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The modern enterprise payment stack: Building flexibility, security, and scale

eBook

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Introduction

It's 2 a.m. on Black Friday and the payment processor just went down in three key markets. The director of store systems is on a conference call with IT, operations, and payments teams trying to explain why a "simple failover" has turned into a six-system coordination nightmare that could take hours to resolve.

By year-end, the same organization is still struggling with disconnected payment infrastructure: rising cart abandonment rates, aging hardware that's becoming harder and more expensive to support, and mounting pressure to modernize without a clear path to ROI.

If any of that feels familiar, you're likely already dealing with the realities of fragmented payment infrastructure: inherited legacy systems, growing operational complexity, and mounting pressure to modernize without disrupting the business.

Payment infrastructure used to be a back-end function. Today it's evolved into a strategic driver across customer experience, data strategy, market expansion, and product innovation. McKinsey's Global Payments Report outlines today's reality: many enterprises face ongoing challenges with complexity, fragmentation, and localized payment solutions that leave them struggling to grow.

The companies leading in their industries have agile, integrated payment stacks that help them break into new markets and capitalize on emerging trends like embedded commerce, biometrics, and AI-driven capabilities. The companies with outdated and convoluted payment stacks are wrestling with fragmented data, closed architectures, and unnecessary friction on every growth or expansion plan.

The pressure is only mounting. According to Capgemini's World Payments Report, global non-cash transaction volume hit 1.411 trillion in 2023 and could double to 2.838 trillion by 2028. Every transaction is a chance to win or lose a customer and expand or constrain what your business does next.

This guide will help you assess where your payment architecture stands today, and choose a path forward that supports innovation, growth, and global expansion.

1.4T

Global non-cash transaction volume in 2023

2.8T

Global non-cash transaction volume by 2028

Why payment infrastructure became a strategic problem

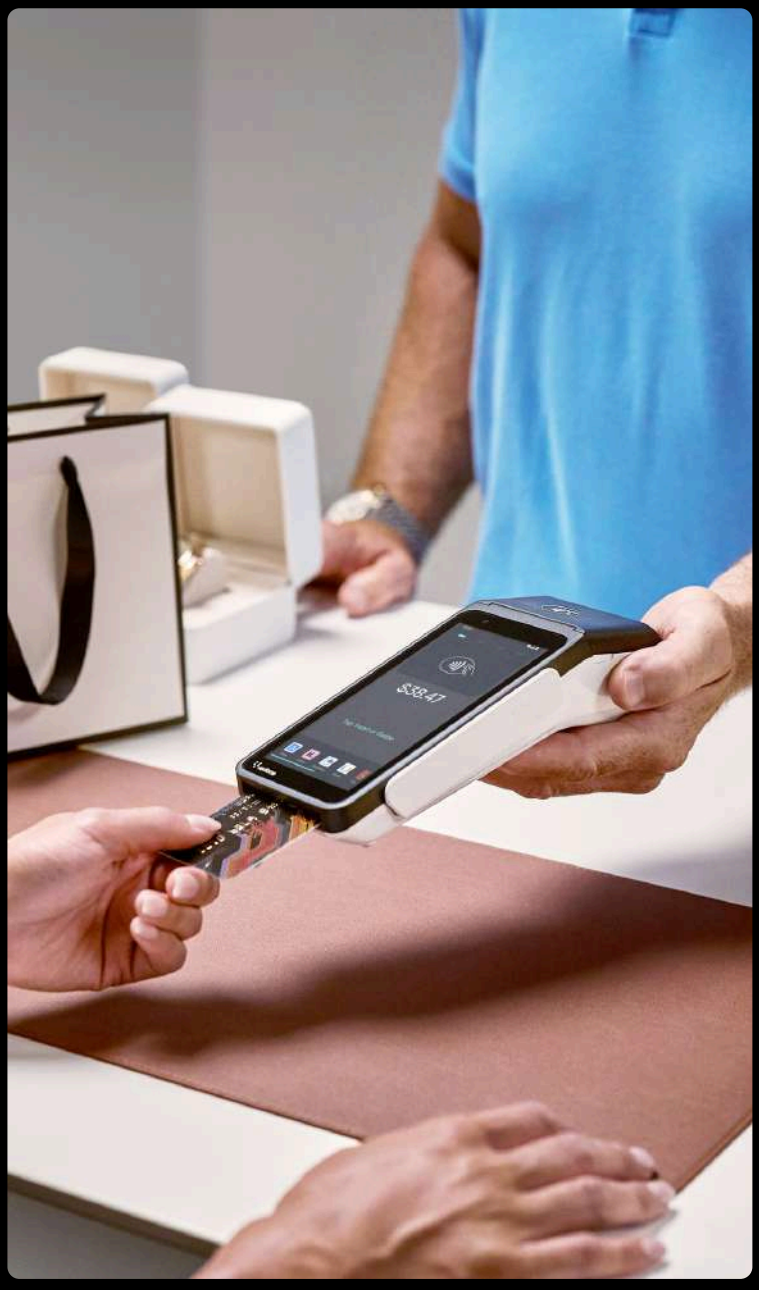
Over the last decade, payments evolved from a processing function into a critical business system. At the same time, customer expectations, transaction complexity, and expansion pressures accelerated faster than most enterprise architectures could adapt.

