



A US PAYMENTS FORUM WHITE PAPER

Role of the Payment Account Reference (PAR) within the Payments Lifecycle

Version 1.0

December 2024

U.S. Payments Forum

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Executive Summary

The Payment Account Reference (PAR) number was developed by EMVCo in January, 2016. PAR is a 29-alphanumeric-character field that is composed of a four-character Bank Identification Number (BIN) Controller Identifier (which is assigned by EMVCo) followed by a 25-character unique value. PAR is used to tie individual tokens (e.g., that are created and used with digital wallets and for online purchases) and reissued card numbers to one payment account number (PAN). When using PAR, payment ecosystem participants can tie all transactions (including tokenized transactions and reissued card numbers) to one account.

Each payment ecosystem participant plays a role in implementing PAR. PAR is issued by the payment networks and used during the transaction authorization request and response processes. Acquirers obtain PAR from authorization response messages and pass PAR to the merchant. Merchants who use PAR capture and store PAR for their customers. Issuers store and manage PAR and are responsible for managing the lifecycle and PAR lineage.

PAR cannot be used to initiate financial transactions. Use cases for PAR include scenarios where one or more tokens and physical cards may be used in transactions. Example use cases include:

- Facilitating returns when a purchase is made with a token and the return is made with the physical card or different token.
- Identifying when a customer is taking advantage of a promotional offer.
- Identifying loyalty program customers and applying loyalty points to a customer's account.
- Identifying fraudulent activity by customers or by merchants.
- Connecting transit authorization requests.
- Providing a complete picture of cardholder activities for use by analytics.

Each payment network has established specifications defining how PAR is supported on its network and how merchants, processors, and issuers can use PAR for different types of transactions (e.g., card present, card not present, token/non-token, recurring, card on file, and installment).

Additionally, as PAR is generally treated as personal data of the cardholder within the payments industry, the use of PAR may require cardholder consents or opt-in for relevant payment stakeholders.

While PAR has limited adoption today, broad industry implementation of PAR can provide potentially significant benefits to all payment ecosystem members. Several trends are making it increasingly important for merchants and other payments industry stakeholders to be able to use PAR to identify all card and token numbers that are associated with the primary account: greater adoption of mobile wallets; an increasing number of card transactions moving from card present to card not present; and increased tokenization adoption. PAR is an industry solution that can help solve the challenges of having a primary account with multiple card numbers and/or tokens and that can maintain a link among them.

1. Background

PAR has been available since 2016. The goal of this white paper is to educate payments stakeholders on how PAR can be leveraged to help improve the customer experience, improve decision making, and decrease fraud. The white paper includes information about the different implementations of PAR by each payment network, including their current support for PAR and associated transaction types. The white paper also provides an inventory of available resources to help with implementation and stimulate thoughts on how the industry can work together to maximize PAR’s benefits.

Table 1 details an example of how PAR creates a link between a cardholder’s primary account number (PAN) and the various tokens created along that cardholder’s payment journey.

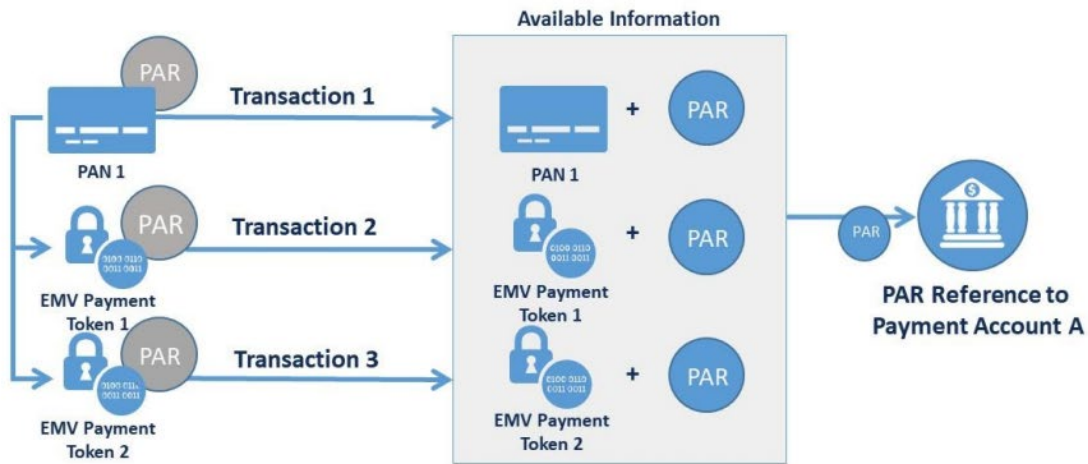
Table 1. Example of Card Number and PAR Relationship

