Mastercard Transit Solutions

A guide to help you select and implement the optimal EMV open loop transit payment solution
Mastercard is leading the growth of EMV open loop payment acceptance in the transit sector

In transportation systems around the world, innovative Mastercard payment solutions are leading the way in facilitating easier, faster and efficient commuting.

Mastercard payment technology offers opportunities to reduce operating costs and manage risk while enhancing speed and convenience across subways, commuter and light rail as well as buses.

With transit deployments established as early as 2005, Mastercard continues to deliver successful solutions for urban transportation centers in Europe, Asia Pacific and North & South America.

This guide is designed to provide a high level summary of the key elements to consider when assessing how to implement an electronic payment solution into a transit environment.

For full details of Mastercard’s rules for accepting and processing payment transactions, please contact: smartcities.europe@mastercard.com or your local Mastercard representative or office.
The transit EMV open loop payment Acceptance Value Proposition

“Focus on moving people, not money”
Enabling EMV open loop payments for transit

Enabling your Transit Solution to offer electronic payments will deliver significant benefits:

**INCREASE YOUR REVENUES**
- Electronic payments drive higher purchase volumes and amounts
- Compounds value of money as payments are made directly to your bank account

**DECREASE YOUR COSTS**
- Reduce cash & coin handling costs
- Reduces processing fees through aggregation
- Simplifies fare collection and automates reconciliation
- Reduces management costs of a proprietary closed loop card

**IMPROVE YOUR SPEED & SECURITY**
- Reduces congestion and shrinks waiting lines during rush hours & peaks
- Reduces risk of break-ins and theft
- Uses Global Interoperability Standards

**DIFFERENTIATE YOUR BUSINESS AND RIDER OUTLOOK**
- Improves overall image with customers
- Is universally recognized and already used by locals, tourists and business people
- Allows for the ability to track ridership and improve reporting capabilities
There are two core payment acceptance solutions for transit recommended by Mastercard. The major difference between the two options is that ‘payment only’ requires additional tickets or tokens (paper or electronic), whilst payment & access uses the card or device as the actual ticket and the permit to access the transit system. A transit operator may opt to use one or both solutions.

Mastercard has a range of standard acceptance payment solutions that can be used in transit:

1. **Real-Time**: The cardholder taps and pays for travel each time.

2. **Pre-Funded**: The cardholder purchases value redeemable on future travel to a transit managed account or other transit managed payment method.

3. **Recurring Payments**: The cardholder purchases a fixed or variable value redeemable on future travel on a regular basis such as a weekly or a monthly pass.

4. **Masterpass**: A secured, digital merchant checkout process for in-app or website purchases. The cardholder purchases a ticket via a mobile app or website and uses the Masterpass checkout button and process to pay.

Payment only

This type of acceptance method involves a transit operator using the account number of a bank-issued contactless device for payments as well as access at the point-of-entry. No additional ticket or token is issued to the passenger.

Mastercard has implemented specific acceptance solutions and payment transaction types to deal with the demands of mass-transit access.

1. **Mastercard Contactless Transit Aggregated Transactions**: A Mastercard or Debit Mastercard transaction combining one or more contactless taps performed with one Mastercard account at one transit merchant. A "tap" means the cardholder’s tap of the card or contactless payment device on the contactless reader of the Point Of Sale (POS) terminal with each ride taken.

2. **Maestro Contactless Transit Aggregated Transactions**: A Maestro transaction combining one or more contactless taps performed with one Maestro account at one transit merchant. A "tap" is defined the same as for Mastercard above.

3. **Debt Recovery Transactions**: Debt recovery transactions are used to generate payment and unblock passengers who are on a deny list for failure to pay.

If your company is interested in deploying such a solution, please contact smartcities.europe@mastercard.com

This guide is not a replacement for the valid rules and regulations.
Mastercard acceptance for transit

We recommend contactless technology!

Today, many mass transit operators around the world have discovered the benefits of ‘open loop’ fare collection systems. In particular, acceptance of open loop contactless cards and mobile wallets for transit payments and as an access device enables transit operators to:

- Reduce operational expenses by simplifying the transit payment processes
- Eliminate the need to create and issue a separate access device such as tokens, tickets or proprietary cards
- Avoid being locked into proprietary payment or access device technologies
- Offer an improved customer experience – passengers don’t need to carry any change or exact change
- Use Global Interoperability Payment Standards to offer passengers a quicker payment process
- Future-proof transit payment and access device technologies

Mastercard Acceptance at Transit Entry Points
Mastercard products can be accepted in open-loop payment acceptance methods:

Mastercard recommends: Contactless Technology

Mastercard contactless technology enables easy, fast and secure global payments through the use of contactless chip and contactless chip acceptance technology.