What once worked as a collection of disconnected systems now creates operational drag across the business.

Customer journeys became omnichannel
Today's buying journey spans digital, physical, in-app, drive-through, curbside, marketplace, and social channels, often during a single transaction. You can buy online and return in store, or pay with biometrics and get a digital receipt to your smartphone. Customers no longer see these interactions as separate channels, but as a part of a single brand interaction. Failing to deliver a fast and easy experience means quickly losing business to competitors.

Payment data became business-critical
Real-time payment data feeds into every aspect of the business, including fraud prevention, authorizations, personalization, loyalty programs, and AI-driven commerce decisions. Enterprises with strong, accurate data have a 360-degree view of their customers and operations, while those that don't are left making critical decisions with gaps in the picture.

Payment complexity expanded rapidly
As enterprises have had to develop the capacity to process more payment types, validate identities, and prevent fraud across more touchpoints in record time, they're often coming to rely on a patchwork of solutions. Payments now also feed the customer experience, loyalty programs, and more. Legacy payment architectures were designed to only process payments, and the lack of capacity in other areas sets a ceiling on enterprise growth.



Checkout became a strategic moment
Everything compounds at checkout. A high-friction checkout process due to fragmentation has real costs to reputation and the bottom line. The Baymard Institute estimates that, on average, 70.22% of eCommerce carts are abandoned, based on a meta-analysis of 50 eCommerce studies.

And while not all abandonment is payment-related, Baymard's research consistently shows that checkout and payment friction remain among the most controllable drivers of lost conversion — from limited payment methods to failed transactions and checkout errors.

Checkout has a greater impact than any other 30-second window you control. Trust is tested, and loyalty is earned or lost. For the modern enterprise, checkout is now the customer experience itself — with only seconds to deliver.

Scaling became a competitive advantage
Enterprises are under pressure to launch new experiences and enter new markets faster than ever. But many legacy payment environments were never designed for rapid scale. Expanding globally often means managing regional payment methods, compliance requirements, currencies, and integrations that slow time to market.

Modern payment infrastructure enables faster expansion, localized customer experiences, and global scale without rebuilding systems for every new market. Fragmented payment stacks, on the other hand, often become a bottleneck to growth and innovation.

Industry pressure intensified
Sophisticated new cyberattacks target payments and retailers daily. Enterprises also have layers of regulatory compliance to navigate: PCI, PSD2, data and privacy laws, and market-by-market variation that require deep customization. And new payment methods are becoming mainstream faster than most enterprise stacks can integrate them.

When things break down, the impact can be catastrophic. Payments Dive reports that U.S. businesses lose $1.2 billion in sales per minute during the eight to 13-minute window of a payment outage, and up to $5.3 billion by the 23-minute mark. These are the critical stakes to consider when deciding whether to continue building out a complex, disconnected payment architecture or move to a more integrated, open, and global solution.

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is lost per minute by the 23-minute mark of a payment outage

The hidden cost of fragmentation

While friction is most apparent at checkout, the real issue lies in the fragmented architecture that drives these transactions.