Transaction Number	Description	Card Number Used	PAR
1	Customer inputs their physical card number to the online retailer at guest checkout.	Card PAN (Funding Primary Account Number (FPAN))	PARx1234
2	Customer creates an account with the online retailer and stores the card number in the account on file.	Token #1	PARx1234
3	Customer uses a mobile wallet (e.g., Apple Pay®, Google Pay™, Samsung Pay®) to check out.	Token #2	PARx1234
4	Customer establishes recurring payments with the same online retailer (as in transaction number 2)	Token #3	PARx1234
5	Customer makes a purchase using browser autofill.	Token #4	PARx1234
6	Customer makes a purchase using Click to Pay.	Token #5	PARx1234

1.1 What Insight Does PAR Provide about a Transaction?

The PAR is a non-financial reference assigned to each unique funding primary account number (FPAN) and is used to link a payment account represented by that FPAN to affiliated payment tokens. Note that references to tokens in this white paper refer to payment tokens. PAR has a one-to-one relationship with an active FPAN and a one-to-many relationship with the payment tokens (Figure 1). In the remainder of this white paper, FPAN is interchangeably used with the term PAN.

Figure 1. Relationship Between Multiple Payment Tokens, a PAR, and the FPAN¹



Whether or not a PAR is consistent at the account level is highly dependent on whether the card issuer provides different card numbers for each user on the account or whether they provide the same card number for each user on the account. Table 2 illustrates use cases when a PAR would remain consistent and when it would not.

Table 2. PAR and Issuance of Multiple Cards on One Account

SCENARIO: The primary cardholder and secondary cardholder (e.g., their spouse) receive cards for a shared account.				
Use case	Description	PAN	PAR	Tokens
If the issuer assigns the same card number to both cards, the same PAR represents both cards and all the associated tokens created by the primary and secondary cardholders.	Primary cardholder	x5555	PARx1111	Token #1
	Secondary cardholder	X5555		Token #3
If the issuer assigns a unique card number to each card, two different PAR values are created. Each PAR value represents one set of PAN and tokens.	Primary cardholder	x5555	PARx1111	Token #1
	Secondary cardholder	X6666	PARx2222	Token #3

¹ EMVCo, "EMVCo White Paper on Payment Account Reference (PAR)" v2.1.1, February 2022, <https://www.emvco.com/specifications/emvco-white-paper-on-payment-account-reference/>.

PAR is most effective when (a) the link between the PAR and the account is preserved as cards are being replaced and (b) issuers inform the token service provider (TSP) when replacing a physical card. This practice also ensures that the tokens associated with that account can continue to be used successfully. See Section 2 Roles and Responsibilities of Payment Ecosystem Participants for how card issuers can use account updaters to inform the network or the TSP when cards are being replaced. Table 3 illustrates a card replacement scenario.

Table 3. PAR and Card Replacement Examples

SCENARIO: The cardholder reports a lost and stolen card. The cardholder receives a new card with a new PAN.				
Use case	Description	PAN	PAR	Tokens
	Original card (lost and stolen)	x5555	PARx1111	Token #1 Token #2
If the issuer informs the network of the PAN replacement, the PAR and all existing tokens are linked to the new PAN.	Replacement card	x6666	PARx1111	Token #1 Token #2
If the issuer fails to inform the network of the PAN replacement, a new PAR is created for the replacement card and the tokens are not linked to the new PAR.	Replacement card	x6666	PARx2222	Tokens remain linked to PAN x5555. New tokens added to PAN x6666 will be linked to PAR x2222

2. Roles and Responsibilities of Payment Ecosystem Participants

Each participant in the payment ecosystem has a role in implementing PAR. A summary of their roles and examples of the payment process flow are discussed in this section.

