Payments Orchestration Layer

Necessary functionality in the payments stack

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RPGC Strategy Note Series

ABSTRACT:

This white paper presents the business case for enterprise merchants to utilize an abstraction layer that consolidates payments functionality into a single business-oriented architecture. The payments ecosystem is complex, exacerbated by fragmentation. No single Payment Service Provider can fully service every market and each merchant must develop the exact same logic and requirements to comply with the changes imposed by the card schemes. In-house solutions are typically engineering driven and since payments expertise is rare among engineers, most legacy architecture is manual and burdensome on IT.

The proposed business-oriented architecture, called a Payments Orchestration Layer (POL), addresses these above challenges. POLs are built on four key pillars of global connectivity, smart routing, real-time ledgers and end-user tools. This architecture allows merchants to use payments to further pursue their goals of enhancing the customer experience, lowering costs and supporting market growth.

1. THE PROBLEM STATEMENT

Payments do not exist for their own sake. The payments function is the merchant's revenue gathering platform that must balance three overarching business goals:

- Enhance the customer experience, increasing sales by maximizing approval rates and mitigating the effect of outages.
- Support growth by connecting to multiple endpoints[1] that enable customers to pay using the currencies and forms of payment which they prefer.
- Lower the cost of payment processing and operations and thereby contributing to the company's bottom line.

Having a consensus on the priorities of these (sometimes conflicting) goals is very important, as they heavily influence how the resources dedicated to support the payment function are allocated.

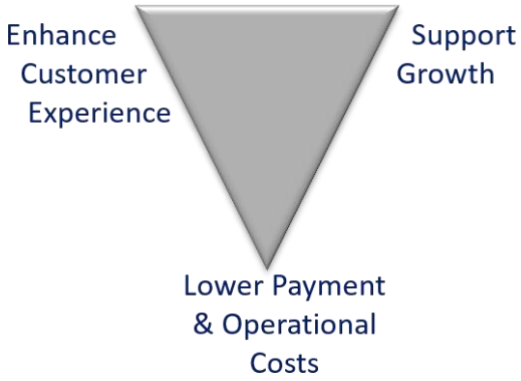


Figure 1—Balancing Sometimes Conflicting Business Goals

The payments "stack" supporting these goals is deceptively simple: an authorization process is followed by a settlement process, with ancillary reporting and exception-handling processes. Upon closer inspection, there are in fact many sub-functions and components, all of which must interact seamlessly with each other and multiple external systems to process Customer Not Present (CNP) payments.[2] The digital global marketplace creates additional complications in the payment acceptance ecosystem with many fragmented solutions for e-commerce and m-commerce.

A few sophisticated merchants are pioneering the emerging concept that payments drive strategic differentiation. Following this principle, they allocate engineering and management resources to optimize the payments function and to reaffirm its value to the company; alas, they are the minority. Most CNP merchants don't have enough engineering and product management to maintain or grow their payment platforms. Consequently, staff tasked with managing payments data, vendor relations, and the overall performance of the payment platform, lack the tools to support the aforementioned business needs. This creates a vicious cycle: payments teams lack the tools to demonstrate the value of payments, so they cannot get the resources needed to optimize payment processing.

The industry is experiencing a resource crisis around the lack of knowledgeable payments product manager and engineers. There are about 23.9 million software developers worldwide, 3.6 million of

[1] An "endpoint" is a Payment Service Provider (PSP), card acquirer, payment method, loyalty point system, 3D-Secure Server, Account Information Service Provider, Third Party Provider, or any other external system which must be accessed by merchants to process a payment

[2] Although this white paper addresses the needs of Customer Not Present merchants, many of the issues identified and the proposal put forth herein also apply to physical merchants

whom are in the U.S. (making up 1% of the total workforce, both globally and domestically).[3] The current worker influx is insufficient to meet the current industry demands. By 2020, the U.S. will have one million more open Computer Science positions than qualified applicants to fill them. This is not just a U.S. problem. The lack of technical resources is global and no amount of off-shoring or near-shoring will solve it.

Given the increased complexity of payments, merchants' technical teams need to understand the payment ecosystem to make proper architectural and engineering decisions.[4] There are cases of merchants retrying all declined authorizations up to 30 times, regardless of the decline reason codes, because the engineers supporting payments were not aware of their rules and nuances.

Technical resources are vital for addressing the main concerns from CNP merchants. Just as artificial intelligence and machine learning help reduce fraud, new technological approaches can also help manage payment processing costs and ease the introduction of new payment methods. According to the Merchants Risk Council (MRC) and CyberSource, the top five payment challenges for merchants are managing fraud and security (e.g. PCI/DSS), followed by cost of payments, then supporting growth (in the form of alternative payment forms and geographic expansion), and finally, IT constraints.

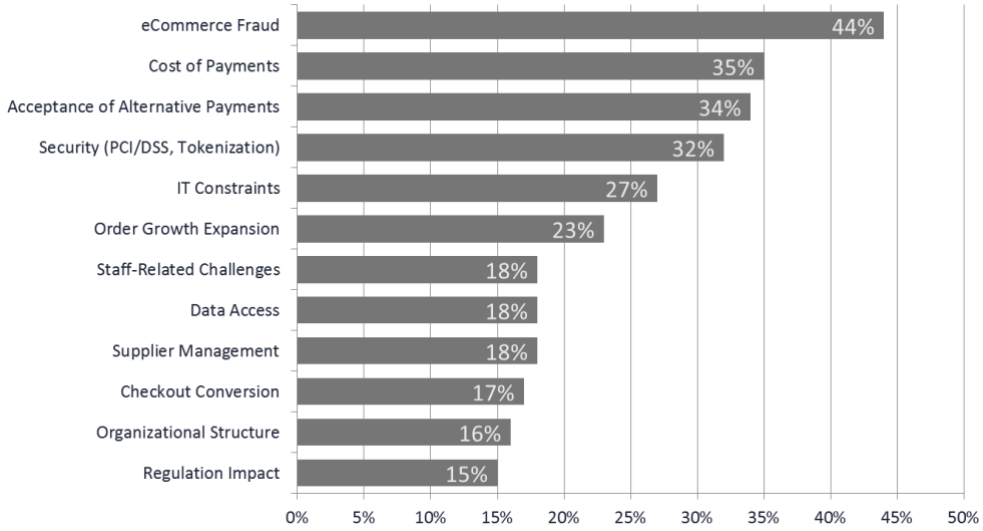


Figure 2—"Payment-Related Challenges Ranked" from MRC and CyberSource's Payment Management Strategies of Forward-Thinking Global Merchants 2018 Global Payments Survey.

For many merchants, the problem is compounded because multiple systems (e.g. A/R or billing systems, fulfillment systems, order entry systems) interact directly with payment endpoints that each must be updated every time the card schemes[5] introduce a new rule.[6] This is the result of evolution without much architectural forethought.

[3] "Global Developer Population and Demographic Study 2019," Evans Data Corp., last accessed May 28, 2019. https://evansdata.com/reports/viewRelease.php?reportID=9

[4] "The Talent Shortage of Software Developers in 2019", last accessed May 28, 2019, https://fullscale.io/the-talent-shortage-of-software-developers-in-2019/

[5] The term card schemes will be used to identify Visa Inc., Mastercard Incorporated, The American Express Company, Discover Financial Services, Inc., JCB Co. Ltd, and Union Pay International

[6] Over the last few years the card schemes have introduced many changes to the CNP payments flows including, but not limited to: replacing $1 authorizations for Account Verification, flagging Merchant Initiated Card On File transactions, requesting an authorization prior to issuing a refund, etc.

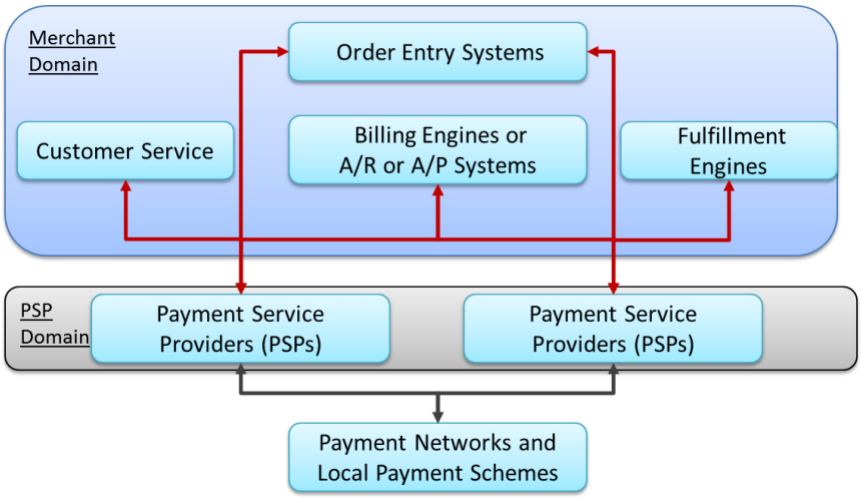


Figure 3—Typical Merchant Payment Functionality Deployment Requiring Multiple Maintenance Efforts.

Many payments platforms remain technically driven, every change or modification requires software development or a high degree of technical knowledge. Often engineers end up looking after payments by default because there isn't a proper function within the organization to manage payment vendors and relationships.

