messages)
- The EPAS Terminal Management Protocol (ISO 20022 CAPE messages)
- The EPAS Retailer Protocol (in the process of becoming ARTS-EPASOrg Specifications).

The EPAS standards and specifications have been designed to be SEPA (Single Euro Payments Area)-compliant and meet the requirements of the European Payments Council in this respect.

www.epasorg.eu

EPAS FOR DUMMIES®

UNIVERSAL STANDARDS FOR CARD PAYMENTS

By William Vanobberghen

WILEY

A John Wiley and Sons, Ltd, Publication

EPAS For Dummies®
Published by
John Wiley & Sons, Ltd
The Atrium
Southern Gate
Chichester
West Sussex
PO19 8SQ
England

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ISBN: 978-1-119-99910-2

Printed and bound in Great Britain by Page Bros, Norwich

10 9 8 7 6 5 4 3 2 1

Acknowledgments

We would like to thank all persons who have been actively involved in and contributed to the content of this book, especially the members of the EPASOrg Communication Committee: Ottilia Rouguet, Convenor of the EPASOrg Communication Committee; Isabelle Pujadas and Coba Taillefer, Members of the Communication Committee.

A special mention and thanks to Louis Jenny, Technical Steering Committee Chairman and Convenor of the EPAS Retailer Protocol Working Group, for his technical contribution, in-depth review, and expertise.

Our thanks are also extended to Jürgen Manske, Chairman of the Board of Directors, for his involvement in the review of the book's content.

Last but not least, we would also like to express our thanks to Groupement des Cartes Bancaires "CB" and especially Cédric Sarazin for their support to this initiative.

Foreword

The retail industry is facing incredible challenges in the payments area, and it's not expected to get easier going forward. New regulations are being introduced and existing ones are evolving, consumers are expecting retailers to support new payment methods, and security threats continue to evolve. As retailers expand globally, they face numerous regional payment infrastructures and requirements.

How can retailers comply, compete, and even thrive in this environment, especially given the challenges with updating legacy POS solutions? Through leveraging a global industry standard to isolate selling systems from payment systems, enabling flexibility in payments while maintaining stability in the selling systems. EPASOrg has created the Retail Protocol of the EPAS standard specifically to achieve this result. The Association for Retail Technology Standards (ARTS), a division of the National Retail Federation (NRF), is very pleased to be partnering with EPASOrg to create a common payment standard.

The jointly developed standard will be compatible with the large library of ARTS standards and the initial version of the EPAS retailer protocol resulting in the first truly global standard in this space supported by the vast constituency of retailers in the ARTS membership and the incredible strength of members of EPAS in the financial services and payment terminal providers space.

Retailing will benefit today and in the future by adopting payment solutions based on this standard, which provides greater flexibility to respond to customer demands, fraud, and competitive pressures, while at the same time reducing compliance and certification costs.

The ARTS and EPASOrg partnership is a great example of the benefit of cooperation – comprehensive products delivered in less time. We encourage all players in the payment space to implement the EPAS Retail Protocol to prepare for a soon-to-be-released common payment standard.

Richard Mader
Executive Director
Association for Retail Technology Standards (ARTS)

Introduction

Today's card payment industry is confronted by numerous and sometimes inconsistent standards and specifications. Most of these standards are based on ISO 8583 technology – a standard developed more than 20 years ago and based on basic bitmap technology.

Despite numerous attempts to achieve interoperability, the different implementations of those standards – especially between merchants and banks – have led to a situation where they still remain non-interoperable.

About This Book

EPASOrg is a non-profit organisation created to promote the widespread acceptance of the EPAS protocols, a series of standards designed to ensure interoperability between card acceptance and acquiring solutions, retail payment solutions, and terminal management systems.

EPASOrg designed *EPAS For Dummies* to help you, the reader, better understand what EPAS is and how the EPAS specifications may help you in addressing your requirements for card protocols related to your environments.

Foolish Assumptions

In writing this book, we made some assumptions about you, the people who read it:

- You're a decision-maker in card payments with few or no expertise in technical issues.
- You're interested in card payment processing.

- Your domain of expertise or interest is SEPA card payments and SEPA common solutions.
- You know that relying on open card payment standards is important to you and your business. You want to understand how EPAS can help you meet this objective and discover whether it may be a viable long-term approach.
- You've heard about ISO 20022, and you want to find out more about the new ISO 20022 standards for cards.
- You want to contribute to the further development of the EPAS standards and specifications and to the ISO 20022 efforts on card payments.

How This Book Is Organised

This book contains six chapters, each covering a different aspect of EPAS. We also include a glossary so that you can easily look up any term you're unfamiliar with:

Chapter 1: EPAS at a Glance

This chapter gives you the basics the EPAS concept and where it all started. We define what a protocol is and cover the reasons for choosing ISO 20022.

Chapter 2: ISO 20022 and EPAS

This chapter addresses the intimate relationship between EPAS and ISO 20022.

Chapter 3: The EPAS Portfolio

This chapter focuses on the three protocols that compose the EPAS portfolio. If you want to know the details on these protocols, then this chapter is for you.

Chapter 4: EPASOrg and Its Partnerships

EPASOrg maintains relationships with various initiatives that aim at developing similar objectives of openness in standardisation. This chapter talks about the organisation's different partners.

Chapter 5: Ten Useful Things to Tell Your Boss about EPAS

This chapter gives you ten great reasons that you should try EPAS. If your boss isn't convinced, he will be after this chapter.

Chapter 6: Ten Useful Links to Implement EPAS Protocols

Theory is nice, but practice is better! In this chapter, we provide ten useful links to help you ensure a proper implementation of the specifications.

Icons Used in This Book

Throughout the margin of this book, you'll see several icons that highlight important information:

This icon offers advice you won't want to miss. This information can save you time or money.

Some information is too good to forget. Whenever you see this icon, you'll know it marks information to keep top of mind.

Where to Go from Here

We wrote this book so that you can head straight for the topics or chapters that interest you the most. You don't have to read this book from cover to cover. Look up what you want to know and flip immediately to that page. If you need background information, we help guide you with cross-references to the chapters that contain it. We also include a handy glossary so that you look up unfamiliar terms.

Chapter 1

EPAS at a Glance

In This Chapter

- Looking at the issues surrounding card payments
- Saving the day with EPAS
- Introducing EPASOrg
- Getting a first look at EPAS protocols

When it comes to standards, the card payment industry abounds with choices. In fact, major industry players, such as Visa and MasterCard, have even developed their own proprietary specifications. Unfortunately, without a uniform system, the card payment industry lacks standard protocol specifications that all groups can take advantage of.

Fortunately, that's starting to change, thanks to the introduction of common open and royalty-free protocols. In this chapter, we give you a big-picture look at the world of EPAS.

The Challenge of Too Many Choices

Today, making payments by cards is a competitive business that relies on different players who are under the scrutiny of national central banks and the European Central Bank in charge of the oversight of payments in Europe. The European Commission also closely monitors the evolution of payments made by cards, namely through the enforcement of rules, in the hopes of ensuring an open and competitive market of payments Europe-wide.

Over the last few decades, the card payment industry has developed an abundance of standards and specifications to help with the process. The old saying "The great thing about standards is that there are so many to choose from . . ." certainly applies to the card payment industry.

But so many choices for the card payment industry doesn't come without challenges:

- The evolution of competition at all levels of the value chain with the emergence of new entrants
- The breaking of commercial, legal, and technical barriers for creating an open and competitive environment of payments in Europe
- The need to improve the interoperability of payments cross-border
- The necessity to rely on common specifications and standards

The answer has been to come up with a set of uniform and common standards. EPAS (Electronic Protocols Application Software) is an initiative to develop a series of application protocols to promote interoperability in card payments. EPASOrg is a non-profit organisation that has been created to spearhead these efforts.

EPAS: When and Where It All Started

In 2005, at the initiative and under the coordination of Groupement des Cartes Bancaires (CB) in France, a group of card schemes, acquirers, retailers, and payment solution providers belonging to the card payment value chain, set up a consortium with the objective of addressing the interaction between electronic payment terminals with other systems in the card transaction ecosystem. That group was the predecessor to what is now EPASOrg. The consortium started by defining three main protocols to be used in a POI (Point of Interaction) environment:

- The Acquirer protocol
- The TMS protocol
- The Retailer protocol

By fall 2005, the members of the consortium endorsed a Consortium Agreement, modelled in the framework of an Information Technology for European Advancement (ITEA) European research program. Over the next three years, work continued on the definition of the EPAS protocols, with an iterative revision process enabling state-of-the art technology and security requirements to be incorporated in the specifications.

From its inception, the EPAS initiative developed its project with a clear aim to enable stakeholders of the wide card payment industry to benefit from the extended expertise of the EPAS consortium and later EPASOrg for the implementation of concrete projects.

The EPAS initiative identified the following milestones, the first two of which have already been reached:

- **The issuance of the EPAS specifications:** You can download these specs for free by agreeing to an End-User License Agreement (EULA). You can download the specifications for both the EPAS Acquirer Protocol (ISO 20022 Acceptor to Acquirer Card Transactions–Card Payments Exchanges) and the Terminal Management System Protocol (ISO 20022 Terminal Management–Card Payments Terminal Management) at `www.iso20022.org/UNIFI_Cards_messages.page`. You can download the specifications of the EPAS Retailer Protocol at `www.epasorg.eu`.
- **The issuance of Message Usage Guides for both the Acquirer protocol and TMS protocol:** (The Retailer protocol already integrates a major part of its implementation guidelines in its specifications). Both guidelines are available for free on the EPASOrg website (`www.epasorg.eu`) by agreeing to a EULA. EPASOrg is now considering a further endorsement of its implementation guidelines by ISO 20022.

- **The finalisation of test cases:** This third milestone, when reached, will allow implementers to test the compliance of their implementation with the official EPAS and/ or ISO 20022 message standards.
- **The actual compliance or certification process:** This process will be conducted either by EPASOrg, another entity acting on its behalf, or by the implementer himself, possibly using a free auto-certification tool provided by EPASOrg. This tool would ensure a proper and formal assessment of the compliance of their implementation with the EPAS specifications.

EPASOrg: What It Is, What It Isn't

EPASOrg is a non-profit organisation created to promote the widespread acceptance of the *EPAS protocols,* a series of standards to ensure interoperability between card acceptance and acquiring solutions, retail payment solutions, and terminal managements systems. (For details on these protocols, see Chapter 3.)

The mission of EPASOrg is to foster interoperability by agreeing on, developing, and implementing common protocol specifications related to secure card payments in the acceptor-to-acquirer domain. By increasing standardisation and interoperability through common protocols, EPASOrg is dedicated to overcoming the barriers of today's fragmented card payment environment.

To help reach its goal, EPASOrg established partnerships with organisations that shared this common goal. (For more on these partnerships, see Chapter 4.)

Many people confuse the EPAS standards with EPASOrg, but in reality, they're actually two different things. While EPASOrg is a non-profit organisation, EPAS protocols and specifications are the outcome of the work produced by EPASOrg.

See Chapter 2 for the lowdown on the features the consortium wanted these protocols to have.

The Inside Scoop on EPAS Protocols

Basically, a *protocol* – at least in the field of information technologies – is a set of rules and/or specifications to enable two or more entities to exchange information.

Protocols come in different types, depending on the field:

- **Data protocols:** In telecommunication, protocols usually refer to some set of rules required to ensure the proper exchange of data between two or more communication nodes.
- **Application protocol:** Similarly, software applications also use protocols to exchange data at their own level. In this case, we usually refer to these protocols as *application protocols*.

EPAS refers to a series of protocols belonging to the category of *application protocols* where the exchange of data is performed between two different equipments:

- The payment terminal (or a payment server) located usually at the merchant's location
- A server under the supervision of a bank, payment service provider, or entity acting on their behalf

EPAS also rely on the use of lower level data transport protocols to ensure that the exchange of information is carried out in a smooth, secure way communication lines.

How a card payment works

In the domain of card payments, a protocol enables, among other things, the exchange of information to

- Authorise a card payment transaction
- Cancel a card payment transaction
- Allow a retailer to be credited for the payment transaction
- Initiate the debit of the account of the customer (cardholder) by the bank.

You may be wondering why you need a protocol to carry out a payment by card and what function it fulfils. Actually, any payment – by card or not – needs a set of rules between two parties for exchanging data.

In a card payment, two main phases have to be considered: an authorisation phase, where an *Acquiring Bank* needs to ensure that the cardholder has sufficient money in his account by soliciting an *Issuing Bank* (the bank issuing a payment card to a cardholder). This process is then followed by a payment phase, where the system ensures that the merchant *(*Acceptor*)* is credited and the cardholder debited for the amount of the commercially agreed transaction.

An additional protocol (Acquirer-to-Issuer protocol) is required to finalise the transaction with the issuer using basically the same two main phases (authorisation and payment).

The protocol determines the functional, technical, and security details to make the transaction happen in a smooth, efficient, and secure way for all parties.

A processing system (or Processor) acts as a switching platform for the exchange of data between the Acquirer and Issuer. This exchange is carried out in compliance with the rules defined by a card scheme

Figure 1-1 illustrates the major steps of a basic card payment and the involvement of the main parties in this process.

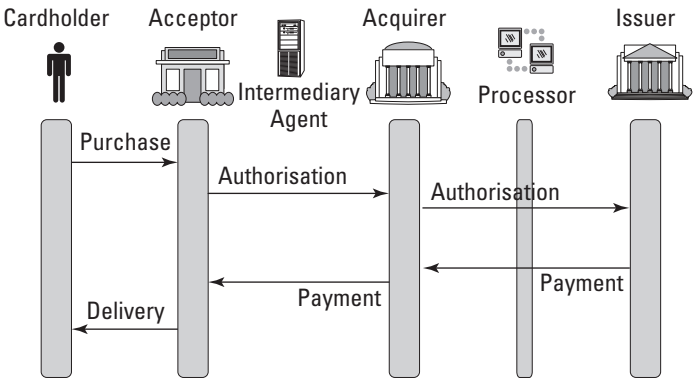

Figure 1-1: Card payment basic process.

ISO standard protocol

The development of card payments in Europe- and worldwide - for the past three decades has led to a situation where each country or card scheme has developed its own rules and specifications to carry out payments by card in a fast and secure way. In order to ensure a minimum level of interoperability, most of those developments have been performed on the basis of ISO standards developed at the same time.

ISO 8583 is a standard developed specifically for card payment exchanges based on a bitmap technology specifically designed for low-speed modems and channels of communication available in the '80s.

Today, card payment systems are transitioning to ISO 20022, which relies on a structured approach for the design of messages.

For more details on the ISO 8583 and ISO 20022 protocols, see Chapter 2.

The SEPA Incentive

One of the main technical obstacles to a unified market of card payments in Europe is the prevalence of local protocols, especially between a retailer and a bank.

National and EU competition authorities view the existence of specifications defined at a country or scheme level as technical barriers that may slow down or hamper the achievement of the EU internal market and create obstacles to a competitive Europe.

The European Commission and the European Central Bank have both put the implementation of SEPA (Single Euro Payments Area) as a top priority on their agenda.

The SEPA initiative was first launched in 2002. Shortly thereafter, it became obvious that the card payments industry would need to migrate to common standards if Europe was to become a genuinely unified market for electronic payments.

Even as we speak today, offering multinational retailers a single card payment solution in the 32 European countries of the SEPA zone is almost impossible.

The pressure to achieve concrete results has led the financial industry to come up with tangible solutions to meet those SEPA requirements and deadlines fixed by the European regulators.

The issuance by the European Payments Council (EPC) of specific implementations of ISO 20022 for SEPA with the SEPA Credit Transfer (SCT) and SEPA Direct Debit (SDD) series of messages in 2009 was a clear response of the industry to this pressure.

For more on ISO 20022 and SEPA, see Chapter 2.

The EPAS Protocols and the Relationships They Address

The EPAS portfolio of protocols has been designed specifically to address the lack of open and common specifications today on the market, especially in three different types of relationships:

- **EPAS Acquirer protocol:** Between a retailer (often also called a Merchant or an Acceptor) and the bank having a contract to accept payments made by card (the Acquirer, in the card payment jargon)
- **EPAS TMS protocol:** Between a Terminal Management System controlled by a retailer, a bank, or a vendor and a Point-of-Interaction (POI) device. This protocol allows the updating of the software of the POI and the downloading of parameters and security keys to secure the transaction
- **EPAS Retailer protocol:** Between a cash register machine or a sale application in a cash register equipment and the payment module associated with the said equipment.

For the details on these three protocols, see Chapter 3.

Chapter 2

ISO 20022 and EPAS

In This Chapter

- Introducing ISO 20022
- Getting an overview of ISO 20022 CAPE message
- Deciphering BJ, MDR, MUG, and other acronyms

ISO 20022 consists of an agreed methodology used by the financial industry to create message standards across all the business process of the industry.

This chapter provides a brief introduction of what ISO 20022 is and how EPAS messages have been drafted to become full ISO 20022 compliant messages.

Where It All Started: ISO 8583

Prior to agreeing on open and common standards, most banks or transaction processors dealing with the acquisitions of card transactions used a wide variety of different legacy protocols defined and implemented at a local or national level. Most of these protocols are based on derivatives of ISO 8583, a standard developed specifically for card payment exchanges.

ISO 8583 is a toolbox that specifies message structure, format, and content, data element, and values of data elements. Application specifications usually remain at the level of the implementation. The method by which settlement takes place is not within the scope of ISO.

Given the rather large flexibility offered by ISO 8583, many implementations initiated by national and international card

schemes have led to the emergence of various specific developments that vary from card scheme to card scheme and/or country to country. Furthermore, while most of those implementations rely on a universal (ISO) standard, the resulting specifications drafted on the basis of this ISO standard are proprietary.

The challenge in migrating toward a new generation of standards had to take into account the legacy of existing applications based on the wide usage of ISO 8583 in order to maintain consistency, at least at a software application level.

More than a pure reverse engineering of ISO 8583 into ISO 20022, most of the EPASOrg working groups' activities have been focusing on how to take into account the emergence of new business requirements in the design of the new messages while maintaining consistency with the existing applications and other message standards in the card payment value chain (namely, the Acquirer-to-Issuer exchange of message, which was not tackled by EPASOrg and for which an ISO Business Justification was later submitted by ISO TC68/SC7/WG9 and further endorsed by the ISO 20022 RMG).

Can't We All Get Along? Interoperability

The absence of a common interpretation and implementation of ISO 8583 has led to a situation where systems have been developed around non-interoperable derivative implementations of ISO 8583.

As a result, an ISO 8583 implementation in one country or card scheme is usually different from the implementation of the same standard in another country or for a dedicated scheme, even though it's based on the same ISO 8583 standard.

In the case of a protocol implementation between a retailer and a bank, an international or multinational company may face a problem where the company has to implement various derivatives of the ISO 8583 standard, each defined locally, to fulfil the requirements of the related national scheme, which means extra costs and additional software developments.

What the standards need to do

When addressing the issue of interoperable and common standards for cards, the following goals should be met:

- Any new standard should address the issue of interoperability to meet the requirements of retailers, especially for major corporations operating at an international level.
- The selected solution should be designed as a common solution that addresses the needs of several actors on a global market and not be restricted to single-country markets, which is usually the case today.
- The new standard should be based on innovative specifications to evolve in parallel with the evolution of the business.
- The standard should restrict the risk of leading to different implementations of the specifications.
- The specifications should ideally be complemented with the provision of implementation guidelines, in addition to the mere functional description of the standard.

Enter ISO 20022

From the start, the EPAS consortium wanted to ensure compatibility with the latest technological standards. The group decided that the EPAS protocols should be based on the ISO 20022 methodology for developing standard messages.

ISO 20022 lets you rely on online data maintained in an official data dictionary or repository managed by ISO 20022. It also gives you the opportunity to rely on ISO 20022 procedures for the further maintenance of the standards.