Important Note: PAR is generally treated as personal data of the cardholder within the payments industry. Accordingly, depending on applicable data privacy laws and stakeholder requirements, use of PAR may require applicable consents, opt-ins, or other undertakings at various points during and after the transaction process. For example, issuers generating and sharing PAR may need to ensure that their cardholders provide appropriate consents or opt-ins, and/or that the use of PAR is addressed in applicable privacy policies. Additionally, acquirers and other payments industry stakeholders (and their respective clients, data processors and other business partners) accessing or processing PAR must ensure they do so in accordance with applicable laws and stakeholder requirements, and only for permitted purposes. For example, depending on applicable data privacy laws, stakeholder requirements, consents and opt-ins, permitted uses may or may not include customer service, fraud and risk control, or value-added services. Payments industry stakeholders interested in utilizing PAR are therefore strongly encouraged to consult with their respective subject matter experts and professional and legal advisors prior to doing so.

2.1 Acquirers and Processors

Acquirers and Processors are responsible for complying with payment network rules regarding storing and managing PAR. Acquirers and processors are able to obtain the PAR from authorization response messages and pass the PAR value to the merchant. Acquirers and processors are responsible for providing feedback to the payment networks about any inaccurate information they are made aware of. Acquirers and processors may also provide lookup capabilities to merchants.

2.2 Issuers

Issuers are responsible for complying with payment network rules regarding storing and managing PAR. Issuers are also generally required to participate in payment network account updater services, subscribe to lifecycle management functionality, and maintain the PAR lineage. Issuer non-participation or delays in providing updates to payment networks may result in multiple PARs for the same underlying account or in PAR being associated with a stale/invalid account. Additional information on network support is outlined in Sections 3 and 4.

2.3 Merchants

In order to use PAR capabilities, Merchants must capture and store PAR, and may report inconsistencies to their payment partner(s) to ensure the mapped accounts are accurate. Additionally, merchants are responsible for complying with payment network rules regarding storing and managing PAR.

2.4 Payment Networks

Payment networks issue the PAR and process FPAN lifecycle events from issuers to update the FPAN-to-PAR mapping. In addition, payment networks pass PAR values back to acquirers in every applicable transaction response and provide PAR lookup services. Additional information about each network's capability is available in Section 3.

2.5 Terminal Vendors

The PAR value may be personalized on the payment device (e.g., card or mobile device), in which case it will be available to the terminal when the payment device is presented (before the transaction authorization). Depending on the device or application, PAR could be in different forms (i.e., data fields). It is currently optional for the terminal to read the PAR upon presentment.

2.6 Network Token Service Provider (TSP)

TSPs follow the card issuer’s instructions when tokens are either deleted or remapped and share the new tokens or the new PAN, aligned to the token, with the merchants who have this token stored on file. TSPs also use account updater updates from the card issuer and update the tokens to map to the new physical card number. This allows PAR to be maintained across the multiple token numbers.

2.7 Payment Process Flows

Figure 2 and Figure 3 show examples of different payment process flows with PAR.