Mastercard Transit Standards

Mastercard has developed standards for transit to enable open loop payments acceptance at fare gates or points of entry whilst still providing the following benefits:

- Quick processing speeds (< 500 ms)
- Reducing processing costs for low value transactions
- Risk and Liability Management
Mastercard supports multiple payment terminal types

Mastercard Electronic Payment terminals are classified into two major types, depending on situation: (a) Attended terminals and (b) Unattended terminals or Cardholder Activated Terminals (CATs)

Attended POS Terminals

A POS transaction occurring at an attended POS terminal is a face-to-face transaction, since a sales person or representative is present at the time of the transaction.

Unattended POS Terminals or CATs

A POS transaction occurring at an unattended POS terminal is a non-face-to-face transaction, as NO sales person or representative is present at the time of the transaction. Examples of unattended POS terminals include ticket dispensing machines, vending machines, automated fuel dispensers, toll booths, and parking meters.

A Mastercard POS transaction that occurs at an unattended POS terminal must be identified as a Cardholder-Activated Terminal (CAT) Transaction, as described in Appendix D of the Mastercard Transaction Processing Rules Manual. See overview below:

<table>
<thead>
<tr>
<th>Level*</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not a Cardholder Activated Terminal – often used for turnstiles or transit points of entry</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level*</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAT 1</td>
<td>Automated Dispensing Machines</td>
</tr>
<tr>
<td>CAT 2</td>
<td>Self-Service Terminals</td>
</tr>
<tr>
<td>CAT 6</td>
<td>Electronic Commerce &amp; Digital Secure Remote Payments (&quot;DSRP&quot;) &amp; Masterpass</td>
</tr>
<tr>
<td>CAT 7</td>
<td>Transponders</td>
</tr>
<tr>
<td>CAT 9</td>
<td>Attended and Unattended Mobile Point of Sale (MPOS)</td>
</tr>
</tbody>
</table>

A. It is essential for all terminal products to meet all applicable standards and be properly certified

B. All contactless terminals must confirm to the Mastercard contactless reader specification 3.xx (MCL 3.xx)

C. All contactless terminals require:
   1. EMV Level 1 approval
   2. Contactless type approval
   3. Terminal Quality Management (TQM) approval
   4. PCI PTS program approved PED, if applicable
Key considerations before Implementation

Prior to selecting your EMV open loop payment device(s), please consider the overall transit turnstile, ticketing and point of entry plans, ticket amounts and customer base (e.g. primarily local, visitors, tourists, etc.) as device selection will depend on your unique circumstances.

Mastercard Products Accepted

Transit solutions qualify for Mastercard’s Contactless Aggregated Transactions rules, the deployment of contactless only terminals and use of Mastercard Quick Payment Service Program (QPS) – full details of these are available from your local Mastercard representative, but a short explanation is provided below:

Special Considerations Explained

- **Contactless Aggregated Transactions:** A Contactless Mastercard, Debit Mastercard or Maestro transaction combining one or more contactless taps performed with one account at one transit operator.

- **Contactless Only Terminals:** Transit qualifies for contactless only terminals for CAT1, CAT2, and MPOS terminal installations. Please observe terminal type PIN Pad / CVM requirements.

- **Quick Payment Service** is for Mastercard & Debit Mastercard POS transactions only. It is for an attended terminal and similar to a contactless payment for amounts < EUR 25. A terminal must prompt for a PIN if a PIN preferred card is presented. See Mastercard Transaction Processing Rules, Chapter 4.8
Which Cardholder Activated Terminal (CAT) is right for my transit needs?