ISO 20022's value proposition

By the start of the EPAS initiative, the value proposition in selecting ISO 20022 was

- A state-of-the-art methodology
- A strong enabler of interoperability in the build-up of standards

- A solution that provides independence between the definition of the message (standard) and its implementation (syntax)
- Open and free of charge standards with a clear and transparent Intellectual Property Rights (IPR) policy
- The strength of a universal ISO standard
- A coherent approach, thanks to its convergence with other categories of financial messages and payment instruments, namely the ISO 20022-based SCT and SDD series of messages

For all these reasons, ISO 20022 is considered an innovative approach in making card payment standards.

Breaking tradition

The new protocols departed from the traditional bitmap approach and the unstructured way of defining data fields inherited from ISO 8583. The goal was to select more appropriate techniques based on the use of data modelling and the separation of data (standard) from the writing of code itself (syntax).

As an outcome of this process, state-of-the-art protocols were drafted based on ISO 20022's methodology in order to cope with the real-world challenges of the card payments' industry. This approach also allowed for a further evolution of the protocols toward innovation and a better implementation of market requirements. Furthermore, the new standard allowed for the smooth convergence of card specifications with similar ISO 20022 standards developed in banking and payments, which are becoming today the *de facto* reference of the financial industry.

What's in a Name? ISO 20022

ISO 20022 is a common methodology used within the financial industry to create consistent messages standards across different subdomains of the industry (foreign exchange, securities, trade services, payments, and now card payments).

ISO 20022 brings profound benefits to the financial services industry, as it realises end-to-end processing across domains and environments that previously used different standards and formats.

The reusability of existing data components as well as the issuance of new components meeting the specific requirements of card payments offer a major benefit associated with the ISO 20022 methodology.

This ISO 20022 common platform allows the development of messages by using

- A modelling methodology (based on UML)
- A central dictionary of business items
- A set of XML design rules to convert the messages described in UML into XML schemas.

The ISO 20022 methodology is based on the concept of separate layers with the business model and the logical messages making up two different layers. The third layer, the syntax, is the physical representation of the logical message.

ISO 20022 uses XML as the primary and preferred syntax because the standard explicitly describes the way to convert a message to XML. The Registration Management Group of ISO 20022 has, however, agreed to adopt for card payments one other type of encoding based on ASN.1/DER.

How ISO 20022 works

ISO 20022 makes a clear distinction between the way of representing the elements of information (the standard itself) and the actual representation of this information in a format or a language (the syntax or coding) that a machine can interpret.

ISO 20022 message developers rely on a structured approach for the design of messages.

Basically, each ISO 20022 message is built along

- A set of syntax and message design rules
- Message components
- Coding elements associated to the message components

The ISO 20022 standard provides a common platform for the development of messages using

- A modeling methodology (based on UML)
- A central dictionary of business items (ISO 20022 Repository)
- A set of design rules to convert the messages described into a specific coding syntax, such as XML

More efficient XML for better performances

In March 2011, the Efficient XML Interchange Working Group of W3C (whose objective is to develop a specification for an encoding format that allows efficient interchange of the XML Information) issued a new standard that claims to dramatically improve the performance, network efficiency, and power consumption of applications that use XML.

This standard is currently being considered by the ISO 20022 Registration Authority as one option to address the issue of performance in transporting and processing ISO 20022 XML messages, especially in regards to trading activities and card payments.

Once approved and endorsed, the models and derived messages issued by the design phase of the messages are published on the official ISO website and become part of the ISO 20022 Financial Repository.

You can read a brief outline of what ISO 20022 actually is by visiting the official ISO 20022 website at `www.iso20022.org`. You can also request a free copy of *ISO 20022 For Dummies* by SWIFT (Society for Worldwide Interbank Financial Communication) and ISO from the official ISO 20022 website.

ISO 20022 Acceptor-to-Acquirer card transactions

ISO 20022 Acceptor-to-Acquirer Card Transactions (Card Payments Exchanges or CAPE) is a specific ISO 20022 Business Area composed of 15 different messages organised along the following categories of exchanges.

The official catalog of ISO 20022 lists a series of 15 messages belonging to the Acceptor-to-Acquirer Card Transactions – Card Payments Exchanges category of messages. Table 2-1 lists the identification of those messages with their related ISO 20022-message identification.

Table 2-1 ISO 20022 Acceptor-to-Acquirer Card Transactions Messages

Message Name	*Msg ID (XML Schema)*
AcceptorAuthorisationRequest	caaa.001.001.01
AcceptorAuthorisationResponse	caaa.002.001.01
AcceptorCompletionAdvice	caaa.003.001.01
AcceptorCompletionAdviceResponse	caaa.004.001.01
AcceptorCancellationRequest	caaa.005.001.01
AcceptorCancellationResponse	caaa.006.001.01
AcceptorCancellationAdvice	caaa.007.001.01
AcceptorCancellationAdviceResponse	caaa.008.001.01

(continued)

Table 2-1 *(continued)*

Message Name	*Msg ID (XML Schema)*
AcceptorReconciliationRequest	caaa.009.001.01
AcceptorReconciliationResponse	caaa.010.001.01
AcceptorBatchTransfer	caaa.011.001.01
AcceptorBatchTransferResponse	caaa.012.001.01
AcceptorDiagnosticRequest	caaa.013.001.01
AcceptorDiagnosticResponse	caaa.014.001.01
AcceptorRejection	caaa.015.001.01

The following sections describe these messages in detail.

AcceptorAuthorisation

This category of exchanges addresses a card authorisation process required to request the approval of a card payment transaction. This authorisation process can be made either remotely or locally depending on the business context. It can also be made online by requesting an authorisation to an Acquirer or offline by performing the authorisation locally. Optionally, you can also use an `AcceptorAuthorisation` to capture the financial data of the transaction.

An authorisation exchange is made up of two different messages:

- An `AcceptorAuthorisationRequest` message used by an Acceptor to request an authorisation to an Acquirer
- An `AcceptorAuthorisationResponse` returned by the Acquirer to the Acceptor to inform the Acceptor of the outcome of the request

AcceptorCompletion

An `AcceptorCompletion` is an additional exchange when the Acquirer wants to be notified online of the outcome of the payment. You can also use this exchange to reverse an unsuccessful transaction where the Acquirer had previously given authorisation.

To capture or to not capture: That's the question!

The sole action for an Acquirer to request the authorisation for a card payment transaction doesn't necessarily lead to the actual financial settlement of the transaction. The Issuer of the card that initiated the transaction may in most cases, accept the transaction. In some cases, the transaction may be declined by the Issuer, either because the funds available on the account of the cardholder were insufficient to cover the transaction or because of a technical problem (broken communication line, error in the message, and so on.).

After the Issuer of the card approves the transaction, the financial elements of the transaction have to be transferred from the Merchant to the Acquirer in order to credit the account of the Merchant. Another transfer of the same financial information to the Issuer must occur in order to ultimately debit the account of its cardholder.

This financial transfer of information – and also of the responsibility associated with this transfer – is called *capture* or *financial capture* in the jargon of card payment experts; which is independent of and should not be confused with the actual data capture by a software program, for example.

You can also use an `AcceptorCompletion` process to capture the financial data of the transaction. (See the nearby sidebar "To capture or to not capture: That's the question.")

`AcceptorCompletion` is made up of two different messages:

- An `AcceptorCompletionAdvice` message to advise the Acquirer of the outcome of a card payment transaction at the Acceptor side
- An `AcceptorCompletionAdviceResponse` returned by the Acquirer in response to an `AcceptorCompletionAdvice` message

AcceptorCancellation

An `AcceptorCancellation` allows an Acceptor to cancel successfully completed payment transactions or other types of transactions (for example, reservations) that haven't yet been cleared. `AcceptorCancellation` is sometimes called a manual reversal. A cancellation can't be revoked.

An Acceptor uses an AcceptorCancellationRequest message to ask the Acquirer whether a cancellation can be performed. Once confirmation is received, the Acceptor sends an AcceptorCancellationAdvice.

An Acceptor uses an AcceptorCancellationAdvice (with or without prior AcceptorCancellationRequest) to inform the Acquirer that a cancellation has been completed. An AcceptorCancellationAdvice also indicates that no response to an AcceptorCancellationRequest was received and that the cancellation was declined. An Acquirer can never decline an AcceptorCancellationAdvice.

AcceptorReconciliation

AcceptorReconciliation is the process of performing checks and balances of transactions previously captured financially. An Acceptor and an Acquirer carry out this process for a given reconciliation period. An Acceptor initiates a reconciliation exchange to ensure that the debits and credits match the computed balances by the Acquirer and performed during the same reconciliation period.

An Acceptor sends an AcceptorReconciliationRequest message to inform the Acquirer about the totals accumulated during the reconciliation period. The Acquirer returns an AcceptorReconciliationResponse message to inform the Acceptor about the totals accumulated during the reconciliation period.

AcceptorBatch

An AcceptorBatch is used to send transactions in a group. Prior to a batch transfer, transactions may have been authorised either online or offline.

The Acquirer can require by configuration that the Acceptor send the transactions in batch. The Acquirer can require the batch for authorised online transactions and/or authorised offline transactions

In an AcceptorBatchTransfer or an AcceptorBatch TransferResponse, transactions are organised in data sets.

The Acquirer returns an AcceptorBatchTransfer Response to the Acceptor to confirm the proper acknowledgement of the card payment transactions by the Acquirer.

An AcceptorBatchTransferResponse is also used to acknowledge the data capture process initiated by the Acceptor and performed by the Acquirer.

AcceptorDiagnostic

An AcceptorDiagnostic exchange is composed of both an AcceptorDiagnosticRequest and an AcceptorDiagnosticResponse messages.

An AcceptorDiagnosticRequest is a message sent by an InitiatingParty to a RecipientParty to check the availability of the dialogue with the RecipientParty. The use of this message avoids relying on dummy transaction messages to achieve the same functionality.

An AcceptorDiagnosticResponse message is sent back by the RecipientParty to the InitiatingParty to confirm the availability of the RecipientParty.

AcceptorRejection

An Acquirer uses an AcceptorRejection message to reject a message received from an Acceptor. The Acquirer uses this message as a substitute to a response or an advice response message sent to the card Acceptor.

ISO 20022 Terminal Management

The EPAS TMS protocol includes a series of three messages belonging to the Terminal Management – Card Payments Terminal Management. Table 2-2 identifies those messages with their related ISO 20022-message identification.

Table 2-2 ISO 20022 Terminal Management Messages

Message Name	*Msg ID (XML Schema)*
StatusReport	catm.001.001.01
ManagementPlanReplacement	catm.002.001.01
AcceptorConfigurationUpdate	catm.003.001.01

For more on the TMS protocols, see Chapter 3.

ISO 20022: Overview of Acronyms and Procedures

As for any other standard ISO 20022 messages, a Business Justification (BJ) initiated the ISO 20022 standardisation process for the EPAS protocols. EPASOrg played the role of a Submitting Organisation (SO) in this process.

The purpose of a BJ is to identify and describe, as far and precisely as possible, the scope, reason, and estimated users, volumes, savings, and so on of the intended submitted ISO 20022-message set by the SO.

The ISO 20022 Registration Management Group (RMG) has to approve the candidate BJ. Once approved, the BJ is sent to the relevant Standards Evaluation Group (SEG), which ultimately validates the messages once developed by the Submitting Organisation. In the case of CAPE messages, a new Cards and Related Retail Financial Services SEG (Cards SEG) was created to evaluate the new series of card payment messages to be submitted by the Submitting Organisations active in the card payment standardisation process.

IFX (the Interactive Financial eXchange Forum) has submitted a BJ for ATM card-related messages. The ISO 20022 RMG eventually validated the BJ.

Similarly, a specific ISO working group (ISO TC68/SC7/WG9) has been created and mandated by ISO TC 68/SC7 to specify a common interface by which retail financial and nonfinancial transaction card-based messages may be interchanged in the Acquirer-to-Issuer domain as specified in ISO 8583 (the ATICA project). ATICA messages are currently under review by the Cards SEG of ISO 20022.

Alternative syntax to ISO 20022 XML

In March 2009, the EPAS consortium issued a modified Business Justification that presented ASN.1-DER as an alternative coding to XML, which remains, nevertheless, the preferred syntax of

the ISO 20022 standard. On top of ISO 20022 XML, the Business Justification suggested the same series of CAPE messages in an alternative ASN.1-DER encoding compliant with ISO 8825-1. This proposal was ultimately endorsed by the ISO 20022 Registration Management Group (RMG) in September 2009 and can be used for the implementation of ISO 20022 CAPE messages.

The Business Justification also made a clear commitment to cooperate with ISO TC68/WG4 to ensure that the proposed alternative syntax would be compliant with a forthcoming version of ISO 20022, which would specifically address the issue of alternative syntaxes and encoding to the current XML one.

ISO 20022 and SEPA

Speaking at a conference in November 2010 in Brussels, Mrs. Tumpel-Gugerell, former Member of the Executive Board of the European Central Bank, invited the financial industry to extend the SEPA project to create a competitive cards market by using an interoperable framework based on the ISO 20022 message standard.

With this statement and the recent confirmation of ECB's policy to support ISO 20022 for cards, the European Central Bank sent a clear message to the industry that any further card standardisation work should be based on ISO 20022 and follow the example of the ISO 20022-based SCT and SDD standardisation initiative.

Chapter 3

The EPAS Portfolio

In This Chapter

- Introducing EPAS
- Looking at the different protocols

The EPAS series of protocols belongs to the category of application protocols that govern the interaction and exchange of data between software applications.

In this chapter, we offer an in-depth look at the three types of EPAS protocols.

The EPAS Acquirer Protocol

An Acquirer protocol addresses the interface between an Acceptor and an Acquirer (see Figure 3-1).

It transports information associated to and required for card-initiated transactions from the POI to the Acquirer. An Intermediary Agent may stand between an Acceptor and an Acquirer and may act on behalf of one of the two parties in the exchange of information.

The EPAS Acquirer protocol is composed of a series of standard ISO 20022 messages (CAPE) for authorising or pre-authorising card payment transactions, cancelling or rejecting some of those transactions, and also ensuring their financial clearing and settlement (actual payment) between the different actors involved in the transaction (Merchant, Acquirer, Issuer, and Cardholder). (For more on ISO 20022, see Chapter 2.)

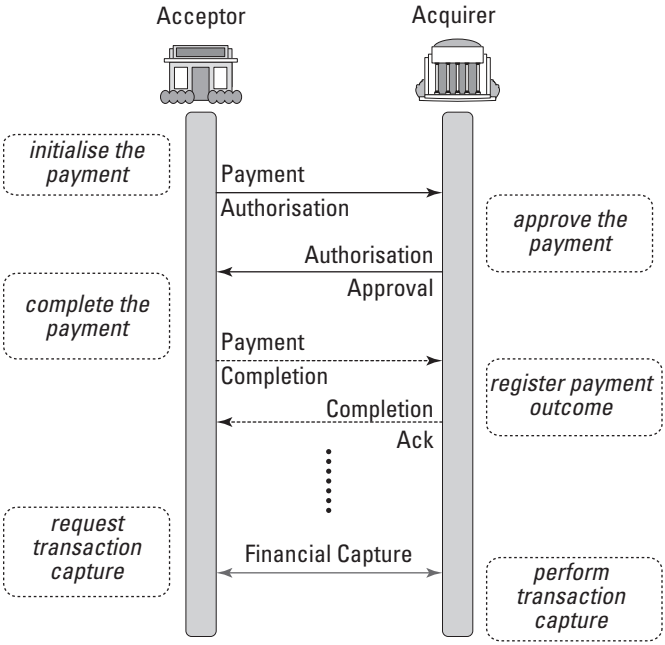

Figure 3-1: The EPAS Acquirer protocol.

The protocol also enables the Merchant to use batches of messages instead of dealing with individual transactions (namely in offline situations).

You can find detailed information on ISO 20022 CAPE messages from the official ISO 20022 website:

```
http://www.iso20022.org
```

The building blocks of the messages

Apart from the ISO 20022 XML envelope containing information about the identity of the message and its version, each CAPE message is usually built around three major message building blocks:

- Header
- Body
- Trailer

Header of the message

The main purpose of a CAPE message header is to convey information related to the actual management and routing of the message to be used by processors or server nodes to reach the proper recipient of the message. It also contains information to trace the journey of the message when relayed through different intermediaries (Intermediary Agents). The performance in transporting and processing the message from one end to the other end of the card payment chain can also be measured through information contained in the header of the message.

A CAPE message header (see Table 3-1) usually embeds information related to

- The type of the message (`MessageFunction`)
- Its application protocol version (`ProtocolVersion`)
- An identification of the exchange of messages (`ExchangeIdentification`)
- The date and time of the creation of the message (`CreationDateTime`)
- The initiating and recipient parties (`InitiatingParty` and `RecipientParty`)
- Traceability information (`TraceabilityInfo`), which gives some visibility on the actual processing performance of the intermediaries in handling the message

The security mechanism, which is part of the Trailer of the message actually covers the body of the message exclusively.

Table 3-1 shows the header of an ISO 20022 CAPE `AcceptorAuthorisationRequest` Message.

Table 3-1 Header of an ISO 20022 CAPE AcceptorAuthorisationRequest Message

	Message Item	*Multiplicity*
A.	**`Header`**	**`[1..1]`**
	`MessageFunction`	`[1..1]`
	`ProtocolVersion`	`[1..1]`

(continued)

Table 3-1 *(continued)*

	Message Item	*Multiplicity*
	ExchangeIdentification	[1..1]
	ReTransmissionCounter	[0..1]
	CreationDateTime	[1..1]
+	InitiatingParty	[1..1]
+	RecipientParty	[0..1]
+	TraceabilityInfo	[0..1]

Body of the message

The body of a CAPE message (see Table 3-2) contains information required by a card payment application to process properly the message from a business, functional, and security perspective.

The body is usually composed of three main functional components:

- The environment (`Environment`) of the card payment transaction in terms of the actors involved (Acquirer, Merchant, POI, Card, Cardholder)
- The context (`Context`) of the transaction (payment, sale)
- The details (`Transaction`) of the card transaction itself or of the products (goods, services) related to that transaction.

Table 3-2 shows the body of an ISO 20022 CAPE `AcceptorAuthorisationRequest` message.

Table 3-2 Body of an ISO 20022 CAPE AcceptorAuthorisationRequest Message

	Message Item	*Multiplicity*
A.	**Body**	**[1..1]**
+	Environment	[1..1]
+	Context	[1..1]
+	Transaction	[1..1]

Environment of the transaction

For authorising a card payment transaction, both the Issuer and the Acquirer need to gather the information about the actors of the transaction (Acquirer, Merchant). The following questions cover some of the typical type of information needed:

- Where was the transaction initiated?
- Which terminal (*POI*) did it occur on?
- Which Acquirer handled the transaction?
- Which card was used?
- Who was the Cardholder*?*

Table 3-3 illustrates the main components of the environment of the transaction. This information is part of the knowledge that an Acquirer or an Issuer needs to get from a transaction and which enable him to take the appropriate decisions in terms of authorisation and financial settlement of the transaction and – to some extent – based on the perception of the risk he has from the information provided.

Table 3-3 Environment Component of an ISO 20022 CAPE AcceptorAuthorisationRequest Message

	Message Item	*Multiplicity*
A.	**Body**	**[1..1]**
+	Acquirer	[0..1]
+	Merchant	[0..1]
+	POI	[1..1]
+	Card	[1..1]
+	Cardholder	[0..1]

Figure 3-2 shows examples of mapping for both Merchant and Acquirer details in the form of ISO 8583 and ISO 20022 (XML).