Consider a typical enterprise payment technology stack: You're running card-present and card-not-present through different vendors. Your in-store gateway is under one agreement, and eCommerce is under another. Your mobile app stack was bolted on. Your loyalty program was built in-house and lives in its own container.

This architecture wasn't the result of a single bad business decision. It evolved as decisions made sense in isolation. Eventually, however, enterprises are left with a friction-filled process when many different systems and processes struggle to operate in a coherent, unified way at scale, leading to multiple challenges:

- **Latency**: Each system you add to transactions requires additional milliseconds. At enterprise volume, those delays and points of friction quickly compound across millions of transactions, impacting revenue and customer experience.
- **Reconciliation**: Single transactions that touch multiple systems leave financial teams reconciling transaction data across platforms instead of analyzing it. With settlement times that vary by payment method or market, enterprises end up focused on manual matching and exception handling rather than strategic insights that align with broader business goals.
- **Support**: Fragmentation is clearest during prime business hours. If an issue arises, enterprises with different systems must coordinate a resolution with multiple vendors and service providers, while navigating the realities of different SLAs. Operationally, that stresses teams and makes it harder to guarantee uptime during peak periods.
- **Customer experience**: When you rely on separate systems, customer information lives in a silo. Tasks that should be simple become frustrating when systems fail to communicate or cause delays in omnichannel customer transactions.

While friction is most apparent at checkout, the real issue lies in the fragmented architecture that drives these transactions.

The three ways enterprises arrive here

You can often see the compounded effects of fragmentation and unnecessary complexity at layers across the business. Enterprise leaders face different scenarios for how their existing payment infrastructure and architecture came to be:

- **You've inherited a payments architecture that you didn't build.** Having seen its weaknesses, you must now advocate for change while managing risk.
- **You're watching industries and customer behavior shift at lightning speed,** and your organization's margins erode, but legacy infrastructure leaves you without the data to explain and address challenges like chargebacks, failed transactions, and fraud.
- **You're a leader with a growth vision that your current payment stack can't support.** You know where payments are headed, but the gap between your current stack and the future of payments is getting harder to close.

However you came to your legacy payment infrastructure in 2026, the costs are the same. Even at a failure rate of 2-3%, at enterprise volumes, those preventable single-digit failures translate to significant revenue loss. And when you're dealing with a fragmented stack, it can be difficult to identify the data needed to address these failures.

Enterprises are also operating in a closed-loop trap. Initially, your payment stack started with a clean starter pack that met your needs. As the business grows, moves into new markets, and scales volume, cracks start to appear. Your existing technology may not efficiently meet your needs, but the costs of switching feel insurmountable.

Business moves that would be easy with an open architecture, such as accepting a new payment method or effectively routing transactions through multiple acquirers, would require rebuilding the entire stack. Architectural simplicity becomes a growth limiter.

For most technology leaders, the biggest question is resilience: will the stack hold when the business scales into three new markets next year? Scaling is often when fragmentation shows. Each market introduces requirements that the existing technology stack wasn't designed to handle, and businesses are left closing gaps with patchwork solutions that end up multiplying the complexity and holding them back.

The good news is that enterprises can move from complex, fragmented systems to integrated, flexible, and scalable payment solutions.