1. I am interested in enabling EMV open loop payments & access for a large scale, mass transit system
   - Attended Terminals: All CATs
   - MPOS: CAT 6

2. I am interested in a ‘Pay as You Go’ solution
   - CAT 1
   - CAT 9
   - CAT 2
   - CAT 6
   - CAT 7

3. I am interested in contactless only terminals
   - CAT 2

4. I am interested in terminals without PIN pads
   - CAT 2
   - CAT 4
   - CAT 7

5. I need an online, recurring payment, omni-channel or an In-App payment solution
   - CAT 6

6. I wish to accept all Mastercard, Mastercard Debit & Maestro products with no restrictions
   - CAT 1
   - CAT 9

If your company is interested in deploying such a solution, please contact smartcities.europe@mastercard.com
This guide is not a replacement for the valid rules and regulations
Appendices
Authorization summary

Authorization is the process of checking the credentials and details of a transaction.

This will often include checking that the card details are valid, the PIN is valid, that the cardholder has been authenticated, that there are sufficient funds for the transaction and that the transaction is allowed to the cardholder (i.e. the service requested is allowed on their account) – often, many more checks are carried out too.

Merchants or acquirers in the Europe Region must ensure that any authorization request for any amount greater than zero is identified as either a pre-authorization or as a final authorization.

Pre-Authorizations*

In the Europe Region, a transaction should be identified as a Mastercard or Debit Mastercard POS transaction authorization request or a Card-not-Present Maestro POS transaction as a Pre-Authorization if:

1. Authorization is requested for an estimated amount that is greater than zero;

OR

2. The transaction might not be completed for reasons other than technical failure or lack of full Issuer approval; for example:
   a. When the cardholder will be offered the choice at a later time to complete the transaction with another payment means (such as when checking out of a hotel or returning a rental car);
   b. When the products ordered by the cardholder might be later found to be out of stock; or
   c. If the mobile phone number for which the cardholder has requested a top-up is later found not to exist.

NOTE: All clearing messages corresponding to a pre-authorization must be presented within 30 calendar days for a Mastercard or Debit Mastercard and 7 calendar days for a Maestro of the authorization approval date.

Final Authorizations*

In the Europe Region, any authorization request for an amount greater than zero is identified as a Final authorization if:

1. The transaction may no longer be cancelled after the authorization request is approved in full by the Issuer (excluding non-completion for technical reasons such as telecommunications failure or POS terminal failure);

AND

2. The authorization being requested is for the final transaction amount.

NOTE: All clearing messages corresponding to a final authorization for either Mastercard or Maestro must be presented within 7 calendar days of the authorization approval date.
Transit transaction flows – illustrative only

There are two unique authorization process flows for transit transactions. On the left Aggregated Contactless and on the right, Pre-funded & Real-time.

**Transit: Aggregated Contactless Transit**

These transit transactions are limited to MCC 4111, 4131 and 4784* and combine one or more contactless taps performed with one contactless account number and with one transit merchant.

1. **Cardholder taps for an amount not to exceed the applicable CVM limit (e.g. < EUR 25)**

2. **Online Pre-Authorization Request 0100 message for an estimated or nominal amount (e.g EUR 25) less than or equal to CVM limit for Maestro and Mastercard**


4. **The cardholder makes subsequent taps for additional rides. The combined amount is “aggregated” but not to exceed the approved time period or amount and Chargeback Protection Period (CPP)**

**4808: Chargeback Protection Period**

- **Mastercard:** Up to 14 calendar days to submit First Presentment
- **Maestro:** Up to 3 calendar days to submit First Presentment

5. **Time limit, not full amount**

6. **Submit a Reversal 0400 or Authorization Advice Message 0120 with final amount & critical data elements**

7. **Receive response**

**Pre-Funded Transit Transactions**

Occurs when a cardholder purchases value redeemable for future travel with a transit operator. The purchased value is held by the transit operator in a separate account. The merchant sends a Final Authorization Request 0100 for the full amount of the transaction.

**Real-time Authorized Transit Transactions**

Occurs when the transit operator generates a Final Authorization Request 0100 message each time a cardholder uses their card or device at a transit terminal for the full amount of the transaction.

**NOTE:** All clearing messages corresponding to a final authorization for either Mastercard or Maestro must be presented within 7 calendar days of the Authorization approval date.