Identification of the **Acquirer**
Acquirer ID: **9287351**
parameters version: **20110107080000**

Identification of the **Merchant**
Merchant ID: **Soluproducts**
type of location: **Fixed**

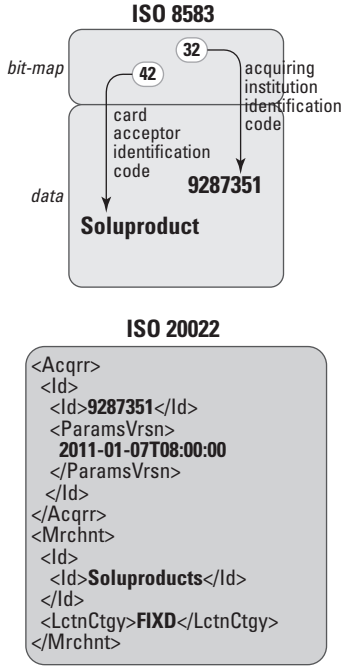

Figure 3-2: Examples of mapping between ISO 8583 and ISO 20022 codings for an Environment component of a CAPE `AcceptorAuthorisationRequest` message.

Context of the transaction

The context of the transaction provides to the recipient of this information (namely, the Acquirer) two types of information:

- A payment context (`PaymentContext`) that provides the payment elements of information associated with the sale transaction

- A sale context (`SaleContext`) that identifies elements related to the pure commercial aspects of the transaction (see Table 3-4)

Table 3-4 Context Component of an ISO 20022 CAPE AcceptorAuthorisationRequest Message

	Message Item	*Multiplicity*
A.	**`Body`**	**`[1..1]`**
+	`PaymentContext`	`[1..1]`
+	`SaleContext`	`[0..1]`

Details of the transaction

This block, shown in Table 3-5, starts by informing the Acquirer whether the transaction needs to be captured (`TransactionCapture`). It then provides the type of transaction (`TransactionType`), the service associated with the transaction (`AddtlSvc`) as well as an additional attribute associated with the service previously referred to (`SvcAttr`).

A unique identification is then assigned to the transaction (`TransactionIdentification`).

The details of a previous transaction (`OriginalTransaction`) may be used to refer to an original transaction, namely in case of a cancellation. It then provides the details of the transaction (`TransactionDetails`) needed to authorise or pre-authorise the transaction, cancel it, or ensure the ultimate settlement of the transaction.

The detailed transaction contains additional information related to one or several products and/or services (Product). ICC-related information such as EMV is transported in a specific container component (`ICCRelatedData`)

Table 3-5 shows the Transaction component of an ISO 20022 CAPE `AcceptorAuthorisationRequest` message. Note that some intermediary elements are missing on purpose.

Table 3-5 Transaction Component of an ISO 20022 CAPE AcceptorAuthorisationRequest Message

	Message Item	*Multiplicity*
A.	**Body**	**[1..1]**
	TransactionCapture	[1..1]
	TransactionType	[1..1]
	AddtlSvc	[0..n]
	SvcAttr	[0..1]
+	TransactionIdentification	[1..1]
+	OriginalTransaction	[0..1]
+	TransactionDetails	[0..n]
+	Product	[0..n]
+	ICCRelatedData	[0..1]

Single versus dual

Single Message System (SMS) refers to the single and only exchange of messages between an Acquirer and an Issuer to determine whether funds are available for the transaction and an approval can be obtained from the Issuer. It allows the transaction to be posted directly to the account of the Merchant. This unique exchange completes the transaction with the clearing and settlement of the transaction and doesn't require any additional exchange of messages.

Dual Message System (DMS) refers to the need to rely on two different exchanges between an Acquirer and an Issuer: one exchange to determine whether funds are available for the transaction and an approval can be obtained from the Issuer. An additional exchange is required to ensure the clearing and settlement of the transaction.

Trailer of the message

The message's trailer serves as a security trailer that contains a message authentication code computed on the body of the message with a cryptographic key. It allows the authentication of the initiator and the protection of the content of the body of the message against any unauthorised alteration of the message.

The EPAS TMS Protocol

A Point of Interaction (POI) contains some vendor-specific firmware and application software performing services beyond the pure card payment ones. It also contains electronic keys to ensure the protection of the data exchange by the POI with its external environment.

The update of software and the downloading of electronic keys can be carried out either through a direct intervention on the POI itself or remotely by using a distant software application.

While most manufacturers of terminals do provide a proprietary tool to achieve this objective, the advantage of relying on an open and common solution, such as the EPAS TMS protocol, is to achieve a clear independence between the terminals on the field and their actual management and control at a distance (see Figure 3-3).

Parameters actually influence the behaviour of the POI. In an EPAS TMS environment, those parameters are under the control of a Terminal Manager (TM). The TM is itself controlled by a unique Master Terminal Manager (MTM), which has the total control of the POI System in terms of security, applicative, and maintenance services needed to manage a Terminal Management System (TMS).

The Master Terminal Manager can delegate part or all of the TMS services to one or several Terminal Managers.

Various actors can actually play the role of TM and MTM (for example, a Manufacturer, an Acceptor, an Acquirer, or a third party).

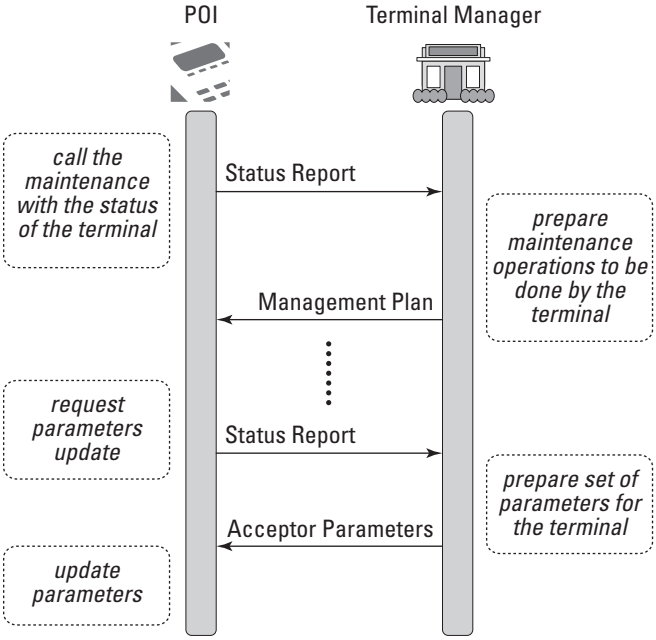

Figure 3-3: The EPAS TMS protocol.

A TMS protocol provides at least the following services:

- Software management (firmware, operating system, and application software)
- Parameter administration (storage, maintenance, and download of configuration parameters and cryptographic keys)
- Maintenance and device management (diagnosis of POI component functionalities with specific access rights)

You can obtain more information on the ISO 20022 Card Payments Terminal Management messages from the official ISO 20022 website:

```
www.iso20022.org
```

The building blocks of the messages

Independently of the ISO 20022 XML envelope containing information about the identification of the message and its version, each Card Payments Terminal Management message is usually built around three major message building blocks:

- Header
- Body
- Trailer

Header of the message

The main purpose of a Card Payments Terminal Management message header is to convey information related to the actual management of the message in terms of the following:

- An indicator whether the message is for download (`DownloadTransfer`)
- The version of the format of the message (`FormatVersion`)
- An identification of the exchange (`ExchangeIdentification`)
- The date and time of the creation of the message (`CreationDateTime`)

It also contains information to identify the `InitiatingParty` as well as the `RecipientParty` involved in the exchange of the message.

Table 3-6 illustrates the main components of an ISO 20022 CAPE TMS message.

Table 3-6 Header Component of an ISO 20022 CAPE TMS Message

	Message Item	*Multiplicity*
A.	**`Header`**	**`[1..1]`**
	`DownloadTransfer`	`[1..1]`

(continued)

Table 3-6 *(continued)*

	Message Item	*Multiplicity*
	FormatVersion	[1..1]
	ExchangeIdentification	[1..1]
	CreationDateTime	[1..1]
+	InitiatingParty	[1..1]
+	RecipientParty	[0..1]

Body of the message

The body of a Card Payments Terminal Management message contains all information required for the actual management of a terminal or a set of terminals in terms of

- Status report (StatusReport message)
- Replacement of terminal management plans (ManagementPlanReplacement)
- Acceptor configuration parameters update (AcceptorConfigurationUpdate)

Trailer of the message

The trailer contains a message signature or alternatively the authentication code, computed on the body of the message with a cryptographic key.

It allows the authentication against any unauthorised alteration of either the POI or the TMS depending on the type of message.

The EPAS Retailer Protocol

The EPAS Retailer protocol addresses the interface between a sale system and a payment system (see Figure 3-4).

The Retailer protocol allows a sale system to request a POI system to process the payment for the purchase of goods or services by a customer.

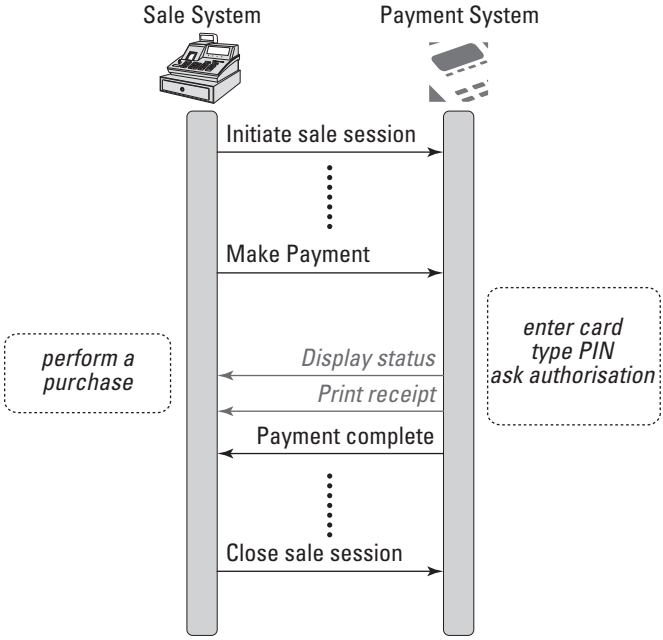

Figure 3-4: The EPAS Retailer protocol.

The sale system

A Merchant uses a sale system to manage the purchase of the goods and services by a customer. The sale

- Identifies and registers all the goods and services selected by the customer for the purchase
- Prepares the total amount of the purchase, including additional charges and discounts
- Makes the payment of the total amount
- Performs the delivery of the goods and services to the customer

The sale system can take various forms, depending on the environment of the store. For example:

- **A line of cash registers in a supermarket:** In this case, all the cash registers are connected to a server by a local network to manage the purchases and the goods of the store. A cash register can be operated by a cashier or can be a self-checkout operated by the customer itself with the possible help of a supervisor.
- **A vending machine for ticketing or paying in a parking lot:** In this case, the customer is alone to make the purchase and the payment.
- A web-server: In this case, a customer can buy goods and services remotely.

The payment system

The payment, which is one of the activities of the sale system, is subcontracted to a dedicated payment system when the customer pays with a payment instrument performing electronic payments.

Electronic payment instrument can have various forms depending on the way to transfer payment data and the type of payment instrument.

Payment data may be exchanged with a magnetic stripe on a card, a chip containing a payment application inside a smart card or other device as a mobile phone, or even a barcode on a loyalty card.

Examples of a payment instrument are a credit or a debit card, a specific purpose card as a fleet card, an anonymous stored value card, or a check.

A dedicated system performs the payment because of the complexity of the payment process, such as for smart cards, the variety of services attached to the payment, and the security related to electronic payment requiring an isolated and certified product.

Categories of services

The EPAS Retailer protocol has defined a set of messages providing several categories of services:

- Financial services to process payment transactions
- Administrative services to manage the interface between the two systems
- Device services to allow sharing of devices between the two systems

Financial services

In addition to the standard payment, financial services include

- Cash-back to obtain extra cash along with the goods
- Dynamic currency conversion when the customer chooses to pay with his own currency rather than the currency of the Merchant
- Refund to reimburse the customer for return of goods
- Payment of tips
- Payment reservation for car rental or hotel booking
- Cancellation to void a previous payment

Financial services also include loyalty services to credit a loyalty account along with a payment, offer discount or free items on a purchase, or redeem a loyalty account.

Administrative services

Financial administrative services let an application check the balance of the account attached to a payment card, loyalty card, or stored value card. Administrative services also let the sale system and the payment system exchange accumulated totals of transactions during a certain period.

Other administrative services are required to

- Synchronise the payment system and the sale system
- Open and close payment services
- Enable a customer to start the payment before the complete identification of the goods

Administrative services also provide error handling:

- Make a diagnosis on the availability of the payment services
- Abort a payment that takes too much time
- Request the result of a previous payment

Device services

Device services provide device sharing for the cashier or customer. The user interface displays information, print receipts or other documents, or requests additional information required for the payment.

Other device services are oriented on the payment interface, such as reading a card or checking the PIN of a card to authenticate the owner of the card.

Chapter 4

EPASOrg and Its Partnerships

In This Chapter

- Developing a retailer protocol with ARTS
- Implementing SEPA standards with OSCar
- Adopting a common protocol for Dutch retailers
- Cooperating with ADS+ on a new protocol

From the beginning of the creation of its legal structure, EPASOrg established a series of partnerships with organisations that shared similar interests in the development of common specifications in the field of card payments. In this chapter, we take a look at some of those partnerships.

ARTS: United We Stand

ARTS, the Association for Retail Technology Standards of the National Retail Federation (NRF) based in the United States, is an international organisation dedicated to reducing the costs of technology through standards. Since 1993, ARTS has been delivering application standards exclusively to the retail industry.

ARTS approached EPASOrg in June 2010. The group wanted to establish strong ties in order to jointly develop the specifications of a retailer protocol that would meet the requirements of both organisations.

ARTS and EPASOrg drafted a Memorandum of Understanding that is now in the final version of endorsement by both organisations. A first version of ARTS-EPAS Common Specifications is expected by the first half of 2012.

OSCar: First Implementation of EPAS in Europe

The OSCar Consortium, established at the end of 2010, has the objective of fostering the implementation of two main SEPA standards in Europe:

- The ISO 20022 EPAS Acquirer protocol
- The SEPA FAST Application specification developed by the CIR Working Group

The basic aim of the OSCar initiative is to facilitate and accelerate the adoption of both complementary specifications by

- Carrying out the very first pilots in Europe of both specifications in a multi-country and multi-scheme environment
- Putting in place an end-to-end evaluation and certification process in compliance with the proposed SEPA certification framework
- Providing a cooperative platform for technical integration and change requests management

A Letter of Intent was addressed to EPASOrg in February 2011. The EPASOrg Board of Directors further acknowledged this proposal of cooperation in March 2011.

Currence: The Choice of Dutch Retailers

Retailers in the Netherlands (small, medium, and large enterprises) experienced a lock-in situation regarding interfaces between sale and payment systems, according to pre-study

and research funded by the Stichting Bevorderen Efficiënt Betalen (SBEB – Foundation for the Promotion of Payment Efficiency).

The study actually demonstrated that retailers had no freedom of choice when it came to connecting a sale system with a payment system. The study also showed that if a full market competition could be achieved, chances were that prices for the interfaces would be substantially reduced.

Because most manufacturers developed their own protocol specifications, a situation of lock-in was created vis-à-vis their customers. In order to avoid this situation, the Dutch retail organisation agreed to proceed with the adoption of a common standard protocol.

Currence, the card payment scheme of the Netherlands, was commissioned by SBEB to support and facilitate this project.

EPASOrg was ultimately approached by Currence for help identifying the best solution to achieve the objectives of openness and universality set out by the Dutch Retailers' organisation.

Both parties signed a Memorandum of Understanding in May 2011 to set out in legal terms the desire to cooperate on the development of a Proof of Concept and to allow EPASOrg to conduct a compliance approval process on the resulting developments.

An ultimate demonstration of the EPAS Retailer Protocol was made on 6 September 2011 in the Netherlands in front of Dutch retailers to endorse the decision to rely on this protocol for addressing the requirements of the Dutch market.

ADS+ and the EPAS Retailer Protocol

ADS+ is an innovative project started in France in March 2010 and labelled by TES and Systematic French Competitiveness Clusters (French Pôles de Compétitivité).

A consortium of 13 organisations and research laboratories leads this project. The main objectives of this initiative are the design and validation of a new open architecture for IP POI with thin client POI approach.

The ADS+ consortium approached EPASOrg in order to jointly develop the specifications of a new protocol to support the open architecture developed by the project. Most the proposed protocol's functionality would inherit several attributes of the EPAS Retailer protocol.

The ADS+ consortium and EPASOrg are in the process of signing a Memorandum of Understanding where EPASOrg would provide support and ensure the further maintenance of this new protocol. The new protocol would become part of EPASOrg portfolio of messages.

Chapter 5

Ten Useful Things to Tell Your Boss about EPAS

In This Chapter

- Counting the benefits of open standards
- Looking at ISO 20022 as a prerequisite for the future of card payments

If your boss doesn't think a new generation of open and common protocols, such as EPAS ones, will become a necessity in the near future, don't lose hope yet. The information in this chapter contains ten valuable reasons he should make the move to EPAS protocols.

Open Standards Are a Must

The evolution of the card payment business has paved the way to more open, transparent, and interoperable solutions for the benefit of all those involved in the card payment value chain (retailers, users, manufacturers, banks, services providers, and so on). EPAS standards fulfil all the criteria required to ensure the proper and long-term implementation of open card payment standards.

Open Standards Are Here to Stay

The recent evolution of card payment regulation has occurred not only in Europe, but also worldwide. As a result, regulators

took a clear stance toward open solutions because they don't present the drawbacks of proprietary specifications, which may create and maintain barriers to competition. Open protocols, such as EPAS ones, supported by a dedicated international non-profit organisation composed of major stakeholders of the industry, provide a guarantee that the whole ISO 20022-standardisation work carried out by EPASOrg is based on solid grounds.

Open Standards Provide Better Guarantees

When drafted or endorsed by an international standardisation organisation, open standards provide better guarantees of quality and evolution.

EPASOrg has developed ISO 20022 standardised messages endorsed by the Cards SEG of ISO 20022. This ISO group is composed of card payments experts from all horizons (geographic, know-how, and so on), giving a strong backing to the whole initiative. EPASOrg is formally committed to ensure the further evolution and maintenance of the standards through the ISO 20022 maintenance process.

ISO 20022: A Better Recipe for Card Payment Messages

ISO 20022 is a methodology for defining messages. Currently, IS) 20022 has defined and endorsed more than 300 messages, with many more on the way. The convergence of ISO 20022 card standards with other types of payment instruments provides an added-value from both a business and implementation point of view.

Gaining Transparency through an End-User License Agreement

With the ISO 20022 standardisation process, EPASOrg acknowledged the acceptance of the ISO 20022 Intellectual Property Rights policy and the fact that it would grant to third parties a nonexclusive, royalty-free license to use the specifications. The EPAS Retailer protocol has also adopted a similar open policy with the same EULA process.

EPAS Standards Aren't Just Mere Protocol Specifications

For all its protocols, EPASOrg has developed a complete toolbox composed of specifications, implementation guidelines, and test cases. EPASOrg is currently considering a tool for implementers, which would allow further auto-certification of an EPAS implementation.

EPASOrg Is Open for Cooperation

Since its inception, EPASOrg has partnered with various entities following the same objectives of openness and non-proprietary royalty-free standards. Some significant examples of such cooperation are ARTS, Currence (Dutch PoC), ADS+, OSCar, and so on. For more on these partnerships, see Chapter 4.

EPAS Standards Are SEPA-Compliant

EPAS protocols specifications have been designed in parallel with the drafting of the EPC Books of Requirements. They're

compliant to these requirements, and several experts of the EPAS Working Groups actually participated in the drafting of those requirements.