Figure 2. Example 1 – PAR and Payment Process Flow

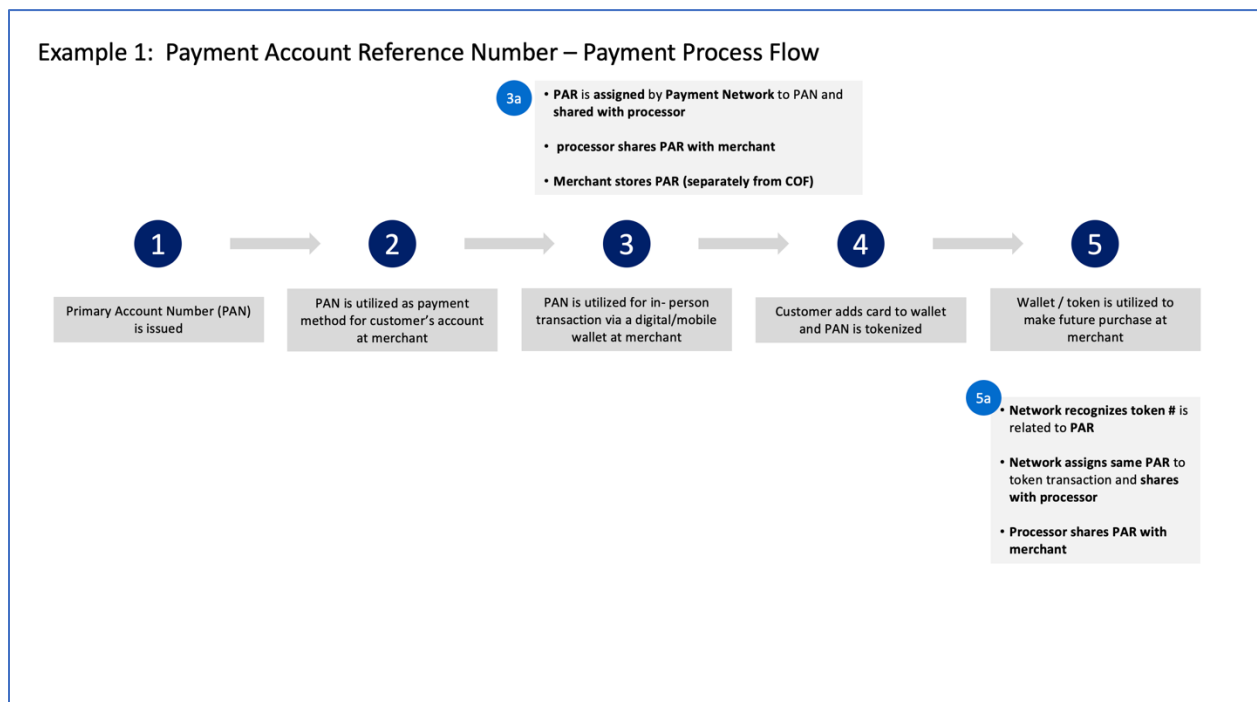
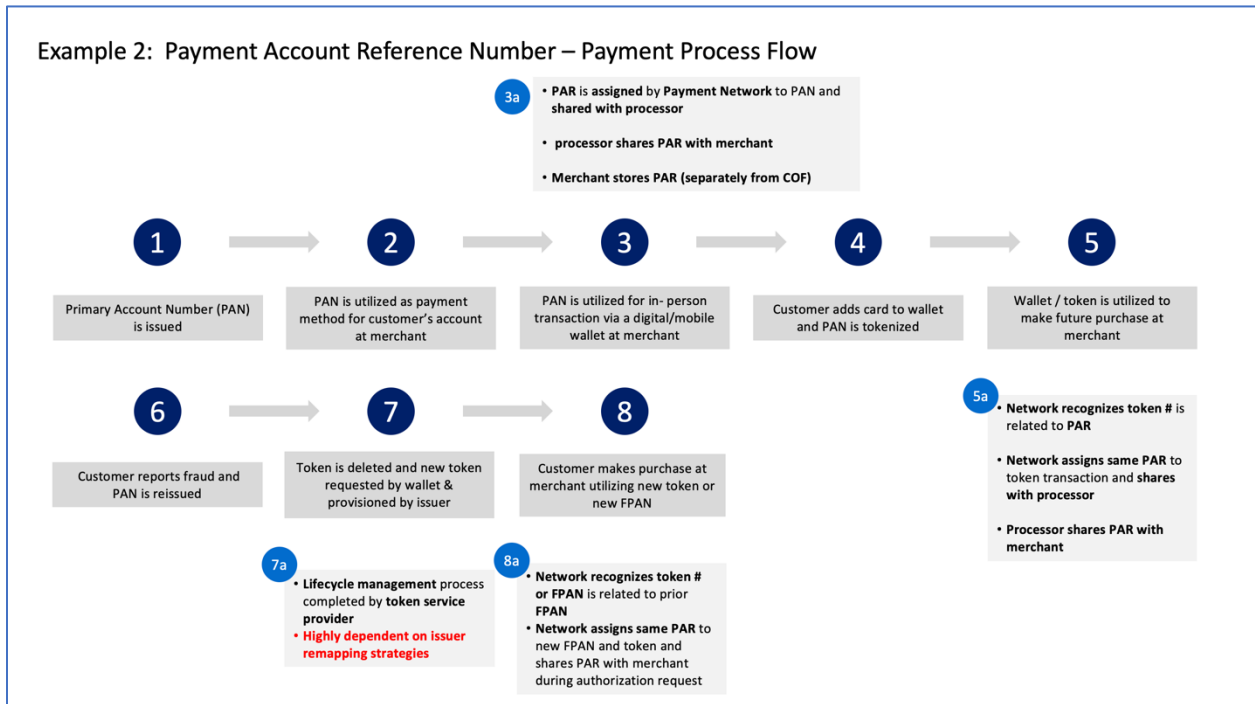