* **Merchant Category Codes:**
  - MCC 4111 (Transportation – suburban and local commuter passenger, including ferries)
  - MCC 4131 (Bus lines)
  - MCC 4784 (Bridge and road fees, tolls)
Standard (e.g. Retail) transaction flows for Pre-Authorizations and Incremental Pre-Authorizations

- Pre-Authorizations are for estimated amounts
- Incremental Pre-Authorizations extend or increase the original Pre-Authorization amount

**Pre-Authorizations**

A. Cardholder is provided with an estimated amount (EUR)

B. Online Pre-Authorization Request
   - 0100 message for the estimated amount

C. Receive Authorization Response
   - 0110 Approval message in DE 39

**4808: Chargeback Protection Period**

Mastercard:
- 30 calendar days to submit First Presentment

Maestro (CNP only):
- 7 calendar days to submit First Presentment

D. Submit a full or partial reversal
   - (0400 msg), if applicable, then submit First Presentment (1240 msg)

**NOTE 1:** If no incremental Pre-Authorization or First Presentment is submitted within the CPP timeframes, then a new Pre-Authorization or Final Authorization request is required

**NOTE 2:** If the transaction is cancelled or the final amount is less than the original pre-authorization estimated amount, then a full or partial reversal message is mandatory, except if within 24 hours of submitting the First Presentment OR the CPP has expired

**Incremental Pre-Authorization**

- An incremental Pre-Authorization “extends” the original Pre-Authorization CPP for either:
  - The originally estimated amount;
  - OR
  - Incrementally increases the original amount by an incremental amount

- **4808:** Chargeback Protection Period extension
  - if submitted within the original timeframes AND for the same original estimated amount or an incremental amount – see below

C.1. Submit an incremental pre-authorization message 0100 within timeframes, and submit DE48, SE 63 with values from original 0110 response msg. response msg.
   - DE63, SF1
   - DE63, SF2
   - DE15

- Include an amount of EUR 0.00 if to extend the Chargeback Protection Period for same original estimated amount EUR X.XX;
  - OR
  - Include incremental amount of EUR Y.YY if to extend the Chargeback Protection for the incremental amount above the original amount of EUR X.XX

D. Submit a full or partial reversal
   - (0400 msg), if applicable, then submit First Presentment (1240 msg)

---

If your company is interested in deploying such a solution, please contact smartcities.europe@mastercard.com

This guide is not a replacement for the valid rules and regulations
Transit payment using a Final Amount for Mastercard, Mastercard Debit and Maestro Transactions

The process described below is designed to outline an example transaction flow using a known final amount. A **Final Amount** transaction is where a final amount is known at the beginning of a journey.

### Mastercard Products Supporting Final Amount Transactions

![Mastercard Cards]

This example may apply to:
1. Real-Time “Tap-In” or “Tap-In and Tap-Out” where a final amount is known prior to the first tap
2. Pre-fund a subway account or pre-pay subway, bus or commuter ticket at counter, via CAT or Card-on-File solution using Masterpass
3. In-App purchase or purchase in train, bus or subway with conductor, driver or CAT device

### Possible Cardholder Activated Terminal (CAT) Types for Final Amount Processing

- **CAT 1**: Automated Dispensing Machine
- **CAT 2**: Self-Service Terminal
- **CAT 4**: In-Flight
- **CAT 6**: eCommerce or DSRP
- **CAT 9**: Mobile POS

---

**A**
- Cardholder “selects ticket” and is provided with a final amount
- Cardholder may insert or tap card / mobile device at the payment terminal
- If applicable – cardholder identity is verified

**B**
- Attempt an **offline** authorization via the card’s CHIP < EUR 200
- Otherwise submit an **online** Final Authorization Request 0100 for the final amount

**C**
- Receive Authorization Response 0110 Approval message in DE 39
- Dispense or issue a valid ticket for journey

**D**
Submit First Presentment as a 1240 message

**4808: Chargeback Protection Period**
Submit Mastercard & Maestro First Presentment within 7 calendar days

---

14
Transit payment using an Estimated Amount for Mastercard or Mastercard Debit Cards

The process described below is designed to outline an example transaction flow using an estimated amount – similar to a Tap-In and Tap Out scenario. Here an **Estimated Amount** of the transaction is authorized at the beginning of a journey and the final amount is known at the end of a journey.

