GUIDELINES ON THE QR CODE DATA ENTRY SOLUTION APPLICABLE IN THE INSTANT PAYMENT SYSTEM

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1. PURPOSE OF THE GUIDELINES

An important element of the payment process of instant payments is the way in which the payee and the payer provide the data required for submitting the payment order or launching the request to pay to the other participant. Although the data entry process can vary, it is important that – pursuant to the MNB Decree[1] regulating, among others, instant payments (hereinafter: MNB Decree) – payment service providers are required to only apply data entry solutions through which "the data required for the instant credit transfer order can be read, decoded and processed by anyone". This provision, therefore, excludes the creation of closed, parallel but non-interoperable data entry solutions. This, however, may prompt all service providers to define their own open data entry solutions, which may thus necessitate extra developments to ensure interoperability between the services; therefore, to ensure, for example, that a mobile payment application is able to support most data entry solutions in the market. In order to resolve this situation and to accelerate the development and facilitate the widespread use of additional payment solutions that are built on instant payment infrastructures, the MNB has decided to develop standards and to define uniform data content for the main data entry solutions.

This document sums up the main technical parameters pertaining to the QR code-based data entry method linked to the domestic instant payment system, which should be taken into consideration by market participants in developing their payment solutions. The MNB expects the developers of payment solutions to apply the QR code symbology standard specified below in the case of instant payments that are based on QR code data entry.

2. POTENTIAL APPLICATIONS OF QR CODES IN THE INSTANT PAYMENT PROCESS

QR codes are two-dimensional barcodes (matrix barcodes), which are used extensively in numerous areas of the economy, including the execution of payment processes. Potentially, it can be also used in numerous payment situations in instant payment processes:

- the beneficiary (payee) can generate a QR code to transmit to the payer the data required for the submission of the payment order,
- the payer can generate a QR code to transmit his data to the payee who, in turn, can launch a request to pay with the data thus received (and supplemented with any additional data necessary for his own internal processing).

[1] Decree No. 35/2017 (XII. 14.) of the Governor of the Magyar Nemzeti Bank on the Execution of Payment Transactions: http://njt.hu/cgi_bin/njt_doc.cgi?docid=205900.368886

Table 1: Potential applications of QR codes in specific payment situations

Payment situation (with reference to the chapter numbers of the Guidelines on payment processes)	Generated by the payee	Generated by the payer
At physical point of sale, without request to pay, initiated on the payer's device (2.1.1)	X	
At physical point of sale, without request to pay, initiated on the payee's device (2.1.2)		X
At physical point of sale, with request to pay (2.1.3)		X
At electronic point of sale, without request to pay, initiated on the payer's device (2.2.1)	X	
Bill payment without request to pay, initiated on the payer's device (2.3.1)	X	
Person-to-person payment without request to pay, initiated on the payer's device (2.4.1)	X	
Person-to-person payment with request to pay (2.4.2)		X

3. STRUCTURE AND DATA CONTENT OF THE QR CODE

Main technical parameters of the application of domestic QR codes in relation to instant payments:

- The maximum size of the code is version 13; that is 65*65 modules plus the surrounding frame.
- The QR code's error correction capability is M, i.e. 15% loss can be restored.
- The character set applied in the code is encoded in accordance with the UTF-8 standard. In the case of domestic instant credit transfers only this configuration can be used in accordance with the HCT Inst standard, since in the text fields of HCT Inst messages (if they are not identifiers) only accented Hungarian characters (above 128 in the extended ASCII range) can be used apart from all basic characters for UTF-8 (within the 32-126 range).

Similar to the messages related to the instant payment process, in the case of QR codes as well, it is necessary to define the minimum data content that is indispensable for the application of the QR code to support the payment process in individual payment situations efficiently. In the domestic application the symbology of the QR code standard and the design of its content in accordance with ISO/IEC 18004/2015 are based on the standard[2] published by the European Payments Council (EPC); however, due to domestic specificities and in order to facilitate widespread use, numerous modifications have been made to the original standard. Table 2 sums up the fields to be used for the uniform data content of the QR code applied in Hungarian instant payments. All fields must be closed with an LF (line feed) character irrespective of whether the field is filled in or not. The first field cannot be preceded by an LF character, but the LF character is mandatory after the last field. Data fields must be always displayed in the QR code in the order shown in the table. Accordingly, irrespective of data content, the QR code must contain 17 data fields (which may even be blank, with a length of zero character) and 17 LF characters.