What a modern payment architecture actually looks like

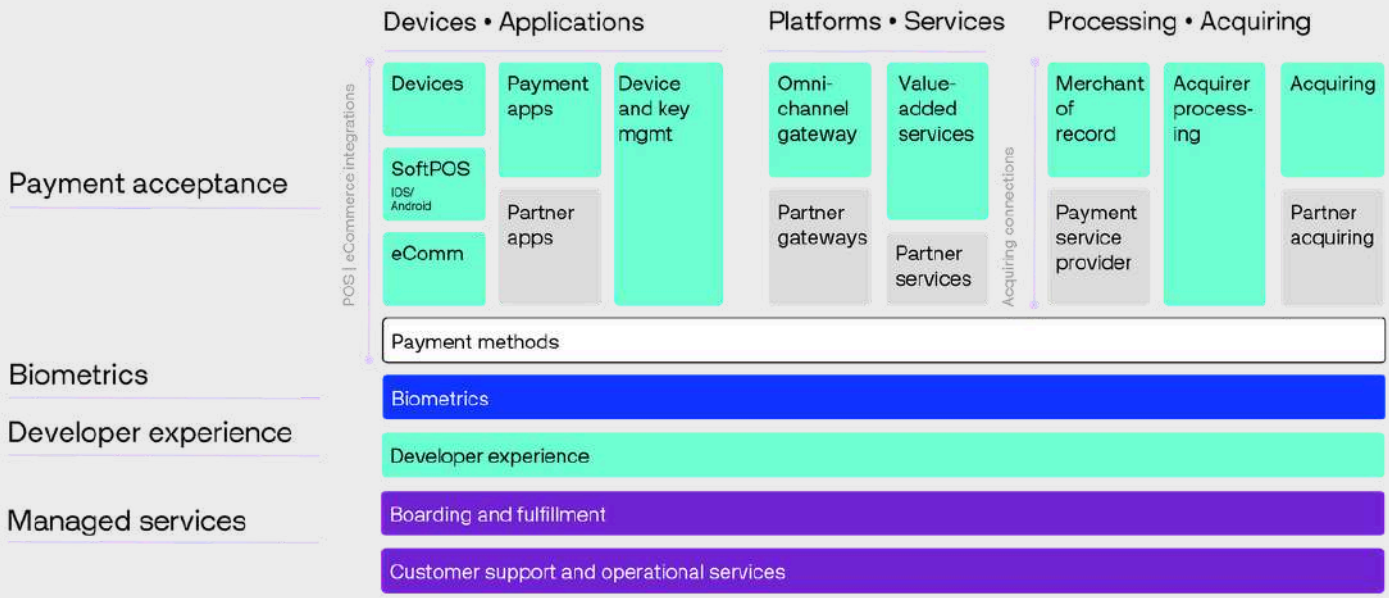
The business case for flexible, modular payment solutions is growing. According to McKinsey's 2025 Global Payments Report, digital wallets now account for approximately 30% of global point-of-sale volume, while cash usage has dropped to 46% of worldwide payments. Enterprises that can only accept the payment methods their legacy stack was originally built for are limiting their ability to evolve.

The modern payment stack is different in its architecture: every layer is independently replaceable. Modularity lets merchants choose devices today, change acquirers in select markets tomorrow, and add biometrics at checkout next year without any single decision impacting another. One layer evolves, and the larger payment infrastructure operates smoothly.

The critical takeaway is that these changes can happen quickly and seamlessly. Upgrading your payment stack doesn't have to be a stressful, fraught project that takes years to implement. Moving from fragmentation to orchestration improves the maturity of your payment solutions, enabling them to handle challenges.

Instead of the legacy bundle trap, merchants can select from a buffet of options that meet their needs. Modern payment architecture has three key pillars.

Boundless payments grid powered by Verifone



Pillar 1
Devices and applications

Payment devices, point-of-sale systems, and the applications they run on serve as nodes in the payment network: data-in, data-out, and feeding into the larger payment ecosystem. Historically, a payment device has been treated like an endpoint. Today, they're processing payments, handling operational workflow, and personalizing the customer experience.

Form factor flexibility is critical. A quick-service drive-thru has different needs than an outdoor, unattended kiosk. Mobility, ruggedization, and the ability to run a SoftPOS on a mobile device are just a few of the use cases enterprises need to accommodate. An integrated architecture enables family-level certification, which speeds up device implementations. Merchants that have already deployed one form factor can add another with faster rollout timelines.

One global quick-service brand recently refreshed 60,000 payment devices across its estate during one initiative. What would have historically taken multiple initiatives and years to complete was successfully completed on an aggressive timeline because the device architecture was designed to support this level of modularity.

Case study: Leading U.S. department store

A leading U.S. department store retailer rolled out 9,000 Verifone M450 devices across more than 1,150 stores in less than four months, with no operational disruption. But the deployment itself was only the beginning.

Shortly after launch, the retailer expanded the M450 into self-service, replacing smaller devices after seeing stronger real-world performance from the hardware.

That kind of agility isn't accidental; it's built into the architecture. Because the retailer's payment application runs on Verifone's ADK platform, the integration developed once can be extended seamlessly across device types and use cases. Whether deploying mobile POS, self-checkout, unattended payment, or endless aisle kiosks, the retailer isn't rebuilding integrations from scratch. They're scaling on a common foundation.

