

E-payments taxonomy

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In the past three years we have witnessed the development or introduction of more than twenty (mobile) e-payment solutions in the Netherlands. Banks, telecom companies, new entrants, retailers and credit-card companies have all been involved in developing specific solutions. A lot of experience and know-how has thus been accumulated at the supplier side of the market for mobile payment products. But the downside to the multitude of solutions available is that it is more difficult for investors, merchants, regulators and consumers to evaluate, value and appreciate these solutions. On a European scale, this problem is even bigger.

In order to better understand the scope and possible use of the different initiatives we have set out to develop a taxonomy to classify mobile payment solutions. This taxonomy serves to identify the specific nature of e-payment systems and allows the identification of alternative payment solutions. The e-payments taxonomy can thus serve as a framework for strategic analysis, but also as quick reference to monitor the latest developments. Also, the framework may be useful in the context of the ePSO work of the European Central Bank.

Its main features: building the payment value chain

Although e-payment solutions come in many forms and shapes, we believe that it is essential to be able to recognize the value chain of payment transactions. Therefore we use the following six features as the basis for our taxonomy (see Figure 1):

- the business context
- the technical device of the customer
- the mode of communication.
- the main authentication method
- the payment model
- the type of payment supplier

Figure 1 - The e-payments taxonomy as a payment value chain



Our taxonomy can be understood as a value chain or flow diagram for electronic payments. Any e-payment occurs in a certain business context, be it remote banking or the physical point of sale. The users of e-payments will possess a device to initiate the transaction. Then, the payment transaction will be effected using specific communication channels and authentication methods. These technical means may vary depending on the nature of the payment (is it pre-paid or will it be charged later) or the nature of the company that supplies the payment method (a bank, a billing service provider).

Refining the taxonomy

Business context

The success of a payment instrument is very much determined by the alignment with the business context in which it is used. Understanding the business context is therefore quite important. To this end, many distinctions may be made.

A first distinction is between situations in which consumers are offered a choice of payment instruments and those in which they are required to use a specific payment instrument (or have to forego consumption of the good/services offered). An example of the latter situation is that public parking in Rotterdam requires consumers to utilize the joint banks' payment product Chipknip.

Another distinguishing feature is the difference between banking and shopping. Consumers will have a very different mind set when doing their finances and budget administration when compared to their shopping behaviour. Within these main categories it is possible to further identify repetitive payments/shopping decisions from those that are incidental and require a more indepth evaluation of available options. Or we could chose to separate routine from impulse behaviour.

We could also classify payments according to their physical characteristics. On the one side of the spectrum we would have the home situation where bank administration occurs, while the typical other end of the extreme would be a shop with staff operating a Point of Sale terminal at the counter. Inbetween we could position unmanned payment terminals and shopping on the Internet.

Other features that may be used to analyse the business context are the value of the payment (which will be related to the risk profile and income of the consumer) or the type of goods/services that the consumer pays for.

For the purpose of our paper we have decided to blend the dimensions banking-shopping, remote / on-site and type of services delivered into the following specific business contexts:

- A consumer doing his banking at home; e-payments are effected as part of administering financial affairs, which also include savings, investments and loans,
- A consumer ordering digital or audio content; e-payments and delivery of the digital content may in a technical sense be integrated or coupled
- A consumer that is shopping on the Internet;
- A consumer that uses unmanned Point of Sale vending machines,
- A consumer that uses staffed Point of Sale payment terminals.

Device

The payment devices that we distinguish in our taxonomy are:

- the personal computer
- the landline telephone
- the Point of Sale terminal / payment card combination
- the GSM phone
- the Personal Digital Assistant
- the (proximity) token.

These devices range in their processing, communication and security capabilities as well as in their availability to consumers.

Mode

With respect to the nature of the interaction with the consumer, we distinguish the following modes:

- Internet or IP-based networks
- Interactive Voice Response (IVR) or Automated Speech Recognition (ASR)
- Short Message Services (SMS) or Multimedia Messaging Services (MMS)
- Wireless Application Protocol (WAP)
- Unstructured Supplementary Service Data (USSD)
- I-mode or WAP over General Packet Radio Service (GPRS)
- Wireless Local Area Network (WiFi)

Authentication

We will not discuss the technicalities of proper authentication methods and how to achieve a security and risk level for payment solutions that fits the business context. We merely outline the main techniques:

- the combination of a card and a Personal Identification Number (PIN)
- the combination of user-id / password
- Calling Line Identification (CLI)
- the use of a Transaction Autorisation Number (TAN) or PIN
- Subscriber WAP Identity Module (SWIM)

Payment type

Both in terms of risks involved as well as in terms of applicable regulation, it is necessary to separate solutions with respect to the moment that consumer payes for the goods/services

- payment before delivery of services (first load electronic purse and then use electronic money for payment),
- payment at the moment of transaction (immediate autorisation and allocation of money in the consumers current account),
- payment after the purchase transaction (delayed payment by billing and debiting the consumers account on a later date).

Payment supplier

The final part of our taxonomy identifies the supplier of the e-payment solution as

- a regular bank or credit-institution,
- an electronic money institution (a credit institution dedicated to issuing and redeeming electronic money)
- a payment service provider (a service organisation that processes and routes payments and payment information on behalf of merchants),
- a billing service provider (an organisation, such as the telephone company or the internet service provider, that has a billing relationship with consumers and may acts as a billing service provider).

In figure two, we have depicted our detailed e-payments taxonomy. It focuses on the transaction part of retail payments, so the further issues in the clearing and settlement domain remain out of scope.

Figure 2 - The E-payment taxonomy

