



# Implementing GPE interface

## User Guide for integrators

version 13.05

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User guide version: v13.05 / supported with Newton version 5.13 and above

For more information, please visit <http://www.mujterminal.cz>

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**Abbreviations, terms and references**

Abbreviation	Explanation
AT	Attended devices (desktop, mobile) like iCT220, iWL228 etc.
CAT	Unattended devices like iUC180B, iUP250 etc.
DHCP	Dynamic Host Configuration Protocol
ECR	Electronic Cash Register
EET	Electronic Registration of Sales (fiscal law for Czech Republic)
POST or POS	Point of Sale Terminal (EFT POS)
RCARC	Interaction diagram (Request, Confirmation, Activity, Response, Confirm.)
SFS	Server of Financial Service (fiscal law for Czech Republic)
SSL	Secure Sockets Layer – provides the encrypted connection above TCP/IP
TCP/IP	Transmission Control Protocol/Internet Protocol
TMS	Terminal Management System – used for terminal parameters and application management

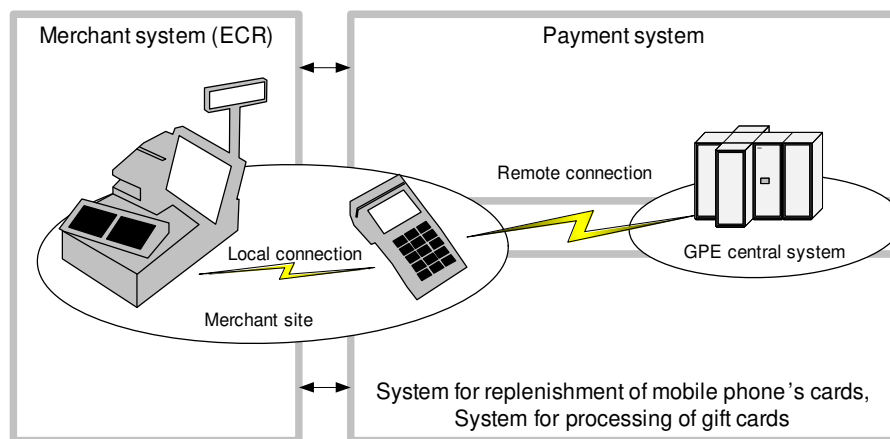
# INTRODUCTION

This document describes the cash register (or any other system like self-service kiosks, vending machines, etc.) interface to the GPE Newton payment terminal application and includes information needed for the implementation of this interface to the cash register (further mentioned as ECR) or any other system.

The cash register interface of the payment terminal is the same for commonly used GPE terminals (attended and also unattended) but implemented only for terminal types in which its usage makes sense (for example mobile GPRS terminal does not have any interface for cash register). We do provide also integration for mobile platforms like Android or iOS, but this function is not a part of this document. Please contact GPE for more information.

The payment terminal's role in processing transactions lies in ensuring the secure collection of input data, mediating the transaction processing via central GPE systems and providing trustworthy information (e.g. output) on the results of the processing.

The operating process of this relation is not usually managed by only the involved systems, but also influenced by two human factors (the operator and customer).



GPE payment terminals currently offer three groups of transaction services:

**Non-cash payment transactions** - Non-cash payments made by card issued by VISA, MASTERCARD, AMEX, JCB, DINERS CLUB, China Union Pay and others. Card details can be stored on plastics, in mobile phone or any other technology.

**Top-Up** – GP Mobile engine enables credit top-up for prepaid mobile phones of all Czech mobile operators: O2, T-Mobile and Vodafone.

**Gift cards** – GP Gift allows for activation, credit top-up and payment via prepaid gift cards issued by GPE.

Specific information is always divided into sub-chapters "Payment transactions" and "Services for top-up and gift cards" so that information concerning individual services can always be distinguished in the text.

## 1.1 Payment transactions

The terminal's cash register interface offers the following transactions as part of the payment methods:

Type	Description	Available for		Draft
		AT	CAT	
Sale	Transfer of an amount from the cardholder's account to the terminal operator's account (merchant) as a payment for goods, services or cash.	●	●	
Refund	Transfer of an amount from the account of the merchant to the card holder's account. This transaction is very risky for frauds, so please handle it carefully.	●	●	
Preauthorization	This transaction block the transaction amount on cardholder's account for limited time (time range depends on the card issuer). Preauthorization completion is necessary to finalize/catch the transaction amount.	●	●	
Incremental Preauthor. (Enhanced matching)	Increase amount or prolong of Transaction Preauthorisation (unique id – sequence number) executed before	●	○	
Preauthorization completion	Finalizes the "Preauthorization" transaction. It means, that blocked amount will be charged from cardholder's account. Completion can be done for partial or full amount of preauthorization. Higher completion amount than preauthorized is not allowed.	●	●	
Preauthorization completion (Enhanced matching)	Finalizes the "Preauthorization" transaction. It means, that blocked amount will be charged from cardholder's account. Completion can be done for partial or full amount of preauthorization. Higher completion amount than preauthorized is not allowed.	●	○	
Transaction cancellation (Enhanced matching)	This operation allows to cancel transaction Sale or Preauthorization completion transaction (as long as it was completed). Regarding to settlement between the vendor and card holder, it has an inverted character to the Sale operation.	●	○	
Reversal (VOID)	Cancellation (reversal or VOID) of last transaction successfully done by terminal.	●	●	
Quasi Cash	The transaction is used for casinos and gambling room for selling tokens.	●	○	
Subtotals	Its purpose is to compare the number and sum of amounts of all transactions made between the payment terminal (or cash register) and authorization system. It is only used for the immediate comparison of the accumulated transaction status.	●	●	
Batch close	The purpose of this transaction is to conclude the accounting period (e.g. with a change of operator) and to check the balance of the transaction state between the payment terminal (or cash register) and authorization system. The result of the operation (in contrast to the Sub-total transaction) is always the clearing of the accumulated transaction state of all systems.	●	●	
Token	This operation is only reads card, from PAN+EXP makes hash, encrypts by RSA and sends this data to ECR(Kiosk)	●	●	



Variable Fare	This operation reads card, sends offline data to AC, checks Deny List stored in POS and from PAN+EXP makes hash, encrypts by RSA and sends this data to ECR(Kiosk)	○	●
VF Advice	This operation is for sending additional information from ECR (Kiosk) to previous Variable Fare transaction.	○	●
Offline upload	Transaction used for sending offline transaction locally stored in terminal to authorization host. This is used mainly by unattended terminals. This operation can be aborted by transaction "Abort transaction".	○	●
Host Handshake	This administrative transaction is used for testing connection to authorization host.	○	●
TMS connect	This operation initiated ECR (Kiosk) to force the POS connect to TMS for upload software, OS or parameters.	○	●
Last TMS connect	This operation returns the last TMS connection date + time and also the last versions of all POS applications.	○	●
POST data printing	The purpose of this operation is to get print data from POS for last transaction or configuration (SW, HW and setting)	○	●
Last TRN Repeat	The return status and data last transaction was performed. Used only if previous transaction was Sale, Cancellation, Refund, Preauthorization, Completion Preauthorization, Token, Variable Fare, Variable Fare Advice, EET Payment or EET Cash refund.	●	●
Multi-ID Sync	This administrative transaction is used for sending list of Multi-ID account numbers and Multi-ID account names	●	○
INIT	Atomic transaction generated by ECR after Cashier login (RCRC)		●
Get UID	Returns UID of card. Dedicated for MIFARE/DESFIRE cards	●	○

## 1.2 Integration use cases / best practices

As the GPE protocol provides wide range of integration options and there are plenty of customer verticals, we tried to prepare use cases to simplify whole integration and to eliminate the reading all chapters, which can be for your purpose useless.

### 1.2.1 Attended vs unattended

#### Attended terminals (AT)

It covers the integration with desktop and mobile terminals. Terminal act as a server, ECR as a client.

Device examples: iCT220, iPP320, iWL228, Desk 3200, Lane 5000, etc.

#### Unattended terminals (CAT)

Implementing GPE protocol for unattended terminals works vice versa. It means, that in following chapters, the terminal act as a client and ECR (kiosk) act as a server.

Device examples: iUC160B, iUC180B, iUP250

### 1.2.2 Enhanced matching feature

At the moment GPE provides two ways, how to manage transactions like sale or preauthorization using transactions "Transaction Cancellation" or "Preauthorization completion". In 2017 GPE introduces service "Enhanced Matching (EM)" which always pair



original transactions with the following ones which are changing original transaction status. From customer perspective, the currently "Enhanced Matching" is supported by:

- Global Payments Europe
- Global Payments Czech Republic
- Global Payments Slovakia
- Global Payments Romania
- Global Payments Europe Hungary
- Global Payments Malta

This functionality is not supported by:

- KB SmartPay

What are the implications to your development? Let's see following table describing the transaction codes based on the EM functionality (EM applies only to financial transactions, others without impact are not listed in table):

Transactions	EM not available	EM available
Sale	00	00
Preauthorisation	01	01
Preauthorization Completion	02	22
Refund	04	04
QuasiCash	05	05
Reversal	10	10
Transaction cancellation	10*	21
Incremental Preauthorization	N/A	07

\*transaction cancellation without EM functionality is same as reversal – last transaction cancellation.

### 1.2.3 Attended best practices

As we have successfully integrated over 80 companies, we tried to prepare for you overview of mostly used integration combinations used by our integrators and customers together with attended terminals.

Segment	Configuration	Commonly used features
<b>Retail store</b>	Receipt printed by ECR Signature check on ECR Close day initiated from ECR	Sale Transaction cancellation Reversal Close day
<b>Groceries</b>	Receipt printed by POS Signature check on POS Close day initiated from POS	Sale Transaction cancellation Reversal Close day
<b>Hotel Car rental</b>	Receipt printed by ECR Signature check on ECR Close day initiated from ECR	Sale Preauthorization Preauthorization completion Transaction cancellation Reversal Close day
<b>Restaurants</b>	Receipt printed by POS Signature check on POS Close day initiated from POS	Sale Transaction cancellation Reversal Close day
<b>Casino</b>	Receipt printed by ECR	Quasi Cash

Signature check on ECR  
Close day initiated from ECR

Transaction cancellation  
Reversal  
Close day

## 1.2.4 Unattended best practices

Segment	Configuration	Commonly used features
Self-service petrol stations	Receipt printed by ECR Close day initiated from ECR	Preauthorization Preauthorization completion Transaction cancellation Reversal Close day TMS connect
Vending machines	Receipt printed by ECR Close day initiated from ECR	Sale Reversal Close day TMS connect
Transport solution	Receipt printed by ECR Close day initiated from ECR	Sale Reversal Close day Token TMS connect Variable Fare VFadvice

## 1.3 Integration package provided by GPE

GPE provides wide range of additional tools helping to integrations to make swift integration:

- Protocol specification (this document)
- terminal simulator
- ECR simulator
- DLL library for faster integration of attended devices
- Integration support by our experienced people

For more details or Q&A please visit: [www.mujterminal.cz](http://www.mujterminal.cz)

## 1.4 Benefits for ECR and POST integration

The main reasons for integration are:

- fast transactions processing
- operator comfort (not necessary to coordinate two separate equipment units)
- transfer of responsibility for processing transactions from operator to cash register system
- errors caused by human factor elimination

## 1.5 Integration risks

The integration risks:

- possibility of creating differing accounting balances of ECR and POST systems
- possibility of holding up operator or customer due to system de-synchronization
- difficult diagnostics at vendor's site in analyzing non-standard behavior

The reason for the creation of the aforementioned states is usually a wrong implementation of the cash register interface, failure of the systems' components or external influences (e.g. electromagnetic fields, incorrect voltage, mechanical damage of equipment, etc.). That's a reason, why GPE insists on the integration certification, where our trained certification specialist will verify your implementation and confirms the proper system behavior.

## 1.6 Certification process

Based on your request we will grant you access to all necessary documentation. With these details you can swiftly start your integration of GPE interface.

During whole development GPE will provide you technical support. At the end of integration leaflet, you can find test cases, which must be successfully passed during our certification event. In the integration sheet, you can also find all mandatory functions that need to be implemented in your system. Rest of services is optional.

Whether your development is finished, you can arrange certification date with our certification specialist. Certification is usually placed in our headquarters in GPE Prague, but if necessary, it can be managed remotely. With our testers you will pass all mandatory test cases described in this leaflet. After successful certification you will receive GPE certificate and your company will be listed as a certified partner.

Certification is not limited by country or customer. For more information please visit [www.mufterminal.cz](http://www.mufterminal.cz) (Czech version, for English version we will launch [www.myfterminal.eu](http://www.myfterminal.eu) soon).

As part of the certification process, you have to prove the ability to obtain a communication log from the ECR. The minimum requirements for the data in the log are described in section 1.7 Troubleshooting.

## 1.7 Troubleshooting

GPE is ready to provide you with the support to explain any unexpected behaviour of the payment terminal. To allow the analysis at GPE premises, our experts need to have the following technical details:

1. The Terminal Identification (TID), where the issue has occurred.
2. The environment - Production or Test.
3. The detailed steps to be followed to simulate the issue, if possible.
4. The log of the communication of at least the whole transaction.

