

STORAGE DEVELOPER CONFERENCE



BY Developers FOR Developers

Authoritative Core Design Patterns

Presented by

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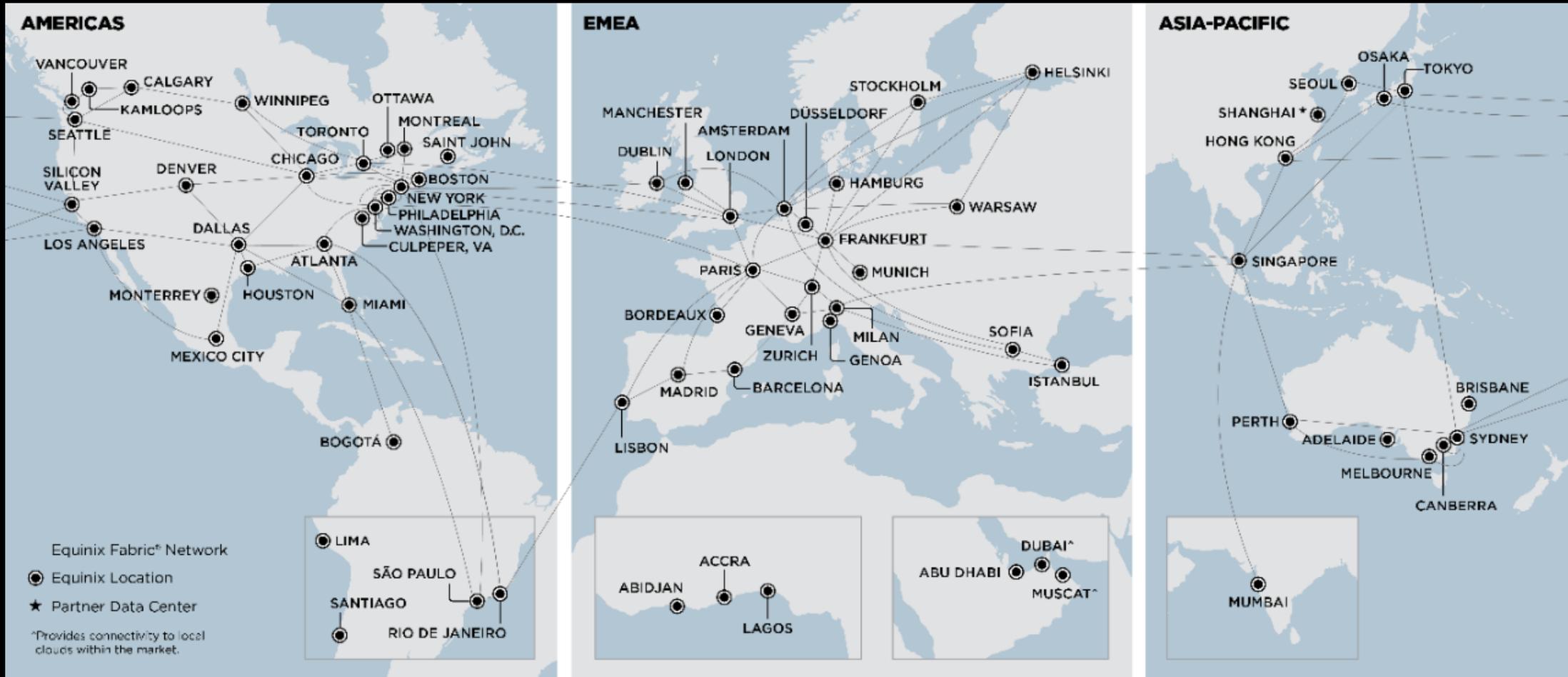
Equinix is the world's digital infrastructure company. We interconnect industry-leading organizations such as finance, manufacturing, retail, transportation, government, healthcare and education across a digital-first world. Business leaders harness our trusted global platform to bring together and interconnect the foundational infrastructure that powers their success—sustainably and securely.

Founded in Silicon Valley in 1998 as a vendor-neutral multitenant data center provider where competing networks could securely connect and share data traffic, we chose a name that reflected our company's focus on EQUality, Neutrality and Internet eXchange—Equinix.

