



E-book

# Modernizing financial services: Constraints, requirements and practical paths forward

Financial services infrastructure is straining under demands it was never designed to handle. Explore where constraints emerge and how phased modernization can address them.



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Global financial services institutions (FSIs) are enhancing digital customer experiences with real-time payments and transactions, near-instant credit and loan approvals, and digital trading and investment.



## Why FSIs are modernizing digital services

To enable these services, many FSIs have invested in resilient, low-latency infrastructure to support these data-intensive, customer-facing processes. As FSIs pursue embedded finance and open banking to personalize services and participate in more partner ecosystems, they must scale performance while maintaining operational control and regulatory compliance.

At the same time, institutions are managing rising data volumes from payments and settlement, fraud detection and risk modeling, regulatory reporting, and data retention. Some FSIs are introducing emerging technologies, including generative artificial intelligence (GenAI) for select use cases, adding new demands on existing infrastructure. (See Figure 1 below.)

In response to these combined challenges, enterprise IT leaders plan to modernize legacy infrastructure to support advanced analytics and automation workloads, accommodate rapid data growth, and meet evolving data security and compliance requirements.



### What this eBook covers

This eBook describes FSI growth imperatives and how real-time digital services are placing their infrastructure under growing strain. It explains how legacy facility power, cooling, and space constraints can affect organizational resilience, performance, and operational risk. It further provides practical pathways for institutions to modernize in a phased manner without disrupting mission-critical systems.

## 3.55 trillion payments

To be executed in 2029, up from 1.97 trillion in 2025. Instant payments and e-money wallets are expected to reach 32% of all non-cash payment volumes by 2029.<sup>1</sup>

## Increased GenAI automation

Up to 32-39% of the work performed across capital markets, insurance, and banking businesses could ultimately be fully automated, while 34-37% could be heavily augmented.<sup>2</sup>

## Regulations expanding

FSIs are already governed by a web of regulations, while new AI regulations are coming into force.<sup>3</sup>

## 11.3 years

The average age of a global data center across industries. These facilities have lower rack density, power usage effectiveness (PUE), and capacity than today's facilities.<sup>4</sup>

**Figure 1: Data-rich financial services processes stress infrastructure**

Growing transaction volumes and innovation imperatives are placing new pressures on infrastructure.

<sup>1</sup> Capgemini Research Institute, 2026.

<sup>2</sup> World Economic Forum & Accenture, 2025.

<sup>3</sup> California State Legislature, 2018.

European Parliament and Council of the European Union, 2016.

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European Parliament and Council of the European Union, 2024.

Payment Card Industry Security Standards Council, 2022.

State of Colorado, 2024.

U.S. Congress, 1999.

U.S. Congress, 2002.

<sup>4</sup> Davis, J., 2024. Uptime Intelligence.

## Envisioning a world of dynamic, personalized services

Leaders want to improve competitiveness by offering continuous, personalized services while also developing a modern infrastructure that supports growing data volumes, real-time, cross-border processes, and simplifies risk management and compliance.

These priorities span:

- **Enabling real-time services:** These B2B and B2C customer services include instant payments and settlements, integration of digital channels, and treasury and liquidity operations.
- **Supporting embedded finance and open banking:** Leveraging customer data (with consent), application programming interfaces (APIs), and partnerships to provide domestic and cross-border payments, integrate into third-party marketplaces and platforms, and innovate faster. China's success in building expansive ecosystems with payments, such as Alibaba, Alipay, and WeChat Pay, is a case in point.
- **Using GenAI to personalize experiences:** GenAI enables FSIs to provide targeted alerts, recommendations, offers, and prices, as well as enhance customer support.
- **Leveraging AI to embed risk and scale services:** Banks can harness predictive AI, GenAI, and agents to strengthen fraud detection, anti-money laundering, real-time customer risk scoring, instant credit and loan decisions, risk and compliance analytics, as well as automate regulatory reporting.
- **Guiding investment decision making:** Consumers expect rich digital dashboards and services that enable them to do their own trading, investing, and portfolio reviews. Advisors can help guide these workflows.