The log must contain:

1. All data sent from the ECR to the payment terminal
2. All data received by the ECR from the payment terminal

3. Each message must be logged with the timestamp with at least seconds granularity. Milliseconds are preferred.
4. Each message must be logged with control characters.

Without this required information we will not be able to provide our support.

## 2 IMPLEMENTATION OF INTERFACE

The payment terminal and its architecture are classified to the category of intentionally designed equipment. Its HW and SW does not allow for parallel processing of multiple tasks. If then the payment terminal processes a task started through a user interface of the terminal, the processing of another task cannot be started through the cash register interface of the terminal and vice versa.

This characteristic also applies for the cash register interface itself; the new task (or transaction) can only be begun in the case that the POST is not yet processing any other task (i.e. the previous task has already been completed).

### 2.1 Before you start - terminal configuration

Because the hardware equipment available by cash register or machine technology is not always the same, terminal application allows to configure the behavior of the terminal against ECR. Except more sophisticated parameters like baud speed, IP addresses or ports, GPE application provides following configuration options:

Name	Description	Values
ECR support	Is ECR communication enabled?	Yes / No
Signature check	It defines, which system is responsible for verifying the card holder's signature. POST – the call to verify a signature is made as part of the processing of the transaction. ECR – signature verification message will appear in ECR system and ECR is responsible for reversal in case, that signature is not valid.	POST/ECR
Close day initiation	Parameter allows to configure, if the close day transaction will be initiated from POST or ECR.	POST/ECR
Receipt printing	It can be configured, whether transaction receipt will be printed on the ECR or POST.	POST/ECR

If you asked GPE for testing terminal, do not forget to share with us requested terminal configuration.

### 2.2 Available connection types

At present the RS232 serial interface and Ethernet TCP/IP (Wi-Fi is also supported) connection can be used for the physical interconnection of the ECR and POST. In the future it will probably be supported connection through USB.

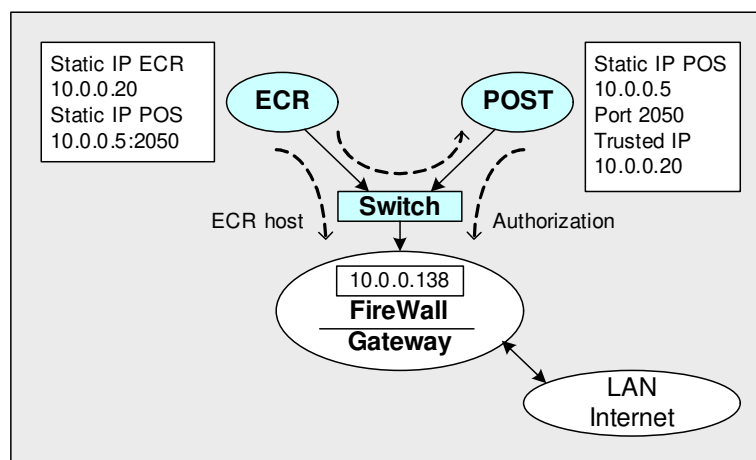
## 2.2.1 RS232

The standard means of connection is done via a cable (for the connection see the chapter Serial cable connection). The interface configuration used is:

Transfer mode:	Serial, asynchronous, full-duplex
Format:	8 data bits, 1 stop bit, no parity;
Speed:	9600 bps
Data flow management:	NONE

## 2.2.2 Ethernet (TCP/IP)

Standard Ethernet cable (with RJ45 on both ends) for physical connection of ECR and terminal is used. The network speed 10Mb/s and TCP/IP protocol is used for terminals. There are no sensitive data included in communication, SSL is not used so far. Picture below shows scheme of the connection through the Ethernet. The terminal is a server listening on the specified port and ECR is a client. In this version only one client is allowed to be connected to the server.



Picture: scheme of the connection through the Ethernet

**In unattended design, the terminal act as a client and connects to the ECR (Kiosk), which act as server, and send request.**

### Communication Settings

Because socket connection is used in TCP/IP, both sides have to be set correctly. On the image upwards, server and client belong to the same network, but they can be in different LAN.

**Setting of ECR:** destination IP address of server (terminal IP e.g. 10.0.0.5)  
 destination port of server (e.g. 2050)  
 protocol: TCP/IP

*Setting of Terminal:*    trusted IP of client (ECR IP e.g. 10.0.0.20)  
                                 Port to listen (e.g. 2050)  
                                 protocol: TCP

## 2.3 Interface interaction

Processing transactions between the cash register and payment terminal is carried out in accordance with three interaction diagrams (RC, RCRC, RCARC) displayed on the diagrams below. The processing logic is analyzed here the way in which it need to be implemented in the cash register software.

The following run variables are used for all types of interactions:

<b>RETRY_CNT</b>	retry counter (decremented)
<b>RECV_TIMEOUT</b>	maximum period for which POST must respond by some type of message

The reason for the relatively long (with regard to continuity of processing on ECR) maximum time limits for completing transactions (RECV\_TIMEOUT) is the user inputs (such as entering PIN, phone numbers, etc.) that block the POST (or the processing of new requests from the cash register interface) and which cannot be shortened. The processing of transaction itself is performed up to 5 seconds on average.

During each processing of a transaction the ECR must maintain the following values:

<b>Terminal ID</b>	identifier of the logical terminal where the transaction was made (ECR obtains the value from the first response of the POST)
<b>Transaction Date &amp; Time</b>	date and time of transaction. (for the duration of the transaction this value is constant)

The value "Cash Register Account ID (see chapter [Data field of Services for credit replenishing and gift cards](#)), which is constant for all transactions carried out within the framework of a single cash register account (purchase), must be maintained by the ECR for processing services for credit replenishing and gift cards.

### 2.3.1 General rules

#### 2.3.1.1 Message continuity

The entire message must be delivered in 1 second (measured from first to last character of the message).

#### 2.3.1.2 Rules for the Ethernet connection

This part describes only rules valid for TCP/IP protocol. Because TCP/IP protocol can be managed as a stage protocol it is necessary to specify the rules for the stage changes (connection opened, connection closed).



*Connection life cycle* – corresponds to type interactions defined later. Terms Open Comm. Channel a Close Comm. Channel can be analogically used for TCP/IP Connection opened / closed.

*Active socket connection without data* – if there is no relevant message received within 5s, terminal closes connection. ECR should accept disconnection and start new transaction as a new connection.

*Closing of active connection* – in case the connection is suddenly closed from ECR, terminal accepts disconnection. If unexpected error appears and the connection is then closed, it is recommended to wait 1s delay before next connection starts.

**For Unattended devices, there is Windows based component covering server side of communication for both ends (ECR, Terminal). Terminal as client connects to this service and connection is held as permanent. Service sends periodical Heart Beat message. The purpose of Heartbeat message is to check if permanent connection between TCP/IP service and POST is still active. The message's length is 2 bytes (0xFF 0xFF) and is periodically repeated every 5 seconds. If POST did not receive it in defined time, reconnection must be done by the terminal.**

#### *Restrictions*

- Only one request can be managed by server at same time
- Only one client can be connected to server
- Only first request in queue is managed, others (max 2 requests in queue) are refused with response message „Terminal is busy “
- DHCP is not supported, fix IP addresses must be set

### **2.3.1.3 Verification of communication's participants**

#### *Serial communication*

There is no verification. It is based on physical connection.

#### *TCP/IP communication*

Client uses the set of server's parameters. There is no other verification. Server verifies client IP, compares this IP against trusted IP's in its parameters. If IP verification will fail, connection is not accepted by server.

### **2.3.1.4 Handling exceptions**

All exceptions in processing should be handled by the ECR in the following manner:

1. by sending a request to terminate the processing of the transaction task (not supported)
2. by closing the communication channel
3. by blocking the communication interface for 60 seconds.

A failure of low-level functions for receiving and sending data, a deviation from the declared sequence of processing or content of messages, etc.

Blocking the communication interface means a state, in which the ECR restricts the initiation of any new transaction for a set time.

The aim of this protective measure is to allow the terminal to cancel the started task and to return to the basic state.

Before starting new connection, it is recommended to clear In/Out buffers for low-level functions.

#### **2.3.1.5 Message content with error values**

If the message contains inaccurate values (for example missing Terminal ID, CRC, different transaction date and time, etc.), the side that received such a message should respond with a FormatError message (see chapter: FormatError message).

## 2.3.2 Interaction of RCARC type

Designated for the following transaction types: Sale, Refund, Transaction cancellation, Sub-total, Close batch, preauthorization and preauthorization completion. Interaction is a way of processing identical to interactions of the RCRC type, only it is enhanced by the option to expand the time necessary for transaction processing by sending a confirmation message from POST to ECR.

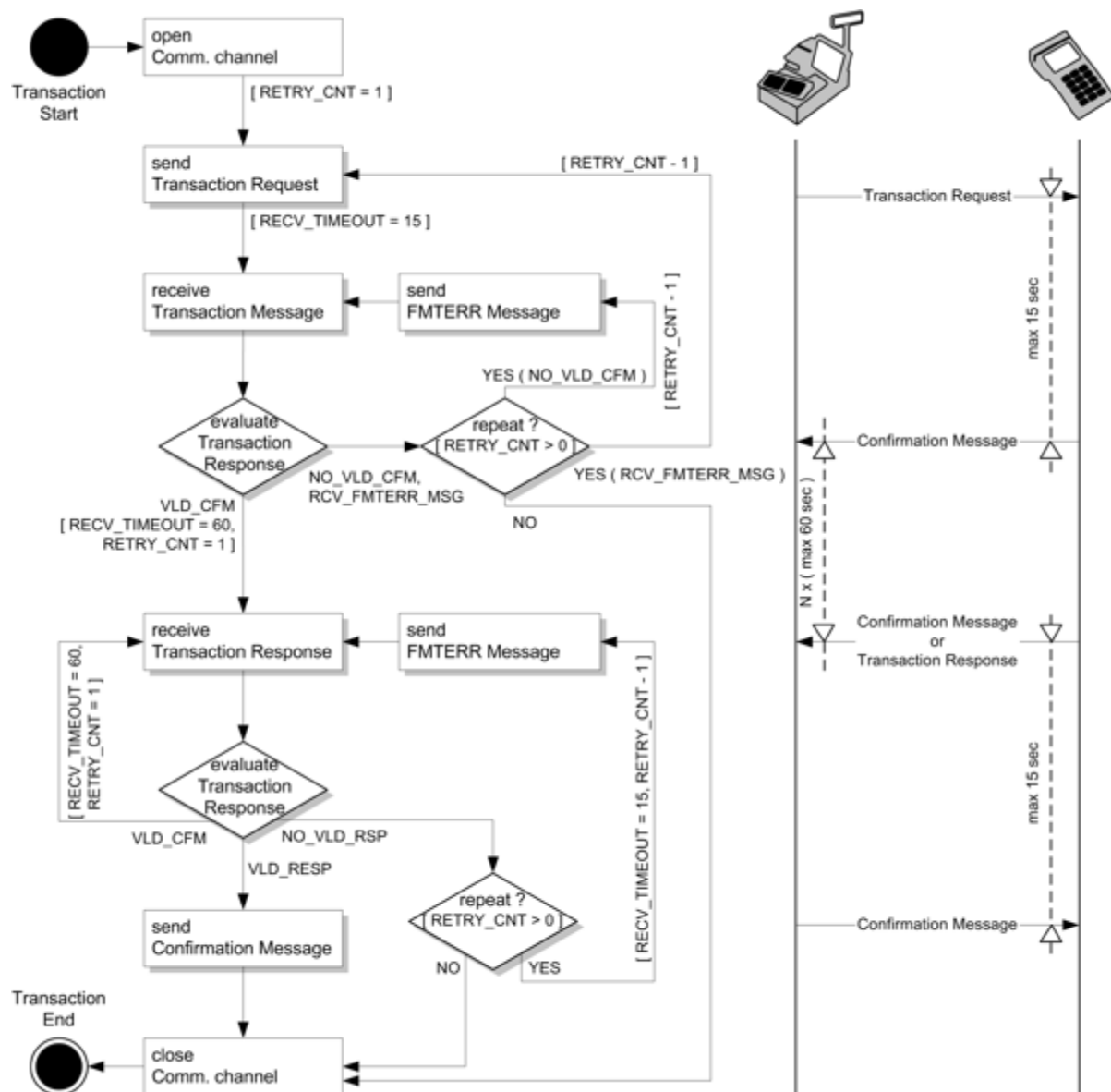
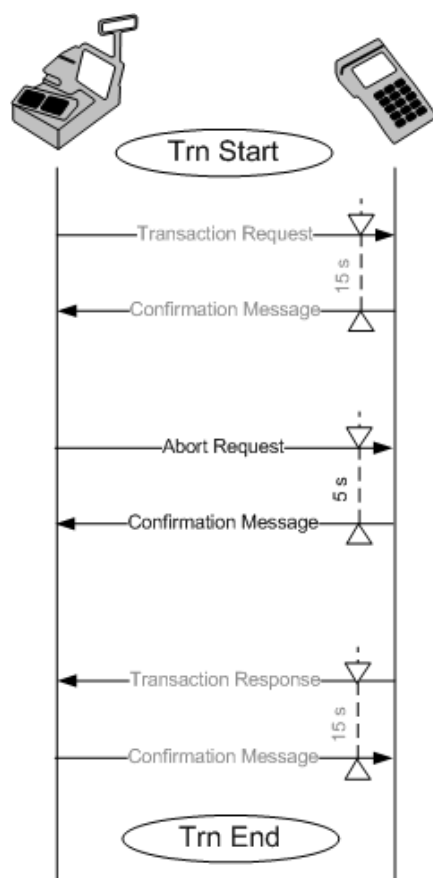


Diagram 3

## 2.3.3 Interaction of RC type with Abort transaction

Abort transaction initiates canceling of current transaction but only if transaction flow did not start online authorization yet. Request is always confirmed by Confirmation message (ACK) sent by the terminal, but final decision is made by financial application according to flow process. If Abort is accepted (transaction is cancelled before online authorization) then

terminal finalize transaction by response with response code RC= 060 (Transaction was cancelled by the operator) otherwise transaction is completed standard way. The timestamp in the header message must be taken over from original request.