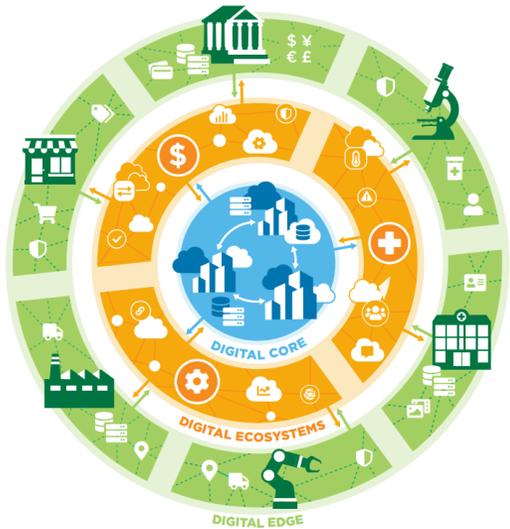
Through Platform Equinix® and our ecosystem of leading service providers, digital leaders fast-track competitive advantage across clouds, networking, storage, compute and software. Whether you're building a history-making product, blazing an industry-first business model or pioneering a new way to collaborate globally, Equinix provides the global reach, the rich ecosystem and the service excellence today's organizations need to compete and win.

Equinix is the world's Digital Infrastructure company

240+ Data Centers, 71 Metros, 32 Countries, >99.9999%* Uptime Record



The components of digital infrastructure



Digital Edge

User Experience

Combine local compute with on-demand capabilities at strategic edge locations, bringing digital infrastructure closer to population and business centers and optimizing user experience.

Smart Edge

Bring HPC infrastructure to the edge and aggregate data across devices, users and partners for AI-driven analysis without core backhauling. Combine platform capabilities with technology partners.

Secure Edge

Extend the security perimeter by deploying secure hubs across distributed edge locations, bringing services closer to users, customers and business locations.



Digital Ecosystem

Commercial services

Automate workflows and scale service delivery by subscribing on demand to the highest density of partners in strategic locations

Data Marketplaces

Provision digital services near high-value data marketplace to access new data sources, reduce risk, lower transfer fees and leverage economies of scale.

SaaS Integration

Extend Deploy local infrastructure on demand while integrating innovative SaaS tools to streamline workflows and develop new offerings.



Digital Core

Dedicated Cloud

Combine dedicated compute and multicloud access. Colocate and integrate with hybrid infrastructure and iPaaS for workload-optimized, hyperconverged infrastructure (HCI)

Cloud Adjacent Data

Subscribe to on-demand storage across distributed infrastructure, with interconnection for high-volume data flows.

Network Modernization

Establish hubs in locations maximizing efficient traffic flows – closest to the highest densities of partners and providers.

What is an Authoritative Core?

A LOGICAL aggregation of localities and digital assets where data is stored, updated, and distributed from, for the purpose of creating an optimized Hybrid Multi-Cloud outcome.

By the end of this session

- We hope to raise awareness of the potential role of storage vendors in helping customers succeed with Hybrid Multi-Cloud.
- You will have a greater understanding of what customers need to succeed with their Hybrid Multi-Cloud architectures.
- You will have specific patterns, already in use by customers, to develop with, create more value in your offerings, and meet these customer needs.

Hybrid Multi-Cloud

Hybrid Multi-Cloud has become the de facto architecture

The number of organizations using 4 or more unique public cloud infrastructure providers (IaaS)