### How business growth is creating greater infrastructure stress

As FSIs expand into new markets, integrate data, analytics, and GenAI into real-time services, and manage growing transactions, they are experiencing greater infrastructure stress.

Legacy environments may experience challenges:

- **Supporting low-latency processes:** Processing payments and trades in real time, with accurate settlements, and the ability to scale with growth.
- **Managing volatility with peak loads:** Transaction loads can spike during market events (such as analyst downgrades and major financial filings) and predictable payment cycles including end-of-month settlements.
- **Meeting demanding regulatory requirements:** FSIs are subject to local and regional regulations governing system uptime, local data protection, and audit trails.

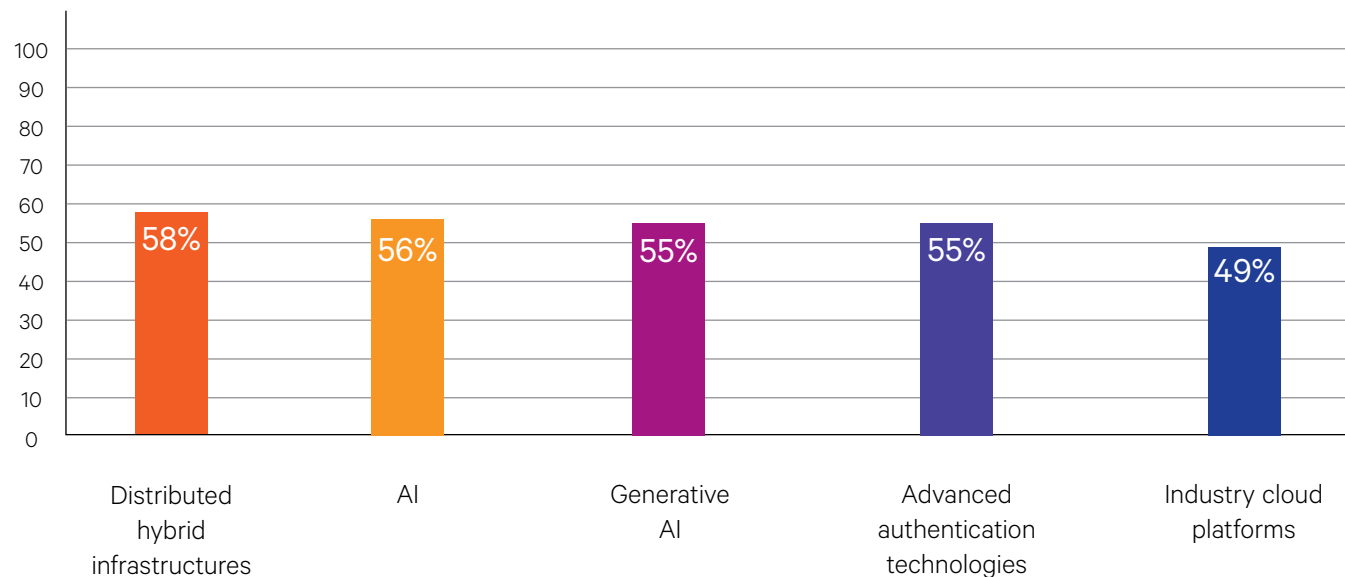


## Increasing operational resiliency to support strategic imperatives

FSIs must to support demanding operational requirements for B2B and B2C customers, including:

- **Uptime focus:** Maintaining 99.9%+ availability during peak transaction periods (such as market events) and planned infrastructure upgrades.
- **Managing power capacity:** Maintaining adequate power for data-dense workloads such as brokerage and payment transactions, fraud and other risk analytics, and AI inference workloads. In many regions, power availability is increasingly constrained by rising AI demand.<sup>5</sup>
- **Supporting new workloads:** Evaluating AI and GenAI workloads for customer-facing and stakeholder-facing apps, while introducing additional demands on existing infrastructure. However, they may be limited by existing footprint or have challenges gaining new data center capacity in top markets.
- **Balancing hybrid infrastructure goals:** Maintaining on-premises control for data security and privacy requirements, while also adopting cloud services for other workloads.