## 2.3.4 Interaction of RCRC type

is designated for the following transactions: INIT

The transaction is initiated ECR by sending a Transaction Request to EFT, that must be confirmed by the within 15 seconds. The processing of the request is synchronous with a maximum response time of less than 7 minutes (in case of INIT response time is upto 15s). The reception of the message with the transaction result (Transaction Response) must be confirmed. If the ECR does not confirm the transaction, it is automatically cancelled. During the processing the sending of the Transaction Request can be repeated once and the resending of the Transaction Response can be repeated once.

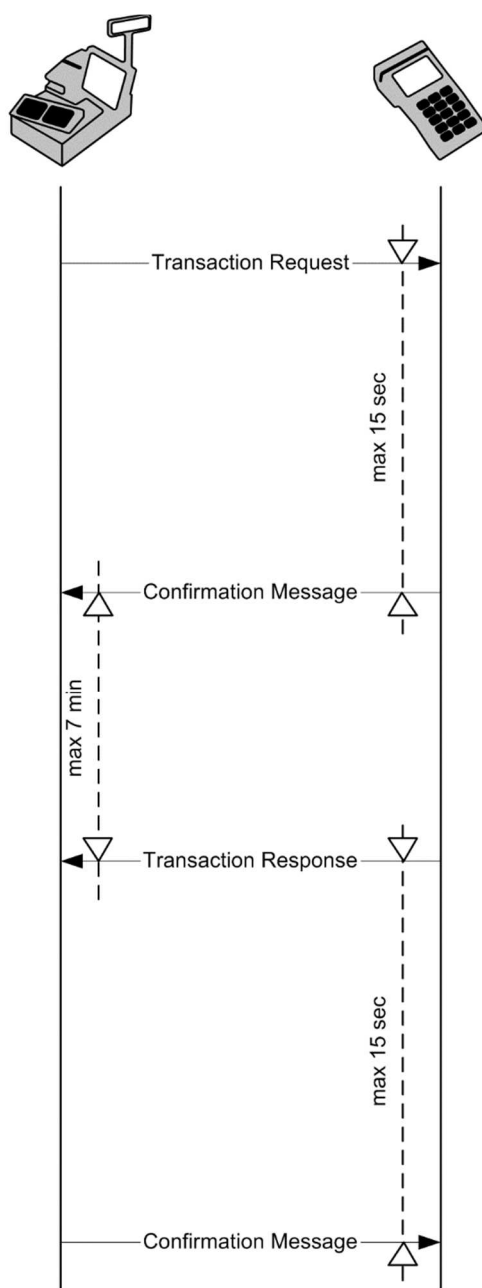


Diagram 1: RCRC interaction.

## 2.3.5 Explanation of terms used in the diagrams

Description of activities	
<i>open Comm. channel</i>	Software opening of communication channel between ECR and POST (including its configuration, deletion of entry queues, etc.).
<i>close Comm. channel</i>	Software closing of the communication channel.
<i>send Transaction Request</i>	Sending message requesting creation of transaction by the payment terminal.
<i>receive Transaction Message</i>	Acceptance of any formally correct message.
<i>evaluate Transaction Message</i>	Evaluation of received message in the sense of message type and logical check of values.
<i>repeat</i>	Evaluation whether it should be repeated.
<i>send Confirmation Message</i>	Sending of confirmation message. See chapter <a href="#">Confirmation message</a>
<i>send FMterr Message</i>	Sending of Error in Format message. See chapter <a href="#">Error in Format message</a>

Description of transitional states	
<i>YES</i>	Positive result of evaluation of condition.
<i>NO</i>	Negative result of evaluation of condition.
<i>NO_VLD_CFM</i>	(No Valid Confirmation Message) During the time limit (RECV_TIMEOUT) no formally correct message was received. See chapter <a href="#">Formally correct message</a>
<i>VLD_CFM</i>	(Valid Confirmation Message) Correct Confirmation Message was received. See chapter <a href="#">Confirmation message</a>
<i>RCV_FMterr_MSG</i>	A message informing ECR that the POST deemed the last message to be an error and requests that the message be sent again.
<i>NO_VLD_RSP</i>	During the time limit (RECV_TIMEOUT) a formally correct Transaction Request or Transaction Request correct in content was not received. See chapter <a href="#">Formally correct message</a>
<i>VLD_RSP</i>	A formally and content-correct response to the Transaction request was received.

## 2.4 Processing statuses

The purpose of this chapter is to clarify the POST processing as a status device regarding to cash register interface. Individual tasks (mostly transactions) are simplified here on the level of events so that their relations are apparent.

Status description	
OUTOF_OPERATION	The system is out of operation.
BASIC_STATUS	POST is prepared to perform any transaction or user operation except for transactions completing the credit top-up process (Confirmation) for the credit top-up process was not initiated. The system's status is not changed by logging in. After reset POST returns back to this status.
COMPLETION	POST can only process payment transactions, transactions for processing gift cards and user operations or to complete the credit top-up process. The system status does not change by logging in. After reset POST returns back to this status.

Description of Events	
Sale, (Cancellation), Return, Sub-total, Close day	Transactions described in the previous chapters.
Task begun from POST offer	User operation that can be any task initiated by the POST operator through a user interface of the payment terminal.
Turn on/off	Connection or disconnection of system's power.

The processing exclusively of payment transactions does not have a status.

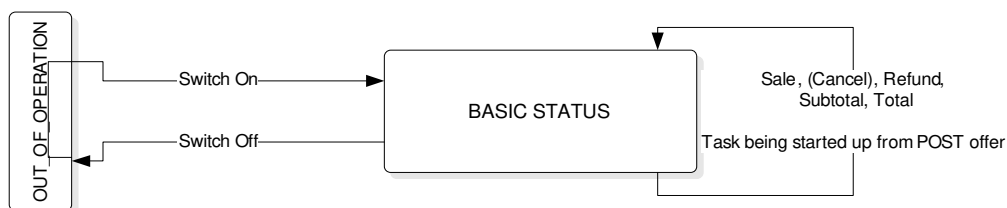


Diagram 2



## 2.5 Specifications for application protocol

This protocol is transparent for supported communications profiles (Serial or Ethernet). This protocol is designed exclusively for ECR and POST communication. Communication of both units is carried out in the form of unified messages. The importance of individual messages is determined by their content. The protocol is ASCII coded, the numerical values are entered by a big-endian convention and are entered as a decimal unless otherwise indicated.

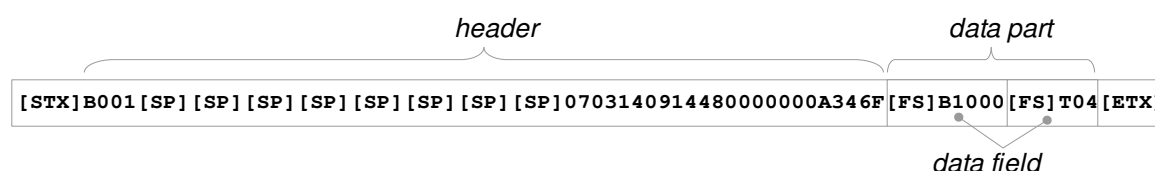
### Used control characters:

<STX>	0x02 - text start
<ETX>	0x03 - text end
<FS>	0x1C - File separator
<GS>	0x1D - Group separator
<CR>	0x0D - Carriage return
<SPC>	0x20 - Space
<LF>	0x0A - Line Feed ('\n')

Each message begins with the control character <STX>, which is followed by the message header, optionally the data part, and ended with the character <ETX>.

### Unified message format:

	Length
STX (Start)	1
HEADER	36
DATA	variables 0 – 65535
ETX (End)	1



Example of an actual message without the data part.

<STX>B001S1APDA0514052908093800000000A5A5<ETX>

Example of an actual message with the data part.

<STX>B001S1APDA05140529084755000000091F01<FS>T00<FS>R060<ETX>

### 2.5.1.1 Formally correct message

A message enclosed by <STX> - <ETX>, which also gives the correct value of the length of the Data part, CRC, Terminal ID, Date and time of the transaction, is considered a formally correct message.

### 2.5.1.2 Confirmation message

The purpose of this report is the confirmation of an activity (confirmation or acceptance of another message or processing activity). This message does not contain a data part, CRC of the Confirmation message should be "A5A5".

Example of Confirmation message:

```
<STX>B001S1APDA0514052808312000000000A5A5<ETX>
```

#### 2.5.1.3 Activity message

The purpose of this message is to signal the ECR that the transaction is still being processed by the POST. ECR refreshes its transaction timeout (60s) after receiving the Activity message from the POST. Activity message looks like the Confirmation message, but always has CRC "0000".

Example of Activity message:

```
<STX>B001S1APDA05140528083120000000000000<ETX>
```

When the protocol D (D1, D2) is used, every message of the protocol D has the same meaning as the Activity message.

#### 2.5.1.4 FormatError message

The purpose of this message is to indicate the acceptance of an incomplete or invalid message (containing a value error of the CRC or of a field).

Example of message signaling the acceptance of a message with a value error of the CRC:

```
<STX>B001S1BPOS5907031409142900010000B6B7<FS>R106<ETX>
```

Example of message signaling the acceptance of a message with a format error:

```
<STX>B0010180322118041315220900000005E612<FS>R103<ETX>
```

#### 2.5.1.5 Protocol abbreviations

Overview of abbreviations used for indicating protocol field format:

Abbreviation	Description
A	Fields with Alfa characters (containing A-Z, a-z characters)
N	Field with Numerical characters (containing only 0-9 characters)
AN	field with Alfa numerical characters (0-9, A-Z, a-z)
V	Field with visible ASCII characters (hexadecimal values 0x20 up to 0x7E)
VCR	as V field + supplemented by line separators [CR] (hexadecimal value 0x0D)
VGS	as V field + supplemented by separator <GS> (hexadecimal value 0x1D)
YN	It can contain only Y character or N character

## 2.5.2 Message header

The following table describes the field of the message header:

Field	Format	Length	Value
Protocol type	AN	2	Information on protocol type: <ul style="list-style-type: none"> <li>The set value for standard implementation is "B0".</li> <li>For device messages<sup>1</sup> supported correct value is "B2"</li> </ul>
Protocol version	N	2	Default value for standard implementation is "01".
Terminal ID	AN	8	Terminal logical identifier on which the transaction will be made. During sending the first Transaction Request, the ECR does not know this value. This is a reason why first message fills this field with 8 spaces (character 0x20). In the verification messages it uses the value obtained from the first message from POST.
Date Time	N	12	Date and Time of transaction. This value is same for all messages of a single transaction. The value is formatted: YYMMDDHHmmSS, where: <ul style="list-style-type: none"> <li>YY – year (last 2 numbers for 2017 only 17 is given) (00 to 99)</li> <li>MM = month (00 to 12)</li> <li>DD = day (01 to 31)</li> <li>HH = hour (00 to 23)</li> <li>mm = minute (00 to 59)</li> <li>SS = second (00 to 59)</li> </ul>
Tags	AN	4	Field with tags of additional parameters. It has the character of a bit map in which each bit signifies an additional parameter. The entry is hexadecimal. <p>For messages of protocol B2 going from ECR to POST value of "0100" tells the POST that Device messages (protocol D2) is supported by the ECR.</p> <p>Other it always has a value of "0000".</p> <p>For messages going from POST to ECR:</p> <p>Bit0: Request for check of card holder's signature (in ECR) during a Sales transaction.</p> <p>= 0 → Signature not required for just completed transaction</p> <p>= 1 → Signature required for just completed transaction</p> <p>Bit 1-15: reserved</p>
Length of data	AN	4	Length of message data part. The value of "0000" is given for messages without a data part. Entry: Hexadecimal, e.g: "001C" for length of data part 28.
CRC16	AN	4	Checksum of message data part. If the message does not contain a data part, then the value of this field is "A5A5". Entry: Hexadecimal, e.g: "F6C8". For a calculation, see chapter Algorithm for calculating CRC16 in C language

### 2.5.3 Message data part

Message data part consist of data fields. Each data field begins with the character <FS> followed by the field identifier and value.

Structure of the data part of message. **field 1 + field 2 + ... + field N**

Structure of data field:

<sup>1</sup> Device messages are specified in the document Ecr\_pos\_device\_messages

Part	Length
<FS>	1
Field identifier	1
Value	Variable length

Example of data part:

```
<FS>T00<FS>B100
```

(with two fields: transaction type and amount, with a total data length of 9 characters)

## 2.5.4 Rules for working with data fields

### 2.5.4.1 Breakdown of data part

The message data part can be broken down into individual fields according to separator <FS>.