EPAS Standards Are Universal

The review and further endorsement by the ISO 20022 Cards SEG of the EPAS standards is a guarantee that EPAS standards were not only developed by Europeans for Europeans. The Cards SEG of ISO 20022 is composed of worldwide card payment experts, which ensured a wider, universal scope of application.

EPASOrg Will Certify EPAS-Compliant Implementations

In its role as specification provider, EPASOrg intends to ensure a proper certification of implementations that claim to be EPAS-compliant. To this end, EPASOrg is considering the development of an auto-certification tool to be delivered for free to implementers.

Chapter 6

Ten Useful Links to Implement EPAS Protocols

In This Chapter

- Finding out all you can about EPAS implementation
- Discovering important official websites

This chapter provides useful links to various websites related directly or indirectly to EPAS and EPAS implementation.

EPASOrg Official Website

This website is the first and most important reference for the implementation of EPAS standards:

```
www.epasorg.eu
```

It helps you find the latest information about EPASOrg and the EPAS protocols. This link is the first to follow, especially if you want to consider a possible implementation of an EPAS protocol and see whether it may fit with your own requirements.

EPAS Message Usage Guides

The EPASOrg website also provides additional implementation specifications to the EPAS and ISO 20022 CAPE specifications.

You can find the EPAS Acquirer Protocol MUG website at

```
www.epasorg.eu/spip.php?rubrique101
```

You can find the EPAS TMS Protocol MUG website at

```
www.epasorg.eu/spip.php?rubrique105
```

ISO 20022 Official Website

The official website and reference for all ISO 20022 standard messages is

```
www.iso20022.org
```

This website is also the place where you can download the official ISO 20022 card payment standards, such as the one issued by EPASOrg. You can also find the EPASOrg End-user License Agreements here as well.

ISO 20022 Cards and Related Retail Financial Services Message Specifications

For the official ISO 20022 Cards and Related Retail Financial Services Message specifications, as well as XML Schema (the XML coding) and XML instances (examples of XML messages), go to

```
www.iso20022.org/UNIFI_Cards_messages.page
```

ISO 20022 EPAS End-User License Agreement

Before using EPAS and ISO 20022 specifications, you need to agree to an end-user license agreement. To see a copy of the end-user license agreement, visit the following website:

```
www.iso20022.org/documents/general/EPASOrg_
EPAS_End-user_License_Final.pdf
```

ISO 20022 For Dummies

SWIFT and ISO issued an *ISO 20022 For Dummies* (English and Japanese versions). You can request your own copy by e-mail to the following address:

```
mailto:standards.forum@swift.com
```

UML Official Website

ISO 20022 specifications rely on a UML methodology. You can find more information on UML at the following website:

```
www.uml.org
```

XML Official Website

ISO 20022 primary coding is XML. You can find more information on XML at the following website:

```
www.w3.org/XML
```

EXI Official Website

EXI provides an appropriate way to optimise XML. You can find an outline of EXI as well as any relevant information about EXI and EXI specifications at the following website:

```
www.w3.org/XML/EXI
```

ASN.1 Official Website

ISO 20022 CAPE specifications use either XML or ASN.1/DER coding. You can find more information on ASN.1 at the following website:

```
www.ncbi.nlm.nih.gov/Sitemap/Summary/asn1.
html
```

Appendix

Glossary

Acceptor: A merchant or other entity that accepts a payment instrument presented by a client in order to transfer funds to that merchant or other entity.

Acceptor-to-Acquirer Card Transactions: ISO 20022 Business Area that covers messages that support any card payment-related transactions and services between a card Acceptor and a card transaction acquirer. It includes the authorisation, cancellation, and capture of card transactions. Business Area Code: `caaa`.

Acquirer: In point-of-sale (POS) transactions, the entity (usually a credit institution) to which the Acceptor (usually a merchant) transmits the information necessary in order to process the card payment.

ADS+: An innovative project initiated in France and labelled by TES and Systematic French Competitiveness Clusters (French Pôles de Compétitivité). A project of 13 organisations and research laboratories carried out under a specific French governmental framework for funding innovative projects.

ARTS: Association for Retail Technology Standards of the National Retail Federation (NRF) based in the United States. An international organisation dedicated to reducing the costs of technology through standards.

ASN.1-TLV/DER (ISO/IEC 8825-1:2002): Abstract Syntax Notation One (ASN.1) is a notation for describing abstract types and values. The Distinguished Encoding Rules for ASN.1 (DER) is intended for applications in which a unique octet string encoding is needed.

ATICA: An ISO 20022 Acquirer-to-Issuer series of card payment messages by which retail financial and nonfinancial transaction card-based messages can be interchanged in the Acquirer to Issuer domain.

ATM: Automated Teller Machine, a machine usually located in a public place allowing consumers to make deposits, obtain cash from checking or savings accounts, pay bills, and, in some cases, transfer money between accounts and do other routine financial transactions.

Authorisation: The guarantee of funds given by an Issuer to an Acquirer according to agreed rules.

Batch: A collection of data sharing the same characteristics, which is gathered for processing as a single group.

Bitmap: Data presented as a map or an array of bits, with each bit having a specific meaning relating to the information its supports. Usually used in telecommunication protocols or in digital image processing where bitmap implies one bit per pixel.

Brand: A particular payment product (especially a card) that has been licensed by its owner (Issuer) for use in a given environment or scheme.

Business Area: Categories defined by the ISO 20022 Registration Authority to classify ISO 20022 Message Definitions and the corresponding four-character code used in the Message Identifier of related ISO 20022 Message Definitions.

Business Component: Components usually characterised by a series of elements. For example, a `PaymentCard` Business Component can be characterised by elements, such as `PAN`, `ExpiryDate`, and so on.

Business Justification (BJ): Overview of the scope, reason, and estimated users, volumes, savings, and so on of the intended submitted ISO 20022-message set. The business justification also describes the commitment of the submitting organisation to dedicate required resources to the development and support of the new messages.

Card scheme: A technical and commercial arrangement set up to serve one or more card brands. It provides the organisational, legal, and operational framework necessary for the functioning of the services marketed by those brands.

Cards Stakeholders Group (CSG): An open forum part of the EPC structure (see upcoming definition) and where stakeholders of the industry exchange views.

CAPE: ISO 20022 series of messages within the POI (Point of Interaction) card payment domain submitted by EPASOrg. Synonym of EPAS Acquirer and TMS Protocols.

Certificate: Letter issued by a certification body for a proofed product.

Certification: The process of certifying that a certain product has passed functional quality assurance tests and/or security tests and/or performance tests according to accredited standards.

CIR (Common Implementation Recommendations) Technical Working Group: An open standardisation initiative of EMV implementers in Europe.

Clearing: Calculation of the bilateral or multilateral obligations in regards to credit and debit positions held by market participants.

Components: Refers to either ISO 20022 Business or Message components.

Data Dictionary: In ISO 20022, part of the ISO 20022 Repository that contains all items that can be reused during business process modelling and message definition activities.

Dictionary Item: Items stored in the Data Dictionary.

Dual Message System (DMS): Exchange to determine whether funds are available for the transaction and an approval can be obtained from the Issuer. The exchange does not allow posting for account reconciliation and needs an additional exchange to enable this feature.

Efficient XML Interchange (EXI): A specification for an encoding format that allows efficient interchange of an XML Information Set.

EPAS: A series of card payment protocols developed by EPASOrg. EPAS is the initial name of the standardisation and cooperation initiative leading to the provision of EPAS specifications. The EPAS portfolio consists of standards for three main protocols: an Acquirer Protocol (ISO 20022 CAPE), a Retailer Protocol, and a TMS Protocol (ISO 20022 CAPE).

EPAS Acquirer Protocol Message Usage Guide: Additional implementation specifications to the ISO 20022 Card Payments Exchanges Message Definition Report (covering ISO 20022 `caaa.001.n.n` to `caaa.015.n.n` series of messages).

EPAS Consortium: Group of actors belonging to the card payment value chain involved in the initial EPAS project carried out under the framework of the ITEA Programme (see ITEA). The project was later taken over by EPASOrg in October 2009 (see EPASOrg).

EPAS TMS Protocol Message Usage Guide: Additional implementation specifications to the ISO 20022 Card Payments Terminal Management Message Definition Report (covering ISO 20022 `catm.001.n.n` to `caaa.003.n.n` series of messages).

EPASOrg: An international non-profit association created to ensure the development and maintenance of universal card payment standards. An EPASOrg legal entity was created in Brussels in October 2009 as an outcome of the former EPAS Consortium launched in the framework of ITEA (see upcoming definition). A European research programme dedicated to the support of IT projects.

EULA (End-User License Agreement): A legal contract between an entity (manufacturer, specification provider, and/or the author) and the end-user of a specification or a software application. The EULA details how the specification or software can and cannot be used and any restrictions that a specification provider or a manufacturer imposes.

European Payments Council (EPC): The decision-making and coordination body of the European banking industry in relation to payments. The EPC develops the payment schemes and frameworks necessary to realise SEPA (see upcoming entry).

Initiating Party: In a CAPE message exchange, the party that initiated the exchange. Used essentially for routing purposes (part of a CAPE Header).

Interoperability: Usually used to refer to the harmonised usage of procedures and protocols to conduct card payment transactions. In ISO 20022, refers to the capability to easily exchange business information while using different message standards.

IFX: The Interactive Financial eXchange Forum created to develop message standards for financial services. The IFX Forum is made up of industry-leading financial institutions, service providers, and independent software vendors.

ISO: International Organization for Standardization, the world's largest developer and publisher of International Standards. It's a network of the national standards institutes of 160 countries, 1 member per country, with a Central Secretariat in Geneva, Switzerland, that coordinates the system. ISO promulgates worldwide standards in a variety of domains with the aim to facilitate cross-border exchanges of goods, services, and techniques.

ISO 8583: An ISO standard for systems exchanging electronic transactions made by cardholders using payment cards. It has three parts:

- Part 1: Messages, data elements, and code values
- Part 2: Application and registration procedures for Institution Identification Codes (IIC)
- Part 3: Maintenance procedures for messages, data elements, and code values.

ISO/IEC 8825-1:2002: *See* ASN.1-DER.

ISO 20022: A common platform for the development of messages using a modelling methodology (based on UML), a central dictionary of business items used in financial communications, and a set of XML design rules to convert the messages described in UML into XML schemas.

ISO 20022 Cards and Related Retail Financial Services SEG: An ISO 20022 Standards Evaluation Group (SEG – see upcoming entry) whose scope includes the messages that support secure transactions and business processes related to card and card-related payment instruments.

ISO 20022 Financial Repository: A repository consisting of two major parts: the Data Dictionary and the Business Process Catalogue. The Data Dictionary contains Business Concepts, Message Concepts and Data Types. All these items are reusable and are called Dictionary Items. The Business Process Catalogue is organised in Business Areas. The communication requirements and the interaction requirements in the various Business Areas are supported by Business Transactions. All items that are stored in the Business Process Catalogue are called Catalogue Items.

ISO 20022 Message Definition Report (MDR): A MDR describes the elements contained in one or more ISO 20022 messages. It provides a table view of the message(s), details the attributes of each element or group of elements, and lists all associated codes contained in the message schema. Conditionality between the components of the message(s) described is also covered.

ISO 20022 Message Usage Guide (MUG): A MUG is an ISO 20022 document that comes in addition to the ISO 20022 Message Definition Report (MDR) when there is a need for further explanation about how to use the message definition(s) in compliance with the standard. MDRs and MUGs are published in the Catalogue of ISO 20022 messages.

ISO 20022 Registration Authority (RA): The guardian of the ISO 20022 Financial Repository. The RA mission is to ensure compliance of developed Repository items with the approved technical specifications and to publish the Financial Repository on `www.iso20022.org`, on behalf of ISO.

ISO 20022 Registration Management Group (RMG): Group made of senior industry experts nominated by ISO TC68 P-member countries and category A liaison organisations. The RMG monitors the overall ISO 20022-registration process and reports directly to ISO TC68.

ISO 20022 Standard: The ISO 20022 standard is described in the document "ISO 20022 Financial Services – Universal financial industry message scheme" and includes six parts:

- **Part 1:** Overall methodology and format specifications for inputs and output from the ISO 20022 Repository
- **Part 2:** Roles and responsibilities of the registration bodies
- **Part 3:** ISO 20022 modelling guidelines (Technical Specification)
- **Part 4:** ISO 20022 XML design rules (Technical Specification)
- **Part 5:** ISO 20022 reverse engineering (Technical Specification)
- **Part 6:** Message transport characteristics

ISO 20022 Standards Evaluation Groups (SEGs): A group of industry experts in specific business domains of the financial industry as defined by the ISO 20022 Registration Management Group (RMG). ISO TC68 member countries and liaison organisations nominate SEG members.

ISO 20022 Submitter or ISO 20022 Submitting Organisation: Any community of users or organisations that want to develop and use ISO 20022-compliant messages to support its financial transactions. EPASOrg is the ISO 20022 Submitter of the CAPE series of messages.

Issuer: A financial institution that makes payment cards available to cardholders, authorises transactions at point-of-sale (POS) terminals, and guarantees payment to the acquirer for transactions that are in conformity with the rules of the relevant scheme.

ITEA: Information Technology for European Advancement: Europe's premier co-operative R&D programme driving precompetitive research on embedded and distributed software-intensive systems and services.

Merchant: *See* Acceptor. In some cases, Merchant and Acceptor can represent different entities.

Message: A set of structured information exchanged between two parties involved in a transaction.

Message Component: A reusable ISO 20022 Dictionary Item used for assembling Message Definitions.

Message Definition: An ISO 20022 formal description of the structure of a message.

Message Definition Report (MDR): Describes the elements contained in one or more ISO 20022 messages. It provides a table view of the message(s), details the attributes of each element or group of elements, and lists all associated codes contained in the message schema. Conditionality between the components of the message(s) described is also covered.

Message Usage Guide (MUG): Describes how to use all the possibilities/options of one or more ISO 20022 Message Definitions. There is only one Message Usage Guide per Message Definition. The Message Usage Guide comes in addition to the official Message Definition Report and should ultimately become part of it to facilitate the life of implementers/users. Like Message Definition Reports, a single MUG can cover usage of several Message Definitions

NRF (National Retail Federation): The world's largest retail trade association and the voice of retail worldwide. NRF's global membership includes retailers of all sizes, formats, and channels of distribution, as well as chain restaurants and industry partners from the United States and more than 45 countries abroad.

Offline: Deferred processing without direct communication.

Online: Direct communication between devices with electronic capability (terminals, networks, hosts, and so on).

OSCar (Open Standards for Cards): A consortium established by the end of 2010 with the objective of fostering the implementation of two main SEPA standards in Europe, namely the ISO 20022 EPAS Acquirer protocol and the SEPA FAST Application specification.

POI (Point of Interaction): Usually used as a synonym for POS when referring to a generic device accepting cards for the payment of goods and services. A POI isn't restricted to a retail environment because it can be used in public and private places in both an attended or unattended mode.

POS (Point of Sales): In a retail environment, refers to a place where a product or service can be purchased and is often referred to as a Point of Purchase. Alternatively, it can also be considered as a terminal used for the replacement for a cash register. In the card payment environment, it usually designates a device that accepts a payment card for the payment of goods and services.

Processing: In a card payment environment, the performance of all the actions required in accordance with the rules of a system for the handling of a transfer order from the point of acceptance by the system to the point of discharge from the system. Processing may include clearing, sorting, netting, matching, and/or settlement.

Processor: *See* Processing.

RecipientParty: In a CAPE message exchange, the party acting as recipient of the exchange. Used essentially for routing purposes (part of a CAPE Header).

Reconciliation: An exchange of messages between two entities (Acquirer, Issuer, or their respective agents) to reach agreement on financial totals.

SEPA (Single Euro Payments Area): A pan-European integration initiative whose objective is to harmonise payment systems in Europe. While SEPA was initially created to cover the euro area countries, it has been extended to address remaining EU countries, as well as Iceland, Liechtenstein, Norway, and Switzerland. SEPA is the logical next step in the completion of the EU internal market and monetary union.

SEPA Credit Transfer (SCT): ISO 20022-based set of messages that enable payment service providers to offer credit transfer services in euro throughout the SEPA region for single or bulk payments. The standard facilitates payment initiation, processing, and reconciliation based on straight-through processing (STP).

SEPA Direct Debit (SDD): An ISO 20022-based set of messages enabling payment service providers to use a payment instrument offering direct debit services that can be used for both domestic and cross-border collections throughout the 32 SEPA countries. EU Regulation (EC) 924 / 2009 mandates every bank in the euro area to be reachable for cross-border direct debits since November 2010.

SEPA-FAST: Specifications based on EMV Chip and PIN technology describing a financial application on a SEPA Cards Framework (SCF) compliant terminal.

Settlement: A transfer of funds to complete one or more prior transactions made, subject to final accounting and corresponding to reconciliation advices.

Single Message System (SMS): The single and only exchange of messages between an Acquirer and an Issuer. Used to determine whether

- Funds are available for the transaction
- An approval can be obtained from the Issuer
- The transaction can be further posted directly to the account.

Submitting Organisation: Any community of users or organisation using the ISO 20022 registration process to develop candidate ISO 20022 messages.

TC68: An ISO technical Committee in charge of ISO standards for supporting financial services.

Terminal Management: ISO 20022 Business Area Messages covering messages that support any card-related terminal management services between a Terminal Management System (TMS) and a Point of Interaction (POI) system. Business Area Code: `catmcatm`.

UML (Unified Modelling Language): An ISO specification language for modelling objects. Used in ISO 20022 to represent the industry business and message definitions.

W3C (World Wide Web Consortium): An international community that develops standards to ensure the long-term growth of the Web.

WG4: ISO TC68 Working Group 4: An international working group of experts set up by TC68 to revise and maintain the ISO 20022 standard and its technical specifications.

XML (Extensible Mark–up Language): Syntax to encode documents or messages. Any individual or group of individuals or companies that wants to share information in a consistent way can use XML.

Breaking technical barriers

EPASOrg

EPASOrg's main objective is to establish a new generation of open and royalty-free standards between card acceptors and card transaction acquirers.

This new environment will create the conditions for a competitive and dynamic market for card payments worldwide.

Driving interoperability in card payments

ISSUANCE OF **UNIVERSAL** ROYALTY-FREE SPECIFICATIONS

DESIGN OF **INNOVATIVE** STATE-OF-THE-ART INTERNATIONAL STANDARDS

DEVELOPMENT OF **OPEN** AND INTEROPERABLE SOLUTIONS

PROVISION OF **SECURE** KEY ELEMENTS OF THE TRANSACTION CHAIN

EPASOrg

The mission of EPASOrg is to develop, promote and maintain interoperable card payment standards.

The widespread implementation of common protocols is a major step towards the achievement of SEPA, the Single Euro Payments Area in Europe.

More information on ***www.epasorg.eu***

Learn how EPAS addresses your needs for open, royalty-free standards for card payments

EPAS card standards have been designed to address the needs of merchants, banks, manufacturers, and solution providers. The provision of open and royalty-free specifications based on state-of-the-art standards such as ISO 20022 brings profound benefits to the whole community of card payment stakeholders. EPASOrg A.I.S.B.L. has been created to ensure the further evolution and maintenance of the standards and to meet the high level of requirements issued by the whole industry and European regulators.

- ***Is EPAS adapted to my requirements?* – explore the benefits of EPAS and see how it addresses your needs for open and common card payment protocol specifications**
- ***Is EPAS ready for implementation?* – EPAS has been developed around a toolbox principle providing the necessary tools for the design of up-and-running applications**
- ***Does EPAS comply with SEPA requirements?* – the main driver in the design of EPAS universal specifications has been the conformance to SEPA requirements as from the early beginning of the project**

Open the book and find:

- **What is EPAS and why this initiative was launched**
- **ISO 20022 and EPAS standards**
- **Things to tell your boss about EPAS**
- **Tips to implement EPAS protocols**

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William Vanobberghen is Head of International Projects at Groupement des Cartes Bancaires "CB." He is also Secretary General of EPASOrg A.I.S.B.L. William initiated and coordinated the former EPAS Project and Consortium. He has a degree in Commercial and Financial Sciences and a degree and master in Computer Sciences. William also holds an Executive MBA from HEC Paris.