New business-oriented payments architectures are required. These proposed architectures must address the shortage of technical know-how and provide non-engineering staff with the tools to manage payments platforms with minimal engineer involvement. This white paper proposes the creation of such an architectural layer that:

- Provides connections to all required Payment Service Providers (PSPs) and payment methods through a single API. [7]
- Provides smart routing capabilities to maximize approval rates
- Is equipped with end-user-configurable tools that enable the quick addition or removal of payment methods, manages connectivity with multiple providers, define the platform's operational parameters in a single consolidated dashboard so that recurring tasks require minimal engineering effort.
- Leverages Real-Time Ledgers to accurately track transaction statuses, costs, and revenue splits improving liquidity management.

This much needed architecture is called the "Payments Orchestration Layer" (POL).

POLs remove the need to support payments functionality in multiple platforms. All the card schemes changes can be addressed in the same layer, simplifying the merchant's efforts to remain compliant with the schemes. Other compliance tasks such as PCI DSS[8] are also assisted by consolidating all payment data and functionality in a single layer.

To address concerns about creating a single point of failure, POLs are designed to be resilient, fault-tolerant, highly secure, and capable of handling thousands of transactions per second. Although it is impossible to create a platform that never fails, POLs are architected to minimize the probability of complete outages by leveraging the cloud-based distribution, scalability, resiliency, and security

[7] The term "PSP" will be used as a catch-all for Payment Service Providers, acquirers, ISOs, and processors that take fiduciary ownership of a transaction.

[8] Payment Card Industry Data Security Standards

advantages. A recent study of merchants who use cloud-based payments platforms reported that "nearly two-thirds … have seen improvements in security, innovation, and uptime, while nearly three in five cited improved scalability" from on-premises-based implementations. [9]

Ultimately, a POL's most important function is "orchestration." In this context, we define orchestration as "software platforms and services that automate business processes to streamline and simplify operations management." Specific examples of orchestration in CNP payments include:

Outage and Latency Management—automatically and immediately switching merchants' transactions from failed or slow PSPs to alternative PSPs to avoid outages, timeouts, and the resulting customer abandonment.

Optimized Routing—providing the tools for non-technical staff to define routing criteria and rules for maximizing approval rates, minimize payment costs, and automatically execute those rules with no manual intervention.

Retry Declined Transactions—providing the tools for non-technical payments staff to define criteria for retrying declined transactions, establish decision trees for these retrials, and automatically executing those rules without manual intervention.

Tokenization—providing a Token Vault, or interface with third-party Token Vaults, and additionally coordinate the tokenization/detokenization of payment credentials to optimize transaction routing flexibility.

Card Scheme Compliance—simplifying the card scheme compliance effort by minimizing the number of platforms where changes are needed, such as performing an authorization prior to issuing a refund or deciding when to do $1 authorizations versus Account Verifications.

Nuisance Fee Avoidance and Interchange Optimization—automating the processes required to avoid and minimize card scheme fees (such as "misuse of authorization" or "floor limit" fees) as well as ensuring that transactions have all the proper data elements for optimal interchange qualification.

A/B Testing—providing the tools to run and report A/B testing, whether the variable in question is a new decline-retry strategy or alternative routing ruleset.[10] Figure 4 lists some of the orchestration tasks that are integrated into a POL.

[9] Jordan McKee, "The Public Cloud Payments Imperative," 451 Research Commissioned by Stripe, December 2018, last accessed June 21, 2019. https://stripe.com/reports/451-research-public-cloud-2019

[10] A/B testing is sometimes called "champion/challenger" testing where one particular strategy is tested against the standard strategy in use for things such as authorization or decline retries

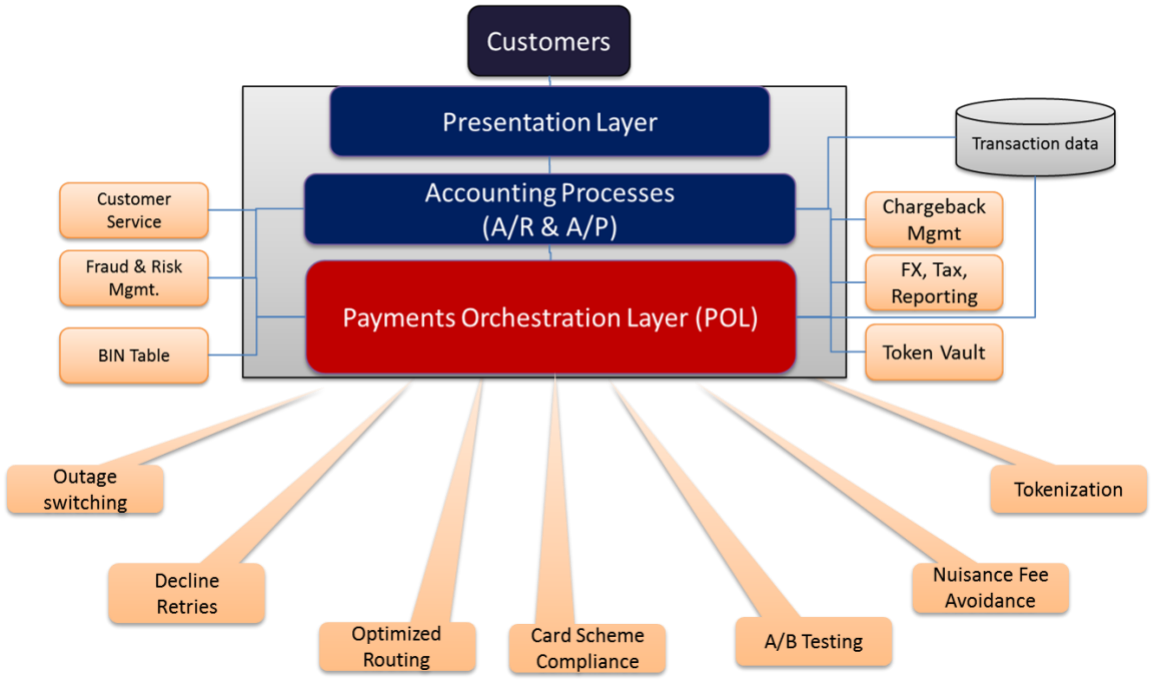


Figure 4—POL "Orchestration Tasks" consolidating multiple maintenance efforts in a single point.

Through this orchestration, POLs enable merchants to do two things: (1) quickly respond to market needs and regulatory demands, and (2) empower merchants with user-driven tools that minimize the demand for engineering resources. No longer weighed down by managing and operating payments platform, technical resources can be focused on developing new value-added functionality in support of business objectives. Payments staff can now focus on demonstrating the true value of the payments function to the business.

It is no longer sufficient to have a technical platform just to connect and switch transactions. The core vision of a POL is that it is a business-oriented platform designed to respond to ever changing business needs and help manage the financial and operational aspects of payments acceptance.

Some PSPs and switches/gateways will claim to function like a POL, but there are no commercial products currently available that meet the business requirements outlined in this white paper. RPGC Group recently performed[11] a survey of 23 payment switches and gateways, the products we see as most likely to evolve into POLs; some delivered 60% to 75% of the stated requirements. Vendors fell short in one of two ways: either they had many connectors but lacked flexible end-user tools, or they had flexible architectures but few connectors. Only a few of these switches/gateways had real-time ledgers to track financial activity.

Differentiating between switches/gateways and PSPs can be confusing. Although switches/gateways are functionally closer to POLs, some PSPs also claim to deliver a POL's benefits, such as automated transaction retries and its accordant sales uplift. Global PSPs[12] are well-positioned to provide benefits of a POL but, ultimately, cannot become a POL since they remain highly incentivized to reduce a merchant's routing flexibility and do not externalize their orchestration tools for a merchant's benefit.

[11] The survey, sponsored by the Merchant Risk Council, was done in cooperation with our friends and partners at Paladin Group and it can be found at http://paladinfraud.com/paladin-payment-report/

[12] A global PSP is a payment service provider that provides payment acceptance in several global markets, offering multiple payment methods and acquiring licenses, which its clients can take advantage of (e.g. Adyen, Worldpay, First Data).

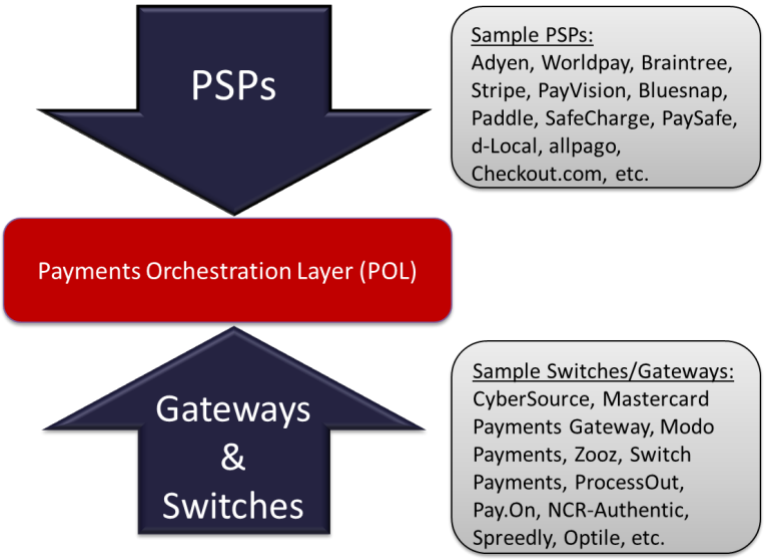


Figure 5—POL Convergence of Switches/Gateways with PSP to Offer New Functionality.