WILL INCREASE 78%

over the next 24 months *(from 23% today to 41% in 24 months).*



Source: ESG/TechTarget, 2023

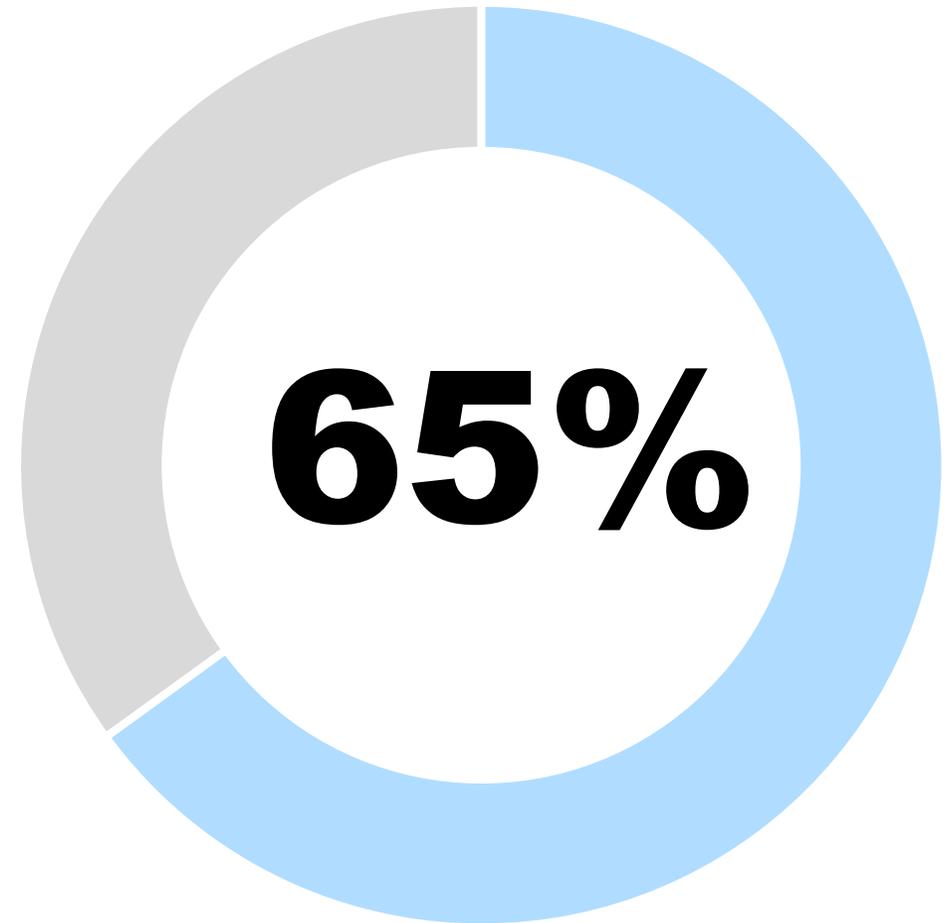
Forces driving Hybrid Multi-Cloud

- Enterprises are either proactively or passively moving to a Hybrid Multi-cloud architecture
 - Continuous Optimization: “...Companies need to optimize early, often, and, sometimes, also outside the cloud.”¹
 - Cost Control
 - Adoption of new services (i.e. new GenAI capabilities)
 - Digital Transformation
 - IoT
 - Inference at the Edge
 - Business leverage
 - Early “Lift and Shift” enterprises
- Edge-to-Core-to-Cloud is an extension of this architecture
- **This results in data EVERYWHERE.**

¹ <https://a16z.com/2021/05/27/cost-of-cloud-paradox-market-cap-cloud-lifecycle-scale-growth-repatriation-optimization/>

“65% of executives reported that their current infrastructure is “struggling to support the rapid adoption of digital technologies.”

Forbes



Data is making conflicting demands of Enterprise



Distributed

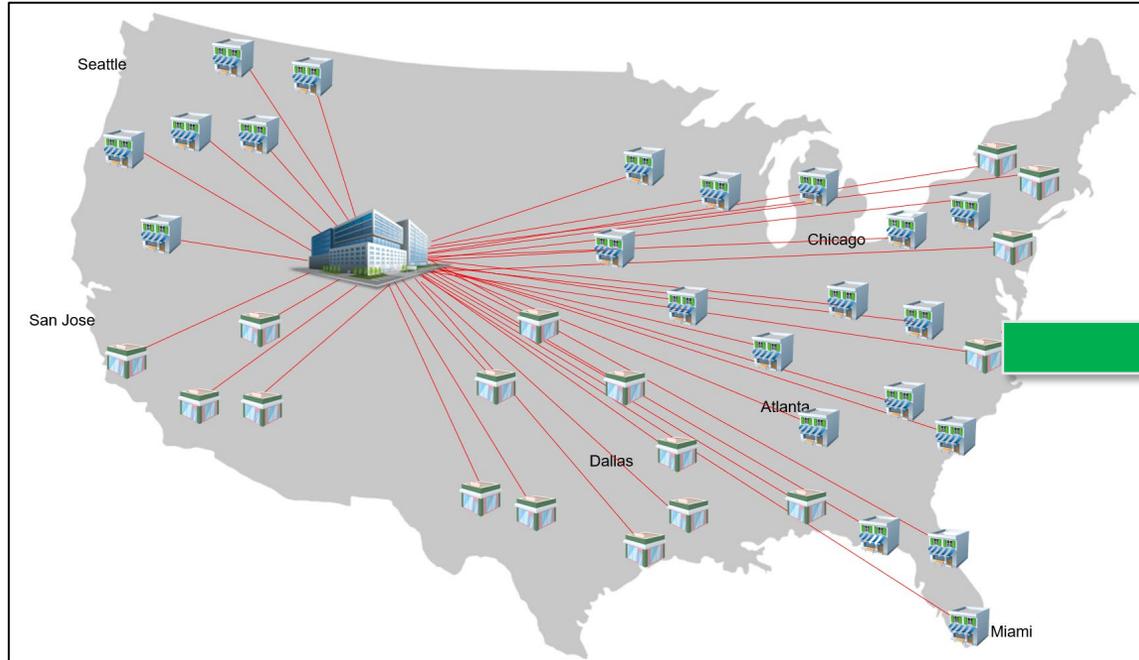
- Performance
- Agility
- Horizontal Scale