## According to Gartner®, Figure 5: Stages for piloting and deploying emerging tech<sup>6</sup>



The share of global FSIs that have deployed emerging technologies to support modernization imperatives, including scaling services, deploying GenAI-driven apps, and improving security:<sup>6</sup>

<sup>5</sup> Datacenters.com, 2025.

<sup>6</sup> Newton, A., 2025. Gartner.

## The operational dilemma: Supporting real-time workloads with legacy technology

Global FSIs are still run by legacy technology, including centralized mainframes that were developed decades ago using COBOL.<sup>7</sup> Many FSI data centers and regional facilities were built for operating models that predate real-time data flows, pervasive digitization, and AI. These sites were designed to run predictable batch workloads that have historically been processed after business hours.

Consequently, legacy power and cooling infrastructure constraints inherited from earlier designs limit many FSIs. IT and facility teams often lack visibility across hybrid environments.

**Mainframes are still a dominant technology:** Stable, reliable, and high-performance mainframes are used globally for transaction-intensive FSI workloads.<sup>8</sup>  
**More than 600:** Major banks used mainframes as of 2023.  
**3 billion:** International commercial transactions were processed in 2025 using mainframes.

## Legacy architecture constraints increase FSI risks

FSIs operating on decades-old infrastructure face mounting technical and operational challenges as they attempt to support modern workloads. These constraints are cascading risks across the organization:

- **Power distribution limitations constrain modernization:** Market demand for AI and high-performance computing workloads has increased rack power density, stressing existing power infrastructure. While 5-kilowatt (kW) loads were once the norm across industries, 20-30 kW loads are now more common as starting points for data-intensive loads.<sup>9</sup> Server racks used to train large AI models can start at roughly 50 kW loads.<sup>10</sup> Upgrading electrical infrastructure can be costly and may not be possible in all locations.
- **Cooling architectures can limit rack-level scaling:** Traditional air-only cooling approaches may face practical limits for sustained high-density AI and HPC workloads. FSIs may retrofit facilities to include air-assisted liquid cooling where feasible or deploy racks and rooms with direct-to-chip and other liquid-cooling systems for dedicated AI/HPC workloads. Manufacturers are building new architectures and solutions to support heat loads from 50kW -100kW per rack.<sup>11</sup>
- **Inconsistent regional standards increase deployment complexity:** As FSIs expand into emerging markets, they may encounter variations in power availability, grid reliability, and local infrastructure standards. While data center standards exist (such as ANSI/TIA-942),<sup>12</sup> adoption and enforcement can vary by geography.
- **Limited edge monitoring can elevate operational risk:** Global FSIs may deploy edge facilities closer to customers to support low-latency and transaction-intensive operations. In some cases, these locations have limited real-time monitoring capabilities, reducing visibility into power and thermal performance and potential anomalies. Without these capabilities, edge sites may be more vulnerable to power or thermal events that disrupt availability.

<sup>7</sup> Ritter, V., 2025. BICon.

<sup>8</sup> Amra & Elma, 2025.


<sup>9</sup> Vertiv, n.d.


<sup>10</sup> Ibid.


<sup>11</sup> Vertiv, 2025.

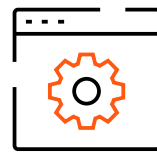
<sup>12</sup> Telecommunications Industry Association, n.d.