Outsourcing is not the only option for merchants to procure a POL. Merchants who have heavily invested in payments can build their own orchestration tools, like LinkedIn's Project Radar,[13] or real-time ledgers, such as Etsy's Ledger Entry[14] system. Development is expensive, but enterprise merchants who have prioritized payments as a strategic asset can justify developing a POL on the basis of better performance, lower costs, as well as positive and measurable contribution to the company's bottom line.

Whether built in-house or outsourced, merchants of all sizes need an abstraction layer that provides accurate data in real-time, smart routing, end-user orchestration tools, and PSP-agnostic connectivity.

The next sections articulate a clear business case for the introduction of a Payment Orchestration Layer in CNP merchants' payment eco-systems: Section 2 shows how POLs enhance the customer experience, and in the process increase sales and customer satisfaction; Section 3 outlines how POLs support market growth by connecting many endpoints while minimizing operational burdens; Section 4 details how POLs can manage and lower payment costs and contribute to the merchant's bottom line. Section 5 gives a high-level overview of the POL's functional architecture. Finally, Section 6 provides our conclusions and summarizes a POL's benefits.

[13] For more information, see: Tan, Tim. "Payment Transaction Routing at LinkedIn." Lecture, MoneyCon 2019, Computer History Museum, Mountain View, CA, May 30, 2019.

[14] For more information, visit: https://www.etsy.com/developers/documentation/reference/ledgerentry

2. ENHANCE CUSTOMER EXPERIENCE

A good customer payment experience is simple, secure, and fast: not even noticed. To create such an experience, platforms must always be available, processes must be streamlined, and customers must be allowed to pay in their local currencies with their preferred payment methods. Most importantly, transactions from good customers must not be declined, or merchants risk losing them to their competitors. Smart routing and end-user tools are a Payment Orchestration Layer's (POL's) key components that enable payments to support the customer experience.

2.1 Using Availability to Maximize Conversion Rates

Regardless of a merchant's size or vertical, conversion rate[15] remains an important Key Performance Indicator (KPI)[16] but processor outages, slow response times, and authorization declines make this simple goal a frustrating challenge. Payment processing outages are of increasing concern to 24x7 merchant operations, for which even scheduled downtime for maintenance is now unacceptable. Outages lasting from a few minutes to several hours wreak havoc on both sales and customers' experiences.

A 2017 Safecharge survey[17] of European merchants found that 76% of survey respondents experienced at least one complete outage in their payment services and 42% experienced six or more partial outages in the 12 months prior to the survey being taken. Worse still, 39% of these outages occurred during peak sales periods, 73% of which lasted between 15 minutes to 1 hour. Surveyed merchants estimated their outage-related financial losses to range from €10.000,00 to around €100.000,00. An unfortunate 11% of respondents even lost up to €1 Million or more.

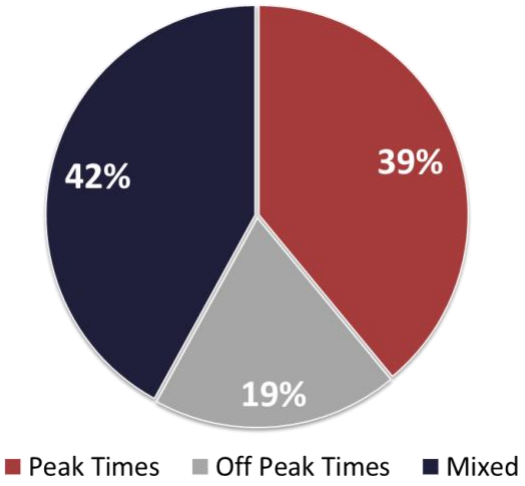


Figure 6—Payment Processor Outages by Time of Occurrence based on data from "Zero Payments Downtime. Myth or Reality: Key Findings about Payment Service Outages in Europe and How to Avoid them" by SafeCharge.

[15] Conversion rate is the percentage of visitors to a website out of the total number of visitors that complete a desired action.

[16] Among Merchant Risk Council members and travel merchants, conversion rate is ranked as the most important KPI with Enterprise merchants ranking conversion rate just second to cost of payments. "Payment Management Strategies of Forward-Thinking Global Merchants," 2018 MRC Global Payments Survey in partnership with CyberSource, last modified May 14, 2018, http://forms.cybersource.com/global-payments-report

[17] "Zero Payments Downtime. Myth or Reality: Key findings about payment service outages in Europe and how to avoid them," SafeCharge commissioned survey of 200+ European merchants' CFO, VP Finance, Payment Managers, and Payments Controllers, last modified November 1, 2017, https://www.safecharge.com/whitepapers/payment-service-outages-and-how-to-avoid-them/

A Stripe-sponsored survey corroborated these SafeCharge conclusions. Merchants were asked to estimate the lost revenue per minute of downtime during peak hours. Nearly three-quarters reported losses at a rate of $1,000/minute or higher. Those with more than $5 Billion in revenue estimated losses at the rate of more than $1 Million in missed revenue for each hour of downtime.[18]

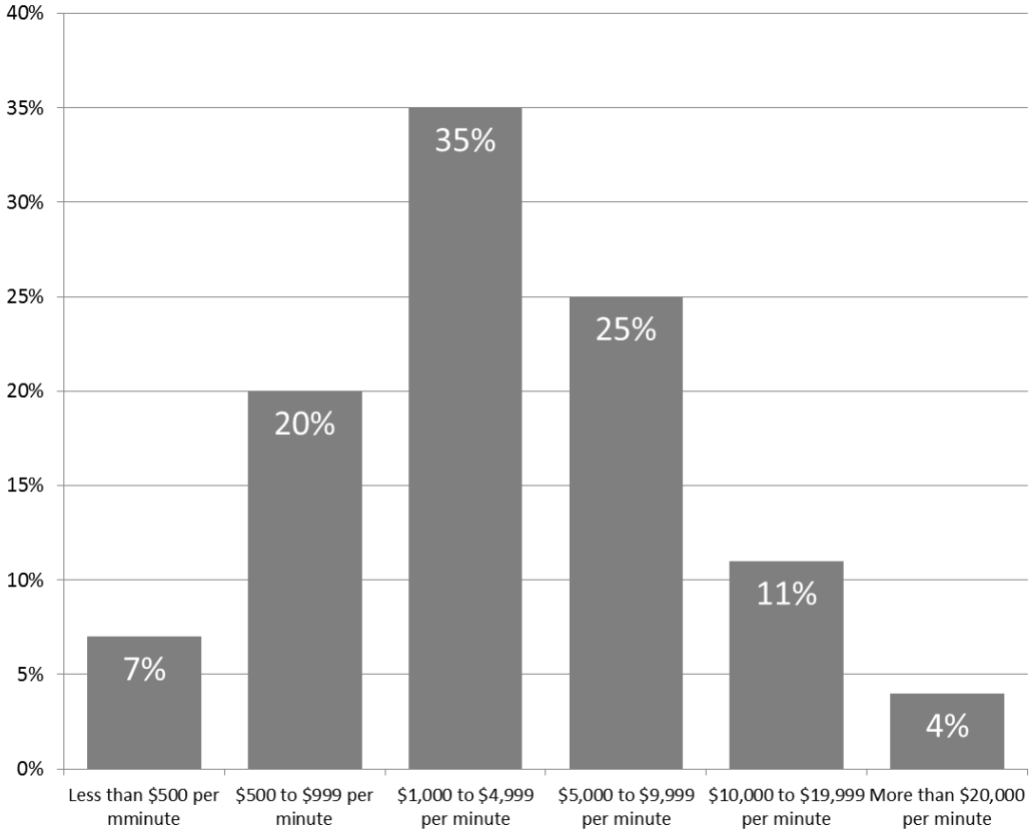


Figure 7—"Impact of Payments Downtime on the Bottom Line," from "The Public Cloud Payments Imperative" by Jordan McKee.

POLs continuously monitor latency for all endpoints. When an outage is detected, POLs automatically switch over traffic from the failed PSP to the active one, without manual intervention. In addition to downtime prevention, POLs measure PSP response times, automatically switching transactions between PSPs to ensure the fastest times. This improves approval rates by minimizing end-user response time and thereby reducing cart abandonment.

It is already best practice for merchants to have relationships with multiple PSPs in key markets with the ability to switch traffic between PSPs when outages and latency spikes occur. Many gateways support this re-routing, but it is seldom automatic. In fact, failover usually requires direct involvement from the gateway provider. Merchants with direct connection to multiple PSPs usually need engineers to manually re-route transactions when outages occur. Consequently, sales are lost while the switchover is taking place. These losses and wasteful use of engineering resources are avoidable with POL's automated switchover capabilities.