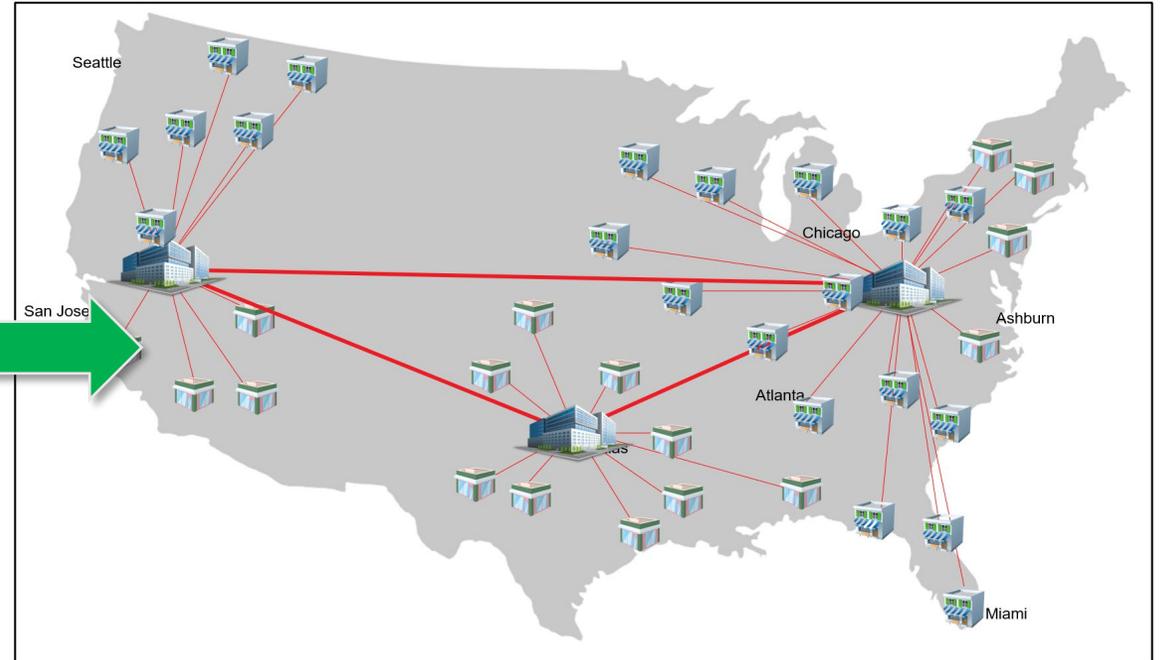
Consolidated

- Governance
- Control
- Compliance
- Recovery
- Vertical Scale

Delivering on a Digital Strategy



“Common” Datacenter-centric design



Distributed Hub Architecture

45% WAN Cost Reduction **83%** Latency Improvement **700%** Bandwidth Increase

Interconnecting the digital core

Remove traditional technology limitations, and multi-cloud adjacent becomes the new on-prem

1. Localize traffic

Proximity solves latency and scales traffic, vastly improving network performance

2. Optimize the network

Direct interconnection to ecosystem participants segments commercial traffic and transforms the WAN