 **55%**  
of global banks report that legacy technology acts as a barrier to transformation.<sup>13</sup>

 **74%**  
of global insurers continue to rely on dated technology for pricing, rating, underwriting, and other core processes.<sup>14</sup>

 **33%**  
of FSI systems have below-average architectures.<sup>15</sup>

 **40%**  
report slower update cycles compared with modern systems.<sup>15</sup>

 **68%**  
of banking leaders say their technology architecture hampers their ability to support customer needs, including digital requirements.<sup>16</sup>

 **46%**  
of banks cite improving customer experience as a primary driver for modernization, alongside the need to maintain market parity.<sup>17</sup>

*\*Note: Data drawn from global banking and insurance industry surveys and analyst research available as of this writing. Figures are indicative and may vary by institution, region, and operating model.*

<sup>13</sup> Methri, G., 2024. IBIS Intelligence.

<sup>14</sup> Earnix, 2025.

<sup>15</sup> Software Improvement Group, 2025.

<sup>16</sup> McGibbon, D., 2025. Baringa.

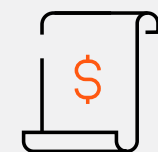
<sup>18</sup> Temenos, 2025.

### Business and regulatory requirements FSIs must meet

- **Reducing downtime:** FSIs must meet high availability requirements for regulators<sup>18</sup> and customers. B2B customers may specify 99.9% availability for non-critical systems and 99.99% for core transactional platforms. Business customers may have service-level agreements that specify fixed uptime, tier ratings, and redundancy configurations (such as N+1 or 2N). Similarly, consumers expect continuous availability of digital services.
- **Supporting availability and security:** FSIs use continuous monitoring, automated processes, and state-of-the-art cybersecurity systems to maintain service availability and regulatory expectations. DevOps processes and microservices, integrated, end-to-end testing, and site reliability engineering are used to improve operational consistency and system availability.
- **Maintaining regulatory compliance:** Global FSIs must adhere to data privacy and security requirements across key geographies, including the United States, the European Union, and China.<sup>19</sup>
- **Managing energy efficiency:** Electricity prices are surging as enterprises and hyperscalers deploy higher-density data centers.<sup>20</sup> Best practice includes monitoring, automation, and predictive maintenance to reduce energy waste, address local power constraints and transition to cleaner energy sources.

#### From data to AI: How workload power costs are soaring

Data-intensive, hot-running racks cost more to power. In the US, in an area with high-cost electricity (\$0.2496) and a facility with an industry-leading PUE of 1.1, it costs:

 **~\$17k**  
To supply power to a 7kW standard rack annually.<sup>21</sup>

 **~\$145K**  
To supply power to an AI-capable 60kW rack annually.<sup>21</sup>

- **Controlling operating costs:** CIOs must deliver modernization programs within constrained budgets. They are expecting modest IT budget increases—3.9% on average for 2026<sup>22</sup>—while also managing technical debt.
- **Enabling future digital services:** By modernizing, FSIs can enable real-time payments and AI-driven hyper-personalization, and support embedded finance, while maintaining always-on capabilities.

<sup>18</sup> Bank for International Settlements, n.d.

<sup>19</sup> California State Legislature, 2018.

California State Legislature, 2020.

Payment Card Industry Security Standards Council, 2022.

European Parliament and Council of the European Union, 2016.

Standing Committee of the National People's Congress, 2021.

<sup>20</sup> Saul, J., Nicoletti, L., Pogkas, D., Bass, D., and Malik, N., 2025. Bloomberg.

<sup>21</sup> Wilson, M., 2025. Nlyte.

<sup>22</sup> Newton, A., 2025. Gartner.



### Meeting regulatory requirements globally

While global data privacy and security regulations vary in terms of guiding philosophy, scope, and enforcement, they share the following priorities:

- Protecting sensitive customer data.
- Designing systems with security measures and risk controls in place.
- Enforcing accountability and governance.
- Enabling effective incident detection, response, and notification.
- Minimizing data collection to stated purposes only.
- Taking responsibility for third-party and supply chain management.
- Demonstrating compliance through auditing and evidence.



## Key use cases requiring exceptional performance

Many use cases require instant processes where milliseconds matter, platforms that can support data-intensive operations, and scalable compliance processes.