[18] Jordan McKee, "The Public Cloud Payments Imperative." 451 Research sponsored by Stripe, last modified April 13, 2019. , https://stripe.com/reports/451-research-public-cloud-2019

2.2 Leverage Transaction Data to Improve Approval Rates

POLs collect transaction data across all customers and all payment methods. Leveraging this data, POL tools determine which PSP delivers the best approval rates by BINs, hour of the day, day of the week, transaction amount, etc. helping merchants fine tune their routing logic. Based on the findings from this data analysis, POLs can route transactions in a manner that will deliver the best approval rates. For example, POLs can route specific BINs to PSP A because it delivers the best success. Similarly, POLS can also route all recurring sales to PSP A and one-off sales to PSP B because the data shows this arrangement delivers the highest approval rates.

Merchants leveraging machine learning algorithms can further provide increased approval rates without having to spend time studying the data. By analyzing transaction sets (both approvals and declines) these algorithms can deliver better results than human empirical analysis could. Because POLs store all transaction details and provide flexible routing capabilities, they are well-positioned to facilitate algorithm-based routing. By maximizing approvals, POLs increase sales.

2.3 Saving Customers by Combatting False Declines

When a customer orders goods from a merchant and experiences a decline, 26% of the time that customer will reduce their patronage; 32% of the time that customer will stop shopping with the merchant entirely.[19] Aite Group reports[20] that false declines for payment card transactions in the U.S. were expected to total $331 Billion in 2018.[21] CNP authorization decline rates are a growing concern because fraudsters have moved from physical to digital commerce, leading merchants and issuers to tighten their risk thresholds.

Most card declines are categorized as "soft"[22] and the majority of these are generic "Do Not Honor," which provides little specificity as to why a transaction was declined. The second most frequent soft decline code is "Insufficient Funds." Soft declines are frustrating for merchants because they cost sales and upset customers. Adyen attests that "Do Not Honor" and "Insufficient Funds" represent the largest percentage[23] of all declines. The percentages vary from country to country and from Issuer to Issuer, but when aggregated across the entire industry, these two reason codes amount to 75% to 95% of all authorization declines.

Merchants operating with multiple PSPs report that when they retry soft declines immediately through alternate PSPs, they get approval many such declines. Even retrying declines through the original PSP a few hours or days later can also translate into approvals. This "save" rate is important because it could mean 1% to 3% uplift in topline sales while reducing customer abandonment. A simple example (Figure 8) using a baseline save rate of 15% demonstrates the value of retrying soft declined transactions:

[19] "Overcoming False Positives: Saving the Sale and the Customer Relationship," Javelin, LLC, September 21, 2015. https://www.javelinstrategy.com/coverage-area/overcoming-false-positives-saving-sale-and-customer-relationship

[20] Julie Conroy, "Chargebacks and False Declines: Cards' Ugly Underbelly", Aite group LLC, August 2016, last accessed August 14, 2019

[21] "Yesterday it was fraud. Today it's false declines: collaboration's latest challenge," The Paypers, February 28, 2018, last accessed May 29, 2018. https://www.thepaypers.com/thought-leader-insights/yesterday-it-was-fraud-today-it-s-false-declines-collaboration-s-latest-challenge/772089

[22] A "soft decline" occurs when the card Issuer refuses to authorize a card for a condition that could be remedied in the future. Examples of these conditions are when the cardholder is delinquent, is over her credit limit, or the Issuer suspects the validity of the transaction given the time and merchant where the transaction was initiated

[23] Chris Laumans, "Coping with 'Do Not Honor' card refusals," June 13, 2018, last accessed June 14, 2019. https://www.adyen.com/blog/coping-with-do-not-honor-card-refusals

Top Line Sales Per Measurement Period	$ 1,000,000,000.00
Decline Rate	10%
Sales Declined	$ 100,000,000.00
Percentage of Soft Declines	80%
Sales Declined with Soft Declined Codes	$ 80,000,000.00
Save Rate of Soft Declines	15%
Recovered Sales	$ 12,000,000.00
Uplift Sales Ratio	1.2%

Figure 8—Estimated Uplift Sales Ratio in the "Value of Retrying Soft Declined Transactions" Based on Data from RPGC Case Studies.

To realize this uplift, merchants must not blindly implement reckless retry strategies, such as retrying every decline multiple times, including "hard" ones.[24] Unfortunately, engineers without payments knowledge have developed exactly these strategies without understanding the business implications of damaging a Merchant ID (MID)'s reputation. When an Issuer gets a transaction from a MID with poor reputation, the authorization request is evaluated with further prejudice, resulting in lower approval rates. Compounding the risks of a reckless retry strategy, Visa and Mastercard set limits[25] on the number of retry attempts that can be performed on declined authorizations. They have also begun to assess fees when merchants excessively retry declined transactions. When a retry strategy is poorly designed, merchants pay more per approval and negatively skew approval rates.

Some PSPs offer automated retry capabilities as a value-add service and tout their ability to increase sales[26] in their marketing materials and industry publications. These PSPs leverage authorization data compiled from all their merchants to develop proprietary retry logic. This logic is either generic or is applied across the various segments of their entire portfolio, indiscriminate of specific business concerns and/or Merchant Category Codes (MCC). Because of the inherent difficulties of managing separate software for each merchant, it is highly unlikely that PSPs will provide merchants with tools to customize retry logic to suit each merchant's specific needs.

Rather than rely on PSPs, POLs provide the tools for merchants to define their own transaction retry logic without programming. POLs automatically retry declined transactions following merchant-specified "decision trees" created and maintained by non-technical personnel. These decision trees allow merchants to define retry logic based on:

- Decline reason code (e.g. Do Not Honor, Insufficient Funds, Lost or Stolen),
- MID (e.g. in-house sales, sub-merchants, line of business, currency),
- Issuer BIN,
- Card type (e.g. pre-paid, elite),
- Transaction (e.g. recurring, one-off purchase),
- Merchandise type (e.g. digital goods, physical goods, services),
- Cardholder's veteran status (e.g. first-time customer vs. existing customer),
- Transaction amount,

[24] A "hard" decline is when the Issuer will never approve a transaction. Examples of these "hard" decline codes are 'card reported as lost or stolen' or 'invalid transaction for this card type'

[25] Visa Rules allow four transaction-retries within 16 days of the original authorization attempt, but this is not actively enforced. Mastercard has fees that penalize merchants that retry authorizations to same account more than 20 times over 24 hours.

[26] Adyen recently conducted a study reporting that their auto-retry logic was able to generate a sales uplift between 1% and 3%. For more information, see: "The Forrester Total Economic Impact of Adyen Global Payment Processing," Forrester, March 2016, last accessed June 21, 2019. https://www.adyen.com/knowledge-hub/white-papers/forrester-report-adyen-processing

- Number of previous retries,
- IP address and/or device fingerprinting (if collected by merchants) and,
- Risk score.

POLs provide merchants with the capability to create decision trees that filter declines based on merchant-specified rules and criteria. POLs then execute the desired retry strategies:

- Retry immediately through another PSP (for merchants with multi-PSP relationships).
- Retry immediately through another "rail" (a debit card declined through a local debit network is retried through Visa or Mastercard rails).
- Retry after *n* hours (where *n* is a value established by the merchant).
- Retry at a time and day of week specified by the merchant.
- Retry at a time and date specified by the merchant.
- Retry after card updater activity.
- Retry after adjusting PCI variable (e.g. expiration date, commerce indicator, AVS).
- Retry after adjusting transaction amount.

These decision trees give merchants the ability to create retry strategies that will deliver the highest approval rates while managing costs. POLs offer strategies customized for each merchant.

2.4 Split Tender Payments

Loyalty as a currency is a powerful proposition for customer retention. Well-executed loyalty programs allow a merchant's customers to use miles or points to pay for a portion (or all) of their purchases, increasing the value of the program. Unfortunately, this split tender capability can be difficult to implement when a merchant's loyalty system is separate from their order entry system.

POLs allow merchants to offer customers the ability to pay for one order with multiple payment methods: a split tender transaction. When orchestrating a purchase into multiple tenders, POLs can receive a single payment request from an order entry system and split the payments into multiple tenders, accessing loyalty systems like any other endpoint.

2.5 Selling and Refunding in Customers' Own Currency

Merchants must have flexible mechanisms to handle transactions in currencies other than their own. This means interfacing with foreign exchange (FX) and tax engines to price transactions at checkout.[27] Merchants who elect to carry the FX risk on cross-currency transactions must track the original exchange rate used in each transaction so that, in cases of refunds, consumers get the same amount they paid in their own currency. Tracking these exchange rates can be burdensome to Enterprise Resource Planning (ERP) systems and billing systems that were not designed to be multi-currency. As a global infrastructure layer, POLs are multicurrency and in a better position to track these rates—providing the proper refund amounts as well as generating accounting and tax reports.

[27] Merchants can choose to price their entire catalog in alternative currencies and display the local prices based on IP address or customers' choice. Other merchants may choose to keep their catalog in their functional currency and offer multi-currency pricing options at checkout time. The former is NOT a POL function but the ability to track exchange rates used in every transaction is.

3. REQUIREMENTS TO SUPPORT MARKET GROWTH

To fully penetrate new markets, merchants must accept payment instruments beyond general purpose payment cards offered by the card schemes. However, payments management becomes more complex as a merchant expands the number of payment methods, currencies, and countries in which it sells. Two of the Payment Orchestration Layer (POL)'s key components, global connectivity and end-user tools to manage PSPs, are integral to achieving these requirements.