**Mastercard Products Supporting Estimated Amount Transactions**

This example may apply to:
1. Real-Time "Tap-In and Tap-Out" where an estimated amount is authorized at the beginning of the journey and the final amount is known after the final tap
2. Real-Time "Tap-In and Tap-Out" aggregation for amounts greater than the Contactless Transit Aggregated Transaction type for Transit

**A**
- Cardholder selects or is presented an estimated amount > 0 (equivalent to an estimated amount for "Pre-Authorization")
- Cardholder agrees to the amount and any other terms and conditions of travel
- Conduct cardholder verification

**B**
- Attempt an **offline** authorization via the card’s CHIP < EUR 200
- Otherwise submit an **online** Pre-Authorization Request 0100 for the estimated amount

**C**
- Receive Authorization Response 0110 Approval message in DE 39
- Issue ticket or begin transit session / validation
- Cardholder may travel up to the estimated amount (or more – see incremental Pre-authorization)

**D**
- Cardholder concludes journey and amount is less than the Pre-Authorization amount
- Submit a full or partial Reversal 0400 message for the difference between the actual and the Pre-Authorized amount
- Receive a Reversal Request Response 0410
- If the expected duration > 30 days or the expected amount exceeds the original Pre-Authorization amount, then submit an incremental Pre-Authorization message, go back to Step D above until completed

**F**
Submit First Presentment with Final Approved Amount as a 1240 message

**E**
4808: Chargeback Protection Period
Submit Mastercard transaction within 30 calendar days of original authorization date
Transit payment & access using a Contactless Transit Aggregated Transaction

The process described below is designed to outline an example payment and access transaction flow using a Contactless Transit Aggregated Transaction.

A Contactless Transit Aggregated transaction may be used for payment and access

This example applies only to transit transactions using MCC 4111, 4131 and 4784 which combine one or more contactless taps performed with one contactless account number and with one transit operator.

Mastercard Products Supporting Contactless Aggregation

- Cardholder taps for an amount not to exceed the applicable CVM limit (e.g. < EUR 25)
- Attempt an **offline** authorization via the card’s CHIP
- Otherwise submit an **online** Pre-Authorization Request 0100 for an estimated amount not to exceed the Contactless CVM amount (e.g. EUR 25)
- Receive authorization Response Approval message
- The cardholder makes subsequent taps for additional rides. The combined amount is “aggregated” but not to exceed the **approved time** period (14 days for Mastercard or Debit Mastercard and 3 days for Maestro) or the pre-authorized amount
- Submit **First Presentment with Final Approved Amount as a 1240 message**
- Full amount or time-limit reached? If either, then:
  - Issue Partial Reversal 0400 or Authorization Advice 0120 message, if amount is less at the end of the period
  - Submit First Presentment for the Final amount or Pre-Authorization amount
  - If using for **Access** – initiate tap sequence and next transaction again at next tap

**4808: Chargeback Protection Period**

Submit Mastercard transaction within **14** calendar days and Maestro within **3** calendar days of original authorization date
Debt recovery for Open Loop Payment Systems

With an open loop payment system, the card presented for payment is also used as validation. Transit merchants assume some risk in allowing a cardholder to travel before confirming payment, or even before knowing if the account linked to the card is in good standing.

To assist transit merchants in recovering funds lost due to declined authorizations, Mastercard has created Debt Recovery transactions to provide a mechanism in which a cardholder must clear the outstanding debt in order to access the transit system and resume travel.

Automatic Debt Recovery

Under this method a transit merchant may attempt to recover the debt owed by the cardholder automatically. They make multiple attempts, for example three times within thirty days or once a week for three weeks etc. Any repeated attempts should be in line with local legislation and Mastercard Rules (if applicable) on merchant initiated resubmission of declined authorizations.

The Debt Recovery transaction is initiated by the transit merchant at some point subsequent to receiving a declined authorization request. When a contactless device is declined after the holder has been granted access to travel, the transit merchant may add the account number to a Deny List, thereby blocking that device from access to travel until the money owed by the passenger has been recovered.

There are several methods of debt recovery that a transit merchant can implement and each allows debit recovery from a Mastercard credit, debit or prepaid card.

Maestro

An Issuer of Maestro Cards that allows its cardholders to perform Maestro Contactless transit aggregated transactions must be able to accept and must make an individual authorization decision for each transit debt recovery transaction identified as a Card-not-present transaction (for example, as a PAN key-entered, e-commerce, or mail order or telephone order (MO/TO) transaction).

In the event a transit agency has implemented transit aggregation, an approved Debt Recovery transaction does not permit the transit agency to commence a new aggregation period, it solely allows them to recover any monies owed and remove the device from the deny list.