Use case	Key metrics*
<b>Real-time payments platforms</b> Demand ultra-low latency and continuous uptime	<ul style="list-style-type: none"> <li>• Sub-second transaction processing</li> <li>• 24/7/365 availability</li> <li>• Zero tolerance for power disruption</li> </ul>
<b>Fraud detection and analytics clusters</b> Compute-intensive workloads with frequent spikes	<ul style="list-style-type: none"> <li>• 20-40 kW racks</li> <li>• 2-4X compute scaling</li> <li>• Sustained thermal load performance</li> </ul>
<b>Trading and market data systems</b> Support peak loads during periods of volatility	<ul style="list-style-type: none"> <li>• 10-20X volatility spikes</li> <li>• Deterministic throughput</li> <li>• No micro-outages</li> </ul>
<b>Regulatory and compliance processing</b> Scale data retention and reporting workloads	<ul style="list-style-type: none"> <li>• Petabyte-scale retention</li> <li>• Local data residency</li> <li>• Long-running workloads</li> </ul>

*\*Note: The metrics above are provided as illustrative examples drawn from the cited industry and regulatory sources. Actual requirements vary by institution, geography, payment rail or market structure, workload design, and contractual SLAs. This section describes common operational characteristics and should not be interpreted as a universal benchmark or expected performance outcome.*

### Delivering a modern financial infrastructure for digital and AI workloads

High-volume, real-time, data and AI-driven services such as analytics, payments, and trading require:

- **Upgrading power management:** Developing resilient, scalable power management architectures that can support higher rack densities, provide uptime and throughput during periods of peak demand, and be upgraded to meet new workload requirements.
- **Evolving thermal management:** Transitioning to liquid-cooling architectures, such as air-assisted liquid cooling, direct-to-chip systems, or immersion cooling, to use energy efficiently, dissipate heat from AI workloads, and maintain optimal performance.
- **Addressing space constraints:** Providing modular, scalable, all-in-one solutions for digital, AI, and HPC workloads that are designed for smaller spaces, provide higher compute density, and streamline redesigns and retrofits.
- **Visibility and resiliency:** Provide comprehensive monitoring, intelligent controls, and redundancy for compute, power, and cooling. With visibility and tools, teams can review performance and anomalies, taking action to mitigate risks.

#### Modernizing data center capabilities

An Asian-Pacific bank upgraded power distribution, enabled remote monitoring, and deployed modular data centers for edge environments to support digital banking growth. The bank created holistic visibility into data center power resources, improving PUE and uptime while gaining a scalable model for future expansion and streamlining maintenance.<sup>23</sup>

<sup>23</sup> Vertiv, 2021.



## Using a phased approach to modernize financial infrastructures

A phased approach can help FSIs align infrastructure investments with strategic priorities, budget constraints, and regulatory obligations. By modernizing in stages, organizations can introduce new capabilities, scale services overtime, and manage operational risk while limiting disruption to critical systems. \*

### 1. Use assessment frameworks to plan modernization

Capacity planning, resiliency, and availability frameworks combined with workload mapping, are used to evaluate infrastructure constraints. These assessments help surface power, cooling, space, and connectivity limitations impacting systems that support payments, trading, and digital services.

### 2. Prioritize modernization by business requirements

Modernization typically prioritizes mission-critical and rapidly growing workloads such as payments and analytics. Modular, scalable infrastructure supports incremental upgrades across core data centers and edge environments, enabling capacity expansion while managing deployment risk.

### 3. Leverage hybrid environments to meet workload requirements

Hybrid architectures integrating on-premises, co-located, and cloud environments, support workloads with stringent latency, regulatory, and resiliency requirements. Cloud services are applied selectively for scalability, analytics, and service development, while regulated workloads retain appropriate control and compliance.

\*Note: This phased modernization approach aligns with established infrastructure resilience frameworks, regulatory guidance, and industry analyst research describing assessment led, risk based, and hybrid modernization practices in financial services.