From an implementation perspective, integration with these global endpoints requires significant technical resources because engineers must spend time learning the rules and behaviors of the payment method that they are implementing. From an operational perspective, the rules governing these payment schemes are different than what merchants are used to. Data and reports that merchants take for granted in their domestic markets can be difficult to obtain. Provisions must also be made to turn on or off a payment method that creates bad customer experiences, is too fraud-prone, or is simply not generating the expected sales uplift. On average, global merchants accept 6.2 different payment methods and nearly 80% of them added and/or removed payment methods in 2017.[28]

Merchants using third-party providers of ERP or billing systems that act as payments gateways are often frustrated in their quest to enter new markets because these vendors, due to their limited payments knowledge, can only offer the desired connectivity for a large fee and long lead times.

3.1 Single API Connectivity

Through the POL's single API connection, merchants can access multiple payment types (e.g. cards, bank transfers, Online Banking e-Payments, and e-wallets). POL APIs support the appropriate functionality required for each payment method (e.g. single/dual message authorizations, multiple billing events, "push"/"pull"[29] payments, wallet[30] redirections, batch processing) and any other activity where payment data must be interchanged with outside systems.

Because the POL API's ability to convert any payment request into a canonical message, merchants realize the benefit of a single integration while leveraging their multi-PSP strategy. Rather than allocating engineers to learn the in-and-outs of each individual payment method, POLs can stand up connectors to new endpoints in a matter of weeks for a reasonable cost. This is in part thanks to their flexible architectures that decouple endpoint connectivity from the transaction logic needed to perform the payment. Merchants using third-party providers of ERP or billing systems can connect these systems to POLs and have access to many payment instruments removing the dependency on vendors to develop these interfaces.

3.2 Global Agnostic Connectivity

Payment gateways are not always agnostic. To maximize market penetration, it is necessary to accept local payment methods and leverage local processing to optimize approval rates. Despite their best efforts, no single global PSP covers all the countries and payment methods that customers and merchants demand. Consequently, global merchants end up establishing relationships with multiple

[28] "Payment Management Strategies of Forward-Thinking Global Merchants," 2018 MRC Global Payments Survey in partnership with CyberSource, last modified May 14, 2018. http://forms.cybersource.com/global-payments-report

[29] Pull" payments are typically found in card payments and direct debit bank transfers where payer credentials are provided to payee and funds are debited from the payer's account. Push payments are further defined in Section 3.3.

[30] E-wallets include wallets such as PayPal, AliPay, Apple Pay, Google Pay, Samsung Pay, etc.; bank transfers such as US Direct Debit or SEPA Direct Debits in Europe; re-direct forms of payment like iDeal in the Netherlands and all of the net banking available in India, China and the Nordic countries. For US merchants, POLs connect to EFT networks such as STAR, NYCE, Pulse, and ACCEL.

PSPs, reporting an average of five gateway processors and four acquiring banks,[31] each with its own connection in most cases. A true POL abstracts messages to and from acquirers, PSPs, alternative payment schemes, banks, loyalty schemes, and any other entity involved in the payments business.

While strong global PSPs and gateways offering local processing are readily available, merchants using them still need to establish legal entities in local markets, which is cost-prohibitive and time-consuming. The Latin American market presents a strong case for using POLs to manage multiple PSP to cover multiple markets without the need for local legal entities.

In Latin America, there are specialized PSPs that aggregate merchant transactions using the Merchant of Record (MOR) model. Under their own name, these PSPs locally collect funds on a merchant's behalf and remit them in the merchant's preferred currency. While these services are contracted at a premium, MOR providers have demonstrated their ability to raise approval rates in the countries in which they process, as these transactions are initiated locally.

Traditional global PSPs cannot offer these benefits and many refuse to connect to said specialized PSPs. This is unsurprising because global PSPs have invested immense capital to obtain their acquiring and processing licenses in those markets. Thus, they have little incentive to connect with and send transactions to the aforementioned local PSPs. This reluctance to connect to perceived competitors gives merchants two bad options to choose from: lower approval rates[32] or invest in a new connector. Despite the obvious benefits these specialized PSPs provide, merchants ultimately desire fewer connections, ideally one. A POL, endpoint-agnostic by nature, sends each transaction to the PSP most capable of returning a successful authorization through its single API connection.

Another benefit of using agnostic POLs to manage a multi-PSP strategy is related to the management of Primary Account Numbers (PANs) and tokens. Most global PSPs provide tokenization services that merchants rely on to reduce their compliance with the card schemes' security requirements. But the tokens provided by one PSP are useless to another. To execute a multi-PSP strategy, it is critical that merchants retain the control of the PAN. POLs resolve this issue with their own Token Vaults which can produce and store flexible token formats, independent of PSPs. This topic is covered in greater detail in Section 4.1.

3.3 "Push" Payments

"Push" payments are those initiated by payors (customers) sending funds from their bank accounts to payees' accounts (merchants). SEPA Credit Transfers, Boleto Bancario, or payments made at convenience stores (such as Konbini payments in Japan or OXXO in Mexico) are all examples of "push" payments. Generally, "push" payments are less expensive than card-based ones because there is neither interchange nor risk of chargebacks from unauthorized transactions. Merchants looking to address markets where the card scheme penetration is low and where "push" payments are popular must implement these payment methods.

A key characteristic of push payments is the time delay between the transaction and the recognition of good funds entering the merchant's account. POLs track outstanding invoices, monitoring and constantly querying the appropriate endpoints (e.g. banks or third-party providers such as OXXO). When

[31] "Payment Management Strategies of Forward-Thinking Global Merchants," 2018 MRC Global Payments Survey in partnership with CyberSource, last modified May 14, 2018. http://forms.cybersource.com/global-payments-report

[32] In certain countries like Brazil, many transactions that are initiated from outside the country are declined. It is not rare to have decline rates of 50% or more in some Latin American countries. When transactions are initiated locally – as in the case when these specialized MOR PSPs initiate them—the approval rates increase dramatically

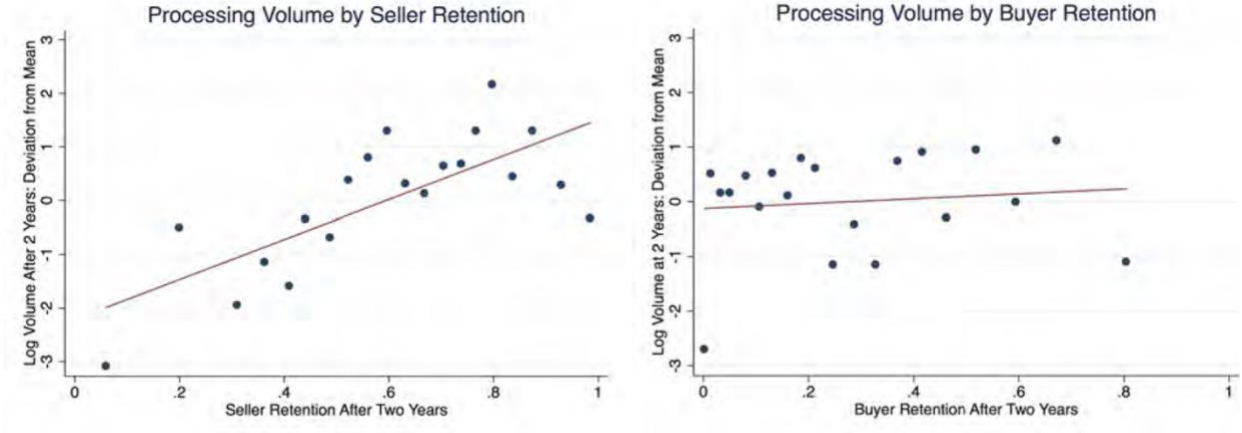
payments arrive, POLs match them to open invoices and notify merchants of the event so that goods can be dispatched or subscriptions re-instated.[33]

When considering real time payments schemes,[34] merchants receive "good funds" into their bank accounts on a 24x7 basis. Consequently, merchants' payment systems must be prepared to receive cash and take the appropriate action when payments are received. This means that merchants must have tools that provide visibility into bank accounts—not a common integration for most engineering teams. POLs provide real time visibility on incoming payments, feeding timely and critical information to the merchants' liquidity management systems.

3.4 Payouts

Since the objective of POLs is to consolidate all payment related functions into a single technical and operational layer, payouts fall under their scope. Payouts are disbursements made by payers (merchants/marketplaces) to payees (e.g. sellers, ride-share drivers, property renters, web developers) who may be located all over the world. These payees expect to be paid in their local currencies and, in general, prefer that their earnings be deposited directly into their local bank accounts. When this is not possible, payers can also fund prepaid reloadable cards or push funds into e-wallets such as PayPal.

Facilitating a good payout experience is critical for marketplaces. A Stripe study found that, over a two year period, its marketplaces with higher seller retention rates generate more revenue gains than those with high buyer retention rates. The study concludes that marketplaces that invest in retaining sellers can generate 10 times more platform volume than when making the same investment in retaining buyers. Further, sellers who sell in multiple marketplaces (e.g. drivers that operate under both Uber and Lyft) are quick to move to another marketplace that offers them better services; faster and simpler payouts can be a critical differentiator. While sellers are likely to be primarily retained by increased transaction volumes, platform user experience, payout speed and reliability, and quality of buyer and seller rating systems can all help determine which platform a seller uses.