For Dummies®
A Branded Imprint of
WILEY

ISBN: 978-1-119-99910-2
Not for resale

UK Edition

Compliments of EPAS Org

Limited Edition

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FOR DUMMIES®

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EPASOrg

The fragmented nature of today's local environments has resulted in barriers hampering the development of a competitive market for card payments. EPASOrg, an international non-profit organisation open to all stakeholders of the card payments industry – acquirers, processors, card schemes, payment service providers, retailers, and hardware and software suppliers – has been initiating the development of a new generation of common and universal card payment standards based on innovative and state-of-the-art technologies. This book outlines the state of affairs as regards the standardisation work achieved by this association in card payment protocols.

EPAS Standards

EPASOrg developed EPAS standards with the goal of providing universal card payment specifications that address the business requirements of most stakeholders of the industry.

The EPAS portfolio is composed today of three main standards:

- The EPAS Acquirer Protocol (ISO 20022 CAPE messages)
- The EPAS Terminal Management Protocol (ISO 20022 CAPE messages)
- The EPAS Retailer Protocol (in the process of becoming ARTS-EPASOrg Specifications).

The EPAS standards and specifications have been designed to be SEPA (Single Euro Payments Area)-compliant and meet the requirements of the European Payments Council in this respect.

www.epasorg.eu

EPAS FOR DUMMIES®

UNIVERSAL STANDARDS FOR CARD PAYMENTS

By William Vanobberghen

WILEY

A John Wiley and Sons, Ltd, Publication

EPAS For Dummies®
Published by
John Wiley & Sons, Ltd
The Atrium
Southern Gate
Chichester
West Sussex
PO19 8SQ
England

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ISBN: 978-1-119-99910-2

Printed and bound in Great Britain by Page Bros, Norwich

10 9 8 7 6 5 4 3 2 1

Acknowledgments

We would like to thank all persons who have been actively involved in and contributed to the content of this book, especially the members of the EPASOrg Communication Committee: Ottilia Rouguet, Convenor of the EPASOrg Communication Committee; Isabelle Pujadas and Coba Taillefer, Members of the Communication Committee.

A special mention and thanks to Louis Jenny, Technical Steering Committee Chairman and Convenor of the EPAS Retailer Protocol Working Group, for his technical contribution, in-depth review, and expertise.

Our thanks are also extended to Jürgen Manske, Chairman of the Board of Directors, for his involvement in the review of the book's content.

Last but not least, we would also like to express our thanks to Groupement des Cartes Bancaires "CB" and especially Cédric Sarazin for their support to this initiative.

Foreword

The retail industry is facing incredible challenges in the payments area, and it's not expected to get easier going forward. New regulations are being introduced and existing ones are evolving, consumers are expecting retailers to support new payment methods, and security threats continue to evolve. As retailers expand globally, they face numerous regional payment infrastructures and requirements.

How can retailers comply, compete, and even thrive in this environment, especially given the challenges with updating legacy POS solutions? Through leveraging a global industry standard to isolate selling systems from payment systems, enabling flexibility in payments while maintaining stability in the selling systems. EPASOrg has created the Retail Protocol of the EPAS standard specifically to achieve this result. The Association for Retail Technology Standards (ARTS), a division of the National Retail Federation (NRF), is very pleased to be partnering with EPASOrg to create a common payment standard.

The jointly developed standard will be compatible with the large library of ARTS standards and the initial version of the EPAS retailer protocol resulting in the first truly global standard in this space supported by the vast constituency of retailers in the ARTS membership and the incredible strength of members of EPAS in the financial services and payment terminal providers space.

Retailing will benefit today and in the future by adopting payment solutions based on this standard, which provides greater flexibility to respond to customer demands, fraud, and competitive pressures, while at the same time reducing compliance and certification costs.

The ARTS and EPASOrg partnership is a great example of the benefit of cooperation – comprehensive products delivered in less time. We encourage all players in the payment space to implement the EPAS Retail Protocol to prepare for a soon-to-be-released common payment standard.

Richard Mader
Executive Director
Association for Retail Technology Standards (ARTS)

Introduction

Today's card payment industry is confronted by numerous and sometimes inconsistent standards and specifications. Most of these standards are based on ISO 8583 technology – a standard developed more than 20 years ago and based on basic bitmap technology.

Despite numerous attempts to achieve interoperability, the different implementations of those standards – especially between merchants and banks – have led to a situation where they still remain non-interoperable.

About This Book

EPASOrg is a non-profit organisation created to promote the widespread acceptance of the EPAS protocols, a series of standards designed to ensure interoperability between card acceptance and acquiring solutions, retail payment solutions, and terminal management systems.

EPASOrg designed *EPAS For Dummies* to help you, the reader, better understand what EPAS is and how the EPAS specifications may help you in addressing your requirements for card protocols related to your environments.

Foolish Assumptions

In writing this book, we made some assumptions about you, the people who read it:

- You're a decision-maker in card payments with few or no expertise in technical issues.
- You're interested in card payment processing.

- Your domain of expertise or interest is SEPA card payments and SEPA common solutions.
- You know that relying on open card payment standards is important to you and your business. You want to understand how EPAS can help you meet this objective and discover whether it may be a viable long-term approach.
- You've heard about ISO 20022, and you want to find out more about the new ISO 20022 standards for cards.
- You want to contribute to the further development of the EPAS standards and specifications and to the ISO 20022 efforts on card payments.

How This Book Is Organised

This book contains six chapters, each covering a different aspect of EPAS. We also include a glossary so that you can easily look up any term you're unfamiliar with:

Chapter 1: EPAS at a Glance

This chapter gives you the basics the EPAS concept and where it all started. We define what a protocol is and cover the reasons for choosing ISO 20022.

Chapter 2: ISO 20022 and EPAS

This chapter addresses the intimate relationship between EPAS and ISO 20022.

Chapter 3: The EPAS Portfolio

This chapter focuses on the three protocols that compose the EPAS portfolio. If you want to know the details on these protocols, then this chapter is for you.

Chapter 4: EPASOrg and Its Partnerships

EPASOrg maintains relationships with various initiatives that aim at developing similar objectives of openness in standardisation. This chapter talks about the organisation's different partners.

Chapter 5: Ten Useful Things to Tell Your Boss about EPAS

This chapter gives you ten great reasons that you should try EPAS. If your boss isn't convinced, he will be after this chapter.

Chapter 6: Ten Useful Links to Implement EPAS Protocols

Theory is nice, but practice is better! In this chapter, we provide ten useful links to help you ensure a proper implementation of the specifications.

Icons Used in This Book

Throughout the margin of this book, you'll see several icons that highlight important information:

This icon offers advice you won't want to miss. This information can save you time or money.

Some information is too good to forget. Whenever you see this icon, you'll know it marks information to keep top of mind.

Where to Go from Here

We wrote this book so that you can head straight for the topics or chapters that interest you the most. You don't have to read this book from cover to cover. Look up what you want to know and flip immediately to that page. If you need background information, we help guide you with cross-references to the chapters that contain it. We also include a handy glossary so that you look up unfamiliar terms.

Chapter 1

EPAS at a Glance

In This Chapter

- Looking at the issues surrounding card payments
- Saving the day with EPAS
- Introducing EPASOrg
- Getting a first look at EPAS protocols

When it comes to standards, the card payment industry abounds with choices. In fact, major industry players, such as Visa and MasterCard, have even developed their own proprietary specifications. Unfortunately, without a uniform system, the card payment industry lacks standard protocol specifications that all groups can take advantage of.

Fortunately, that's starting to change, thanks to the introduction of common open and royalty-free protocols. In this chapter, we give you a big-picture look at the world of EPAS.

The Challenge of Too Many Choices

Today, making payments by cards is a competitive business that relies on different players who are under the scrutiny of national central banks and the European Central Bank in charge of the oversight of payments in Europe. The European Commission also closely monitors the evolution of payments made by cards, namely through the enforcement of rules, in the hopes of ensuring an open and competitive market of payments Europe-wide.

Over the last few decades, the card payment industry has developed an abundance of standards and specifications to help with the process. The old saying "The great thing about standards is that there are so many to choose from . . ." certainly applies to the card payment industry.

But so many choices for the card payment industry doesn't come without challenges:

- The evolution of competition at all levels of the value chain with the emergence of new entrants
- The breaking of commercial, legal, and technical barriers for creating an open and competitive environment of payments in Europe
- The need to improve the interoperability of payments cross-border
- The necessity to rely on common specifications and standards

The answer has been to come up with a set of uniform and common standards. EPAS (Electronic Protocols Application Software) is an initiative to develop a series of application protocols to promote interoperability in card payments. EPASOrg is a non-profit organisation that has been created to spearhead these efforts.

EPAS: When and Where It All Started

In 2005, at the initiative and under the coordination of Groupement des Cartes Bancaires (CB) in France, a group of card schemes, acquirers, retailers, and payment solution providers belonging to the card payment value chain, set up a consortium with the objective of addressing the interaction between electronic payment terminals with other systems in the card transaction ecosystem. That group was the predecessor to what is now EPASOrg. The consortium started by defining three main protocols to be used in a POI (Point of Interaction) environment:

- The Acquirer protocol
- The TMS protocol
- The Retailer protocol

By fall 2005, the members of the consortium endorsed a Consortium Agreement, modelled in the framework of an Information Technology for European Advancement (ITEA) European research program. Over the next three years, work continued on the definition of the EPAS protocols, with an iterative revision process enabling state-of-the art technology and security requirements to be incorporated in the specifications.

From its inception, the EPAS initiative developed its project with a clear aim to enable stakeholders of the wide card payment industry to benefit from the extended expertise of the EPAS consortium and later EPASOrg for the implementation of concrete projects.

The EPAS initiative identified the following milestones, the first two of which have already been reached:

- **The issuance of the EPAS specifications:** You can download these specs for free by agreeing to an End-User License Agreement (EULA). You can download the specifications for both the EPAS Acquirer Protocol (ISO 20022 Acceptor to Acquirer Card Transactions–Card Payments Exchanges) and the Terminal Management System Protocol (ISO 20022 Terminal Management–Card Payments Terminal Management) at `www.iso20022.org/UNIFI_Cards_messages.page`. You can download the specifications of the EPAS Retailer Protocol at `www.epasorg.eu`.
- **The issuance of Message Usage Guides for both the Acquirer protocol and TMS protocol:** (The Retailer protocol already integrates a major part of its implementation guidelines in its specifications). Both guidelines are available for free on the EPASOrg website (`www.epasorg.eu`) by agreeing to a EULA. EPASOrg is now considering a further endorsement of its implementation guidelines by ISO 20022.

- **The finalisation of test cases:** This third milestone, when reached, will allow implementers to test the compliance of their implementation with the official EPAS and/ or ISO 20022 message standards.
- **The actual compliance or certification process:** This process will be conducted either by EPASOrg, another entity acting on its behalf, or by the implementer himself, possibly using a free auto-certification tool provided by EPASOrg. This tool would ensure a proper and formal assessment of the compliance of their implementation with the EPAS specifications.

EPASOrg: What It Is, What It Isn't

EPASOrg is a non-profit organisation created to promote the widespread acceptance of the *EPAS protocols,* a series of standards to ensure interoperability between card acceptance and acquiring solutions, retail payment solutions, and terminal managements systems. (For details on these protocols, see Chapter 3.)

The mission of EPASOrg is to foster interoperability by agreeing on, developing, and implementing common protocol specifications related to secure card payments in the acceptor-to-acquirer domain. By increasing standardisation and interoperability through common protocols, EPASOrg is dedicated to overcoming the barriers of today's fragmented card payment environment.

To help reach its goal, EPASOrg established partnerships with organisations that shared this common goal. (For more on these partnerships, see Chapter 4.)

Many people confuse the EPAS standards with EPASOrg, but in reality, they're actually two different things. While EPASOrg is a non-profit organisation, EPAS protocols and specifications are the outcome of the work produced by EPASOrg.

See Chapter 2 for the lowdown on the features the consortium wanted these protocols to have.

The Inside Scoop on EPAS Protocols

Basically, a *protocol* – at least in the field of information technologies – is a set of rules and/or specifications to enable two or more entities to exchange information.

Protocols come in different types, depending on the field:

- **Data protocols:** In telecommunication, protocols usually refer to some set of rules required to ensure the proper exchange of data between two or more communication nodes.
- **Application protocol:** Similarly, software applications also use protocols to exchange data at their own level. In this case, we usually refer to these protocols as *application protocols*.

EPAS refers to a series of protocols belonging to the category of *application protocols* where the exchange of data is performed between two different equipments:

- The payment terminal (or a payment server) located usually at the merchant's location
- A server under the supervision of a bank, payment service provider, or entity acting on their behalf

EPAS also rely on the use of lower level data transport protocols to ensure that the exchange of information is carried out in a smooth, secure way communication lines.

How a card payment works

In the domain of card payments, a protocol enables, among other things, the exchange of information to

- Authorise a card payment transaction
- Cancel a card payment transaction
- Allow a retailer to be credited for the payment transaction
- Initiate the debit of the account of the customer (cardholder) by the bank.

You may be wondering why you need a protocol to carry out a payment by card and what function it fulfils. Actually, any payment – by card or not – needs a set of rules between two parties for exchanging data.

In a card payment, two main phases have to be considered: an authorisation phase, where an *Acquiring Bank* needs to ensure that the cardholder has sufficient money in his account by soliciting an *Issuing Bank* (the bank issuing a payment card to a cardholder). This process is then followed by a payment phase, where the system ensures that the merchant *(*Acceptor*)* is credited and the cardholder debited for the amount of the commercially agreed transaction.

An additional protocol (Acquirer-to-Issuer protocol) is required to finalise the transaction with the issuer using basically the same two main phases (authorisation and payment).

The protocol determines the functional, technical, and security details to make the transaction happen in a smooth, efficient, and secure way for all parties.

A processing system (or Processor) acts as a switching platform for the exchange of data between the Acquirer and Issuer. This exchange is carried out in compliance with the rules defined by a card scheme

Figure 1-1 illustrates the major steps of a basic card payment and the involvement of the main parties in this process.

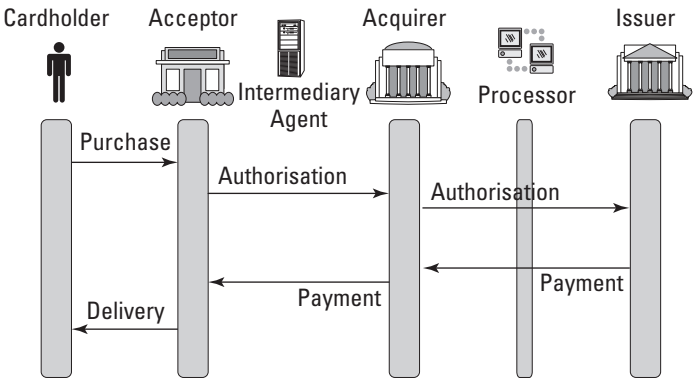

Figure 1-1: Card payment basic process.

ISO standard protocol

The development of card payments in Europe- and worldwide - for the past three decades has led to a situation where each country or card scheme has developed its own rules and specifications to carry out payments by card in a fast and secure way. In order to ensure a minimum level of interoperability, most of those developments have been performed on the basis of ISO standards developed at the same time.

ISO 8583 is a standard developed specifically for card payment exchanges based on a bitmap technology specifically designed for low-speed modems and channels of communication available in the '80s.

Today, card payment systems are transitioning to ISO 20022, which relies on a structured approach for the design of messages.

For more details on the ISO 8583 and ISO 20022 protocols, see Chapter 2.

The SEPA Incentive

One of the main technical obstacles to a unified market of card payments in Europe is the prevalence of local protocols, especially between a retailer and a bank.

National and EU competition authorities view the existence of specifications defined at a country or scheme level as technical barriers that may slow down or hamper the achievement of the EU internal market and create obstacles to a competitive Europe.

The European Commission and the European Central Bank have both put the implementation of SEPA (Single Euro Payments Area) as a top priority on their agenda.

The SEPA initiative was first launched in 2002. Shortly thereafter, it became obvious that the card payments industry would need to migrate to common standards if Europe was to become a genuinely unified market for electronic payments.

Even as we speak today, offering multinational retailers a single card payment solution in the 32 European countries of the SEPA zone is almost impossible.

The pressure to achieve concrete results has led the financial industry to come up with tangible solutions to meet those SEPA requirements and deadlines fixed by the European regulators.

The issuance by the European Payments Council (EPC) of specific implementations of ISO 20022 for SEPA with the SEPA Credit Transfer (SCT) and SEPA Direct Debit (SDD) series of messages in 2009 was a clear response of the industry to this pressure.

For more on ISO 20022 and SEPA, see Chapter 2.

The EPAS Protocols and the Relationships They Address

The EPAS portfolio of protocols has been designed specifically to address the lack of open and common specifications today on the market, especially in three different types of relationships:

- **EPAS Acquirer protocol:** Between a retailer (often also called a Merchant or an Acceptor) and the bank having a contract to accept payments made by card (the Acquirer, in the card payment jargon)
- **EPAS TMS protocol:** Between a Terminal Management System controlled by a retailer, a bank, or a vendor and a Point-of-Interaction (POI) device. This protocol allows the updating of the software of the POI and the downloading of parameters and security keys to secure the transaction
- **EPAS Retailer protocol:** Between a cash register machine or a sale application in a cash register equipment and the payment module associated with the said equipment.

For the details on these three protocols, see Chapter 3.

Chapter 2

ISO 20022 and EPAS

In This Chapter

- Introducing ISO 20022
- Getting an overview of ISO 20022 CAPE message
- Deciphering BJ, MDR, MUG, and other acronyms

ISO 20022 consists of an agreed methodology used by the financial industry to create message standards across all the business process of the industry.

This chapter provides a brief introduction of what ISO 20022 is and how EPAS messages have been drafted to become full ISO 20022 compliant messages.

Where It All Started: ISO 8583

Prior to agreeing on open and common standards, most banks or transaction processors dealing with the acquisitions of card transactions used a wide variety of different legacy protocols defined and implemented at a local or national level. Most of these protocols are based on derivatives of ISO 8583, a standard developed specifically for card payment exchanges.

ISO 8583 is a toolbox that specifies message structure, format, and content, data element, and values of data elements. Application specifications usually remain at the level of the implementation. The method by which settlement takes place is not within the scope of ISO.

Given the rather large flexibility offered by ISO 8583, many implementations initiated by national and international card

schemes have led to the emergence of various specific developments that vary from card scheme to card scheme and/or country to country. Furthermore, while most of those implementations rely on a universal (ISO) standard, the resulting specifications drafted on the basis of this ISO standard are proprietary.

The challenge in migrating toward a new generation of standards had to take into account the legacy of existing applications based on the wide usage of ISO 8583 in order to maintain consistency, at least at a software application level.

More than a pure reverse engineering of ISO 8583 into ISO 20022, most of the EPASOrg working groups' activities have been focusing on how to take into account the emergence of new business requirements in the design of the new messages while maintaining consistency with the existing applications and other message standards in the card payment value chain (namely, the Acquirer-to-Issuer exchange of message, which was not tackled by EPASOrg and for which an ISO Business Justification was later submitted by ISO TC68/SC7/WG9 and further endorsed by the ISO 20022 RMG).

Can't We All Get Along? Interoperability

The absence of a common interpretation and implementation of ISO 8583 has led to a situation where systems have been developed around non-interoperable derivative implementations of ISO 8583.