Pillar 2
Platforms and services

Payment applications, partner applications, and the omnichannel gateway are all part of the orchestration layer. Modern gateways are processor-agnostic, which is both a technical feature and a competitive advantage. Merchants locked into one processor have no leverage. Gateways that are processor-agnostic and pre-certified across multiple processors give merchants negotiating power.

Modern commerce also requires omnichannel gateways that use one token that works in-store, online, in-app, and with loyalty systems. This creates a unified customer profile that turns the payment architecture into something that delivers personalization, biometric verification, and other features with ease.

When evaluating platforms, consider the strength of their ecosystem. A strong provider will offer thousands of pre-certified connections across commerce platforms, loyalty providers, fraud tools, field service partners, retail media networks, and point-of-sale systems. When payment architecture is built to support an ecosystem, enterprises can tailor the stack to their business needs rather than retrofitting business decisions to technology.

Case study: European grocery store

A leading European grocery discounter operating ~4,200 stores faced a highly complex IT environment alongside a major shift in its payment processing infrastructure.

The retailer partnered with Verifone to support a coordinated migration while enhancing in-store and self-checkout payment capabilities.

The solution included Verifone PIN pad devices integrated with a content management system, enabling active customer engagement at the terminal, digital receipt storage, and fast contactless payments. A companion mobile payment application also enabled smartphone-based checkout across the broader retail group.

The result is a more connected, flexible payment experience that improves both operational continuity and customer engagement across thousands of stores.

Pillar 3
Processing and acquiring

In a legacy architecture, the settlement layer is expensive to change. Modern architecture is designed with loosely connected layers, so merchants can choose acquirers for specific markets or introduce a new payment service provider without disrupting the rest of their stack.

With greater flexibility at the acquiring layer, merchants can choose smart routing for their transactions. If an acquirer experiences downtime, for example, smart routes automatically change to support resilience. Merchants can also route based on factors like authorization rates or costs to support margins.

Flexibility supports global expansions that can be difficult to achieve with legacy technology stacks. With acquiring flexibility, global merchants can partner with local acquirers and meet localization demands instead of being locked into a one-size-fits-all model that doesn't scale or localize effectively.

When the elements of the modern technology stack come together, it's possible to shift any layer without forcing the rebuilding of the others. That's the architecture of future-readiness.

Case study: Global QSR leader

A global quick-service retailer processing extremely high transaction volumes across thousands of locations relies on Verifone's integrated payment stack to maintain speed and reliability at scale.

The retailer uses Verifone's payment gateway to enable dynamic transaction routing across acquirers, optimizing approval rates and performance during peak demand periods.

Across its estate, Verifone hardware and tokenization services help ensure secure, repeatable transactions while supporting seamless in-store and mobile ordering experiences. The result is a highly resilient payment infrastructure designed for continuous, high-throughput operations.

What a modern payment architecture enables

With the right approach, enterprise organizations can evolve from rigid, legacy payment systems into flexible, scalable, and secure payment stacks that modernize your operations. What are the critical shifts an enterprise can expect to see when they modernize their payment architecture?

Payment data becomes a strategic asset
Historically, payment processing was viewed as a cost center. Today's payment data flows into broader data and cloud infrastructure, informing every aspect of the business process.

- **Pre-transaction**: Data helps drive strategic decisions on approvals, processor routing, and more to maximize both revenue and the customer experience.
- **During the transaction**: Real-time intelligence supports fraud detection, personalization, upselling, and payment method prioritization to drive conversions.
- **Post-transaction**: Data powers a 360-degree customer view that provides context for customer service and call centers, loyalty and marketing, and operational decisions.

Fragmentation gives way to orchestration
While many enterprise technology stacks evolved organically, today's leaders are left managing fragmented systems. Fragmentation creates friction, management blind spots, and inconsistent customer experiences. By strategically shifting to one integrated system, it's possible to orchestrate aspects of the business with innovation and growth in mind. Adopting new features such as AI solutions, biometrics, or the ability to quickly service a new payment method becomes a competitive advantage.