Source: Stripe administrative data.

Figure 9—Processing Volume by Retention. "How do Marketplaces Compete? The View from Stripe Connect," Nate G. Hilger, Stripe Inc., page 13

Many marketplaces and merchants that perform payouts generally have separate systems for taking payments in and sending payment out. This implies developing and maintaining separate connectors

[33] If an invoice is over-paid or underpaid, this is also reported to the merchants' billing or accounting systems as resolving these exception conditions is NOT a POL function.

[34] e.g. Faster Payments in the U.K., RTP, Zelle & FedNOW in the U.S., FAST in Singapore, and UPI in India

with similar or same providers (e.g. PSPs, banks). When appropriate, POLs process payouts using the same connectors for accepting pay-ins, minimizing development and maintenance efforts. POLs provide marketplaces and merchants the ability to implement netting strategies where payouts are made in the same currencies that they received. This avoids double FX spending on income repatriation and operational funding. Finally, because POLs have a complete view of inbound and outbound money flows, they can assist merchants and marketplaces manage their liquidity more effectively.

3.5 PSP Management

As connectivity hubs, POLs collect and retain transaction and operational data from all PSPs. This allows merchants to better monitor and manage the performance of all their vendors via dashboards (even allowing merchants to create and customize their own). Dashboard reporting could include the following information for each individual PSP:

- Uptime/downtime.
- Average response time.
- Approval/decline rate.
- Transaction share (in cases of multi-PSP merchants).
- Sales monetary value and count (from Beginning of Day to present minute).
- Average sales monetary value and count per minute (to calculate losses in outages).
- Refunds to sales ratios (both monetary and count).
- Average cost per transaction.
- Authorization to capture ratios.
- Sales “lost” (e.g. in cases of PSP providing 3DS services or re-direct to net banking sites).
- Chargebacks to sales ratio.
- Receivable days sales outstanding (for “push” payments).
- Payouts by channel and by monetary value and count.

By collecting and reporting on these statistics, POLs help merchants manage their Service Level Agreements more accurately and effectively.

4. REQUIREMENTS TO LOWER OPERATING COSTS

In the 2018 MRC's Payment Management Strategies of Forward-Thinking Global Merchants survey, 484 large global merchants ranked (Section 2, Figure 2) "cost of payments" as the second biggest challenge faced by merchants and "cost per transaction" as a top Key Performance Indicator across multiple merchant segments (Figure 10).[35]

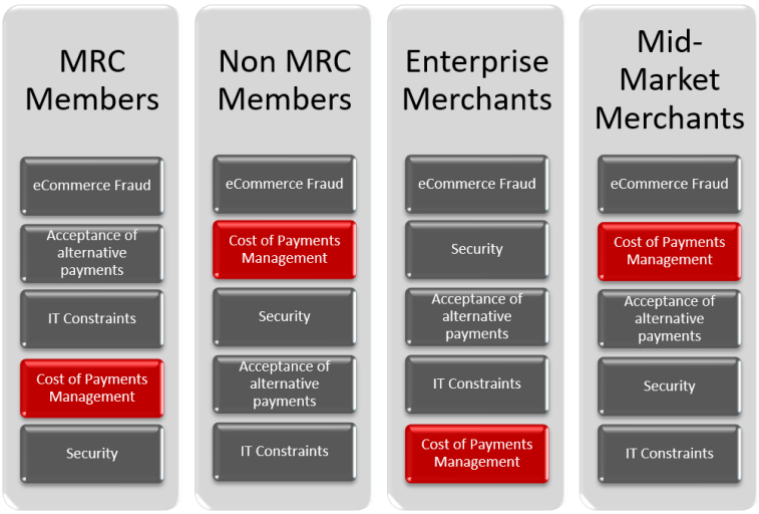


Figure 10—"Payment-Related Challenges Ranked" from MRC's Payment Management Strategies of Forward-Thinking Global Merchants, pg. 22.

The most sizable portion of payment costs is interchange. While interchange rates are rarely negotiable, how the merchant processes a transaction can greatly affect their cost. POLs are designed to help merchants manage their payment costs through reduced PCI DSS compliance, optimized processing costs and lowered staffing costs. Coincidentally, these cost-reducing efforts also help improve security, ease IT constraints, and minimize the impact of regulatory demands. Failure to properly address any of these needs is itself incredibly costly. Two of a POL's key components, real-time ledgers and end-user tools, manage PSPs and are integral to managing these costs.

4.1 Minimizing PCI DSS Compliance Costs

Security concerns in the early days of e-commerce led to the birth of Payment Card Industry Data Security Standards (PCI DSS). PCI DSS establishes the technical and operational requirements to protect payment card data; they must be adopted by merchants in order to participate in the card payments ecosystem. When companies are non-compliant, they risk data breaches, the cost of which is estimated at $148 per lost or stolen record.[36] This cost not only comes from fines, but also includes reputational damage and downstream costs, such as reimbursing Issuers for mailing replacement cards.

PCI DSS costs can still be considerable depending on the size of the merchant. Security Metrix reports that, for large merchants, the assessment alone can cost as much as USD $70,000+ per year. TrustNet

[35] "Payment Management Strategies of Forward-Thinking Global Merchants," 2018 MRC Global Payments Survey in partnership with CyberSource, last modified May 14, 2018, http://forms.cybersource.com/global-payments-report

[36] Gary Glover, "How Much Does PCI Compliance Cost?" last updated on November 26, 2018, https://www.securitymetrics.com/blog/how-much-does-pci-compliance-cost

reported that compliance costs range from less than USD $10,000 per year to several Millions of dollars annually.[37]

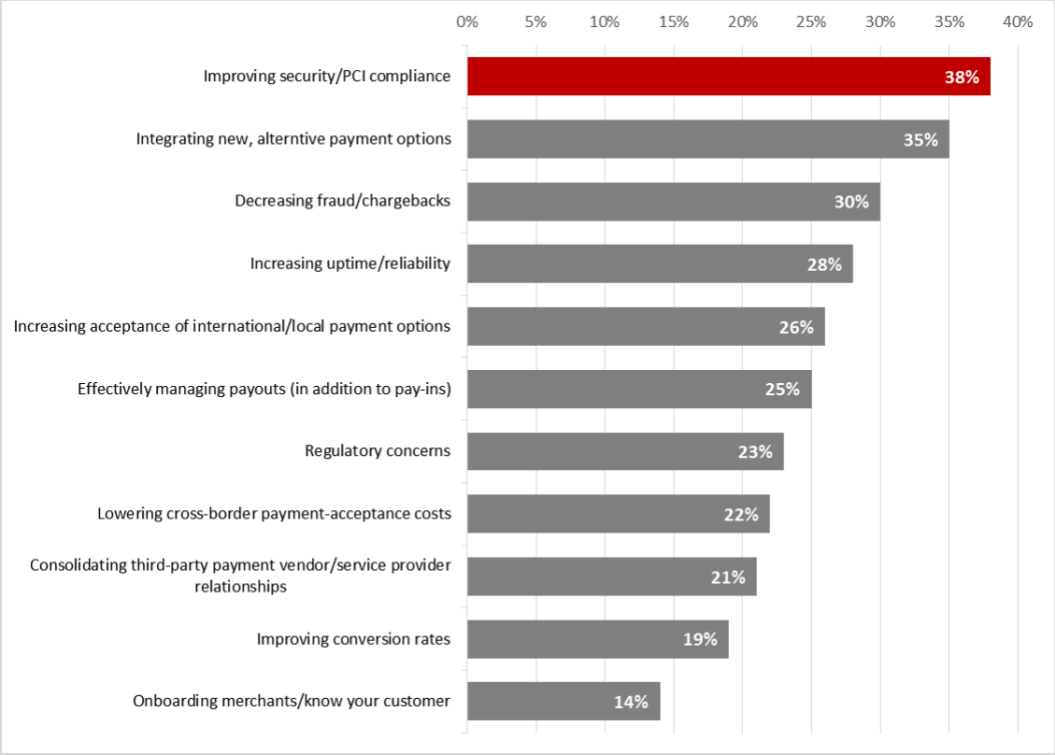


Figure 11—Biggest Payments Challenges Facing Enterprises in 2018 from "The Public Cloud Payments Imperative" by Jordan McKee, Page 8

Improving security and being compliant with PCI DSS is the top challenge faced by merchants (Figure 11). Merchants also cite security/compliance as their "most pertinent obstacle to implementing new payments and commerce technologies."[38] Poorly designed security gets in the way of integrating new and alternative payment methods and it also impacts uptime and availability.

After the high-profile data breaches in the early 2010s, merchants began storing sensitive customer data (e.g. PANs) in token vaults hosted by their PSPs. Soon thereafter merchants realized that reliance on PSP token vaults had a major shortcoming. Tokenization services are sticky. It is hard for merchants to migrate to another provider if the PSP controls all the PAN data. PSP-based token management creates an operational hurdle for merchants with multiple PSPs. Each with their own token formats, it is impossible to route transactions between PSPs without the PAN. More troublesome, some merchants have reported that their tokens have been held "hostage" by a few unscrupulous PSPs when merchants try to terminate their relationships.