### 2.5.4.2 Order

The data fields can be arbitrarily arranged.

### 2.5.4.3 Unknown fields

Data fields with unknown identifiers are ignored.

## 2.5.5 Data fields of Payment Services

An overview of required and optional fields in relation to the messages of individual transactions:

Transaction	Msg	Field																														
		A	B	C	D	E	F	H	I	J	K	L	N	M	P	R	S	T	U	Z	a	b	d	f	g	i	m	n	q	s	t	
Sale	Req	○	●						○				○				○	●		○		○					○				○	
	Resp		○			○	●	○		○					●	●		●			○	○		○				○	○	○		○
Reversal	Req		●				●		○									●				○					○					
	Resp															●		●					○						○			
Refund	Req	○	●						○				○					●		○							○				○	
	Resp					○	●	○		○					●	●		●			○			○				○	○	○		○
Preauthorization	Req	○	●						○				○					●		○							○					
	Resp		○			○	●	○		○					○	●		●			○	○		○		●		○	○	○		○
Completion	Req	○	●						○				○					●		○						●	○					
	Resp		○			○	●	○		○					○	●		●			○			○				○	○			○
Subtotal	Req																	●														
	Resp															●		●					○									○
Total	Req											○						●	○													
	Resp											○				●		●					○									○
Offline upload	Req			○														●														
	Resp															●		●											○			
POST data printing	Req										●							●														
	Resp															●		●					●									●
HOST Handshake	Req																	●														
	Resp															●		●														
TMS connect	Req																	●														
	Resp																	●														
Last TMS connect	Req																	●														
	Resp															●		●											●			
Last TRN repeat (RLM)	Req					○	●			○					●	●		●			○			○				○	○			○
	Resp																	●			○			○				○	○			○
Token	Req																	●	●													
	Resp							●								●		●	●													
Variable Fare	Req				●													●	●													
	Resp							●					●			●		●	●													
VF Advice	Req				●								●					●	●													
	Resp															●		●														
Abort transaction	Req																	●														
	Resp															●		●														
Cancellation	Req		●															●					●			○						
	Resp															●		●					○					○				○

QuasiCash	Req	○	●						○				○				●								○			○			
	Resp					○	●	○		○				●	●		●			○			○			○	○	○	○		
Completion New	Req		●												●	●		●				●			○						
	Resp					○	●		●	○				○	●		●			○			○		●		○	○	○		
● Incremental Author.	Req		●														●		○			●		○							
	Resp					○	●		●	○				○	●		●			○			○		○		○	○			
● Init	Req																●														
	Resp														●		●														
Multi-ID Sync	Req																●														
	Resp													●																	
GetUID	Req																●														
	Resp														●		●						●								
Transaction	Msq	A	B	C	D	E	F	H	I	J	K	L	N	M	P	R	S	T	U	Z	a	b	d	f	q	i	m	n	**q	s	t

\* Field 'L' is only filled in if the ECR maintains its own accumulated information on transactions made.

\*\* This field is not used in all versions of application

● - required field.

○ - optional fields

● - still in Pilot (testing) stage

● - draft

List of used data fields:

Field identifier	Format	Field length	Name	Description
A	A	2	Customer Language (Iso639-1)	Optional field is designed for Unattended POS but can be used also by attended POS terminals. Customer language code (ISO639-1) sent by ECR. Example: cs, en, de, fr, sk etc.
B	N	1 - 18	Paid amount	Transaction amount defines the value of a transaction. The amount is given without decimal point. Example: the amount "2000" is given for the amount 2000 HUF or 20,00 CZK In request it is MANDATORY In response it is OPTIONAL (used only for Partial Approval and means really approved amount)
C	N	3	Count	Maximum number of transactions processed by operation. Typically used for upload of offline transactions. It sends just defined number of offline transactions stored in terminal. The rest will be send next time when initiated.

D	AN	0 - 1000	Transport data	Field containing addition information/data related to transport.											
E	N	4	Card's expiration date	expiration date of a payment card in the month and year form. Example: 1017 for a card expiring in October 2017											
F	V	8	Authorization code	Identification of completed non-cash financial transaction. It is used to identify the transaction when a claim for refund is made.											
H	V	16 - 64	Token, HASH of Card PAN	Field containing hash of enciphered PAN (SHA-256)											
I	N	3	Multicurrency – currency codes	Currency of a transaction. It is important for transaction receipt, but currency has no impact on the Totals where in FID L is clear total of all transaction amounts. If this field is not included in message, terminal will use its default currency. Format: numeric Length: fix 3 Example of supported codes: <b>203</b> = CZK, <b>978</b> = EUR, <b>840</b> = USD, <b>826</b> = GBP, <b>643</b> = RUB											
J	V	2 - 10	Indication of card product	Indication of used card scheme product. Example: Visa, Mastercard, etc.											
K	N	2	Id of printed information	Field contains information about terminal data asked to be printed on the ECR printer Terminal prepares formatted receipt.  ID: 00 – application decision what to print (e.g. can be selected from terminal MENU) 01 – application parameters (min TID + comm data) 02 – Receipt of the last financial transaction (merchant ticket) 03 – Receipt of the last financial transaction (customer ticket) 04 – EMV data of last transaction 05 - Subtotals											
L	V	75	Sums of financial transactions	Field is a summary of transactions made since the last transaction "Close day". It contains a constant prefix, numbers and sums of credit and debit transactions, as well as Cashback withdrawals.  <b>Format:</b> <table><tr><td>Prefix</td><td>"001001"</td></tr><tr><td>Number of debit transactions</td><td>4-digit number</td></tr><tr><td>Sum of amounts of debit transactions</td><td>sign (+ / - ) and 18 digit number (last 2 digits are decimals)</td></tr><tr><td>Number of credit transactions</td><td>4-digit number</td></tr><tr><td>Sum of amounts of credit transactions</td><td>sign (+ / - ) and 18 digit number (last 2 digits are decimals)</td></tr></table>		Prefix	"001001"	Number of debit transactions	4-digit number	Sum of amounts of debit transactions	sign (+ / - ) and 18 digit number (last 2 digits are decimals)	Number of credit transactions	4-digit number	Sum of amounts of credit transactions	sign (+ / - ) and 18 digit number (last 2 digits are decimals)
Prefix	"001001"														
Number of debit transactions	4-digit number														
Sum of amounts of debit transactions	sign (+ / - ) and 18 digit number (last 2 digits are decimals)														
Number of credit transactions	4-digit number														
Sum of amounts of credit transactions	sign (+ / - ) and 18 digit number (last 2 digits are decimals)														



Number of Cashbacks made	4-digit number
Sum of Cashbacks made	sign (+ / - ) and 18 digit number (last 2 digits are decimals)

Example:

```
"0010010002+0000000000002000000001+000000000000100000001+00000000000030000"
```

Message contains following transactions:

- 2 debit transactions in the total amount of HUF 200000
- 1 credit transaction for HUF 10000
- 1 Cashback for CZK 300.00

"Sales" type transactions are considered to be debit transactions. "Refund" type transactions are considered to be credit transactions. "Cancellation" transaction has an opposite effect on sums than "Sales" transaction (i.e. subtraction from number of transactions and subtraction from amount). Amount Cashback is considered to be debit transactions, but Number of debit transaction is not changed (i.e. 1x Sale + Cashback = 500CZK + 300CZK => Total = 800CZK, Number=1). Multicurrency has no impact on the totals (it is still simple total of all amounts).

If this FID is present in the ECR request, POST sends to ECR totals from AC or POST in response  
If this FID is missing in ECR request, POST doesn't send this FID in response.

M	VGS	4 – 480	Multi-ID account number Multi-ID account name
---	-----	---------	--

List of Multi-ID names. Min1 - Max 10 items - 10x (field\_ID + <GS>AccountNumber; AccountName). The field contains a list of Multi-IDs account number and Multi-IDs account names. This field is used as an answer to request Multi-ID Synchronization. There are max 10 items and max length of every account name is 24 chars, max length of every account number is 22 chars. Every item starts by group separator <GS>, account number and account name is separates by ; . Selected Item index is sent in payment request.

Example:

For two items the field value will be as follows:

```
<GS>125678/0710;Tax1(insurance)<GS>125879/0780;Income
```

The field is given in the message (transaction response) only if terminal supports Multi-ID and obtained this list from HOST otherwise only R100 is included in response.

N	AN	1 - 20	Reference number (transaction identifier)	Alphanumeric information sent by ECR to identify each transaction by adding identifier. This identifier appears in transaction reports. <b>Warning:</b> FID_S or FID_N can be used, cannot be used together.																																																															
P	V	9 - 19	Card number (PAN)	This number must be masked for security reason. Example: "472925*****135" (len=15) "472925*****135" (len=16) "472925*****328135" (len=19)																																																															
R	N	3	Response Code	This field informs about processing result (of transaction or message). Defined codes are in the chapter <a href="#">Transaction response codes</a> .																																																															
S	N	1 - 10	Invoice number	Allows to add additional identifier related to each transaction, which will appear in a transaction report.																																																															
T	N	2	Transaction type	Defines the type of transaction that is to be (or is) processed. Following values supported: <table><thead><tr><th>Transactions</th><th>Value</th><th>Info</th></tr></thead><tbody><tr><td>Sale</td><td>00</td><td></td></tr><tr><td>Preauthorisation</td><td>01</td><td></td></tr><tr><td>Preauthorization Completion</td><td>02</td><td></td></tr><tr><td>Refund</td><td>04</td><td></td></tr><tr><td>QuasiCash</td><td>05</td><td></td></tr><tr><td>Incremental Preaut.</td><td>07</td><td></td></tr><tr><td>Reversal</td><td>10</td><td></td></tr><tr><td>Offline Upload</td><td>11</td><td></td></tr><tr><td>Abort transaction</td><td>12</td><td>Timestamp is the same as current Trn</td></tr><tr><td>HOST Handshake</td><td>13</td><td></td></tr><tr><td>TMS connect</td><td>14</td><td></td></tr><tr><td>Token</td><td>15</td><td></td></tr><tr><td>POST data printing</td><td>16</td><td></td></tr><tr><td>Repeat Last Transaction</td><td>17</td><td>If Timestamp it is the same as original Trn</td></tr><tr><td>Variable Fare</td><td>18</td><td></td></tr><tr><td>VF Advice</td><td>19</td><td></td></tr><tr><td>Last TMS connect</td><td>20</td><td></td></tr><tr><td>Transaction cancellation</td><td>21</td><td>Enhanced Matching version</td></tr><tr><td>Preauthorization Completion</td><td>22</td><td>Enhanced Matching version</td></tr><tr><td>Init</td><td>23</td><td></td></tr></tbody></table>	Transactions	Value	Info	Sale	00		Preauthorisation	01		Preauthorization Completion	02		Refund	04		QuasiCash	05		Incremental Preaut.	07		Reversal	10		Offline Upload	11		Abort transaction	12	Timestamp is the same as current Trn	HOST Handshake	13		TMS connect	14		Token	15		POST data printing	16		Repeat Last Transaction	17	If Timestamp it is the same as original Trn	Variable Fare	18		VF Advice	19		Last TMS connect	20		Transaction cancellation	21	Enhanced Matching version	Preauthorization Completion	22	Enhanced Matching version	Init	23	
Transactions	Value	Info																																																																	
Sale	00																																																																		
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Transaction cancellation	21	Enhanced Matching version																																																																	
Preauthorization Completion	22	Enhanced Matching version																																																																	
Init	23																																																																		

Sub-total	65	
Close Totals	60	
Multi-ID Synchronization	28	
GetUID	29	Get non-banking card ID