## Decision criteria for driving industry infrastructure modernization

These five strategic imperatives guide how use case priorities are translated into data center requirements.

Strategic imperative	Focus areas or use cases	Infrastructure implications
<b>Be transformative</b>	<ul style="list-style-type: none"> <li>Real-time payments and settlement</li> <li>Multi-channel customer engagement</li> <li>Advanced fraud detection and transaction monitoring;</li> <li>Risk analytics and management</li> <li>Platform banking and integration into ecosystems</li> </ul>	<ul style="list-style-type: none"> <li>Integrated infrastructure, with compute, power, cooling, and monitoring</li> <li>High-availability architectures for continuous transaction processing</li> <li>Low-latency systems for analytics and real-time decisions</li> <li>Infrastructure supporting growing data workloads while maintaining service continuity</li> </ul>
<b>Be efficient</b>	<ul style="list-style-type: none"> <li>Transaction processing and clearing built for scale</li> <li>Consolidating and optimizing infrastructure and facility footprints</li> <li>Improving energy efficiency to achieve cost and sustainability goals;</li> <li>Automating IT and facility operations</li> <li>Optimizing hybrid environments and cloud deployment models</li> </ul>	<ul style="list-style-type: none"> <li>Modern power distribution to maximize capacity</li> <li>Advanced cooling architectures efficiently supporting denser racks</li> <li>Monitoring and analytics to improve power utilization</li> <li>Modular designs that are easy to extend and upgrade</li> </ul>
<b>Be first</b>	<ul style="list-style-type: none"> <li>Being fast to market with digital products</li> <li>Deploying new payment rails and services</li> <li>Expanding into new markets and regions</li> <li>Accelerating digital service deployment and launches</li> </ul>	<ul style="list-style-type: none"> <li>Pre-engineered, modular infrastructure to speed deployment and commissioning</li> <li>Standardized reference designs that can be rolled out globally</li> <li>Reduced data center customization</li> <li>All-in-one data centers to deploy at the edge</li> </ul>
<b>Be confident</b>	<ul style="list-style-type: none"> <li>Continuous availability of core and training systems</li> <li>Streamlined regulatory compliance and audit readiness</li> <li>Sensitive data compliance</li> <li>Business continuity and disaster recovery</li> <li>Reduced operational risk</li> </ul>	<ul style="list-style-type: none"> <li>Proven, resilient architectures that meet service-level agreements (SLAs)</li> <li>Redundant power and cooling for mission-critical workloads</li> <li>Real-time monitoring and visibility for distributed environments</li> <li>Lifecycle services and predictive maintenance</li> </ul>
<b>Be future-ready</b>	<ul style="list-style-type: none"> <li>Embedded finance</li> <li>Open banking</li> <li>API-driven ecosystems</li> <li>Distributed digital systems</li> <li>Data-intensive workload scalability</li> </ul>	<ul style="list-style-type: none"> <li>Interoperable infrastructure for next generation compute</li> <li>Scalable power and cooling designs that support rising density</li> <li>Edge solutions for low-latency services</li> <li>Flexible architectures for diverse workload types and deployment models</li> </ul>