Local needs and global expansion become easier to scale
Historically, the move into new markets often led to a patchwork of payment solutions and relationships that failed to scale effectively or meet the nuances and needs of local buyers. Modular systems create a stable, systematic payment infrastructure that's globally coherent yet flexible enough to meet local needs. At the same time, enterprises can design a checkout experience and payment processing workflow that localizes effectively, meets compliance requirements, and supports successful expansion into new markets.

Adopting new features such as AI solutions, biometrics, or the ability to quickly service a new payment method becomes a competitive advantage.

Open ecosystems accelerate innovation
With new technologies, payment mechanisms, product opportunities, and supply chain shifts redefining business faster than ever before, agile infrastructure wins. Closed systems once offered simplicity, but today their rigidity hampers an organization's ability to adapt to changing demands.

Open solutions and open payment architecture are designed to be flexible as business needs change. When a business decision requires new hardware or a shift in the relationship with an acquirer, for example, open solutions make it easy to implement without demanding a full rebuild. Open payment architecture is also supported by partner ecosystems to add speed, security, and service to investments.

Security and compliance improve
From PCI compliance to resilience during partner outages, modern payment technology is designed with merchants' operating realities in mind and to streamline payment processes with integrity. Adopting an integrated payment architecture ensures reinforced security and stability.

Emerging technologies are better supported
Emerging technologies are making it easier for enterprises to win at everything from expediting checkouts to preventing fraud. Modern, open architecture that's built to maximize flexibility across the core pillars supports the adoption of:

- **Biometrics** to confirm identity, deliver faster checkout experiences, and integrate personalization and loyalty with the payment process. Juniper Research projects biometric-enabled point-of-sale transactions will grow 138% by 2028, reaching 46 billion globally.
- **Emerging forms of payment**, from stablecoins to embedded payments, are rapidly becoming the norm. Enterprises that can quickly and securely adopt them will see significant economic upside. Chainalysis reports that stablecoins processed $28 trillion in real economic volume in 2025, with the trajectory pointing toward $1.5 quadrillion by 2035.
- **AI technologies** are changing every aspect of payments. Whether you're using AI-powered solutions at the payment layer to detect fraud or on the back end to speed up processing, technology that's AI-ready is a significant competitive advantage.

Why openness and modularity matter for the future of payments

Investing in your payment architecture solves critical operating challenges today and lays the foundation for growth tomorrow. But more importantly, it determines whether these next-generation capabilities can be enabled incrementally — or whether they require a costly, disruptive rebuild when they become business-critical. These four capabilities shaping the future of enterprise payments all require the same architectural characteristic: openness.

- **Stablecoins and new settlement models** are quickly moving from speculation to enterprise pilots. Operationally, this offers a compressed settlement window and less global friction. Stacks designed for one settlement model will struggle to adapt, while those built with modularity will treat it as another payment method to enable.
- **Ambient and embedded commerce** are shifting the buyer journey, moving away from explicit checkout moments and toward commerce embedded in context: in-app, in-care, or in-chat with an AI model. Open design and modularity can position enterprises to embrace ambient commerce as it takes shape.
- **AI runs through every layer of the stack** as a core element rather than a standalone feature, powering authorization optimization, fraud prevention, personalization, customer service, payment method selection, and dynamic pricing. An effective payment architecture will be able to feed AI the right data and act on its insights.
- **Hardware is moving away from being a disposable endpoint toward a high-value ecosystem node.** RFID inventory scanning, dynamic advertising, identity verification, cross-brand loyalty capture, and endless aisle are all running on one device. Together, these quickly transform the ROI of payment devices.

Merchants whose stacks are designed with openness and modularity will be able to adapt to the future of enterprise payments, including the ones we can’t yet predict.

How to start modernizing your payment stack

Modernizing payments doesn't require a disruptive rip-and-replace. With a modular approach, especially across in-store acceptance and commerce infrastructure, enterprises can modernize incrementally, reduce operational risk, and unlock measurable ROI faster. For enterprises working with Verifone, modernization often starts at the intersection of physical and digital commerce, where fragmentation is most visible to both customers and frontline staff.