U	AN	4	Code of Region in the Czech Republic	Field contains code defining the transport region. This field is used by GPE transport solution only. Example: region Praha, Kladno etc.
Z	VGS	3-27	Identification numbers	Additional numbers for identification transaction : <GS>VS[10]<GS>SS[Var10]<GS>KS[4] where : VS – Variable symbol, numeric, length of 10 bytes. SS – Specific symbol, numeric, variable length max. 10 bytes. KS – Constant symbol, numeric, length of 4 bytes.
a	AN	12-24	Application ID (AID)	Field contains information of chip application ID with leading information. The value of AID is set by card associations. Examples: "A0000000031010" or "A0000000043060"
b	N	1 – 18	Cashback amount	Gives the amount, which the customer wishes to withdraw. It is given without decimal places and without a separator (decimal point). Example: the amount "20000" is given for the amount 20000 HUF or 200,00 CZK.
d	AN	21-32	Data for transactions. Cancellation, New Completion and Incremental Auth ("TID[2-8];PAN[4];SQN[9];DT[6]")	Field contains added data need for transaction cancellation. Format: TID, PAN, Sequence Number and date separated by ";". TID - the terminal ID where the original transaction was created, available on original slip PAN - last four digits of the originally used PAN, available on original slip. In case of transaction New Preauthorisation Completion the last four digits of PAN is optional. If the last four digits of PAN are NOT sent then card has to be used. Sequence Number - of the original transaction, available on original slip. Sequence Number is 9 bytes long, in future can be up to 16 bytes. Date - YYMMDD when the original transaction was initiated. Available on the original receipt or from stored data.
f	AN	10	CodePage info for printing reasons	This code page is used for receipt printing, data sent in FID_t. Possible values are: ISO_8859-1 ISO_8859-2
g	AN	1 – 12	UID of MIFARE/DESFIRE cards	

i	N	9	Sequence number (Preauthorization + Completion)	Fix 9 → numeric unique identifier used for Preauthorisation and its Completion.
m		1 - 22	Multi ID account number	Optional FID of financial Request The field contains a Multi ID account number
n	N	12	Id of transaction	Fix 12 → numeric unique identifier of the financial transaction. Date and time of the authorization is used in format RRMDDHHMMSS. ECR uses this ID with unique TID so the whole unique identification of transaction contains 20 alphanumeric characters.
q	V	1 - 100	Extra Text with add. information	Field contains additional text with information about response. Format of text: "#id:Text1; #id:Text2;...; #id:Text5;" where ID can be response code  Last TMS connect transaction returns extra information about applications, versions (without application ID, just major a minor version) and the last TMS connection date + time in format RRMDDHHMMSS. Example: "MASTER:0107; GPE_PAY:0107; LAST_TMS:161107153125;"
s	N	1-10	Client ID (either FID_S or FID_s)	Field allows to add additional information related to transaction, which is then used to check the transaction via non-cash payment.  Field contains preformatted text for the printing of the transaction receipt by the ECR. The text is formatted into lines. Each line ends with a separator <LF> = 0x0A. The line contains formatting characters and/or constant value or directive. Size of field is variable (max size = 3 KB). In all versions of protocol (Bo,B1,B2) fid_t[max 3kB] is used as a part of final terminal's response. In new version (B2) of protocol where DeviceMessages are defined, fid_t can also be used in DeviceMessage for printing on ECR.
t	AN	1 - 3072	Text for printing of receipt	<u>Format character:</u> \c - following value (constant or directive) is centered on the line \b - following value (constant or directive) is in bold \s - following value (constant or directive) is printed in narrow (42 chars per line)  Directive #: #{value} - value is ID of FID used previously in message (FID_P, FID_a, or FID_J). - value Z means TID[8] from message header  Directive \$: \${value} - value is name of printed block. This block is loaded in ECR for all tickets - value: PAGE - move paper with ticket (equivalent to \n\n\n\n)

- SEPAR - print separ line [24] with "-----"
- ADDR - print address of merchant
- CABA - print info text for Cash back
- INFO - print info special text (not used)

Example1:

\b#{P}<LF >\cExp Date: 1205<LF >\${SEPAR}<LF > AutorCode: 123456<LF >

5434 **** **04	"b#{P}<LF > "
Exp Date: 1205	"\cExp Date: 1205<LF > "
-----	"\${SEPAR}<LF > "
----	"AutorCode: 123456<LF > "
AutorCode: 123456	

Example2:

\*\*\*\* \*\* 1204<LF > Exp Date: 1605<LF > \${SEPAR}<LF > AutorCode: 123456<LF >

**** ** 1204	" **** ** 1204<LF > "
Exp Date: 1605	"Exp Date: 1605<LF > "
-----	"\${SEPAR}<LF > "
----	"AutorCode: 123456<LF > "
AutorCode: 123456	

## 2.5.6 Transaction response codes

If the value of the response code is from 0 to 10 including, then the transaction is completed and accepted. If the value is different, message is not completed and is rejected.

### Overview of values and description of Response codes:

Codes of accepted transactions	
00 - 09	Accepted
10	Accepted, partial amount approved
Codes of rejected transactions	
050	General processing error
051	Unable to connect with Central Systems
053	A response from the Central System was not delivered
055	Declined by chip card without authorization
056	Declined by authorization host (online transaction)
060	Transaction was cancelled by the operator
061	Transaction was cancelled by the customer
062	Customer rejected transaction due to amount
063	Processing exceeded the designated time limit
070	Transaction was not cancelled
071	Currency not supported (Multicurrency)
080	No paper in the internal printer
100	Transaction not supported or not allowed
101	Invalid card
103	Error in message format (protocol error) *
106	Error in message CRC (protocol error) *
107	Error in MAC (protocol error) *
108	Terminal Busy (protocol error) *
110	The amount is not allowed
160	Totals on ECR, POST are equal, on AC finished with error
161	Totals on ECR, POST are not equal, on AC finished with error
200	Mandatory field missing in request message
360	Repeat Last Message – origin message not found
500	Internal application Error

\* These errors belong to the transport layer of the protocol and it is not confirmed by ECR.

Values undefined in the table (between values '050' – '999') means, that transaction was declined.

## 3 VALUE ADDED SERVICES

GPE provides value added services to our customers to extend usage of payment terminals for its business.

### 3.1 EET service (only for Czech Republic)

This chapter describes the additional information necessary to use EET functionality of payment terminal. This part of document is designed according to *Act no.112/2016 Coll.* <sup>[1]</sup>

Basic EET principals and recommendations

- ECR must inform POST about all EET payments.
- Recommended connectivity is RS232 (TCP/IP is also supported).
- Backup of all EET payments in ECR is **highly** recommended but it is not mandatory for using EET service.
- If the ECR supports or implements the EET extension the implementation of synchronization process (T46) is also **highly** recommended.
- ECR starts all transactions process.
- Multicurrency and DCC are out of scope of this version of document.

#### 3.1.1 EET transactions

With EET service you are able to use following transactions:

EET Transactions	Value	Mandatory	Info
EET Check	45	●	Get status of PT
EET Synchronization	46	○	Synchronize the transactions offline log
EET Payment	47	●	General transaction to register payment
EET Cash Refund	48	○	Opposite to EET Payment registration
EET Repeat Last Transaction	17	●	Result of last TRN if the response was not delivered to ECR.
EET Sale	00	●	Extended standard transaction
EET Reversal	10	●	Extended standard transaction
EET Refund	04	○	Extended standard transaction

There are several transactions which are extended by EET service and several new EET transactions focused to cash operations. The EET transaction has to be registered online only, but if a communication error occurs it can be registered in offline mode in the terminal. These offline registered transactions must be uploaded to NEST (GPE Gateway) as soon as possible. To keep the offline log of registered transactions only in the terminals is **highly risky**. From that reason it is **highly** recommended to implement replication backup also in an ECR. There are several levels of backup described below (if you can accept appropriate degree of risk). For detailed information about current implementation of offline level in the terminal please ask GPE.



### Implementation level of offline EET log.

Level	Description
1	No backup offline EET trx. in an ECR at all. In the case of terminal corruption all offline transactions can be lost forever.
2	Offline registered transactions are store also in an ECR. If the terminal is corrupted the HW can be changed regardless to EET offline transactions. These will be refreshed from ECR backup during synchronize phase. The log will be cleared immediately after successful close day (means executing close totals transaction).
3	All offline transactions are also stored in an ECR as the level 2, but the uploading of all offline transactions are controlled and synchronized with an ECR. Online uploaded EET transactions are returned as a list of EET trx. IDs. Offline records are cleared consecutively at both devices.

### 3.1.2 Extended data fids of EET service

Standard card transactions extended by EET service. Fid **e** keeps all extra EET data.

Transaction	Msq	Extension for EET			
		T	R	e	o
EET Sale	Req	●		●	
	Resp	●	●	●	○
EET Reversal	Req	●		●	
	Resp	●	●	●	○
EET Refund	Req	●		●	
	Resp	●	●	●	○

### 3.1.3 Fids for other EET transactions

Fids for other EET transactions

Transaction	Msq	Data fids for EET transactions							
		T	R	e	p	j	o	n	
EET Check	Req	●			○				
	Resp	●	●		○				
EET Payment	Req	●		●					
	Resp	●	●	●			○		
EET Cash Refund	Req	●		●					
	Resp	●	●	●			○		
EET Repeat Last Trn <sup>1</sup>	Req	●						●	
	Resp	●	●	○		○	○		
EET Synchronization	Req	●		●		○			
	Resp	●	●				○		

<sup>1</sup> This transaction is considered to use also for cashless transactions which are extended by EET service. The fid **n** contains original timestamp of requested transaction.

### 3.1.4 Fid definition

This table contains extended EET fids

Fid identifier	Format	Length	Description
e	collection	Variable	Collection of values which are separated to several parts according to EET requirements [2]. ( <a href="#">2.8.1.6.1</a> )
p	N	1-4	Count of offline registered transactions (in terminal or in an ECR).
o <sup>2</sup>	List	Max. AN (249)	EET transaction's IDs which have been already sent to GP Gateway (Up to 10) separated by ';' 10 x [21-32]B + 9x';' = 219-329.
j	N	2	Original transaction type

<sup>2</sup> fid o example: <STX>...<FS>oS1AP22350001160723141513;S1AP22350002160723152508<FS>...<ETX>

### 3.1.5 EET Check

This transaction is set by ECR to POST always if a cashier is logging into ECR system. The result of this action is the POST status. This status notifies the ECR about ability to use EET service successfully. In additional the transaction executes check of offline EET transactions stored in the POST. Terminal inserts fid **p** with count of unregistered offline EET transactions which are currently remain in its log. It can help and warn a cashier in case that count of offline transactions is above than specified a limit on the ECR. An ECR can send its count of offline transactions to a POST and this one can be compared with count in the POST as a complementary check, but it is not necessary.

R	Response Code – Extended codes for the EET service
---	--

This part defines extended response codes regard to EET service:

- POST is ready for EET payment (RC = 000) or transaction was successfully done and registered.
- New terminal – if it possible to recognize (after physical HW change) (RC = 300)  
ECR is expected to send all EET transaction marked as undelivered to POST (described later in more details)
- It is not possible to accept EET transaction due to full of offline EET log (RC = 301)  
It is expected clear offline log using standard process which executes upload offline EET transaction from ECR and terminal to GP-Gateway.
- It is not possible to send undelivered EET transactions from PT to GP-Gateway (internal non-communication problem) (RC = 302)  
ECR is expected to store current EET transaction marked as undelivered  
POST is expected to inform about situation → **CRITICAL PROBLEM: hardware replacement.**
- it is not possible to count BPK or PKP in POST if required (RC = 303)  
ECR is expected to store current EET transaction marked as undelivered POST is expected to inform about situation → **CRITICAL PROBLEM: hardware replacement or check the settings in the Merchant Portal!**

Extended response codes for EET service.

#### Codes of accepted transactions

00 – 10	Accepted – no changes
---------	-----------------------

#### Codes of rejected transactions

300	New terminal hardware (There is no offline log)
301	An offline trx. cannot be accepted due to full log
302	Internal problem with the offline log
303	Terminal cannot generate secure or signature code
350	Repeat last message is not available
360	Repeat last message: original transaction was not found

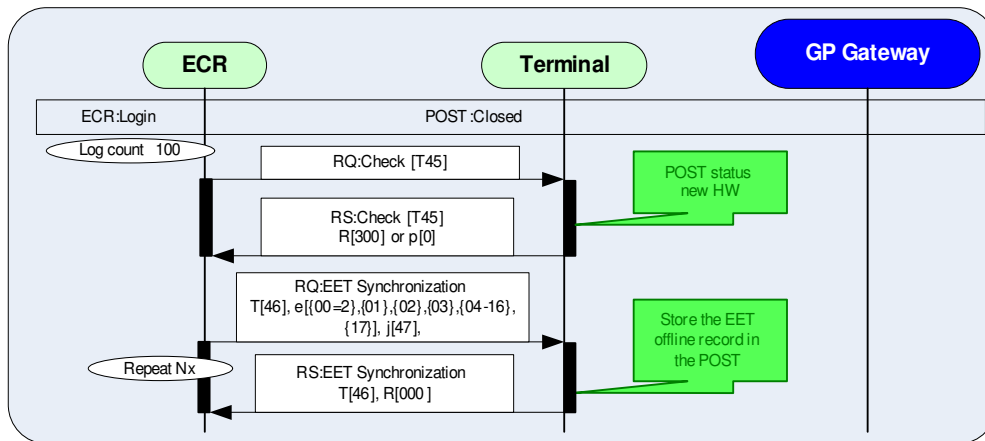
### 3.1.6 EET Synchronization of transactions

This message is used to synchronize offline logs between an ECR and terminal. An ECR sends EET Synchronization request with original EET transaction data in fid **e** according to table (2.8.1.6.2). Registration codes (BKP, PKP) will be completed by terminal or GP-Gateway. The synchronization (If it is supported by the ECR) can be sent to the terminals base on the situation:

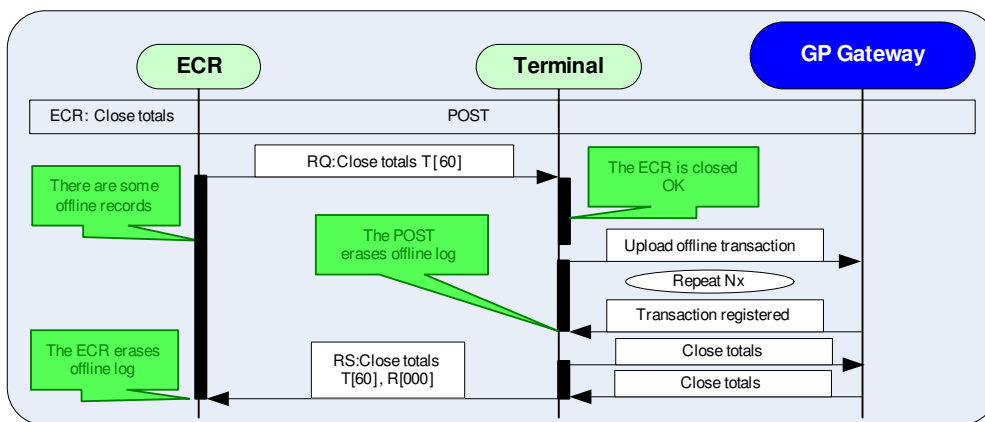
- Manually by some key or menu on the ECR since new terminal installation occurred.
- Automatically due to check message response code is 300 (New HW) and the ECR has stored unregistered offline transaction).