Figure 3. Example 2 – PAR and Payment Process Flow with Reissued Card



3. Payment Network Support for PAR

Table 4 provides details of PAR support from each payment network identified below.

Table 4. Payment Network PAR Support

	American Express	Discover	Mastercard	Visa
Provided to issuer for OR at token provisioning?	Yes	Available to token requestor upon provisioning, if available	Yes	Yes
Provided or available to issuer at authorization request?	Yes	No	Yes	Yes
Provided or available from merchant acquirer/merchant at authorization request?	Yes	No	Yes	Yes (optional)
Provided or available to merchant acquirer at authorization response?	Yes – merchant acquirer Field 112, subfield 1	Yes PAR is returned for both PAN and token transactions Field 56, if available	Yes – merchant acquirer Field 56	Yes PAR is returned for both PAN and token transactions Field 56
Batch availability (via API)	Yes	Yes - issuers	No	Yes - issuers/acquirers
On-demand availability (via API)	Yes – issuers/acquirers/merchants/token requestors	Yes – issuers/acquirers/merchants/token requestors	Yes – issuers/acquirers/merchants/token Requestors	Yes – issuers/acquirers/merchants/token requestors
Data field location (EMV form factors) contact/contactless/mobile	Tag 9F24	Not supported	Tag 9F24	Tag 9F24
Card product types available: consumer, small business, corporate, prepaid, debit, credit	All	Yes – except for prepaid and debit, and small business	All	All
Utilize account updaters/token life cycle management to keep PAR aligned when physical card number changes?	Yes	Yes – except for prepaid and debit, and small business	Yes	Yes

4. Transaction Types and PAR

Table 5 provides a list of transaction types and indicates whether the identified payment network assigns a PAR to the transaction type. This list is not meant to be exhaustive. Please consult with payment network partners and documentation for information about transaction types that are not included in this table.

Table 5. PAR and Transaction Types

	American Express	Discover	Mastercard	Visa
Card present – token	Yes	Yes	Yes	Yes
Card not present – non-token	Yes	Yes	Yes	Yes
Card not present – token	Yes	Yes	Yes	Yes
Card on file – token	Yes	Yes	Yes	Yes
Recurring – token	Yes	Yes	Yes	Yes
Installment – token	No	Yes	Yes	Yes
Card on file – non-token	Yes	Yes	Yes	Yes

5. Examples of Use Cases That Leverage PAR

This section includes examples of use cases that leverage PAR. All use cases assume that the merchant is receiving PAR from the acquirer and that the payment network is providing PAR as part of transaction flow or with a lookup function.

5.1 Use Case #1: Purchase and Return with Different Tokens

PAR can be used to tie a purchase made with a token to a return made with a different token or with the associated physical card (and vice versa).

Example 1

- A customer makes an online purchase with Google Pay™ at XYZ Retailer.
- The customer receives the merchandise and returns it to their local XYZ Retailer's physical location, using their physical plastic card.
- Since the token used to make the original purchase via Google Pay and the physical plastic card used to initiate the return have the same PAR, XYZ Retailer can tie the purchase and return together via PAR.

Example 2

- A customer makes an online purchase using the card number on file (which ABC Merchant has tokenized) at ABC Merchant.
- The customer returns the merchandise at their local ABC Merchant, using Apple Pay®.
- Since both tokens (one for the card on file and one for Apple Pay) have the same PAR, ABC Merchant can tie the purchase and return together via PAR.