01
Assess your payments and in-store acceptance architecture
Begin by mapping your end-to-end payment environment — from the point-of-sale device to gateway, processor, and back-office systems. Focus on where fragmentation typically shows up:

- Disconnected in-store and digital payment experiences
- Legacy terminal fleets with inconsistent capabilities
- Multiple acquirers or processors with limited routing intelligence
- Siloed reporting across channels and locations

A clear view of the acceptance stack helps identify where modernization will reduce cost and improve customer experience most quickly.

02

Modernize the highest-impact layers first

The fastest value often comes from modernizing the point of interaction and the orchestration layers around it. Prioritize areas such as:

- Modern smart terminals and Android-based acceptance devices
- Unified commerce enablement across in-store and digital channels
- Payment orchestration and intelligent routing across acquirers
- Tokenization and security layers that reduce PCI burden across channels

This approach improves checkout performance while laying the groundwork for consistent omnichannel experiences.

03

Align teams around unified outcomes

Successful modernization requires alignment across store operations, payments, IT, and finance. Define KPIs tied directly to outcomes enabled through a modern payment acceptance infrastructure:

- In-store conversion and checkout speed
- Payment acceptance uptime across locations and devices
- Faster rollout of new payment methods and experiences at scale
- Reduced terminal management and support overhead
- Total cost of acceptance across channels

Future-proof your enterprise payments with Verifone

Today most payment infrastructure providers focus on just one or two layers of the enterprise payment stack. Some build software platforms, others manage gateways, and fewer manufacture hardware and devices.

Processing over $8 trillion in annual global volume, Verifone designs and manufactures point-of-sale devices, builds software payment platforms, operates gateways, and provides managed services to keep stacks running. End-to-end ownership offers enterprises something truly unique: a single accountable partner who works with you across the full payment journey.

For the CTO who inherited a stack of stitched-together hardware vendors, gateways, and processors, that means one architecture through a trusted partner instead of seven integrations and SLAs to maintain.

For the CCO accountable for conversion, it means a unified data layer that finally explains why abandonments or chargebacks are happening and a strategy to address them.

For the CFO considering the ROI of new tech initiatives, it means a partner whose roadmap reduces ownership costs and modularity that gets you out of the financial constraints of closed architecture.

$8T+

Annual global volume processed by Verifone

With more than 40 years of payments leadership and a presence in 165+ countries with 2,500+ partner integrations, Verifone partners with enterprises to deliver:

- **One device platform across all channels**: Whether a customer is at a fixed lane, at a drive-thru kiosk, or paying on a mobile device, every transaction runs on the same underlying architecture. The result is consistent performance across every touchpoint — no channel gaps, no reconciliation surprises, and no fragmented SLAs to manage.
- **Orchestration software that enables growth**: When a business decision requires a new acquirer, payment method, or market expansion, the orchestration layer absorbs it. No rebuilds, no multi-vendor negotiations, and no disruption to the customer experience.
- **An open ecosystem, not a closed architecture**: Your payments stack can evolve without forcing re-architecture. Add a loyalty provider, swap a processor, or expand into a new market as needed. The ecosystem moves with you, supported by 2,500+ pre-certified partner integrations.
- **One gateway in every market**: Enter new regions without rebuilding your payments infrastructure. A single secure gateway connects you to global payment networks while maintaining compliance, security, and local regulatory requirements across markets.
- **Managed services reduce complexity**: Operational complexity is removed from your team's day-to-day. Verifone manages device fleets, deployments, and ongoing support so you are not troubleshooting across vendors or systems during peak periods.