The manual approach is better apparently since no unwanted automatic sync. process can be started. Using of this transaction has two possibilities according to parameter *transaction treatments* in request from fid **e**. For the current level of imp. on the terminal site please ask for GPE.

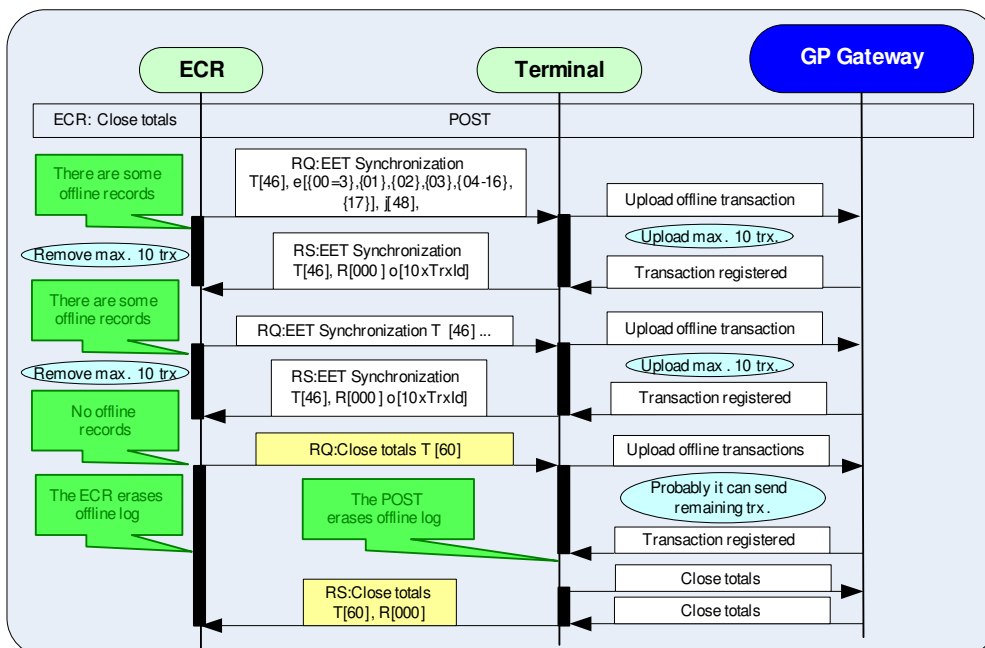
- Refreshing transactions from an ECR offline EET log to terminal EET log. See diagrams 1 and 2 below.
- Forwarding transactions from an ECR offline EET log through the terminal to GP-Gateway. See diagram 3 below.



1. Synchronization diagram: POST HW was changed.



2. Synchronization diagram: erasing log on POST site regardless logs on ECR.



3. Synchronization diagram: erasing the logs on both sites.

### 3.1.7 EET Payment and EET Sale

This transaction is sent by ECR to PT to require process of EET payment by cash or card. Both transaction must be complemented by fid\_e.

### 3.1.8 EET Cash Refund, EET Refund

These transactions are opposite to registered payment by EET Payment or EET Sale. All values are taking as a positive. Positive or negative amount are recognized by the transaction type. Specific set of amounts in fid\_e are not required for this transaction, only mandatory sFids are required according to table below.

### 3.1.9 EET Reversal

This transaction does not have specific additional impact to processing than transaction EET Refund or EET Cash Refund. This transaction is used by ECR only in case the previous transaction by bank card requires the signature validation (tag 0 in header is set to 1) and the signature mismatch with the card. Fid\_e contains same mandatory sFids as EET Cash Refund or EET Refund.

### 3.1.10 Fids structure

e	EET data
---	----------

- The fid contains all addition data which is required for EET registration regardless payment method. The mandatory sFids are driven by type of message (it means request/response).

The sFids are separated by group separator <GS> (0x1D). Some subfids are conditional relative to another subfid (see the table of sFids e). The structure is dynamic and from that reason it's expected its extension in a future development.

Structure of the sFid: <GS>[ {2B} sFid ][ {nB} value ]

## Format of the fid e

sFid	Description	Format	Request mandatory	Response mandatory
00	The EET transaction treatment	<a href="#">(2.8.12)</a>	<a href="#">(2.8.11)</a>	<a href="#">(2.8.11)</a>
01	A part of unique EET transaction ID	AN (9-20)	<a href="#">(2.8.11)</a>	<a href="#">(2.8.11)</a>
02	Date and time of sales [YYMMDDhhmmss]	N 12	<a href="#">(2.8.11)</a>	<a href="#">(2.8.11)</a>
03	Total amount of sale	N (1-12)	●	
04	Total amount for performance exempted from VAT	N (1-12)	○	
05	Total tax base - basic VAT rate	N (1-12)	○	
06	Total VAT - basic VAT rate ( <i>Conditional to 05</i> )	N (1-12)	○	
07	Total tax base - first reduced VAT rate	N (1-12)	○	
08	Total VAT - first reduced VAT rate ( <i>Conditional to 07</i> )	N (1-12)	○	
09	Total tax base - second reduced VAT rate	N (1-12)	○	
10	Total VAT - second reduced VAT rate ( <i>Conditional to 09</i> )	N (1-12)	○	
11	Total amount under the VAT scheme for travel service	N (1-12)	○	
12	Total amount under the VAT scheme for the sale of used goods - basic VAT rate	N (1-12)	○	
13	Total amount under the VAT scheme for the sale of used goods - first reduced VAT rate	N (1-12)	○	
14	Total amount under the VAT scheme for the sale of used goods - second reduced VAT rate	N (1-12)	○	
15	Total amount of payments intended for subsequent drawing or settlement	N (1-12)	○	
16	Total amount of payments which are payments subsequently drawn or settled	N (1-12)	○	
17	Type of registered payment	<a href="#">(2.8.13)</a>	<a href="#">(2.8.11)</a>	<a href="#">(2.8.11)</a>
18	Taxpayer's Signature Code (PKP)	<a href="#">(2.8.14)</a>	<a href="#">(2.8.11)</a>	<a href="#">(2.8.11)</a>
19	Taxpayer's Security Code (BKP)	<a href="#">(2.8.14)</a>	<a href="#">(2.8.11)</a>	<a href="#">(2.8.11)</a>
20	Fiscal Identification Code (FIK)	<a href="#">(2.8.14)</a>	<a href="#">(2.8.11)</a>	<a href="#">(2.8.11)</a>

Example of request uses EET fid e (amount 500.00 with combined payment method):

<FS>e<GS>**03**50000<GS>**04**41320<GS>**05**<GS>**06**8680<GS>**17**3<FS>

Example of response uses EET fid e:

<FS>e<GS>**00**0<GS>**01**S1AP00250001<GS>**02**160815142203<GS>**19**03ec1d0e-6d...<GS>**20** b3a09b52-7c87...<FS>

### 3.1.11 The EET sFids of fid e

The table specifies mandatory sFids inside fid e for each EET transaction.

EET Message type	Msg	Data subfids for EET transaction									
		00	01	02	03	04-16	17	18	19	20	
EET Sale	Req				●	●	●				
EET Payment	Resp	●	●	●				○ <sup>1</sup>	● <sup>1</sup>	○ <sup>1</sup>	
EET Refund	Req				●		●				
EET Cash Refund	Resp	●	●	●				○ <sup>1</sup>	● <sup>1</sup>	○ <sup>1</sup>	
EET Reversal	Req				●		●				
	Resp	●	●	●				○ <sup>1</sup>	● <sup>1</sup>	○ <sup>1</sup>	
EET	Req	●	●	●	●	●	●				
Synchronization	Resp										

<sup>1</sup> sFids are mandatory only if they are not automatically involved in the receipt text.

### 3.1.12 The EET transaction treatment

This sFid precisely specifies how the transaction was processed (Online or Offline). Offline marked transaction the ECR should store in log. Store or Forward values are used only in synchronization phase. The ECR specify how the offline transaction should be processed (only store on the terminal or online sent to GP-Gateway).

Value	Meaning	Direction	Description
0	Online	Response:	The transaction was registered online at the GP Gateway. It is not needed to store in the ECR backup log.
1	Offline	Response	The transaction was registered offline at the terminal. It is recommended to store in the ECR backup log.
2	Store	Request	<i>Only for Synchronization msg.</i> The ECR wants to store this transaction to offline log in terminal.
3	Forward	Request	<i>Only for Synchronization msg.</i> The offline EET transaction are sent to the GP Gateway directly and checked at the both log (ECR, POST)

### 3.1.13 Type of registered payment

The table specifies elementary payment methods defined by GPE and it is intended to future extension. These methods will be displayed in merchant portal view for each transaction.

Id	Method	Description
0	Unspecified	It is not specified at all.
1	Combined	Several payment methods in one EET registration message.
2	Bank card	It was used bank card

3	Cash	It was paid by cash
4	Gift card	It was paid by gift card or loyalty card
5	meal ticket	It was paid by meal tickets
6	Voucher	The voucher was used

### 3.1.14 Signature and security codes

Codes identify each payment on the EET server and they must be printed on a receipt. If the transaction is registered online the FIK and BKP are returned. If the transaction is offline registered (on the terminal or on the GP-Gateway, SFS is not available) the PKP and BKP are returned.

These sFids can be presented in the response message as sFid value (i.e. it can be placed on any location of ECR tickets) or it can be automatically involved in receipt fid **t**, it depends on the terminal settings. If the codes are involved in receipt they will not be placed in sFid **e** in response. Right place on the ticket can be leaded by directive corresponding to particular name of code `${FIK}`, `${BKP}`, `${PKP}` or they can be rendered directly into the text without any leading marks or they can be returned simply only as a value of sfids (18,19,20). All codes are in printable format.

- Mandatory sFids for online registered transactions:

Name	coding	Length	Description
FIK	BASE 16	39	Fiscal Identification Code
BKP	BASE 16	44	Taxpayer's Security Code

**Examples:**

FIK:b3a09b52-7c87-4014-a496-4c7a53cf9125-03  
BKP:03ec1d0e-6d9f77fb-1d798ccb-f4739666-a4069bc3

- Mandatory sFids for offline registered transactions:

Name	coding	Length	Description
PKP	BASE 64	344	Taxpayer's Signature Code
BKP	BASE 16	44	Taxpayer's Security Code

**Examples:**

BKP:03ec1d0e-6d9f77fb-1d798ccb-f4739666-a4069bc3  
PKP:Ca8sTbURReQjgcy/znXBKjPOnZof3AxWK5WySpyMrUXF0o7cz1BP6adQzktODKh2d8s  
oAhn1R/S071VDTa/6r9xTuI3NBH/+7YfYz/t92eb5Y6aNvLm6tXfOdE3C94EQmT0SEez  
9rInGXXP1whIKYX7K0HgVrxjdxCFkZF8Lt12XbahhAzJ47LcPxBZZp6U6wJ2sWI5os3  
KY9u/ZChzAUaCec7H56QwkMnu3U3Ftwi/YrxSzQZTmPTpFYKXnYanrFaLDJm+1/yg+VQ  
ntoByBM+HeDXigBK+SHaxx+Nd0sSmm1Im4v685BRVdUId+4CobcnSQ3CBsjAhqmIrtWT  
GQ==



### 3.1.15 Unique EET Transaction number

This number is only part of entire unique EET transaction number. Unique transaction number is complemented by sFid 02 (see the table with fid **e**). Entire unique number is constructed by {TID[5-16], SequenceNr [4], Date+Time [12]} in summary 21-32B.

### 3.1.16 EET Repeat Last Trn.

This transaction's scope was changed as transaction became public for NON-EET configurations from document version 13.2. In spite of upcoming description is valid, more information can be found in APPENDIX "RLM – Repeat Last Message principles".

If the EET service is activated on the terminal it will not be possible to use automatic transaction Reversal since the EET transaction was successfully registered in the SFS. From that reason the transaction Repeat Last Trn. must be used. If the ECR does not receive response message in defined timeout ECR should send message Repeat Last Trn. If there is no response also for Repeat Last Trn. request the transaction has to be checked in the transaction system of provider payment services. There is not possible to resolve this transaction automatically. The Repeat Last Trn. can be sent after all timeouts expire on the terminal (default timeout is 60 [response]+2x15s[confirmation] = 90s). If the ECR sends the Repeat Last Trn. earlier than the defined timeout limits the terminal can replay by codes R108 (terminal busy) or it can repeat the original response again according to current processing phase.

#### 3.1.16.1 Negative response message

The negative response code informs that the requested transaction was not found in log or terminal was not able to send Last Transaction Response due to unexpected reasons. It is critical state since there is no possible to retrieve signature and secure codes for a payment on a receipt.