[2] Quick Response Code: Guidelines to Enable Data Capture for the Initiation of a SEPA Credit Transfer: https://www.europeanpaymentscouncil.eu/document-library/guidance-documents/quick-response-code-guidelines-enable-data-capture-initiation

Table 2: Structure of the Hungarian QR code's data content

Field name	Length	Mandatory? (Y / N)	Fixed length? (Y / N)	Value set
ID code	3	Y	Y	"HCT" or "RTP"
Version number	3	Y	Y	3 num e.g. "001"
Character set	1	Y	Y	1
Payer's or Payee's BIC/BEI	11	Y	Y	BIC
Payer's or Payee's name	70	Y	N	Name
Payer's or Payee's IBAN	28	Y	Y	IBAN
Amount	15	N	N	"HUF"+12 num
Validity period	16	Y	Y	14 num "+" num YYYYMMDDhhmmss+Z
Payment situation identifier	4	N	Y	AT-44
Remittance information (unstructured)	70	N	N	
Retail unit, shop identifier	35	N	N	
Merchant device (POS, cash register) identifier	35	N	N	
Invoice or receipt identifier	35	N	N	
Customer identifier	35	N	N	
Payee's internal transaction identifier	35	N	N	
Loyalty or discount scheme identifier	35	N	N	
NAV verification code	35	N	N	
Space required for separators	17	Y	Y	
Total field length	**345**			

Summary of the content of individual fields:

- ID code: It indicates the payment situation in which the QR code was generated (see Table 1).
    - If it supports the submission of the credit transfer order – i.e. the payee generates the QR code to enable the payer to submit the credit transfer order with the correct data – the "HCT" code must be used.
    - If it supports the transmission of the request to pay – i.e. the payer generates the QR code to transfer his main data to the payee in order to enable the payee to send a request to pay – the RTP code must be used.
- Version number: The marker used to track the modifications of the Hungarian standard.
- Character set: The Hungarian standard follows the UTF-8 character encoding. In the text fields of the QR code data content (if they are not identifiers), only accented Hungarian characters (above 128 in the extended ASCII range) can be used apart from all basic characters for UTF-8 (within the 32-126 range). When compiling the data content it should be taken into account that the use of accented characters will occupy a field length corresponding to more than one character when UTF-8 is used. Accordingly, in the case of domestic instant payments, the value of the code must be "1"; keeping the field is justified by the need to retain potential international interoperability.

- BIC code, name, IBAN: These three fields are used for the purposes of transferring the payer or the payee's data. As to which participant the data displayed in the three fields pertain to depends on the content of the "ID code" field.
- Amount: This field indicates the transaction amount involved in the payment order or in the request to pay. Completing this field is not mandatory as there may be payment processes where the payer generates a QR code for his own identification, while the payee supplements the payer's data obtained by scanning the QR code with additional data required for the sending of the request to pay, and in such situations the payee specifies the transaction amount as well.
- Validity period: It specifies the validity period of the QR code to the second. In the case of requests to pay generated on the basis of scanning the payer's QR code, the payee may specify a different validity period as well, because the time specified in the QR code pertains only to the code, whereas the time specified in the request to pay pertains to the request. The data must be supplied without separators, at local time and with an indication of the time zone (e.g. 20200302010101+2).
- Payment situation identifier: In the credit transfer and request to pay messages, service providers will be enabled to indicate the specific payment situation in which the given transaction was executed. Although, due to the flexible use of instant credit transfers, situations may arise where even the payment service provider is unable to decide whether the given transaction is a person-to-person money transfer or, for example, a retail purchase, service providers should make an effort to be able to specify the correct payment situation code in as many payment situations as possible. This will also be a significant assistance in their own business analyses. The payment situation is supplied in the purpose code (AT-44 "Purpose" field of the DS-02 dataset) of the credit transfer order and the request to pay initiation from a set of elements that can be selected from a list defined by the ISO standard.
- Remittance information: There is a 70-digit space available for adding remittance information during the submission of the payment order or request to pay.
- Retail unit, shop identifier: in the case of physical retail purchases where the acquirer is a retail chain, for the correct identification of the point of sale the acquirer may need the transaction to also include the code of the shop processing the payment. The above information is supplied in the "ShopID" field of the "Regulatory Reporting" block of the credit transfer order and the request to pay initiation, as a 35-digit character data type.
- Merchant device (cash register, POS) identifier: in the case of physical retail purchases, there may be several devices in a shop (e.g. cash register, POS terminal) where instant payments can be processed immediately; therefore, it is important to include not only the shop ID but also the identifier of the specific device in the credit transfer message. The above information is supplied in the "MerchDevID" field of the "Regulatory Reporting" block of the credit transfer order and the request to pay initiation, as a 35-digit character data type.
- Invoice or receipt identifier: it may be important to provide the identifier of the bill or invoice to be paid – for instance, in the case of utility bill payments –, because this may support subsequent retrievability both on the payer's and on the payee's side. Similarly, in the case of retail transactions it may be useful to supply the receipt identifier. The above information is supplied in the "InvoiceID" field of the "Regulatory Reporting" block of the credit transfer order and the request to pay initiation, as a 35-digit character data type.
- Customer identifier (for bill payments): it primarily happens in the case of utility bill payments that a service provider identifies its customers by way of a special identifier only used by the given service provider. In this case, this also needs to be included in the credit transfer message, because it helps to monitor the financial settlements both on the payer's and on the payee's side unambiguously. The above information is supplied in the "CustomerID" field of the "Regulatory Reporting" block of the credit transfer order and the request to pay initiation, as a 35-digit character data type.
- Payee's internal transaction identifier: the payee business may assign an identifier to each individual financial settlement, and the inclusion of such identifiers in the credit transfer message may facilitate the quick and unambiguous processing of the transaction in the payee's own internal systems. The above information is