As a result, an ISO 8583 implementation in one country or card scheme is usually different from the implementation of the same standard in another country or for a dedicated scheme, even though it's based on the same ISO 8583 standard.

In the case of a protocol implementation between a retailer and a bank, an international or multinational company may face a problem where the company has to implement various derivatives of the ISO 8583 standard, each defined locally, to fulfil the requirements of the related national scheme, which means extra costs and additional software developments.

What the standards need to do

When addressing the issue of interoperable and common standards for cards, the following goals should be met:

- Any new standard should address the issue of interoperability to meet the requirements of retailers, especially for major corporations operating at an international level.
- The selected solution should be designed as a common solution that addresses the needs of several actors on a global market and not be restricted to single-country markets, which is usually the case today.
- The new standard should be based on innovative specifications to evolve in parallel with the evolution of the business.
- The standard should restrict the risk of leading to different implementations of the specifications.
- The specifications should ideally be complemented with the provision of implementation guidelines, in addition to the mere functional description of the standard.

Enter ISO 20022

From the start, the EPAS consortium wanted to ensure compatibility with the latest technological standards. The group decided that the EPAS protocols should be based on the ISO 20022 methodology for developing standard messages.

ISO 20022 lets you rely on online data maintained in an official data dictionary or repository managed by ISO 20022. It also gives you the opportunity to rely on ISO 20022 procedures for the further maintenance of the standards.

ISO 20022's value proposition

By the start of the EPAS initiative, the value proposition in selecting ISO 20022 was

- A state-of-the-art methodology
- A strong enabler of interoperability in the build-up of standards

- A solution that provides independence between the definition of the message (standard) and its implementation (syntax)
- Open and free of charge standards with a clear and transparent Intellectual Property Rights (IPR) policy
- The strength of a universal ISO standard
- A coherent approach, thanks to its convergence with other categories of financial messages and payment instruments, namely the ISO 20022-based SCT and SDD series of messages

For all these reasons, ISO 20022 is considered an innovative approach in making card payment standards.

Breaking tradition

The new protocols departed from the traditional bitmap approach and the unstructured way of defining data fields inherited from ISO 8583. The goal was to select more appropriate techniques based on the use of data modelling and the separation of data (standard) from the writing of code itself (syntax).

As an outcome of this process, state-of-the-art protocols were drafted based on ISO 20022's methodology in order to cope with the real-world challenges of the card payments' industry. This approach also allowed for a further evolution of the protocols toward innovation and a better implementation of market requirements. Furthermore, the new standard allowed for the smooth convergence of card specifications with similar ISO 20022 standards developed in banking and payments, which are becoming today the *de facto* reference of the financial industry.

What's in a Name? ISO 20022

ISO 20022 is a common methodology used within the financial industry to create consistent messages standards across different subdomains of the industry (foreign exchange, securities, trade services, payments, and now card payments).

ISO 20022 brings profound benefits to the financial services industry, as it realises end-to-end processing across domains and environments that previously used different standards and formats.

The reusability of existing data components as well as the issuance of new components meeting the specific requirements of card payments offer a major benefit associated with the ISO 20022 methodology.

This ISO 20022 common platform allows the development of messages by using

- A modelling methodology (based on UML)
- A central dictionary of business items
- A set of XML design rules to convert the messages described in UML into XML schemas.

The ISO 20022 methodology is based on the concept of separate layers with the business model and the logical messages making up two different layers. The third layer, the syntax, is the physical representation of the logical message.

ISO 20022 uses XML as the primary and preferred syntax because the standard explicitly describes the way to convert a message to XML. The Registration Management Group of ISO 20022 has, however, agreed to adopt for card payments one other type of encoding based on ASN.1/DER.

How ISO 20022 works

ISO 20022 makes a clear distinction between the way of representing the elements of information (the standard itself) and the actual representation of this information in a format or a language (the syntax or coding) that a machine can interpret.

ISO 20022 message developers rely on a structured approach for the design of messages.

Basically, each ISO 20022 message is built along

- A set of syntax and message design rules
- Message components
- Coding elements associated to the message components

The ISO 20022 standard provides a common platform for the development of messages using

- A modeling methodology (based on UML)
- A central dictionary of business items (ISO 20022 Repository)
- A set of design rules to convert the messages described into a specific coding syntax, such as XML

More efficient XML for better performances

In March 2011, the Efficient XML Interchange Working Group of W3C (whose objective is to develop a specification for an encoding format that allows efficient interchange of the XML Information) issued a new standard that claims to dramatically improve the performance, network efficiency, and power consumption of applications that use XML.

This standard is currently being considered by the ISO 20022 Registration Authority as one option to address the issue of performance in transporting and processing ISO 20022 XML messages, especially in regards to trading activities and card payments.

Once approved and endorsed, the models and derived messages issued by the design phase of the messages are published on the official ISO website and become part of the ISO 20022 Financial Repository.

You can read a brief outline of what ISO 20022 actually is by visiting the official ISO 20022 website at `www.iso20022.org`. You can also request a free copy of *ISO 20022 For Dummies* by SWIFT (Society for Worldwide Interbank Financial Communication) and ISO from the official ISO 20022 website.

ISO 20022 Acceptor-to-Acquirer card transactions

ISO 20022 Acceptor-to-Acquirer Card Transactions (Card Payments Exchanges or CAPE) is a specific ISO 20022 Business Area composed of 15 different messages organised along the following categories of exchanges.

The official catalog of ISO 20022 lists a series of 15 messages belonging to the Acceptor-to-Acquirer Card Transactions – Card Payments Exchanges category of messages. Table 2-1 lists the identification of those messages with their related ISO 20022-message identification.

Table 2-1 ISO 20022 Acceptor-to-Acquirer Card Transactions Messages

Message Name	*Msg ID (XML Schema)*
AcceptorAuthorisationRequest	caaa.001.001.01
AcceptorAuthorisationResponse	caaa.002.001.01
AcceptorCompletionAdvice	caaa.003.001.01
AcceptorCompletionAdviceResponse	caaa.004.001.01
AcceptorCancellationRequest	caaa.005.001.01
AcceptorCancellationResponse	caaa.006.001.01
AcceptorCancellationAdvice	caaa.007.001.01
AcceptorCancellationAdviceResponse	caaa.008.001.01

(continued)

Table 2-1 *(continued)*

Message Name	*Msg ID (XML Schema)*
AcceptorReconciliationRequest	caaa.009.001.01
AcceptorReconciliationResponse	caaa.010.001.01
AcceptorBatchTransfer	caaa.011.001.01
AcceptorBatchTransferResponse	caaa.012.001.01
AcceptorDiagnosticRequest	caaa.013.001.01
AcceptorDiagnosticResponse	caaa.014.001.01
AcceptorRejection	caaa.015.001.01

The following sections describe these messages in detail.

AcceptorAuthorisation

This category of exchanges addresses a card authorisation process required to request the approval of a card payment transaction. This authorisation process can be made either remotely or locally depending on the business context. It can also be made online by requesting an authorisation to an Acquirer or offline by performing the authorisation locally. Optionally, you can also use an `AcceptorAuthorisation` to capture the financial data of the transaction.

An authorisation exchange is made up of two different messages:

- An `AcceptorAuthorisationRequest` message used by an Acceptor to request an authorisation to an Acquirer
- An `AcceptorAuthorisationResponse` returned by the Acquirer to the Acceptor to inform the Acceptor of the outcome of the request

AcceptorCompletion

An `AcceptorCompletion` is an additional exchange when the Acquirer wants to be notified online of the outcome of the payment. You can also use this exchange to reverse an unsuccessful transaction where the Acquirer had previously given authorisation.

To capture or to not capture: That's the question!

The sole action for an Acquirer to request the authorisation for a card payment transaction doesn't necessarily lead to the actual financial settlement of the transaction. The Issuer of the card that initiated the transaction may in most cases, accept the transaction. In some cases, the transaction may be declined by the Issuer, either because the funds available on the account of the cardholder were insufficient to cover the transaction or because of a technical problem (broken communication line, error in the message, and so on.).

After the Issuer of the card approves the transaction, the financial elements of the transaction have to be transferred from the Merchant to the Acquirer in order to credit the account of the Merchant. Another transfer of the same financial information to the Issuer must occur in order to ultimately debit the account of its cardholder.

This financial transfer of information – and also of the responsibility associated with this transfer – is called *capture* or *financial capture* in the jargon of card payment experts; which is independent of and should not be confused with the actual data capture by a software program, for example.

You can also use an `AcceptorCompletion` process to capture the financial data of the transaction. (See the nearby sidebar "To capture or to not capture: That's the question.")

`AcceptorCompletion` is made up of two different messages:

- An `AcceptorCompletionAdvice` message to advise the Acquirer of the outcome of a card payment transaction at the Acceptor side
- An `AcceptorCompletionAdviceResponse` returned by the Acquirer in response to an `AcceptorCompletionAdvice` message

AcceptorCancellation

An `AcceptorCancellation` allows an Acceptor to cancel successfully completed payment transactions or other types of transactions (for example, reservations) that haven't yet been cleared. `AcceptorCancellation` is sometimes called a manual reversal. A cancellation can't be revoked.

An Acceptor uses an AcceptorCancellationRequest message to ask the Acquirer whether a cancellation can be performed. Once confirmation is received, the Acceptor sends an AcceptorCancellationAdvice.

An Acceptor uses an AcceptorCancellationAdvice (with or without prior AcceptorCancellationRequest) to inform the Acquirer that a cancellation has been completed. An AcceptorCancellationAdvice also indicates that no response to an AcceptorCancellationRequest was received and that the cancellation was declined. An Acquirer can never decline an AcceptorCancellationAdvice.

AcceptorReconciliation

AcceptorReconciliation is the process of performing checks and balances of transactions previously captured financially. An Acceptor and an Acquirer carry out this process for a given reconciliation period. An Acceptor initiates a reconciliation exchange to ensure that the debits and credits match the computed balances by the Acquirer and performed during the same reconciliation period.

An Acceptor sends an AcceptorReconciliationRequest message to inform the Acquirer about the totals accumulated during the reconciliation period. The Acquirer returns an AcceptorReconciliationResponse message to inform the Acceptor about the totals accumulated during the reconciliation period.

AcceptorBatch

An AcceptorBatch is used to send transactions in a group. Prior to a batch transfer, transactions may have been authorised either online or offline.

The Acquirer can require by configuration that the Acceptor send the transactions in batch. The Acquirer can require the batch for authorised online transactions and/or authorised offline transactions

In an AcceptorBatchTransfer or an AcceptorBatch TransferResponse, transactions are organised in data sets.

The Acquirer returns an AcceptorBatchTransfer Response to the Acceptor to confirm the proper acknowledgement of the card payment transactions by the Acquirer.

An AcceptorBatchTransferResponse is also used to acknowledge the data capture process initiated by the Acceptor and performed by the Acquirer.

AcceptorDiagnostic

An AcceptorDiagnostic exchange is composed of both an AcceptorDiagnosticRequest and an AcceptorDiagnosticResponse messages.

An AcceptorDiagnosticRequest is a message sent by an InitiatingParty to a RecipientParty to check the availability of the dialogue with the RecipientParty. The use of this message avoids relying on dummy transaction messages to achieve the same functionality.

An AcceptorDiagnosticResponse message is sent back by the RecipientParty to the InitiatingParty to confirm the availability of the RecipientParty.

AcceptorRejection

An Acquirer uses an AcceptorRejection message to reject a message received from an Acceptor. The Acquirer uses this message as a substitute to a response or an advice response message sent to the card Acceptor.

ISO 20022 Terminal Management

The EPAS TMS protocol includes a series of three messages belonging to the Terminal Management – Card Payments Terminal Management. Table 2-2 identifies those messages with their related ISO 20022-message identification.

Table 2-2 ISO 20022 Terminal Management Messages

Message Name	*Msg ID (XML Schema)*
StatusReport	catm.001.001.01
ManagementPlanReplacement	catm.002.001.01
AcceptorConfigurationUpdate	catm.003.001.01

For more on the TMS protocols, see Chapter 3.

ISO 20022: Overview of Acronyms and Procedures

As for any other standard ISO 20022 messages, a Business Justification (BJ) initiated the ISO 20022 standardisation process for the EPAS protocols. EPASOrg played the role of a Submitting Organisation (SO) in this process.

The purpose of a BJ is to identify and describe, as far and precisely as possible, the scope, reason, and estimated users, volumes, savings, and so on of the intended submitted ISO 20022-message set by the SO.

The ISO 20022 Registration Management Group (RMG) has to approve the candidate BJ. Once approved, the BJ is sent to the relevant Standards Evaluation Group (SEG), which ultimately validates the messages once developed by the Submitting Organisation. In the case of CAPE messages, a new Cards and Related Retail Financial Services SEG (Cards SEG) was created to evaluate the new series of card payment messages to be submitted by the Submitting Organisations active in the card payment standardisation process.

IFX (the Interactive Financial eXchange Forum) has submitted a BJ for ATM card-related messages. The ISO 20022 RMG eventually validated the BJ.

Similarly, a specific ISO working group (ISO TC68/SC7/WG9) has been created and mandated by ISO TC 68/SC7 to specify a common interface by which retail financial and nonfinancial transaction card-based messages may be interchanged in the Acquirer-to-Issuer domain as specified in ISO 8583 (the ATICA project). ATICA messages are currently under review by the Cards SEG of ISO 20022.

Alternative syntax to ISO 20022 XML

In March 2009, the EPAS consortium issued a modified Business Justification that presented ASN.1-DER as an alternative coding to XML, which remains, nevertheless, the preferred syntax of

the ISO 20022 standard. On top of ISO 20022 XML, the Business Justification suggested the same series of CAPE messages in an alternative ASN.1-DER encoding compliant with ISO 8825-1. This proposal was ultimately endorsed by the ISO 20022 Registration Management Group (RMG) in September 2009 and can be used for the implementation of ISO 20022 CAPE messages.

The Business Justification also made a clear commitment to cooperate with ISO TC68/WG4 to ensure that the proposed alternative syntax would be compliant with a forthcoming version of ISO 20022, which would specifically address the issue of alternative syntaxes and encoding to the current XML one.

ISO 20022 and SEPA

Speaking at a conference in November 2010 in Brussels, Mrs. Tumpel-Gugerell, former Member of the Executive Board of the European Central Bank, invited the financial industry to extend the SEPA project to create a competitive cards market by using an interoperable framework based on the ISO 20022 message standard.

With this statement and the recent confirmation of ECB's policy to support ISO 20022 for cards, the European Central Bank sent a clear message to the industry that any further card standardisation work should be based on ISO 20022 and follow the example of the ISO 20022-based SCT and SDD standardisation initiative.

Chapter 3

The EPAS Portfolio

In This Chapter

- Introducing EPAS
- Looking at the different protocols

The EPAS series of protocols belongs to the category of application protocols that govern the interaction and exchange of data between software applications.

In this chapter, we offer an in-depth look at the three types of EPAS protocols.

The EPAS Acquirer Protocol

An Acquirer protocol addresses the interface between an Acceptor and an Acquirer (see Figure 3-1).

It transports information associated to and required for card-initiated transactions from the POI to the Acquirer. An Intermediary Agent may stand between an Acceptor and an Acquirer and may act on behalf of one of the two parties in the exchange of information.

The EPAS Acquirer protocol is composed of a series of standard ISO 20022 messages (CAPE) for authorising or pre-authorising card payment transactions, cancelling or rejecting some of those transactions, and also ensuring their financial clearing and settlement (actual payment) between the different actors involved in the transaction (Merchant, Acquirer, Issuer, and Cardholder). (For more on ISO 20022, see Chapter 2.)

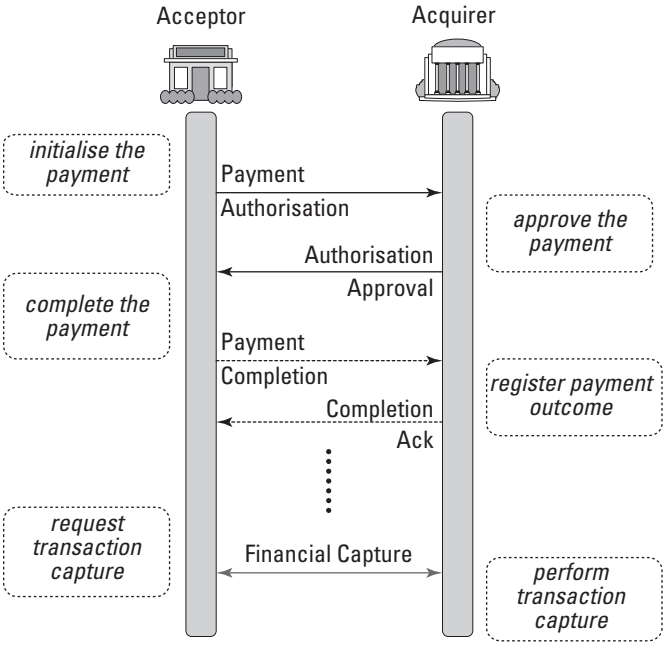

Figure 3-1: The EPAS Acquirer protocol.

The protocol also enables the Merchant to use batches of messages instead of dealing with individual transactions (namely in offline situations).

You can find detailed information on ISO 20022 CAPE messages from the official ISO 20022 website:

```
http://www.iso20022.org
```

The building blocks of the messages

Apart from the ISO 20022 XML envelope containing information about the identity of the message and its version, each CAPE message is usually built around three major message building blocks:

- Header
- Body
- Trailer

Header of the message

The main purpose of a CAPE message header is to convey information related to the actual management and routing of the message to be used by processors or server nodes to reach the proper recipient of the message. It also contains information to trace the journey of the message when relayed through different intermediaries (Intermediary Agents). The performance in transporting and processing the message from one end to the other end of the card payment chain can also be measured through information contained in the header of the message.

A CAPE message header (see Table 3-1) usually embeds information related to

- The type of the message (`MessageFunction`)
- Its application protocol version (`ProtocolVersion`)
- An identification of the exchange of messages (`ExchangeIdentification`)
- The date and time of the creation of the message (`CreationDateTime`)
- The initiating and recipient parties (`InitiatingParty` and `RecipientParty`)
- Traceability information (`TraceabilityInfo`), which gives some visibility on the actual processing performance of the intermediaries in handling the message

The security mechanism, which is part of the Trailer of the message actually covers the body of the message exclusively.

Table 3-1 shows the header of an ISO 20022 CAPE `AcceptorAuthorisationRequest` Message.

Table 3-1 Header of an ISO 20022 CAPE AcceptorAuthorisationRequest Message

	Message Item	*Multiplicity*
A.	**`Header`**	**`[1..1]`**
	`MessageFunction`	`[1..1]`
	`ProtocolVersion`	`[1..1]`

(continued)

Table 3-1 *(continued)*

	Message Item	*Multiplicity*
	ExchangeIdentification	[1..1]
	ReTransmissionCounter	[0..1]
	CreationDateTime	[1..1]
+	InitiatingParty	[1..1]
+	RecipientParty	[0..1]
+	TraceabilityInfo	[0..1]

Body of the message

The body of a CAPE message (see Table 3-2) contains information required by a card payment application to process properly the message from a business, functional, and security perspective.

The body is usually composed of three main functional components:

- The environment (`Environment`) of the card payment transaction in terms of the actors involved (Acquirer, Merchant, POI, Card, Cardholder)
- The context (`Context`) of the transaction (payment, sale)
- The details (`Transaction`) of the card transaction itself or of the products (goods, services) related to that transaction.

Table 3-2 shows the body of an ISO 20022 CAPE `AcceptorAuthorisationRequest` message.