Example 3

- A customer makes an online purchase using their physical card number at 123 Store.
- The customer experiences fraud at another retailer and reports the fraud to the card issuer.
- The card issuer sends a new card with a different card number.
- The customer returns the goods purchased at 123 Store, in person.
- 123 Store customer service asks for the physical card to process the return.
- The return is processed with the new card number.
- Since the payment networks have made PAR available with physical card numbers, the merchant can use PAR to connect the original transaction with the return.

5.2 Use Case #2: Promotional Offers

An eCommerce retailer can use PAR to identify when a customer is taking advantage of a promotional offer.

Example 1

- An eCommerce retailer offers free shipping for new customers on the first purchase.
- The customer signs up with Gmail account and uses Apple Pay to make an online transaction.
- The retailer honors the free shipping promotional offer.

- The customer, wanting to receive free shipping on a second purchase, signs up with another email address and makes the purchase with a web browser. The customer uses a payment credential that is linked to the same account.
- Since the PAR is the same for both the purchase made with the customer's web browser and the purchase made with the Apple Pay token, the retailer is able to recognize that the customer has already taken advantage of the free shipping promotional offer.
- The retailer does not apply the promotional free shipping to the second order.

Example 2

- An eCommerce retailer offers a \$100 gift card for new customers that sign up for their service.
- A customer signs up for the service, using their Gmail email address and uses Apple Pay as their card number on file.
- The retailer provides a \$100 gift card to the customer.
- The customer then creates another account with their Yahoo email address and uses the physical card number associated with the same account used for Apple Pay.
- Since the PAR is the same for both the token used with Apple Pay and the physical card number, the retailer can identify that the customer has already taken advantage of this offer.
- The retailer does not issue another gift card, as the customer is not eligible.

5.3 Use Case #3: Loyalty Programs

Retailers can use PAR to identify loyalty program members and apply loyalty points to the customers' accounts.

Example 1

- A customer signs up for Retailer XYZ's loyalty program. They add their physical card number to the account. The merchant does a PAR lookup for the payment credential and adds it to the account.²
- The customer makes a transaction using Apple Pay.
- Since the physical card number and the Apple Pay token card number have the same PAR, the retailer can apply loyalty rewards to the transaction made with Apple Pay.

Example 2

- A customer creates an account to start earning loyalty points with a retailer who has both an online and physical presence. They add their physical card number to the account.
- The customer makes a purchase using a web browser, which generated an autofill token.
- The customer makes a second purchase with their mobile device.
- The customer then goes to the retailer's physical location and makes a third purchase using Apple Pay.
- Since the PAR is the same for card numbers used with a web browser, a mobile device and Apple Pay, the retailer is able to reward the customer for all three purchases.

Example 3

- A customer signs up for a recurring digital service through Acme Corporation.
- The customer adds their physical card number to the account and Acme Corporation tokenizes the card number.

² This may not be available for every payment network. Refer to Section 3, Table 4, for additional information.

- The customer loses their physical card. Since there has been no reported fraud, the issuer issues a new physical card number and notifies the payment network on the card that the card number has been updated through the account updater process.
- The payment network issues an update to the token service provider.
- The token service provider uses this update to issue a notification to the merchant that the card has been updated.³
- The PAR remains the same.
- The customer continues to receive loyalty points with the updated credential.

5.4 Use Case #4: First Party Fraud Activity

Retailers can use PAR to identify fraudulent activity.⁴

Example

- A customer adds their physical card number to a device wallet.
- The customer uses their device wallet to conduct a transaction at Fast Food 4.
- The customer disputes the transaction.
- Fast Food 4 processes the return to the customer.
- The customer removes the payment credential from their device wallet.
- The customer adds their card back to the device wallet.
- The customer uses their device wallet to conduct another transaction at Fast Food 4.
- The customer disputes their second device wallet transaction made at Fast Food 4.
- The customer repeats this behavior.
- Since the PAR remains consistent across all tokens and the merchant has captured and stored PAR, Fast Food 4 may identify the abusive behavior and use that information in the dispute process.

5.5 Use Case #5: Transit Retailer Authorization Requests

PAR could be used to connect the many authorization requests that are generated by transit retailers.