#### 3.1.16.2 Positive response message

The response message contains also fid **j** in which is placed original transaction type. Other fids match with previous performed transaction and it contains original response data belongs to the original transaction type.

4. Repeat last response diagram.

### 3.1.17 EET advices and recommendations

1. It is highly recommended to implement backup log of offline transaction in the ECR system (Level 2 or Level 3). It can eliminate losses of offline registered transactions inside a terminal when a terminal is unavailable to upload offline transaction to GP Gateway (from different reasons).
2. We prefer to use serial communication channel since it is resistant to wrong local Ethernet configuration or blackout of infrastructure.
3. It is necessary to take to account that upload all offline transactions can take a little more time. The process of real upload can be driven by terminal or ECR. Uploading offline EET transactions can be processed before or after closing phase of ECR or terminal.

## 3.2 Transport additional information

There are additional response codes for Transport transactions which are: Token and Variable Fare. POS reads only payment cards, tries to make ODA (Offline Data Authentication) during Sale request to 0.00 CZK or 0.01 CZK and returns result of this.

#### Extended response codes for Transport

900	Offline accepted
901	Online processing request – ODA successful
902	Online processing request – ODA failed
903	Offline declined by chip card
904	Declined by internal error
905	Invalid card
906	Card on Deny List

### 3.3 MultiMerchant ID detailed information

ECR is required to select one of the obtained items (account name) to allow payment under special conditions. To be able to do it is necessary to process INIT transaction which is started after login of Cashier to synchronise special data.

If Terminal supports MultiMerchant ID then in INIT response there is a list of possible account names which are stored in ECR and used during payment.

During payment cashier is asked to select one of the items from stored list to gain index of item (see FID\_M). This index is then send to terminal in payment request (probably as FID\_m – TODO)

FID\_M is sent in the message (Init response) only if terminal supports Multi ID and obtained this list from HOST otherwies only R100 is included in response and ECR will not offer Selection of account name durin following payments.

TODO:

1. Definovat index field FID\_m
2. Přidat FID\_m do Payment requestů
3. Vyřešit reinicializaci uložených položek (v případě, že terminál synchronizoval změněné položky z NESTu – TOTO JE POTŘEBA DOMYSLET.

### 3.4 RLM - Repeat Last Message principles

GPE application provides extra features than can be modified for different merchant requirements and are expected to support more implementations.

RLM seems to be simple task "terminal, resend last response". But there are some general suppositions and conditions :

- a) RLM is activated only if Automatic Financial Transaction Reversal (AFTR) is not allowed (set in TLV param tag DFDE.FEATURES). ECRxPOST flow uses either RLM or AFTR.
- b) Backup of response is stored in terminal's database so it is available even after restart
- c) If the ECR does not receive response message in defined timeout ECR should initiate transaction RLM (Repeat Last Message Trn.)
- d) The RLM trn. can be sent after all timeouts expire on the terminal (default timeout is 60 [response]+2x15s[confirmation] = 90s). If the ECR sends the RLM request earlier than the defined timeout limits the terminal can replay by codes R108 (terminal busy) or it can repeat the original response again according to current processing phase.
- e) RLM trn. Can be used for
  - a. financial and administrative transactions
  - b. approved and declined transactions
- f) R360 (not found)
- g) Processing of RLM for EET transactions is described in paragraph [3.1.16](#)

The RLM is processed in two different scenarios according to new version of document (13.2). Terminal application selects the flow according to ECR request automatically:

- 1) **RLM flow 1** - principle where RLM request contains FID\_n (timestamp of last processed transaction either financial or administrative)
- 2) **RLM flow 2** - principle where RLM request does not contain FID\_n

#### 3.4.1 RLM Version 1

This flow is the **same** as described in EET chapter 3.1.16 !

- The FID\_n must be present in ECR RLM request
- If FID\_n was present in original response it MUST NOT be changed (the whole response is repeated without any change)

Example

```

PAYMENT
request sent:<STX>B001<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>19031808452700000009D8A8<FS>B300<FS>T00<ETX>
confirm rcv:<STX>B001S1APDA0619031808452700000000A5A5<ETX>
message response :<STX>B001S1APDA0619031808452700000000F65F8<FS>T00<FS>R050<FS>E2401<ETX>
confirm sent :<STX>B001S1APDA0619031808452700000000A5A5<ETX>
RLM
Info : request
sent:<STX>B001<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>190318084600000000123F8F<FS>T17<FS>n190318084527<ETX>
Info : confirm rcv:<STX>B001S1APDA06190318084600000000A5A5<ETX>
Info : message response :<STX>B001S1APDA06190318084600000000F65F8<FS>T00<FS>R050<FS>E2401<ETX>
Info : confirm sent :<STX>B001S1APDA06190318084600000000A5A5<ETX>
Info : Communication task is finished
  
```

### 3.4.2 RLM Version 2

This flow is **different** EET version described in chapter 3.1.16 !

- The FID\_n MUST NOT be used in ECR RLM request
- Terminal application adds new or change existing FID\_n in response (confirmation what transaction it is – Timestamp of last trnx.)

Example

```

PAYMENT
request sent:<STX>B001<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>19031808561900000009D8A8<FS>B300<FS>T00<ETX>
confirm rcv:<STX>B001S1APDA0619031808561900000000A5A5<ETX>
message respons :<STX>B001S1APDA0619031808561900000000F65F8<FS>T00<FS>R050<FS>E2401<ETX>
confirm sent :<STX>B001S1APDA0619031808561900000000A5A5<ETX>

RLM
request sent:<STX>B001<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>190318085649000000004A68B<FS>T17<ETX>
confirm rcv:<STX>B001S1APDA0619031808564900000000A5A5<ETX>
message respons :<STX>B001S1APDA0619031808564900000001DFB3D<FS>T00<FS>R050<FS>E2401<FS>n190318085619<ETX>
confirm sent :<STX>B001S1APDA0619031808564900000000A5A5<ETX>

```

### 3.4.3 Negative RLM

If terminal is not able to find last transaction than sent reponse contains negative response code '360'.

Example

```

RLM
Request:<STX>B001<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>190318090222000000012DC1B<FS>T17<FS>n190318090201<ETX>
confirm rcv:<STX>B001S1APDA0619031809022200000000A5A5<ETX>
response :<STX>B001S1APDA061903180902220000000093671<FS>T17<FS>R360<ETX>
confirm sent :<STX>B001S1APDA0619031809022200000000A5A5<ETX>

```

## 4 APPENDICES

### 4.1 Algorithm for calculating CRC16 in C language

The following code uses POST for calculating CRC16. Standard CCITT v.41 prescribes the polynomial value:  $x^{16} + x^{12} + x^5 + 1$ .

```
const unsigned short ccittTable[256] =
{
    0x0000, 0x1021, 0x2042, 0x3063, 0x4084, 0x50A5, 0x60C6, 0x70E7,
    0x8108, 0x9129, 0xA14A, 0xB16B, 0xC18C, 0xD1AD, 0xE1CE, 0xF1EF,
    0x1231, 0x0210, 0x3273, 0x2252, 0x52B5, 0x4294, 0x72F7, 0x62D6,
    0x9339, 0x8318, 0xB37B, 0xA35A, 0xD3BD, 0xC39C, 0xF3FF, 0xE3DE,
    0x2462, 0x3443, 0x0420, 0x1401, 0x64E6, 0x74C7, 0x44A4, 0x5485,
    0xA56A, 0xB54B, 0x8528, 0x9509, 0xE5EE, 0xF5CF, 0xC5AC, 0xD58D,
    0x3653, 0x2672, 0x1611, 0x0630, 0x76D7, 0x66F6, 0x5695, 0x46B4,
    0xB75B, 0xA77A, 0x9719, 0x8738, 0xF7DF, 0xE7FE, 0xD79D, 0xC7BC,
    0x48C4, 0x58E5, 0x6886, 0x78A7, 0x0840, 0x1861, 0x2802, 0x3823,
    0xC9CC, 0xD9ED, 0xE98E, 0xF9AF, 0x8948, 0x9969, 0xA90A, 0xB92B,
    0x5AF5, 0x4AD4, 0x7AB7, 0x6A96, 0x1A71, 0x0A50, 0x3A33, 0x2A12,
    0xDBFD, 0xCBDC, 0xFBBF, 0xEB9E, 0x9B79, 0x8B58, 0xBB3B, 0xAB1A,
    0x6CA6, 0x7C87, 0x4CE4, 0x5CC5, 0x2C22, 0x3C03, 0x0C60, 0x1C41,
    0xEDAE, 0xFD8F, 0xCDEC, 0xDDCD, 0xAD2A, 0xBD0B, 0x8D68, 0x9D49,
    0x7E97, 0x6EB6, 0x5ED5, 0x4EF4, 0x3E13, 0x2E32, 0x1E51, 0x0E70,
    0xFF9F, 0xEFBE, 0xDFDD, 0-CFFC, 0xBF1B, 0xAF3A, 0x9F59, 0x8F78,
    0x9188, 0x81A9, 0xB1CA, 0xA1EB, 0xD10C, 0xC12D, 0xF14E, 0xE16F,
    0x1080, 0x00A1, 0x30C2, 0x20E3, 0x5004, 0x4025, 0x7046, 0x6067,
    0x83B9, 0x9398, 0xA3FB, 0xB3DA, 0xC33D, 0xD31C, 0xE37F, 0xF35E,
    0x02B1, 0x1290, 0x22F3, 0x32D2, 0x4235, 0x5214, 0x6277, 0x7256,
    0xB5EA, 0xA5CB, 0x95A8, 0x8589, 0xF56E, 0xE54F, 0xD52C, 0xC50D,
    0x34E2, 0x24C3, 0x14A0, 0x0481, 0x7466, 0x6447, 0x5424, 0x4405,
    0xA7DB, 0xB7FA, 0x8799, 0x97B8, 0xE75F, 0xF77E, 0xC71D, 0xD73C,
    0x26D3, 0x36F2, 0x0691, 0x16B0, 0x6657, 0x7676, 0x4615, 0x5634,
    0xD94C, 0xC96D, 0xF90E, 0xE92F, 0x99C8, 0x89E9, 0xB98A, 0xA9AB,
    0x5844, 0x4865, 0x7806, 0x6827, 0x18C0, 0x08E1, 0x3882, 0x28A3,
    0xCB7D, 0xDB5C, 0xEB3F, 0xFB1E, 0x8BF9, 0x9BD8, 0xABBB, 0xBB9A,
    0x4A75, 0x5A54, 0x6A37, 0x7A16, 0x0AF1, 0x1AD0, 0x2AB3, 0x3A92,
    0xFD2E, 0xED0F, 0xDD6C, 0xCD4D, 0xBDAA, 0xAD8B, 0x9DE8, 0x8DC9,
    0x7C26, 0x6C07, 0x5C64, 0x4C45, 0x3CA2, 0x2C83, 0x1CE0, 0x0CC1,
    0xEF1F, 0xFF3E, 0xCF5D, 0xDF7C, 0xAF9B, 0xBFBA, 0x8FD9, 0x9FF8,
    0x6E17, 0x7E36, 0x4E55, 0x5E74, 0x2E93, 0x3EB2, 0x0ED1, 0x1EF0
};

// =====
// unsigned short calcCRC16(unsigned char *data, unsigned short len)
//
// In:          data - pointer to data from which CRC16 is calculated
//             len  - length of data from which CRC16 is calculated
//
// Out:         -
//
// Return:      CRC16
//
```

```
//      Test:          calcCRC16((unsigned char*) "123456", 6) => 20E4
//      =====
unsigned short calcCRC16( unsigned char *data, unsigned short
dlen )
{
    unsigned short crc16 = 0x0000;
    unsigned short len = dlen;

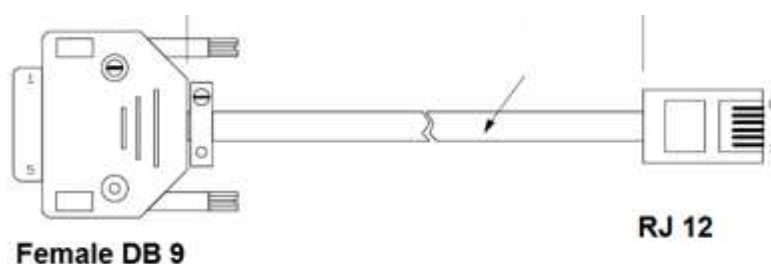
    if (!data || !len)
        return crc16;

    while(len --)
        crc16 = (crc16 << 8) ^ ccittTable[(crc16 >> 8) ^ *data ++];

    return crc16;
}
```

## 4.2 Serial cable structure

### Crossover cable design



### Full connection (POST RS232-1):

Female DB 9		RJ 12 6/6
2	-	2
3	-	3
8	-	4
7	-	5
5	-	6

### Energy-efficient connection for ECR (POST RS232-2):

Female DB 9		RJ 12 6/6
2	-	2
3	-	3
5	-	6

## 4.3 Communication trace

### SALE

#### ECR: Transaction request

<STX>B001<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>140526124328000000167673  
<FS>B1500<FS>T00<FS>S0123456789<ETX>