supplied in the “CredTranID” field of the “Regulatory Reporting” block of the credit transfer order and the request to pay initiation, as a 35-digit character data type.

- Loyalty or discount scheme identifier: in the case of retail purchases, it may be in the interest of both the payer and the payee merchant to include identifiers linked to specific discounts. This also enables the customer to identify himself with his own loyalty card number and claim the personal discounts to which he is eligible even before the approval of the transaction. The above information is supplied in the “LoyaltyID” field of the “Regulatory Reporting” block of the credit transfer order and the request to pay initiation, as a 35-digit character data type.
- National Tax and Customs Administration (NAV) verification code: in the case of retail purchases, the receipt must mandatorily contain the NAV verification code. In view of the posterior transaction processing, this code can also be included in the credit transfer message. The above information is supplied in the “NAVCheckID” field of the “Regulatory Reporting” block of the credit transfer order and the request to pay initiation, as a 35-digit character data type.

Additional data content considerations:

- In defining the maximum size of the total character length (345 characters), the ability to generate a QR code of version 13 (65*65 modules plus canvas area) that can be easily displayed and scanned with the current widely used devices was an important consideration. Any further data content expansion may result in an increase in the QR code’s total size, which may render the code difficult to display in certain payment situations.
- It is an important difference from the EPC standard that, while the European standard is basically intended to support payment transactions between remote participants, the data content of the domestic QR code must adjust to the widespread application of the instant payment system; in other words, it should be suitable for use in physical and bill payment situations, online purchases and person-to-person money transfers alike.
- In the case of optional data fields, essentially two criteria have been considered:
    - The character number permitted for credit transfer messages was not adjusted and accordingly, when setting up any identifier, market participants can take advantage of the maximum number of characters available in HCTInst messages even if QR code data entry was applied during the submission of the payment order or the request to pay.
    - If all optional fields could be filled out with the maximum number of characters in a QR code, the total character number of the code would be significantly higher (483 characters) than the capacity of the selected QR code version, which would hinder the display of the code significantly on the currently used devices. However, the optional fields are related to a variety of payment situations, which means that typically, not all optional fields are filled out in all payment situations and therefore, the market participants generating the QR code can decide themselves which fields should be filled out and how many characters can the identifiers take.
    - Since total data capacity is made up of the actually populated character numbers in each field, filling out the fields with shorter content than the maximum space available allows for the completion of several types of data fields in the QR code.
- Service providers should use a character counter to indicate the number of characters available for the user in the comment field.
- The standard does not include a field for secondary account identifiers, as the QR code provides a means for supplying both the payer and the payee’s account numbers; i.e. for the unambiguous identification of the payee of the instant credit transfer or the addressee of the request to pay.
- The standard does not include a field for the unique identifier of the QR code, because the use of this field would require centrally issued unique identifiers in the interest of avoiding duplicates.

4. INTERNATIONAL APPLICATION

The use of the QR code is also possible in the case of foreign payment solutions adhering to the EPC QR standard, in which case the fields supporting the development of domestic additional services besides the EPC standard are disregarded. Moreover, it is also possible to make the applications developed for scanning the domestic QR code interoperable with the EPC QR standard by using a more restricted data content than the Hungarian standard, taking into consideration only the identical data fields of the two standards.

5. FUTURE TREATMENT OF THE DOMESTIC QR CODE STANDARD

In designing the data content of the domestic QR code, the MNB strived to support all potential uses and payment processes known at the time of the Hungarian launch of the instant payment system by defining the required data contents and supplying the technical parameters. Market innovation, however, may give rise to new business requirements in the future, which may necessitate the modification and extension of the QR code data content defined upon the launch of the instant payment system. Since in certain cases this may differently affect the business interests of individual market participants, it is important that all decisions regarding the QR code standard are made on the basis of market feedbacks, but essentially in consideration of public good and the advancement of the entire Hungarian payment market. Therefore, the QR code standard will remain in the care of the MNB and GIRO Zrt. after the launch of the instant payment service. Market participants, in turn, may also submit proposals regarding potential modifications to the standard, with consultations held on the application possibilities thereof between the managers of the standards and the affected users. The modifications approved on the basis of the proposals will be publicly announced by no later than 3 months before the entry into force.