Example 1

- The customer taps a Near Field Communication (NFC)-enabled mobile device at the contactless transit point-of-sale terminal for Train ABC retailer.
- Train ABC conducts the pre-authorization for the transit ride.
- The customer then takes a second ride by tapping the physical card at the contactless transit point-of-sale terminal for Train ABC.
- Since the PAR values are the same for both transactions, Train ABC could link the two taps together and submit the complete fare transaction for authorization.

Example 2

- The customer wants access to their transit account to view trip history, buy products, or reconcile transactions to their credit or debit account statement.

³ Merchants are advised to work with their service providers to understand the specifics of this process. Network and issuer support for updating tokens varies.

⁴ PAR cannot occur in real time.

- During account creation, the customer enters the card FPAN in the online transit account to see applicable transactions.
- Since PAR is consistent across all card numbers, the transit retailer could display transactions from both trips using the actual card or using mobile or wearable devices within the trip history on the account.

5.6 Use Case #6: Fraud Monitoring

PAR can be used to monitor and take action on fraudulent activity.

Example 1

- Several out-of-pattern, large transactions are submitted by a merchant site to an acquirer/processor using several different payment form factors (e.g., PAN, mobile wallet token, card-on-file token) for one funding account.
- The payment acquirer/processor can use the PAR to link those transactions together and identify potential fraudulent merchant activity as part of their transaction monitoring program.

Example 2

- All members of the payments ecosystem deploy fraud models to help identify and fight fraud.
- Many models look at disputes and high-risk activity at the account level.
- Using PAR provides a full picture of an account that can be used in these models.

5.7 Use Case #7: Anti-Money-Laundering (AML) Activity

PAR can be used to monitor and take action on AML activity.

Example 1

- The acquirer/processor recognizes attempts to money launder through business-as-usual transaction monitoring.
- The processor confirms the card number attempting transactions has been listed on the global watchlist for sanctions.
- The processor blocks this card number from making any future transactions.
- The processor can use PAR to identify connected transactions and also block these transactions.

5.8 Use Case #8: Cardholder Activity Analytics

PAR can be leveraged in analytics, to ensure the merchant or processor has a complete picture of cardholder activity.

Example 1

- The merchant may want to track customer-level spending to market or provide incentives for their highest performing clients.
- PAR ensures that this spending is captured across all card numbers (e.g., token, FPAN, contactless, contact) that are generated from the customer's account.

Example 2

- The merchant may want to look at statistics, such as average spending per customer.
- Using PAR allows the merchant to capture total spending more accurately at the customer level.

6. Conclusion

Several trends are making it increasingly important for merchants and other payments industry stakeholders to be able to identify all card and token numbers that are associated with the primary account: greater adoption of mobile wallets; an increasing number of card transactions moving from card present to card not present; and increased tokenization adoption by merchants. PAR is an industry solution that can help solve the challenges of having a primary account with multiple card numbers and can maintain a link among them.

While the realization of the potential significant benefits of PAR for all industry stakeholders will require work, coordination and broad adoption across issuers, merchants, processors, and acquirers, the payment networks have established specifications and requirements for PAR support. Section 9.2 provides additional reference documents for payment stakeholders who are interested in implementing PAR in their transaction processing.

7. Legal Notice

This document is provided solely as a convenience to its readers, as a high-level overview of PAR, its benefits, and current PAR support among the payment networks identified herein. While great effort has been made to ensure that the information provided in this document is accurate and current, this document does not constitute legal or technical advice and should not be relied upon for any legal or technical purpose; accordingly, all warranties of any kind, whether express or implied, relating to this document, the information herein, or the use thereof are expressly disclaimed, including but not limited to warranties as to the accuracy, completeness or adequacy of such information, all implied warranties of merchantability and fitness for a particular purpose, and all warranties regarding title or non-infringement. Any person that uses or otherwise relies on the information set forth herein does so at his or her sole risk. Without limiting the foregoing, note that this document provides only a high-level description of the subject matter, and is not exhaustive; for example: there are payment networks other than those identified herein; each payment network (and potentially other stakeholders) has (or have) their own rules and requirements regarding PAR and the use thereof; various considerations relevant to implementation of PAR are not addressed in this paper; and notwithstanding anything in this paper, there may be other factors not described in this paper (legal, contractual, technical, or otherwise) that impact the use or implementation of PAR. Accordingly, readers interested in exploring the implementation or benefits of PAR are strongly encouraged to consult with their respective subject matter experts and professional and legal advisors, as well as relevant payments industry stakeholders, such as payment networks, issuers, acquirers, and others, prior to any implementation decisions.