Table 3-2 Body of an ISO 20022 CAPE AcceptorAuthorisationRequest Message

	Message Item	*Multiplicity*
A.	**Body**	**[1..1]**
+	Environment	[1..1]
+	Context	[1..1]
+	Transaction	[1..1]

Environment of the transaction

For authorising a card payment transaction, both the Issuer and the Acquirer need to gather the information about the actors of the transaction (Acquirer, Merchant). The following questions cover some of the typical type of information needed:

- Where was the transaction initiated?
- Which terminal (*POI*) did it occur on?
- Which Acquirer handled the transaction?
- Which card was used?
- Who was the Cardholder*?*

Table 3-3 illustrates the main components of the environment of the transaction. This information is part of the knowledge that an Acquirer or an Issuer needs to get from a transaction and which enable him to take the appropriate decisions in terms of authorisation and financial settlement of the transaction and – to some extent – based on the perception of the risk he has from the information provided.

Table 3-3 Environment Component of an ISO 20022 CAPE AcceptorAuthorisationRequest Message

	Message Item	*Multiplicity*
A.	**Body**	**[1..1]**
+	Acquirer	[0..1]
+	Merchant	[0..1]
+	POI	[1..1]
+	Card	[1..1]
+	Cardholder	[0..1]

Figure 3-2 shows examples of mapping for both Merchant and Acquirer details in the form of ISO 8583 and ISO 20022 (XML).

Identification of the **Acquirer**
Acquirer ID: **9287351**
parameters version: **20110107080000**

Identification of the **Merchant**
Merchant ID: **Soluproducts**
type of location: **Fixed**

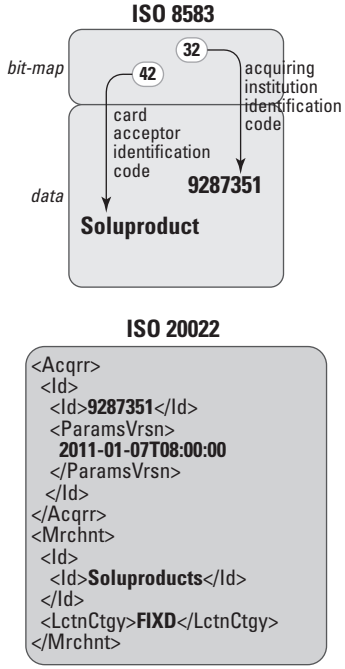

Figure 3-2: Examples of mapping between ISO 8583 and ISO 20022 codings for an Environment component of a CAPE `AcceptorAuthorisationRequest` message.

Context of the transaction

The context of the transaction provides to the recipient of this information (namely, the Acquirer) two types of information:

- A payment context (`PaymentContext`) that provides the payment elements of information associated with the sale transaction

- A sale context (`SaleContext`) that identifies elements related to the pure commercial aspects of the transaction (see Table 3-4)

Table 3-4 Context Component of an ISO 20022 CAPE AcceptorAuthorisationRequest Message

	Message Item	*Multiplicity*
A.	**`Body`**	**`[1..1]`**
+	`PaymentContext`	`[1..1]`
+	`SaleContext`	`[0..1]`

Details of the transaction

This block, shown in Table 3-5, starts by informing the Acquirer whether the transaction needs to be captured (`TransactionCapture`). It then provides the type of transaction (`TransactionType`), the service associated with the transaction (`AddtlSvc`) as well as an additional attribute associated with the service previously referred to (`SvcAttr`).

A unique identification is then assigned to the transaction (`TransactionIdentification`).

The details of a previous transaction (`OriginalTransaction`) may be used to refer to an original transaction, namely in case of a cancellation. It then provides the details of the transaction (`TransactionDetails`) needed to authorise or pre-authorise the transaction, cancel it, or ensure the ultimate settlement of the transaction.

The detailed transaction contains additional information related to one or several products and/or services (Product). ICC-related information such as EMV is transported in a specific container component (`ICCRelatedData`)

Table 3-5 shows the Transaction component of an ISO 20022 CAPE `AcceptorAuthorisationRequest` message. Note that some intermediary elements are missing on purpose.

Table 3-5 Transaction Component of an ISO 20022 CAPE AcceptorAuthorisationRequest Message

	Message Item	*Multiplicity*
A.	**Body**	**[1..1]**
	TransactionCapture	[1..1]
	TransactionType	[1..1]
	AddtlSvc	[0..n]
	SvcAttr	[0..1]
+	TransactionIdentification	[1..1]
+	OriginalTransaction	[0..1]
+	TransactionDetails	[0..n]
+	Product	[0..n]
+	ICCRelatedData	[0..1]

Single versus dual

Single Message System (SMS) refers to the single and only exchange of messages between an Acquirer and an Issuer to determine whether funds are available for the transaction and an approval can be obtained from the Issuer. It allows the transaction to be posted directly to the account of the Merchant. This unique exchange completes the transaction with the clearing and settlement of the transaction and doesn't require any additional exchange of messages.

Dual Message System (DMS) refers to the need to rely on two different exchanges between an Acquirer and an Issuer: one exchange to determine whether funds are available for the transaction and an approval can be obtained from the Issuer. An additional exchange is required to ensure the clearing and settlement of the transaction.

Trailer of the message

The message's trailer serves as a security trailer that contains a message authentication code computed on the body of the message with a cryptographic key. It allows the authentication of the initiator and the protection of the content of the body of the message against any unauthorised alteration of the message.

The EPAS TMS Protocol

A Point of Interaction (POI) contains some vendor-specific firmware and application software performing services beyond the pure card payment ones. It also contains electronic keys to ensure the protection of the data exchange by the POI with its external environment.

The update of software and the downloading of electronic keys can be carried out either through a direct intervention on the POI itself or remotely by using a distant software application.

While most manufacturers of terminals do provide a proprietary tool to achieve this objective, the advantage of relying on an open and common solution, such as the EPAS TMS protocol, is to achieve a clear independence between the terminals on the field and their actual management and control at a distance (see Figure 3-3).

Parameters actually influence the behaviour of the POI. In an EPAS TMS environment, those parameters are under the control of a Terminal Manager (TM). The TM is itself controlled by a unique Master Terminal Manager (MTM), which has the total control of the POI System in terms of security, applicative, and maintenance services needed to manage a Terminal Management System (TMS).

The Master Terminal Manager can delegate part or all of the TMS services to one or several Terminal Managers.

Various actors can actually play the role of TM and MTM (for example, a Manufacturer, an Acceptor, an Acquirer, or a third party).

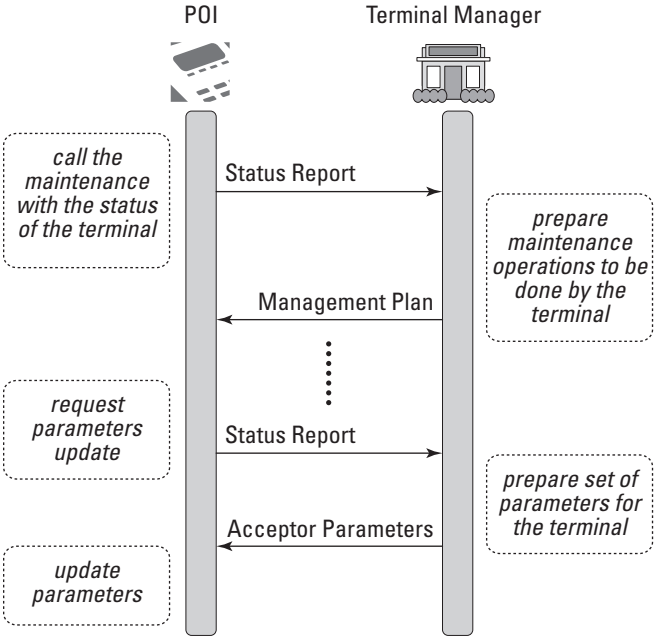

Figure 3-3: The EPAS TMS protocol.

A TMS protocol provides at least the following services:

- Software management (firmware, operating system, and application software)
- Parameter administration (storage, maintenance, and download of configuration parameters and cryptographic keys)
- Maintenance and device management (diagnosis of POI component functionalities with specific access rights)

You can obtain more information on the ISO 20022 Card Payments Terminal Management messages from the official ISO 20022 website:

```
www.iso20022.org
```

The building blocks of the messages

Independently of the ISO 20022 XML envelope containing information about the identification of the message and its version, each Card Payments Terminal Management message is usually built around three major message building blocks:

- Header
- Body
- Trailer

Header of the message

The main purpose of a Card Payments Terminal Management message header is to convey information related to the actual management of the message in terms of the following:

- An indicator whether the message is for download (`DownloadTransfer`)
- The version of the format of the message (`FormatVersion`)
- An identification of the exchange (`ExchangeIdentification`)
- The date and time of the creation of the message (`CreationDateTime`)

It also contains information to identify the `InitiatingParty` as well as the `RecipientParty` involved in the exchange of the message.

Table 3-6 illustrates the main components of an ISO 20022 CAPE TMS message.

Table 3-6 Header Component of an ISO 20022 CAPE TMS Message

	Message Item	*Multiplicity*
A.	**`Header`**	**`[1..1]`**
	`DownloadTransfer`	`[1..1]`

(continued)

Table 3-6 *(continued)*

	Message Item	*Multiplicity*
	FormatVersion	[1..1]
	ExchangeIdentification	[1..1]
	CreationDateTime	[1..1]
+	InitiatingParty	[1..1]
+	RecipientParty	[0..1]

Body of the message

The body of a Card Payments Terminal Management message contains all information required for the actual management of a terminal or a set of terminals in terms of

- Status report (StatusReport message)
- Replacement of terminal management plans (ManagementPlanReplacement)
- Acceptor configuration parameters update (AcceptorConfigurationUpdate)

Trailer of the message

The trailer contains a message signature or alternatively the authentication code, computed on the body of the message with a cryptographic key.

It allows the authentication against any unauthorised alteration of either the POI or the TMS depending on the type of message.

The EPAS Retailer Protocol

The EPAS Retailer protocol addresses the interface between a sale system and a payment system (see Figure 3-4).

The Retailer protocol allows a sale system to request a POI system to process the payment for the purchase of goods or services by a customer.

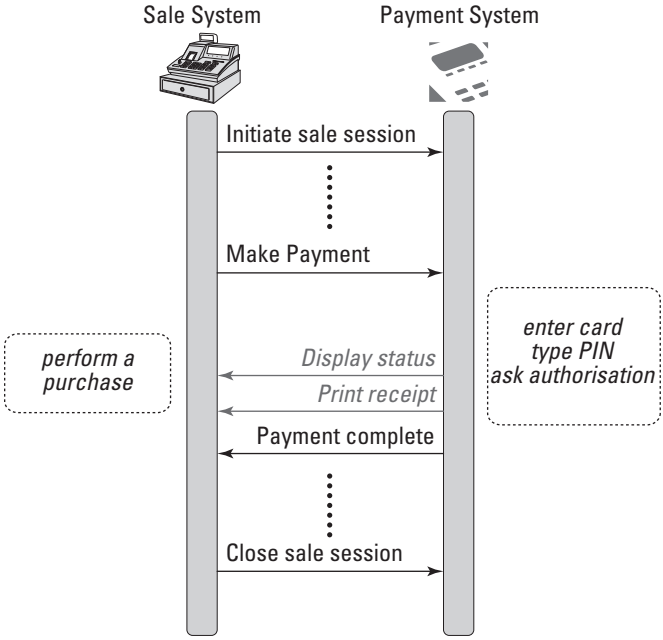

Figure 3-4: The EPAS Retailer protocol.

The sale system

A Merchant uses a sale system to manage the purchase of the goods and services by a customer. The sale

- Identifies and registers all the goods and services selected by the customer for the purchase
- Prepares the total amount of the purchase, including additional charges and discounts
- Makes the payment of the total amount
- Performs the delivery of the goods and services to the customer

The sale system can take various forms, depending on the environment of the store. For example:

- **A line of cash registers in a supermarket:** In this case, all the cash registers are connected to a server by a local network to manage the purchases and the goods of the store. A cash register can be operated by a cashier or can be a self-checkout operated by the customer itself with the possible help of a supervisor.
- **A vending machine for ticketing or paying in a parking lot:** In this case, the customer is alone to make the purchase and the payment.
- A web-server: In this case, a customer can buy goods and services remotely.

The payment system

The payment, which is one of the activities of the sale system, is subcontracted to a dedicated payment system when the customer pays with a payment instrument performing electronic payments.

Electronic payment instrument can have various forms depending on the way to transfer payment data and the type of payment instrument.

Payment data may be exchanged with a magnetic stripe on a card, a chip containing a payment application inside a smart card or other device as a mobile phone, or even a barcode on a loyalty card.

Examples of a payment instrument are a credit or a debit card, a specific purpose card as a fleet card, an anonymous stored value card, or a check.

A dedicated system performs the payment because of the complexity of the payment process, such as for smart cards, the variety of services attached to the payment, and the security related to electronic payment requiring an isolated and certified product.

Categories of services

The EPAS Retailer protocol has defined a set of messages providing several categories of services:

- Financial services to process payment transactions
- Administrative services to manage the interface between the two systems
- Device services to allow sharing of devices between the two systems

Financial services

In addition to the standard payment, financial services include

- Cash-back to obtain extra cash along with the goods
- Dynamic currency conversion when the customer chooses to pay with his own currency rather than the currency of the Merchant
- Refund to reimburse the customer for return of goods
- Payment of tips
- Payment reservation for car rental or hotel booking
- Cancellation to void a previous payment

Financial services also include loyalty services to credit a loyalty account along with a payment, offer discount or free items on a purchase, or redeem a loyalty account.

Administrative services

Financial administrative services let an application check the balance of the account attached to a payment card, loyalty card, or stored value card. Administrative services also let the sale system and the payment system exchange accumulated totals of transactions during a certain period.

Other administrative services are required to

- Synchronise the payment system and the sale system
- Open and close payment services
- Enable a customer to start the payment before the complete identification of the goods

Administrative services also provide error handling:

- Make a diagnosis on the availability of the payment services
- Abort a payment that takes too much time
- Request the result of a previous payment

Device services

Device services provide device sharing for the cashier or customer. The user interface displays information, print receipts or other documents, or requests additional information required for the payment.

Other device services are oriented on the payment interface, such as reading a card or checking the PIN of a card to authenticate the owner of the card.

Chapter 4

EPASOrg and Its Partnerships

In This Chapter

- Developing a retailer protocol with ARTS
- Implementing SEPA standards with OSCar
- Adopting a common protocol for Dutch retailers
- Cooperating with ADS+ on a new protocol

From the beginning of the creation of its legal structure, EPASOrg established a series of partnerships with organisations that shared similar interests in the development of common specifications in the field of card payments. In this chapter, we take a look at some of those partnerships.

ARTS: United We Stand

ARTS, the Association for Retail Technology Standards of the National Retail Federation (NRF) based in the United States, is an international organisation dedicated to reducing the costs of technology through standards. Since 1993, ARTS has been delivering application standards exclusively to the retail industry.

ARTS approached EPASOrg in June 2010. The group wanted to establish strong ties in order to jointly develop the specifications of a retailer protocol that would meet the requirements of both organisations.

ARTS and EPASOrg drafted a Memorandum of Understanding that is now in the final version of endorsement by both organisations. A first version of ARTS-EPAS Common Specifications is expected by the first half of 2012.

OSCar: First Implementation of EPAS in Europe

The OSCar Consortium, established at the end of 2010, has the objective of fostering the implementation of two main SEPA standards in Europe:

- The ISO 20022 EPAS Acquirer protocol
- The SEPA FAST Application specification developed by the CIR Working Group

The basic aim of the OSCar initiative is to facilitate and accelerate the adoption of both complementary specifications by

- Carrying out the very first pilots in Europe of both specifications in a multi-country and multi-scheme environment
- Putting in place an end-to-end evaluation and certification process in compliance with the proposed SEPA certification framework
- Providing a cooperative platform for technical integration and change requests management

A Letter of Intent was addressed to EPASOrg in February 2011. The EPASOrg Board of Directors further acknowledged this proposal of cooperation in March 2011.

Currence: The Choice of Dutch Retailers

Retailers in the Netherlands (small, medium, and large enterprises) experienced a lock-in situation regarding interfaces between sale and payment systems, according to pre-study

and research funded by the Stichting Bevorderen Efficiënt Betalen (SBEB – Foundation for the Promotion of Payment Efficiency).

The study actually demonstrated that retailers had no freedom of choice when it came to connecting a sale system with a payment system. The study also showed that if a full market competition could be achieved, chances were that prices for the interfaces would be substantially reduced.

Because most manufacturers developed their own protocol specifications, a situation of lock-in was created vis-à-vis their customers. In order to avoid this situation, the Dutch retail organisation agreed to proceed with the adoption of a common standard protocol.

Currence, the card payment scheme of the Netherlands, was commissioned by SBEB to support and facilitate this project.

EPASOrg was ultimately approached by Currence for help identifying the best solution to achieve the objectives of openness and universality set out by the Dutch Retailers' organisation.

Both parties signed a Memorandum of Understanding in May 2011 to set out in legal terms the desire to cooperate on the development of a Proof of Concept and to allow EPASOrg to conduct a compliance approval process on the resulting developments.

An ultimate demonstration of the EPAS Retailer Protocol was made on 6 September 2011 in the Netherlands in front of Dutch retailers to endorse the decision to rely on this protocol for addressing the requirements of the Dutch market.

ADS+ and the EPAS Retailer Protocol

ADS+ is an innovative project started in France in March 2010 and labelled by TES and Systematic French Competitiveness Clusters (French Pôles de Compétitivité).

A consortium of 13 organisations and research laboratories leads this project. The main objectives of this initiative are the design and validation of a new open architecture for IP POI with thin client POI approach.

The ADS+ consortium approached EPASOrg in order to jointly develop the specifications of a new protocol to support the open architecture developed by the project. Most the proposed protocol's functionality would inherit several attributes of the EPAS Retailer protocol.

The ADS+ consortium and EPASOrg are in the process of signing a Memorandum of Understanding where EPASOrg would provide support and ensure the further maintenance of this new protocol. The new protocol would become part of EPASOrg portfolio of messages.

Chapter 5

Ten Useful Things to Tell Your Boss about EPAS

In This Chapter

- Counting the benefits of open standards
- Looking at ISO 20022 as a prerequisite for the future of card payments

If your boss doesn't think a new generation of open and common protocols, such as EPAS ones, will become a necessity in the near future, don't lose hope yet. The information in this chapter contains ten valuable reasons he should make the move to EPAS protocols.

Open Standards Are a Must

The evolution of the card payment business has paved the way to more open, transparent, and interoperable solutions for the benefit of all those involved in the card payment value chain (retailers, users, manufacturers, banks, services providers, and so on). EPAS standards fulfil all the criteria required to ensure the proper and long-term implementation of open card payment standards.

Open Standards Are Here to Stay

The recent evolution of card payment regulation has occurred not only in Europe, but also worldwide. As a result, regulators

took a clear stance toward open solutions because they don't present the drawbacks of proprietary specifications, which may create and maintain barriers to competition. Open protocols, such as EPAS ones, supported by a dedicated international non-profit organisation composed of major stakeholders of the industry, provide a guarantee that the whole ISO 20022-standardisation work carried out by EPASOrg is based on solid grounds.

Open Standards Provide Better Guarantees

When drafted or endorsed by an international standardisation organisation, open standards provide better guarantees of quality and evolution.

EPASOrg has developed ISO 20022 standardised messages endorsed by the Cards SEG of ISO 20022. This ISO group is composed of card payments experts from all horizons (geographic, know-how, and so on), giving a strong backing to the whole initiative. EPASOrg is formally committed to ensure the further evolution and maintenance of the standards through the ISO 20022 maintenance process.

ISO 20022: A Better Recipe for Card Payment Messages

ISO 20022 is a methodology for defining messages. Currently, IS) 20022 has defined and endorsed more than 300 messages, with many more on the way. The convergence of ISO 20022 card standards with other types of payment instruments provides an added-value from both a business and implementation point of view.