#### POST: Confirmation message(s)

<STX>B001S1APDA0514052612432800000000A5A5<ETX>

#### POST: Transaction response

<STX>B001S1APDA05140526124328000000499D0E<FS>T00<FS>R000<FS>P472943\*\*\*\*\*143  
<FS>F123456<SPC>B<FS>aA0000000041010<FS>JVISA<FS>n140526124333<ETX>

#### ECR: Confirmation message

<STX>B001S1APDA0514052612432800000000A5A5<ETX>

### SALE (WITH RECEIPT PRINTING IN ECR)

#### ECR: Transaction request

<STX>B001<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>1405261303310000000A0221  
<FS>B5500<FS>T00<ETX>

#### POST: Confirmation message(s)

<STX>B001S1APDA0514052613033100000000A5A5<ETX>

#### POST: Transaction response

<STX>B001S1APDA05140526130331000001417FE9<FS>T00<FS>R000<FS>P472943\*\*\*\*\*143  
<FS>F123456<SPC>B<FS>aA0000000041010<FS>JVISA<FS>fISO-8859-  
2<FS>t26/05/14<SPC><SPC>13:03:31<SPC>001<LF>#{Z}<LF>\${SEPAR}<LF>A0000000041010  
<LF>VISA<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>  
<SPC><SPC><SPC><SPC><SPC>(S)<LF><SPC>\*\*\*\*<SPC>\*\*\*\*<SPC>\*\*\*\*<SPC>\*143<SPC>  
<SPC><SPC><SPC><LF>PRODEJ<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>  
<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC><LF><xC8><xE1>stka<SPC>CZK  
<SPC>:<SPC>55.00<SPC><SPC><SPC><SPC><SPC><SPC><LF>Autoriza<xE8>n<xED>  
<SPC>k<xF3>d:<SPC>123456<SPC>B<LF>\${SEPAR}<LF>Doklad<SPC>uchovejte  
<SPC>pro<LF>pozd<xEC>j<x9A><xED><SPC>kontrolu<LF>\${PAGE}<LF><FS>n140526130336<ETX>

#### ECR: Confirmation message

<STX>B001S1APDA0514052613033100000000A5A5<ETX>

### SALE WITH CASHBACK

#### ECR: Transaction request

<STX>B001<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>140526131317000000104D6A  
<FS>B3000<FS>b1000<FS>T00<ETX>



POST: Confirmation message(s)

<STX>B001S1APDA0514052613131700000000A5A5<ETX>

POST: Transaction response

<STX>B001S1APDA0514052613131700000049B82B<FS>T00<FS>R000<FS>P472943\*\*\*\*\*143<FS>F123456  
<SPC>B<FS>aA0000000041010<FS>JVISA<FS>n140526131323<ETX>

ECR: Confirmation message

<STX>B001S1APDA0514052613131700000000A5A5<ETX>

REVERSAL

ECR: Transaction request

<STX>B001S1APDA051405290913090000001469BA<FS>B1500<FS>F123456<SPC>B  
<FS>T10<ETX>

POST: Confirmation message(s)

<STX>B001S1APDA0514052909130900000000A5A5<ETX>

POST: Transaction response

<STX>B001S1APDA051405290913090000000090DC6<FS>T10<FS>R000<ETX>

ECR: Confirmation message

<STX>B001S1APDA0514052909130900000000A5A5<ETX>

REVERSAL FOR SALE WITH CASHBACK

ECR: Transaction request

<STX>B001S1APDA051405291028440000001BB7C9<FS>B1500<FS>b10000<FS>F123456<SPC>B  
<FS>T10<ETX>

POST: Confirmation message(s)

<STX>B001S1APDA0514052910284400000000A5A5<ETX>

POST: Transaction response

<STX>B001S1APDA05140529102844000000009F0DC6<FS>T10<FS>R000<ETX>

ECR: Confirmation message

<STX>B001S1APDA0514052910284400000000A5A5<ETX>

REFUND - MERCHANDISE RETURN

ECR: Transaction request

<STX>B001<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>1405261349320000000A346F  
<FS>B1000<FS>T04<ETX>

POST: Confirmation message(s)

<STX>B001S1APDA0514052613493200000000A5A5<ETX>

POST: Transaction response

<STX>B001S1APDA0514052613493200000039B95E<FS>T04<FS>R000<FS>P472943\*\*\*\*\*143  
<FS>F123456<SPC>B<FS>JVISA<FS>n140526134937<ETX>

ECR: Confirmation message

<STX>B001S1APDA0514052613493200000000A5A5<ETX>

PREAUTHORIZATION

ECR: Transaction request

<STX>B001<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>1405261356480000000A64CA  
<FS>B1000<FS>T01<ETX>

POST: Confirmation message(s)

<STX>B001S1APDA0514052613564800000000A5A5<ETX>

POST: Transaction response

<STX>B001S1APDA0514052613564800000054F87B<FS>T01<FS>R000<FS>P472943\*\*\*\*\*143<FS>F123456  
<SPC>B<FS>i001001230<FS>aA0000000041010<FS>JVISA<FS>n140526135653<ETX>

ECR: Confirmation message

<STX>B001S1APDA0514052613564800000000A5A5<ETX>

PREAUTHORIZATION COMPLETION

ECR: Transaction request

<STX>B001<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>14052614090300000015E68E<FS>B1000  
<FS>i001001230<FS>T02<ETX>

POST: Confirmation message(s)

<STX>B001S1APDA0514052614090300000000A5A5<ETX>  
<STX>B001S1APDA05140526140903000000000000<ETX>

POST: Transaction response

<STX>B001S1APDA0514052614090300000039D9D7<FS>T02<FS>R000<FS>P472943\*\*\*\*\*143<FS>F123456  
<SPC>B<FS>JVISA<FS>n140526140909<ETX>

ECR: Confirmation message

<STX>B001S1APDA0514052614090300000000A5A5<ETX>

## CLOSE TOTALS

### ECR : Transaction request

<STX>B001<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>1405261417040000003A872E<FS>T60  
<FS>L0010010007+0000000000000195000002+00000000000004000<ETX>

### POST: Confirmation message(s)

<STX>B001S1APDA0514052614170400000000A5A5<ETX>

### POST: Transaction response

<STX>B001S1APDA051405261417040000003F52C7<FS>T60<FS>R000<FS>L0010010007+000000000000019500  
0002+00000000000004000<ETX>

### ECR : Confirmation message

<STX>B001S1APDA0514052614170400000000A5A5<ETX>

## COMMUNICATION TCP/IP (SALE)

-- (ECR open connection to POST) ==

From ECR (192.168.252.84) To POST (192.168.252.168) TCP:2050 [SYN]  
From PORT (192.168.252.168) To ECR (192.168.252.84) TCP:2050 [SYN, ACK]  
From ECR (192.168.252.84) To POST (192.168.252.168) TCP:2050 [ACK]  
From ECR (192.168.252.84) To POST (192.168.252.168) TCP:2050 [PSH, ACK]

-- (ECR connected to POST) ==

-- (ECR REQ -> POST) ==

<STX>B001<SPC><SPC><SPC><SPC><SPC><SPC><SPC><SPC>09110618112000000014CBBF  
<FS>T00<FS>B100<FS>S123456789<ETX>

From POST (192.168.252.168) To ECR (192.168.252.84) TCP: 2050 [ACK]  
From POST (192.168.252.168) To ECR (192.168.252.84) TCP: 2050 [PSH, ACK]

-- (POST CONFIRM. -> ECR) ==

<STX>B001S1BP725809110618112000000000A5A5<ETX>

From ECR (192.168.252.84) To POST (192.168.252.168) TCP:2050 [ACK]  
From POST (192.168.252.168) To ECR (192.168.252.84) TCP:2050 [PSH, ACK]

-- (POST ACTIVITY -> ECR) ==

<STX>B001S1BP7258091106181120000000000000<ETX>

From ECR (192.168.252.84) To POST (192.168.252.168) TCP:2050 [ACK]  
From POST (192.168.252.168) To POST (192.168.252.84) TCP:2050 [PSH, ACK]

-- (POST RESP. -> ECR) ==

<STX>B001S1BP72580911061811200001003F0F55<FS>R001<FS>T00<FS>F432419<SPC>B  
<FS>P472941\*\*\*\*\*145<FS>E1012<FS>JVisa<FS>n091106181301<ETX>

From ECR (192.168.252.84) To POST (192.168.252.168) TCP:2050 [PSH, ACK]

-- (ECR CONFIRM. -> POST) ==

<STX>B001S1BP725809110618112000000000A5A5<ETX>

-- (ECR close connection) ==

From ECR (192.168.252.84) To POST (192.168.252.168) TCP:2050 [FIN, ACK]

From POST (192.168.252.168) To POST (192.168.252.84) TCP:2050 [ACK]

From POST (192.168.252.168) To POST (192.168.252.84) TCP:2050 [FIN, ACK]

From ECR (192.168.252.84) To POST (192.168.252.168) TCP:2050 [ACK]

-- (ECR disconnected) ==

## Revisions history

version	date	modified	Description	applies to:	
				AT	CAT
<b>13.05</b>	<b>18.05.2020</b>	<b>P. Košťál</b>	<b>1.7 Troubleshooting - add</b>		
13.04	03.03.2020	P.Kotal	Partial approval - Update Response code from POST	●	○
	28.02.2020	P.Kotal	ŠP - Add new field Z – additional identification of tran	●	○
13.03	27.02.2020	P.Kotal	Token - added for financial transactions	●	○
	20.08.2019	P. Košťál	Field d – change description	●	●
13.02	16.4.2019	D.Pollák	Feature “get UID”	●	○
	14.3.2019	M.Dáňa	Repeat Last Message transaction for all configurations	●	●
	24.08.2018	C. Pilat	Added POS handshake transaction	●	●
13.01	17.12.2018	R. Bryx P.Košťál	New Multi-ID feature added into specification.	●	○
13.00	01.03.2018	R. Bryx	Complete user guide redesign	●	●
12.35	23.02.2018	Č. Pilát	Note about device messages support in B2	○	○
12.34	12.02.2018	Č. Pilát	New transaction Incremental Authorisation	○	○
12.33	14.08.2017	P. Kotal	Extended descriptions	○	○
12.32	07.08.2017	P. Kotal	Added Preauthorization completion transaction support	●	●
12.31	25.07.2017	P. Perman	Added QuasiCash transaction	●	○
			New response codes and note added	●	●
12.30	06.06.2017	M. Trita	Offline upload – number of offline transactions to upload	○	●
		M. Dáňa	Close day – new optional field U	○	●
		P. Perman			
12.29	11.05.2017	P. Kotal	Add remark and information	●	●
12.28	28.04.2017	P. Kotal P. Perman	Correction of transaction description	●	●
			New “Transaction cancellation” type added	●	●
			EET Revision	●	○
12.27	7/11/2016	M. Trita	Transaction type “Last TMS connect” added	○	●
12.26	30/08/2016	M. Trita	VF Advice transaction, U tag changed, response codes for transport transactions added	○	●
12.25	13/07/2016	M. Dáňa	EET specification – additional information added	●	○
12.24	6/6/2016	M. Trita	Transport Data, Variable Fare transaction	●	●
12.23	26/4/2016	P. Kotal	FIX - Correct format field A Language code, from N to A	●	●
12.23	26/4/2016	P. Kotal	Corrections – unattended	○	●
			Change of formatted printer field “FID_t” (new max size = 3kB)		
			New transaction “Offline upload” added	○	●
			New transaction “Abort transaction” added	○	●
			New transaction “HOST Handshake” added	○	●
			New transaction “TMS connect” added	○	●
			New transaction “Token” added	○	●
12.22	13/1/2016	P. Kotal	New transaction “POST data printing” added	○	●

			New transaction "Repeat last transaction" added	<input type="radio"/>	<input checked="" type="radio"/>
12.21	28/04/2015	M. Dáňa	FID_N: Reference number definition added	<input checked="" type="radio"/>	<input checked="" type="radio"/>
			description of VAS removed	<input checked="" type="radio"/>	<input type="radio"/>
			Changes for Hungary (amounts without decimal places)		
12.20	24/11/2014	M. Dáňa	<ul style="list-style-type: none"> <li>FID_B (amount)</li> <li>FID_L (totals)</li> <li>FID_b (cashback)</li> </ul>	<input checked="" type="radio"/>	<input type="radio"/>

#### References

- CRC-16 CCITT v.41
- EIA RS-232
- Control characters / ASCII, ANSI X3.4, CCITT Recommendation V.3

This document fully replaces the original protocol documentation for communication with the cash register (Protocol\_B\_vX - where X is the version number).

#### Trace convention

In tracing the invisible signs are replaced by the indication of the sign (according to ASCII) in the square brackets. Messages exceeding 1 line are divided and continue on the next line only after a tab.

## 4.4FAQ

A few tips and tricks:

1	It is recommended to have 2 seconds timeout between two following messages sent by ECR (i.e. between Close Totals and Logout or Gift payment and Confirmation).
2	Check number (CRC) for messages without data part (len =0) should be 0 (0000). Some POST versions use in message header of Confirmation (ACK) value A5A5 instead of 0000. It has no impact on the transaction and value of CRC is not checked.

## 5 REFERENCES

1. Act no. 112/2016 Coll., - The exact wording of the law Czech Republic
2. Electronic Registration of Sales - <http://www.etrzby.cz/cs/technicka-specifikace>