8. Definitions and Document Resources

8.1 Definitions

Term	Definition
Autofill Token	Token service providers enable web browsers to enhance autofill features with tokens. The web browser replaces the primary account number with the token number.
Bank Identification Number (BIN)	The first six or eight digits of a payment card number (e.g., credit cards, debit cards). These are now known as the Issuer Identification Number (INN). The BIN/INN identifies the institution that issued the card to the cardholder.
BIN Controller Identifier Registration (“BIN Controller ID” or “BCID”)	A four-character value assigned to a BIN Controller for purposes of PAR governance, with registration maintained by EMVCo. ⁵
Payment Account Reference (PAR)	A non-financial reference assigned to each unique PAN and used to link a payment account represented by that PAN to affiliated payment token. As multiple payment tokens can be associated to the same underlying PAN, the PAR is a non-financial token value that has a one-to-one relationship with the underlying PAN assigned to help enable identification of the customer for backend processes such as loyalty tracking. The PAR cannot be used for financial transactions (e.g., authorization requests, settlement, reversals).
Payment Token	A surrogate value for a PAN that is a variable length, ISO/IEC 78-12-compliant numeric issued from a designed token BIN or token BIN range and flagged accordingly in all appropriate BIN tables. A payment token must pass basic validation rules of a PAN, including the Luhn check digit. Payment tokens must not collide or conflict with a PAN. ⁶
Token Card Number	The unique card number that is the tokenized number that replaces the actual card number. Also referred to as “token.”

⁵ <https://www.emvco.com/processes/bin-controller-id/>

⁶ U.S. Payments Forum, “EMV Payment Tokenization Primer and Lessons Learned” v1.0, June 2019, <https://www.uspaymentsforum.org/emv-payment-tokenization-primer-and-lessons-learned/>

8.2 Document Resources

Date	Forum	Title	Link
October, 2021	EMVCo	EMV: Payment Tokenization Specification Technical Framework	https://www.emvco.com/specifications/emv-payment-tokenisation-specification-technical-framework/
April, 2018	Secure Technology Alliance	EMVCo Payment Account Reference (PAR): A Primer	https://www.securetechalliance.org/wp-content/uploads/EMVCo-PAR-WP-FINAL-April-2018.pdf
November, 2019	U.S. Payments Forum	How Emerging Data Elements Can Support Mobile Wallet Use Cases	https://www.uspaymentsforum.org/how-emerging-data-elements-can-support-mobile-wallet-use-cases/
June, 2019	U.S. Payments Forum	EMV Payment Tokenization Primer and Lessons Learned	https://www.uspaymentsforum.org/emv-payment-tokenization-primer-and-lessons-learned/
2023	Visa Publications	Visa Payment Account Reference Inquiry (library)	https://developer.visa.com/capabilities/visa-par-inquiry
2023	Mastercard Publications	Payment Account Reference Inquiry (library)	https://developer.mastercard.com/payment-account-reference-inquiry/documentation/
2023	American Express Publications	American Express Token Service Overview (library)	https://developer.americanexpress.com/products/payment-account-reference-public/overview
2023	Discover Publications	Payment Account Reference Overview	https://www.discoverglobalnetwork.com/content/dam/discover/en_us/dgn/docs/payment-account-reference-overview.pdf
February 2022, v2.1.1	EMVCo	EMVCo White Paper on Payment Account Reference (PAR)	https://www.emvco.com/specifications/emvco-white-paper-on-payment-account-reference/
January 2023, v2.2.1	EMVCo	EMV Payment Tokenization: A Guide to Use Cases	https://www.emvco.com/wp-content/uploads/2023/03/EMVCo-Payment-Tokenisation-A-Guide-To-Use-Cases-v2.2.1.pdf