40+

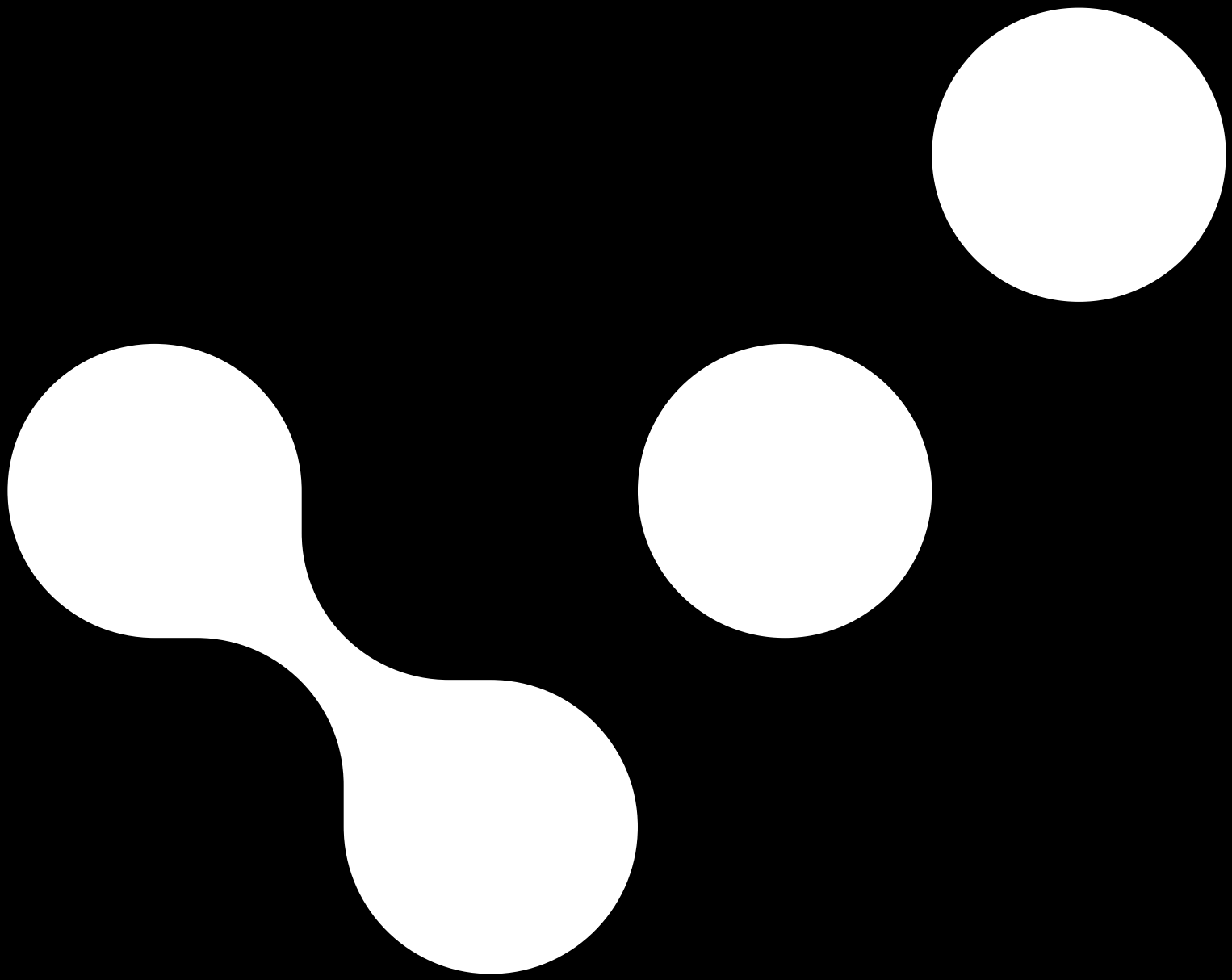
Years of payment leadership

165+

Countries with Verifone presence

2,500+

Partner integrations



Your payment stack is either a competitive advantage or a ceiling, and most enterprises don’t realize which one they have until they try to build on it.

Choose Verifone for a partner that will work closely with you to modernize every layer of your architecture, so you are ready for the challenges and opportunities ahead.

We help you move beyond legacy constraints and design a payments foundation built for flexibility, security, and scale across every channel. Speak with a commerce expert to explore how Verifone can help you evolve your payment stack into a resilient, future-ready foundation.

Get started today

The world's leading brands trust Verifone for global payments. We power the boundless payments grid — enabling distinctive commerce experiences for merchants, fintech companies, and financial institutions wherever commerce happens.

By combining a flexible payments platform comprised of devices, applications, services, acquiring and more, an open ecosystem of 2,500+ integrations, and four decades of payments expertise, Verifone eliminates complexity and expands what's possible across every payment channel.

Each year, Verifone processes $8 trillion in transaction value across 165+ countries around the world helping businesses of all sizes to grow without limits.

Learn more at verifone.com

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