## Designing modern financial infrastructure to support business growth

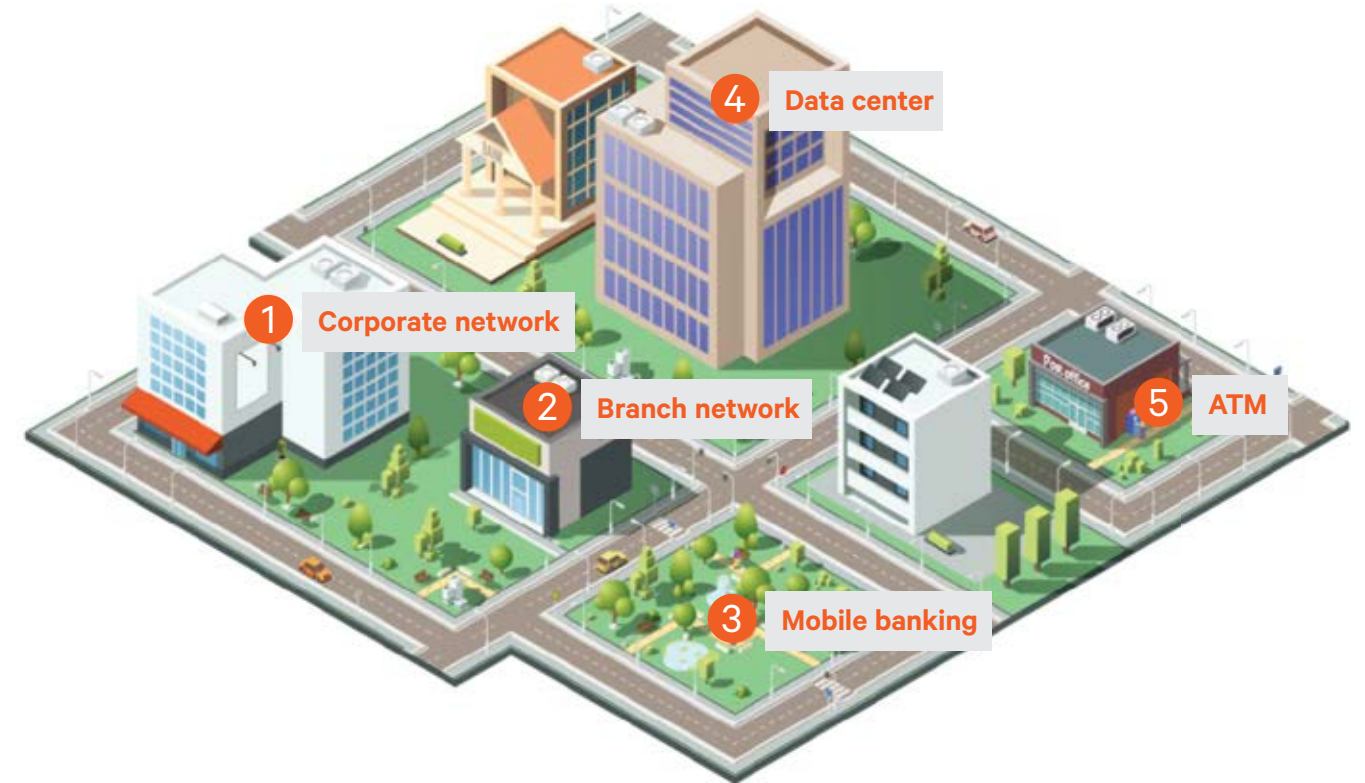
For most financial services institutions, the decision is not whether to modernize, but how to execute it with discipline: managing risk, limiting disruption, and delivering tangible business value.

A phased approach to improving power, cooling, and supporting infrastructure, offers a practical path to strengthen operational confidence, control costs, and meet regulatory requirements.

Position your organization to meet evolving customer needs by assessing infrastructure readiness, sequencing modernization strategically, and investing in long-term resilience.



## Supporting an always-on financial network



### 1. Corporate network

- Modular data center platform
- Integrated, self-contained row-based data center
- Building- and room-scale UPS systems
- Wall-mount and ceiling-mount cooling systems
- Network closet infrastructure

### 2. Branch network

- Edge-ready micro data center
- Rack-mount UPS systems
- Remote monitoring
- Access to servers

### 3. Mobile banking

- Edge-ready micro data centers to reduce latency

### 4. Data Center

- High-density equipment racks
- Modular three-phase UPS systems
- Floor- and rack-mount power distribution
- Packaged, water-free economizer systems
- Infrastructure monitoring and management

### 5. ATM

- Compact, single-phase UPS
- Remote connectivity and access



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