To further complicate matters, card schemes have recently introduced their own "Network Payment Tokens." These tokens promise to remove the need for card updater services and allow merchants the use of the same token across multiple PSPs. Intentionally, Network Tokens also prevent merchants from

[37] Jacqueline von Ogden, "How Much Does PCI Compliance Cost? 9 Factors to Consider," last updated on March 24, 2016, https://www.cimcor.com/blog/how-much-does-pci-compliance-cost-9-factors-to-consider

[38] McKee, Jordan, "The Public Cloud Payments Imperative," Page 10, December 2018, 451 Research sponsored by Stripe, last accessed June 13, 2019, https://stripe.com/reports/451-research-public-cloud-2019

routing U.S. debit cards through the lower cost debit networks. Thus, Network Tokens cannot support a flexible routing strategy, which is increasingly paramount to CNP merchants.

To maintain security while still achieving cost savings through lower cost routing, merchants must use an independent external provider, which stores the PAN on their behalf but without any of the constrains that PSPs impose. The POL is a globally agnostic connectivity layer, designed to sit outside the rest of the merchant's technical stack. This allows a POL's token vault to reduce or eliminate a merchant's PCI DSS compliance requirements, thus lowering the overall cost of payments, while supporting the merchants' routing strategies.

POLs' token vaults are inherently flexible, allowing for multiple token formats. A POL token vault allows merchants to store PANs, PCI tokens, Network Tokens, Payment Account Reference (PAR) numbers, Token Requestor fields, and any transaction metadata, linking them all together in a manner that best suits business needs. POLs mitigate provider lock-in when merchants decide to take their business to a different PSP.

4.2 Lower Processing Costs

Even though interchange is rarely negotiable and card scheme fees are a given, how a merchant processes its transactions affect the total cost of payments. A POL assists merchants in minimizing scheme fees, enhancing netting capabilities, ensuring optimal interchange qualification, and provides the tools and connectivity for least cost routing.

4.2.1 Minimize Scheme Fees

While interchange remains the largest component of external payments costs, card scheme fees and assessments have been increasing in both number and value. In April 2019, Visa increased its Authorization Processing Fee (APF) for international credit transactions from $0.0195 to $0.0395 per authorization. Mastercard introduced its "Mastercard Transaction Processing Excellence Fee—Excessive Authorizations" describing fees of $0.10 for each authorization attempt after the 20th previously-declined attempts on the same account number within a 24-hour period.[39] As described in Section 2.3, this fee will impact those merchants—primarily subscription based—that retry all declines indiscriminately up to 30 times.

To minimize these fees, merchants must examine every transaction during the authorization and settlement processes, ensuring each transaction complies with regulations. For example, merchants must reverse authorizations about to expire when there are no captured transactions (i.e. "misuse of authorization" fee) but request new ones when captures are detected without matching authorizations (i.e. "zero floor limit" fee). The frequency of these events changes from merchant to merchant, depending on the accuracy of their order entry and fulfillment systems.

POLs have calendars that track transaction authorizations' expiration dates and match these with captures. By doing these tasks, merchants avoid the "misuse of authorization" and "zero floor" fees, as well as potential interchange downgrades. Using merchant-defined rules, POLs can take the necessary actions on behalf of the merchants to avoid the fee in the first place (e.g. reauthorize a stale authorization).

4.2.2 Ensuring Optimal Interchange Qualification

Although there is little that merchants can do to reduce interchange, they should ensure that their transactions qualify for the best possible rates. Timeliness of capture and completeness of

[39] "Payment Network Pass-Through Fee Schedule", Effective April 2019 Wells Fargo merchant Services LLC, www.wellsfargo.com/biz/merchantpassthroughfees

data submitted dictates whether a transaction is downgraded from its optimal interchange. Merchants have little visibility into why downgrades are applied and for how much. They need tools that understand the cost of each individual transaction.

For example, an e-commerce transaction on a Visa Consumer Credit card that qualifies for Visa's CPS/E-Commerce Basic[40] interchange of 1.80% + 10 ¢ must be electronically authorized, must use the Address Verification Service (AVS), the capture and settlement of these transactions must happen within 2 days of the transaction date, and must also incorporate a few more data elements. Failure to comply with any of the above conditions will cause the transaction to be downgraded to an interchange category called EIRF[41] which will apply a 2.30% + 10 ¢, a half a percentage increase in the transaction cost.

POLs include interchange qualification rules,[42] which they continuously update as the card schemes change these rates at least twice a year. POLs calculate the interchange associated with each transaction so that merchants can compare these estimates against the interchange qualification provided by their PSP. When the possibility of a downgrade is detected, POLs notify merchants of the problem and, when possible, take corrective action. POLs with access to BIN files and interchange qualification rules can also track the cost of each transaction and help resolving billing differences. Failure to monitor interchange qualification rules and downgraded could cost merchants lots of money.[43]

4.2.3 Debit Card Routing

In the U.S., debit cards can be routed through Visa and Mastercard or, for lower costs, through the local debit networks, such as STAR, NYCE, Pulse, or Accel. [44] This is due to different scheme fees and interchange rates between card schemes and local debit networks. For merchants, the cost difference is significant, in favor of routing debit card transactions through the debit networks.[45]

Given this cost difference, merchants are incentivized to connect directly with debit networks. In order to do so, merchants must have access to the PAN (a concern raised in Section 4.1). While PSPs offer connectivity to debit networks, POLs do not limit the number of cards that qualify for debit network routing, nor do they not take an *ad valorem* fee for the service as some PSPs do.

To manage tier-based pricing between merchants and debit networks, POLs track the merchants' volume commitments against contractual agreements. When these thresholds are reached, POLs automatically switch routing between debit networks, enabling merchants to maximize their financial benefit with minimal interruptions.

[40] Custom Payment Service or CPS/E-commerce basic is an interchange category that requires submission of certain data elements and it also has certain timing requirements

[41] Electronic Interchange Reimbursement Fee

[42] These are generally known in the acquiring business as front-end qualification rules and, although they are not publicly available, can be determined based on the card type (from the BIN file), merchants' MCC, and other qualifying criteria.

[43] RPGC consulted for a Client that was experiencing nearly $1 Million in downgrades annually because of a one day delay in the submission of their captured transactions into settlement

[44] Outside the U.S. there is generally only one national debit network that may compete with the global card schemes. In the U.S. there are approximately 18 different debit networks. The four mentioned are the largest in the U.S. but there are also other networks of importance such the Co-Op and CUliance which are networks of credit unions

[45] Similar savings can be obtained outside the U.S. for debit transactions, even if the card is co-branded with Visa or Mastercard. For example, a Dankort card in Denmark has the same interchange regardless of routing but the merchants' fees are less when routed directly through Dankort than through Visa/Mastercard.

4.2.4 Automatic Chargeback Fighting

POLs are also able to read incoming chargebacks and assist merchant defending against chargebacks and non-card disputes. For example, because POLs know everything about a merchant transaction, they can detect if the chargeback is "stale" (i.e. a chargeback is submitted past the allowable time) or is improper (e.g. a chargeback amount below a certain amount or a chargeback for a transaction already refunded).

Although POLs are not intended to be full chargeback management systems, they act as first line of defense, returning chargebacks and disputes that should not have been sent to the merchant in the first place. Of course, POLs interact with in-house or third-party chargeback management systems to exchange information about transaction and chargeback data, empowering those solutions to be more cost-effective in the resolution of chargebacks.

4.3 Lower Staffing Costs

Engineering resources are scarce and expensive, leading few merchants to dedicate engineering and technical support to the payments function. Every merchant needs software to comply with card scheme rules. Sadly, each one spends their own engineering resources developing similar solutions to a shared problem.

The card schemes continuously introduce new fees and regulations that cause merchants to fine-tune their authorization and transaction handling processes; these changes are not expected to abate. As a matter of fact, the schemes will likely increase the pace of these changes. Merchants need to minimize their redundant use of engineers to comply with card scheme rules.

These changes have direct cost implications. Merchants with disparate systems find themselves making compliance-related changes throughout their technology stacks (e.g. ERPs, order-entry systems, billing engines). The following sidebar shows a couple of "use cases" where engineering efforts are wastefully duplicated.

Use Cases of Engineering Effort Duplication

Verifying New Customers

One of the standard means of onboarding customers for e-commerce merchants is to verify that the card presented is valid by running a $1 Authorization that is never settled. In 2009, Visa and Mastercard established Account Verifications (also known as "$0 authorization.") to replace the traditional $1 authorizations. Every e-commerce merchant had to invest engineering resources to make this change which delivered little value to merchants as compared with the $1 authorizations.

Increase Refund Visibility

Beginning in April 2019, Visa and Mastercard started a global rollout of a program that requires merchants to perform credit authorizations prior to issuing refunds.[46] All merchants need to introduce this logic, but it is essentially the same from merchant to merchant.