Gaining Transparency through an End-User License Agreement

With the ISO 20022 standardisation process, EPASOrg acknowledged the acceptance of the ISO 20022 Intellectual Property Rights policy and the fact that it would grant to third parties a nonexclusive, royalty-free license to use the specifications. The EPAS Retailer protocol has also adopted a similar open policy with the same EULA process.

EPAS Standards Aren't Just Mere Protocol Specifications

For all its protocols, EPASOrg has developed a complete toolbox composed of specifications, implementation guidelines, and test cases. EPASOrg is currently considering a tool for implementers, which would allow further auto-certification of an EPAS implementation.

EPASOrg Is Open for Cooperation

Since its inception, EPASOrg has partnered with various entities following the same objectives of openness and non-proprietary royalty-free standards. Some significant examples of such cooperation are ARTS, Currence (Dutch PoC), ADS+, OSCar, and so on. For more on these partnerships, see Chapter 4.

EPAS Standards Are SEPA-Compliant

EPAS protocols specifications have been designed in parallel with the drafting of the EPC Books of Requirements. They're

compliant to these requirements, and several experts of the EPAS Working Groups actually participated in the drafting of those requirements.

EPAS Standards Are Universal

The review and further endorsement by the ISO 20022 Cards SEG of the EPAS standards is a guarantee that EPAS standards were not only developed by Europeans for Europeans. The Cards SEG of ISO 20022 is composed of worldwide card payment experts, which ensured a wider, universal scope of application.

EPASOrg Will Certify EPAS-Compliant Implementations

In its role as specification provider, EPASOrg intends to ensure a proper certification of implementations that claim to be EPAS-compliant. To this end, EPASOrg is considering the development of an auto-certification tool to be delivered for free to implementers.

Chapter 6

Ten Useful Links to Implement EPAS Protocols

In This Chapter

- Finding out all you can about EPAS implementation
- Discovering important official websites

This chapter provides useful links to various websites related directly or indirectly to EPAS and EPAS implementation.

EPASOrg Official Website

This website is the first and most important reference for the implementation of EPAS standards:

```
www.epasorg.eu
```

It helps you find the latest information about EPASOrg and the EPAS protocols. This link is the first to follow, especially if you want to consider a possible implementation of an EPAS protocol and see whether it may fit with your own requirements.

EPAS Message Usage Guides

The EPASOrg website also provides additional implementation specifications to the EPAS and ISO 20022 CAPE specifications.

You can find the EPAS Acquirer Protocol MUG website at

```
www.epasorg.eu/spip.php?rubrique101
```

You can find the EPAS TMS Protocol MUG website at

```
www.epasorg.eu/spip.php?rubrique105
```

ISO 20022 Official Website

The official website and reference for all ISO 20022 standard messages is

```
www.iso20022.org
```

This website is also the place where you can download the official ISO 20022 card payment standards, such as the one issued by EPASOrg. You can also find the EPASOrg End-user License Agreements here as well.

ISO 20022 Cards and Related Retail Financial Services Message Specifications

For the official ISO 20022 Cards and Related Retail Financial Services Message specifications, as well as XML Schema (the XML coding) and XML instances (examples of XML messages), go to

```
www.iso20022.org/UNIFI_Cards_messages.page
```

ISO 20022 EPAS End-User License Agreement

Before using EPAS and ISO 20022 specifications, you need to agree to an end-user license agreement. To see a copy of the end-user license agreement, visit the following website:

```
www.iso20022.org/documents/general/EPASOrg_
EPAS_End-user_License_Final.pdf
```

ISO 20022 For Dummies

SWIFT and ISO issued an *ISO 20022 For Dummies* (English and Japanese versions). You can request your own copy by e-mail to the following address:

```
mailto:standards.forum@swift.com
```

UML Official Website

ISO 20022 specifications rely on a UML methodology. You can find more information on UML at the following website:

```
www.uml.org
```

XML Official Website

ISO 20022 primary coding is XML. You can find more information on XML at the following website:

```
www.w3.org/XML
```

EXI Official Website

EXI provides an appropriate way to optimise XML. You can find an outline of EXI as well as any relevant information about EXI and EXI specifications at the following website:

```
www.w3.org/XML/EXI
```

ASN.1 Official Website

ISO 20022 CAPE specifications use either XML or ASN.1/DER coding. You can find more information on ASN.1 at the following website:

```
www.ncbi.nlm.nih.gov/Sitemap/Summary/asn1.
html
```

Appendix

Glossary

Acceptor: A merchant or other entity that accepts a payment instrument presented by a client in order to transfer funds to that merchant or other entity.

Acceptor-to-Acquirer Card Transactions: ISO 20022 Business Area that covers messages that support any card payment-related transactions and services between a card Acceptor and a card transaction acquirer. It includes the authorisation, cancellation, and capture of card transactions. Business Area Code: `caaa`.

Acquirer: In point-of-sale (POS) transactions, the entity (usually a credit institution) to which the Acceptor (usually a merchant) transmits the information necessary in order to process the card payment.

ADS+: An innovative project initiated in France and labelled by TES and Systematic French Competitiveness Clusters (French Pôles de Compétitivité). A project of 13 organisations and research laboratories carried out under a specific French governmental framework for funding innovative projects.

ARTS: Association for Retail Technology Standards of the National Retail Federation (NRF) based in the United States. An international organisation dedicated to reducing the costs of technology through standards.

ASN.1-TLV/DER (ISO/IEC 8825-1:2002): Abstract Syntax Notation One (ASN.1) is a notation for describing abstract types and values. The Distinguished Encoding Rules for ASN.1 (DER) is intended for applications in which a unique octet string encoding is needed.

ATICA: An ISO 20022 Acquirer-to-Issuer series of card payment messages by which retail financial and nonfinancial transaction card-based messages can be interchanged in the Acquirer to Issuer domain.

ATM: Automated Teller Machine, a machine usually located in a public place allowing consumers to make deposits, obtain cash from checking or savings accounts, pay bills, and, in some cases, transfer money between accounts and do other routine financial transactions.

Authorisation: The guarantee of funds given by an Issuer to an Acquirer according to agreed rules.

Batch: A collection of data sharing the same characteristics, which is gathered for processing as a single group.

Bitmap: Data presented as a map or an array of bits, with each bit having a specific meaning relating to the information its supports. Usually used in telecommunication protocols or in digital image processing where bitmap implies one bit per pixel.

Brand: A particular payment product (especially a card) that has been licensed by its owner (Issuer) for use in a given environment or scheme.

Business Area: Categories defined by the ISO 20022 Registration Authority to classify ISO 20022 Message Definitions and the corresponding four-character code used in the Message Identifier of related ISO 20022 Message Definitions.

Business Component: Components usually characterised by a series of elements. For example, a `PaymentCard` Business Component can be characterised by elements, such as `PAN`, `ExpiryDate`, and so on.

Business Justification (BJ): Overview of the scope, reason, and estimated users, volumes, savings, and so on of the intended submitted ISO 20022-message set. The business justification also describes the commitment of the submitting organisation to dedicate required resources to the development and support of the new messages.

Card scheme: A technical and commercial arrangement set up to serve one or more card brands. It provides the organisational, legal, and operational framework necessary for the functioning of the services marketed by those brands.

Cards Stakeholders Group (CSG): An open forum part of the EPC structure (see upcoming definition) and where stakeholders of the industry exchange views.

CAPE: ISO 20022 series of messages within the POI (Point of Interaction) card payment domain submitted by EPASOrg. Synonym of EPAS Acquirer and TMS Protocols.

Certificate: Letter issued by a certification body for a proofed product.

Certification: The process of certifying that a certain product has passed functional quality assurance tests and/or security tests and/or performance tests according to accredited standards.

CIR (Common Implementation Recommendations) Technical Working Group: An open standardisation initiative of EMV implementers in Europe.

Clearing: Calculation of the bilateral or multilateral obligations in regards to credit and debit positions held by market participants.

Components: Refers to either ISO 20022 Business or Message components.

Data Dictionary: In ISO 20022, part of the ISO 20022 Repository that contains all items that can be reused during business process modelling and message definition activities.

Dictionary Item: Items stored in the Data Dictionary.

Dual Message System (DMS): Exchange to determine whether funds are available for the transaction and an approval can be obtained from the Issuer. The exchange does not allow posting for account reconciliation and needs an additional exchange to enable this feature.

Efficient XML Interchange (EXI): A specification for an encoding format that allows efficient interchange of an XML Information Set.

EPAS: A series of card payment protocols developed by EPASOrg. EPAS is the initial name of the standardisation and cooperation initiative leading to the provision of EPAS specifications. The EPAS portfolio consists of standards for three main protocols: an Acquirer Protocol (ISO 20022 CAPE), a Retailer Protocol, and a TMS Protocol (ISO 20022 CAPE).

EPAS Acquirer Protocol Message Usage Guide: Additional implementation specifications to the ISO 20022 Card Payments Exchanges Message Definition Report (covering ISO 20022 `caaa.001.n.n` to `caaa.015.n.n` series of messages).

EPAS Consortium: Group of actors belonging to the card payment value chain involved in the initial EPAS project carried out under the framework of the ITEA Programme (see ITEA). The project was later taken over by EPASOrg in October 2009 (see EPASOrg).

EPAS TMS Protocol Message Usage Guide: Additional implementation specifications to the ISO 20022 Card Payments Terminal Management Message Definition Report (covering ISO 20022 `catm.001.n.n` to `caaa.003.n.n` series of messages).

EPASOrg: An international non-profit association created to ensure the development and maintenance of universal card payment standards. An EPASOrg legal entity was created in Brussels in October 2009 as an outcome of the former EPAS Consortium launched in the framework of ITEA (see upcoming definition). A European research programme dedicated to the support of IT projects.

EULA (End-User License Agreement): A legal contract between an entity (manufacturer, specification provider, and/or the author) and the end-user of a specification or a software application. The EULA details how the specification or software can and cannot be used and any restrictions that a specification provider or a manufacturer imposes.

European Payments Council (EPC): The decision-making and coordination body of the European banking industry in relation to payments. The EPC develops the payment schemes and frameworks necessary to realise SEPA (see upcoming entry).

Initiating Party: In a CAPE message exchange, the party that initiated the exchange. Used essentially for routing purposes (part of a CAPE Header).

Interoperability: Usually used to refer to the harmonised usage of procedures and protocols to conduct card payment transactions. In ISO 20022, refers to the capability to easily exchange business information while using different message standards.

IFX: The Interactive Financial eXchange Forum created to develop message standards for financial services. The IFX Forum is made up of industry-leading financial institutions, service providers, and independent software vendors.

ISO: International Organization for Standardization, the world's largest developer and publisher of International Standards. It's a network of the national standards institutes of 160 countries, 1 member per country, with a Central Secretariat in Geneva, Switzerland, that coordinates the system. ISO promulgates worldwide standards in a variety of domains with the aim to facilitate cross-border exchanges of goods, services, and techniques.

ISO 8583: An ISO standard for systems exchanging electronic transactions made by cardholders using payment cards. It has three parts:

- Part 1: Messages, data elements, and code values
- Part 2: Application and registration procedures for Institution Identification Codes (IIC)
- Part 3: Maintenance procedures for messages, data elements, and code values.

ISO/IEC 8825-1:2002: *See* ASN.1-DER.

ISO 20022: A common platform for the development of messages using a modelling methodology (based on UML), a central dictionary of business items used in financial communications, and a set of XML design rules to convert the messages described in UML into XML schemas.

ISO 20022 Cards and Related Retail Financial Services SEG: An ISO 20022 Standards Evaluation Group (SEG – see upcoming entry) whose scope includes the messages that support secure transactions and business processes related to card and card-related payment instruments.

ISO 20022 Financial Repository: A repository consisting of two major parts: the Data Dictionary and the Business Process Catalogue. The Data Dictionary contains Business Concepts, Message Concepts and Data Types. All these items are reusable and are called Dictionary Items. The Business Process Catalogue is organised in Business Areas. The communication requirements and the interaction requirements in the various Business Areas are supported by Business Transactions. All items that are stored in the Business Process Catalogue are called Catalogue Items.

ISO 20022 Message Definition Report (MDR): A MDR describes the elements contained in one or more ISO 20022 messages. It provides a table view of the message(s), details the attributes of each element or group of elements, and lists all associated codes contained in the message schema. Conditionality between the components of the message(s) described is also covered.

ISO 20022 Message Usage Guide (MUG): A MUG is an ISO 20022 document that comes in addition to the ISO 20022 Message Definition Report (MDR) when there is a need for further explanation about how to use the message definition(s) in compliance with the standard. MDRs and MUGs are published in the Catalogue of ISO 20022 messages.

ISO 20022 Registration Authority (RA): The guardian of the ISO 20022 Financial Repository. The RA mission is to ensure compliance of developed Repository items with the approved technical specifications and to publish the Financial Repository on `www.iso20022.org`, on behalf of ISO.

ISO 20022 Registration Management Group (RMG): Group made of senior industry experts nominated by ISO TC68 P-member countries and category A liaison organisations. The RMG monitors the overall ISO 20022-registration process and reports directly to ISO TC68.

ISO 20022 Standard: The ISO 20022 standard is described in the document "ISO 20022 Financial Services – Universal financial industry message scheme" and includes six parts:

- **Part 1:** Overall methodology and format specifications for inputs and output from the ISO 20022 Repository
- **Part 2:** Roles and responsibilities of the registration bodies
- **Part 3:** ISO 20022 modelling guidelines (Technical Specification)
- **Part 4:** ISO 20022 XML design rules (Technical Specification)
- **Part 5:** ISO 20022 reverse engineering (Technical Specification)
- **Part 6:** Message transport characteristics

ISO 20022 Standards Evaluation Groups (SEGs): A group of industry experts in specific business domains of the financial industry as defined by the ISO 20022 Registration Management Group (RMG). ISO TC68 member countries and liaison organisations nominate SEG members.

ISO 20022 Submitter or ISO 20022 Submitting Organisation: Any community of users or organisations that want to develop and use ISO 20022-compliant messages to support its financial transactions. EPASOrg is the ISO 20022 Submitter of the CAPE series of messages.

Issuer: A financial institution that makes payment cards available to cardholders, authorises transactions at point-of-sale (POS) terminals, and guarantees payment to the acquirer for transactions that are in conformity with the rules of the relevant scheme.

ITEA: Information Technology for European Advancement: Europe's premier co-operative R&D programme driving precompetitive research on embedded and distributed software-intensive systems and services.

Merchant: *See* Acceptor. In some cases, Merchant and Acceptor can represent different entities.

Message: A set of structured information exchanged between two parties involved in a transaction.

Message Component: A reusable ISO 20022 Dictionary Item used for assembling Message Definitions.

Message Definition: An ISO 20022 formal description of the structure of a message.

Message Definition Report (MDR): Describes the elements contained in one or more ISO 20022 messages. It provides a table view of the message(s), details the attributes of each element or group of elements, and lists all associated codes contained in the message schema. Conditionality between the components of the message(s) described is also covered.

Message Usage Guide (MUG): Describes how to use all the possibilities/options of one or more ISO 20022 Message Definitions. There is only one Message Usage Guide per Message Definition. The Message Usage Guide comes in addition to the official Message Definition Report and should ultimately become part of it to facilitate the life of implementers/users. Like Message Definition Reports, a single MUG can cover usage of several Message Definitions

NRF (National Retail Federation): The world's largest retail trade association and the voice of retail worldwide. NRF's global membership includes retailers of all sizes, formats, and channels of distribution, as well as chain restaurants and industry partners from the United States and more than 45 countries abroad.

Offline: Deferred processing without direct communication.

Online: Direct communication between devices with electronic capability (terminals, networks, hosts, and so on).

OSCar (Open Standards for Cards): A consortium established by the end of 2010 with the objective of fostering the implementation of two main SEPA standards in Europe, namely the ISO 20022 EPAS Acquirer protocol and the SEPA FAST Application specification.

POI (Point of Interaction): Usually used as a synonym for POS when referring to a generic device accepting cards for the payment of goods and services. A POI isn't restricted to a retail environment because it can be used in public and private places in both an attended or unattended mode.

POS (Point of Sales): In a retail environment, refers to a place where a product or service can be purchased and is often referred to as a Point of Purchase. Alternatively, it can also be considered as a terminal used for the replacement for a cash register. In the card payment environment, it usually designates a device that accepts a payment card for the payment of goods and services.

Processing: In a card payment environment, the performance of all the actions required in accordance with the rules of a system for the handling of a transfer order from the point of acceptance by the system to the point of discharge from the system. Processing may include clearing, sorting, netting, matching, and/or settlement.

Processor: *See* Processing.

RecipientParty: In a CAPE message exchange, the party acting as recipient of the exchange. Used essentially for routing purposes (part of a CAPE Header).

Reconciliation: An exchange of messages between two entities (Acquirer, Issuer, or their respective agents) to reach agreement on financial totals.

SEPA (Single Euro Payments Area): A pan-European integration initiative whose objective is to harmonise payment systems in Europe. While SEPA was initially created to cover the euro area countries, it has been extended to address remaining EU countries, as well as Iceland, Liechtenstein, Norway, and Switzerland. SEPA is the logical next step in the completion of the EU internal market and monetary union.

SEPA Credit Transfer (SCT): ISO 20022-based set of messages that enable payment service providers to offer credit transfer services in euro throughout the SEPA region for single or bulk payments. The standard facilitates payment initiation, processing, and reconciliation based on straight-through processing (STP).

SEPA Direct Debit (SDD): An ISO 20022-based set of messages enabling payment service providers to use a payment instrument offering direct debit services that can be used for both domestic and cross-border collections throughout the 32 SEPA countries. EU Regulation (EC) 924 / 2009 mandates every bank in the euro area to be reachable for cross-border direct debits since November 2010.

SEPA-FAST: Specifications based on EMV Chip and PIN technology describing a financial application on a SEPA Cards Framework (SCF) compliant terminal.

Settlement: A transfer of funds to complete one or more prior transactions made, subject to final accounting and corresponding to reconciliation advices.

Single Message System (SMS): The single and only exchange of messages between an Acquirer and an Issuer. Used to determine whether

- Funds are available for the transaction
- An approval can be obtained from the Issuer
- The transaction can be further posted directly to the account.

Submitting Organisation: Any community of users or organisation using the ISO 20022 registration process to develop candidate ISO 20022 messages.

TC68: An ISO technical Committee in charge of ISO standards for supporting financial services.

Terminal Management: ISO 20022 Business Area Messages covering messages that support any card-related terminal management services between a Terminal Management System (TMS) and a Point of Interaction (POI) system. Business Area Code: `catmcatm`.

UML (Unified Modelling Language): An ISO specification language for modelling objects. Used in ISO 20022 to represent the industry business and message definitions.

W3C (World Wide Web Consortium): An international community that develops standards to ensure the long-term growth of the Web.

WG4: ISO TC68 Working Group 4: An international working group of experts set up by TC68 to revise and maintain the ISO 20022 standard and its technical specifications.

XML (Extensible Mark–up Language): Syntax to encode documents or messages. Any individual or group of individuals or companies that wants to share information in a consistent way can use XML.

Breaking technical barriers

EPASOrg

EPASOrg's main objective is to establish a new generation of open and royalty-free standards between card acceptors and card transaction acquirers.

This new environment will create the conditions for a competitive and dynamic market for card payments worldwide.

Driving interoperability in card payments

ISSUANCE OF **UNIVERSAL** ROYALTY-FREE SPECIFICATIONS

DESIGN OF **INNOVATIVE** STATE-OF-THE-ART INTERNATIONAL STANDARDS

DEVELOPMENT OF **OPEN** AND INTEROPERABLE SOLUTIONS

PROVISION OF **SECURE** KEY ELEMENTS OF THE TRANSACTION CHAIN

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The mission of EPASOrg is to develop, promote and maintain interoperable card payment standards.

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