Figure 12—Use Cases of Engineer Effort Duplication

Isolating payments from the rest of the technology stack reduces complexity and engineering efforts spent on redundant functions. POLs support these compliance changes with minimal-to-no engineering support. The POL's architectural position spares ERP, billing, and fulfillment systems from payments-

[46] "Improve the Customer Return Process, New Purchase Return Authorization Message", Visa Merchant Resource Library, accessed August 15th, 2019, https://usa.visa.com/dam/VCOM/global/support-legal/documents/new-purchase-return-vbs-10-apr-17.pdf

related updates. For instance, POLs automatically initiate refund authorizations and determine optimal card verification values without requiring modifications to the rest of the technology stack.

Minimizing these redundant efforts is just one part of the staffing cost savings. POLs also provide dashboard tools that allow end-users to operate and maintain the system, saving engineers from maintaining and operating the system. This way, many business needs—from report generation, to retry logic changes, to implementing new payment methods—are removed from engineering's scope of responsibilities.

POLs also help reduce non-technical staffing costs by automating various operational and managerial tasks. For example, when authorized by merchants, POLs access bank accounts to pull information about cash payments from proceeds being paid by a PSP to the merchant. POLs use the SWIFT messaging network or Open Banking APIs, depending on the bank's location and capabilities and automatically reconcile PSP activity reports[47] against their own activity logs, flagging any discrepancies.

With such automated tools, merchants can customize their own order-to-cash reconciliation processes by using POLs to aggregate cash deposits and match them against store sales. Other examples for reducing non-technical staffing costs include automatic chargeback fighting (Section 4.2.4), and consolidation of all PSP activity into single integrated reports, usually a labor-intensive process.

Since most companies do not categorize staffing costs[48] under "payments," it is difficult to quantify a POL's financial benefits. But consider the hard savings that can be realized:

- Fewer software engineers are needed to maintain and operate payments platforms.
- Demands are less on HR and recruiting to hire and keep these engineers.
- Supporting new payment methods costs less to integrate and they are delivered to market faster.
- Reduction of training and employee onboarding cost as many operating and managing exception conditions are handled automatically by the POL.

4.4 Real-Time Ledgers (RTL)

Traditional payment platforms do not provide real-time financial data visibility. The emerging global trend towards faster payments[49] requires merchants to closely manage liquidity in order to benefit from early access to funds. Real-time projections of funds availability will create an opportunity for additional interest income and, similarly, real-time projections of daily payouts will ensure that bank accounts are properly funded, minimizing bank fees and fines.

The traditional approach to manage liquidity has been to develop batch-oriented software and processes, collect detailed transaction information, and reconcile payments activity. Only after these slow error-prone processes have been executed, can merchants know the position of key accounts such as Cash-In-Transit, Accounts Receivable (A/R), Accounts Payable (A/P), and Projected Revenue & Expenses (in those cases where merchants share revenue with Partners). The delays born from these anachronistic processes force merchants to only have a snapshot of their financial environment on a daily, weekly, or even monthly basis. All of this undermines efficient cash management policies.

[47] Activity reports are generated by PSPs for each brand processed during a given period (e.g. day). These reports detail the total count and monetary value of payments and refunds as well as any fees netted out by the PSPs and state the monetary amount that merchants can expect to receive in their bank accounts

[48] These costs often qualify as "overhead" or "General Sales and Administrative."

[49] There are 40+ real-time payment systems around the world offering or developing immediate or near rea-time payments functionality. Among them are Faster Payments in the UK, Real Time Payments (RTP) in the US, SPEI in Mexico, India's Unified Payments Interface (UPI), the New Payments Platform (NPP) in Australia, and Singapore's FAST

Real-Time Ledgers (RTL) immediately and automatically record accounting events[50] as they occur when transactions are being processed, updating every sub-account following rules and actions defined by merchants' accounting departments. For example, a credit card authorization approval from a PSP results in an immediate credit to that PSP's A/R sub-account and a debit to a merchant prepaid liability sub-account. Another example is when a payout is initiated to a Partner (e.g. a travel agency or a ride-share driver). In that case, the Partner's A/P sub-account would be credited while the merchant's cash sub-account would be debited.

The RTL within POLs do not establish which events are tracked and how accounting entries are be defined. Instead, POLs provide tools for merchants' accounting personnel to define where accounting events occur in the transaction processing flow and how to perform the accounting entry. Further, a POL's RTL tracks financial activity at the partner level—as compared with tracking this activity on an aggregated basis. POLs do this by using Partners' sub-accounts setup by merchants, using calculations defined by merchants.[51]

Besides calculating revenue share, POLs can also determine—on a per Partner and per transaction basis—not just the cost paid in interchange and card schemes fees, but also all costs allocated to each transaction. This allows merchants and marketplaces to be more granular and transparent with their fees to Partners, while increasing operating margins and/or reducing operational costs.

The increased visibility from RTL enhances the productivity of the staff charged with managing payments. When treasurers and cash managers are informed in real-time, they are better able to make cash-management decisions. The RTL provide visibility into cash, liquidity, and risk factors, thus enabling holistic financial clarity. The use of RTL is inherent to any POL, given its architectural location in relation to the rest of the technology stack and its orchestration tools that rely on real-time data visibility.

[50] POLs have their own Chart of Accounts with key liquidity and operational sub-accounts such as Cash-in-Transit, A/R, A/P, and others as might be defined by merchants. These sub-accounts are a subset of a merchant's General Ledger, kept separate from the rest of the merchant's technology stack. These accounts or "sub-ledgers" are, in essence, the POL's financial book.

[51] For example, a merchant's revenue share from a Partner A transaction could be a fixed amount whereas a similar transaction from Partner B could be a percentage of the transaction value.

5. CONCLUSION

The four components ascribed to POLs in this white paper are available to merchants in one form or another: global connectivity, smart routing, end-user payment management tools, and real-time ledgers. The key concept behind POL is that all this functionality is abstracted into a single layer and that all four components work together to deliver a value that is greater than the sum of their parts. Any solution that does not have all these four components seamlessly interacting cannot be called POLs.

To increase sales by maximizing conversion rates, a merchant needs to implement multiple PSP connections and smart routing capabilities, which means that POLs must deliver a great deal of agnostic connectivity. Similarly, to lower payments costs, a merchant needs to be able to route transactions through the best-priced route, but to do this merchants requires real-time data visibility and the tools to make dynamic changes to routing rules, without engineers required to make these changes.

Although the scenarios may change from merchant to merchant, using POLs CNP merchants:

- Reduce outages and minimize outage impact (which can recover an average of $1,000/min. in lost revenue).
- Increase sales from smartly retrying declined transactions and by routing transactions for optimal approval rates (which can deliver a 1% to 3% net sales increase).
- Quickly deploy new payment methods for improved market penetration.
- Enable loyalty as a currency through split tender transactions.
- Easily quantify the total cost of payments across all PSPs and articulate actionable strategies to reduce costs and improve approval rates.
- Maintain flexibility while reducing PCI DSS compliance costs (depending on their size, merchants could save anywhere from thousands to millions of dollars).
- Ensure optimal interchange qualification and reduce "nuisance fees" imposed by the card schemes (value varies from merchant to merchant).
- Remove engineers from payment operations by providing end-users the tools to modify retry logic, routing logic, and generate reports.
- Improve financial accuracy thanks to real-time ledgers calculating and tracking payment costs, transaction statuses, and revenue splits.

Some "enlightened"—usually larger, well-funded—merchants have developed their own POL-like solutions, such as like LinkedIn's Project Radar.[52] Others have also made these investments and delivered a positive contribution to their company's bottom lines. Some of these large merchants are even beginning to monetize their payments platform by offering some of their capabilities to peers or industry partners (e.g. an online travel agency offering payment services to the small mom-and-pop travel agencies).

But there are other options. We have spoken to several gateways and switches that aspire to become POLs and are on their way to develop most of the functionality specified in this white paper. Some of these solutions are more than halfway there and will offer small- and medium-sized merchants the same capabilities that larger ones enjoy.

It is not our (RPGC Group) intent to build a POL solution; we are not a software company. Our intent is to challenge the payments industry—especially in e-commerce and m-commerce—to provide solutions

[52] For more information, see: Tan, Tim. "Payment Transaction Routing at LinkedIn." Lecture, MoneyCon 2019, Computer History Museum, Mountain View, CA, May 30, 2019.

that help merchants manage their payments platforms, reduce demand for scarce engineering resources, and support critical business objectives.

RPGC will publish a forthcoming companion document to this white paper, the "Payments Orchestration Layer Functional Specification," that details the functional and architectural requirements for the implementation of POL solutions.

The case for a Payment Orchestration Layer (POL) is clear. Regardless of how POLs are implemented, their time has arrived.

6. ABOUT RETAIL PAYMENTS GLOBAL CONSULTING GROUP

Retail Payments Global Consulting (RPGC) Group was founded to help and educate merchants grow globally. As an advocate of payments as a strategic asset, RPGC provides advisory services in payments strategy, education, RFP management, and functional architecture design.

ACKNOWLEDGEMENTS

Writing this white paper has been a labor of love. While born from our love of payments, writing it with family was at times frustrating and challenging. Sometimes the process resembled a father teaching a self-assured teenager how to drive a car, at other times it felt like running into a brick wall head-first. Somehow, we survived and are a stronger family for it.

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