3. Simplified cloud strategy

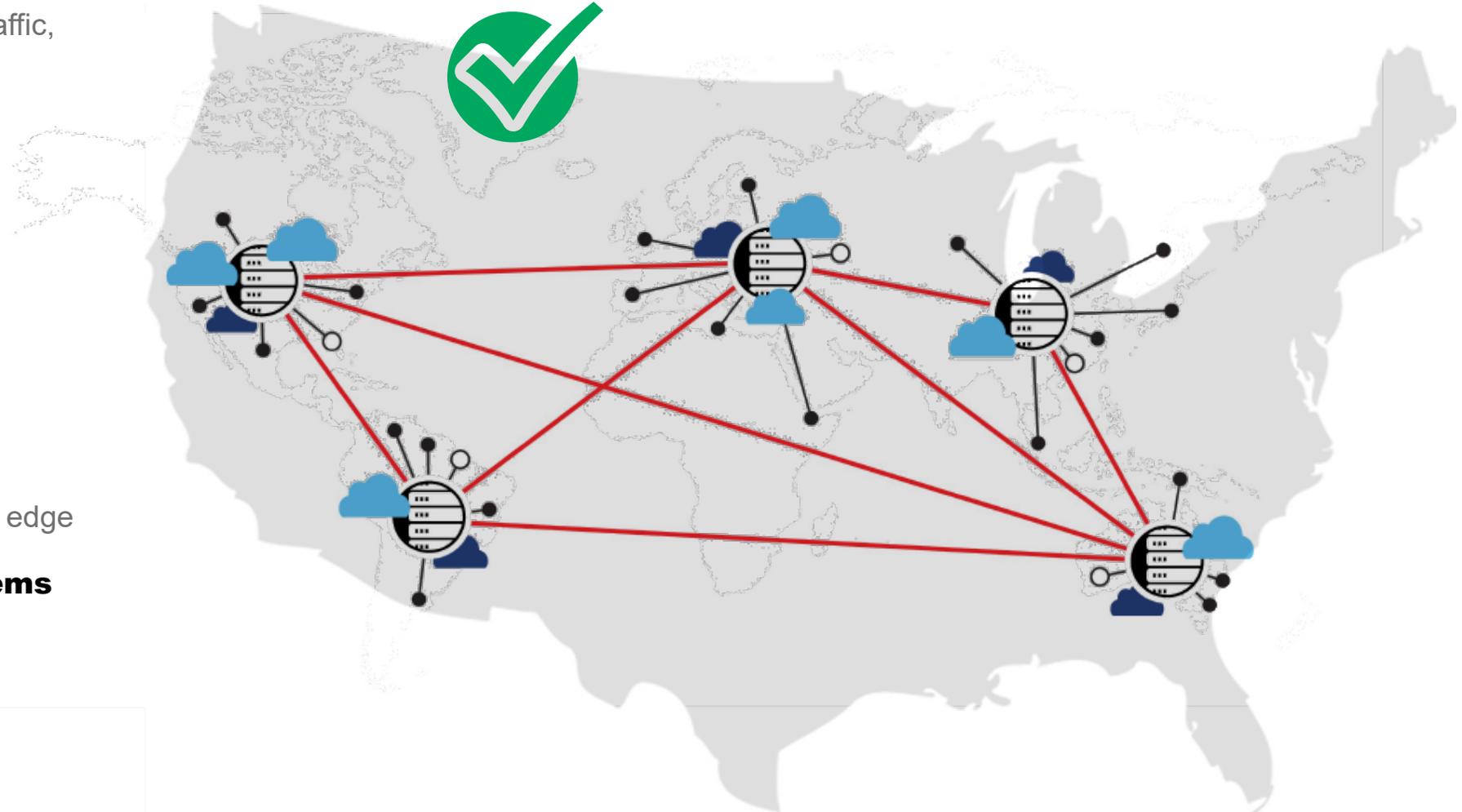
A single connection to a service fabric reduces costs and complexity

4. Peer directly with partners

Direct peering with internet providers enables secure traffic offloading at the edge

5. Leverage business ecosystems

Strategic interconnection to a robust marketplace of digital ecosystems expands opportunity



Challenges for consumers of storage

- Multi-Cloud Data mobility can be prohibitively expensive.
 - i.e. Sample egress + API charges of moving a 30PB dataset from Cloud provider object over private interconnect to on-prem: \$1.2 Million
 - The same egress over Public Internet can be 4X this cost
 - Moving large datasets takes time – which limits options and informs actions
- Executing a Multi-Cloud infrastructure can be very difficult.
 - “Business as Usual” will mean redundant costs, networks, NSP contracts, complexity....and usually failure
 - LATENCY MATTERS – especially in the case of Cloud cost rationalization.

The Authoritative Core Architectural Design Pattern

Primary Purposes of this Pattern

- Remove the threat of cloud egress charges from decisions to optimize infrastructure cost, test or migrate to a new or better service, or exploit a new opportunity.
- Provide primary custody of enterprise data, for reasons such as compliance, governance, auditability, and sovereignty.
- Allow for the placement of workloads in the right place at the right time.
- Support the rapid adoption of new technologies and business needs, without breaking any of the above-mentioned goals.
- Ensure the most efficient, direct, and dynamic transport for data replication and server/storage communications in hybrid cloud scenarios.

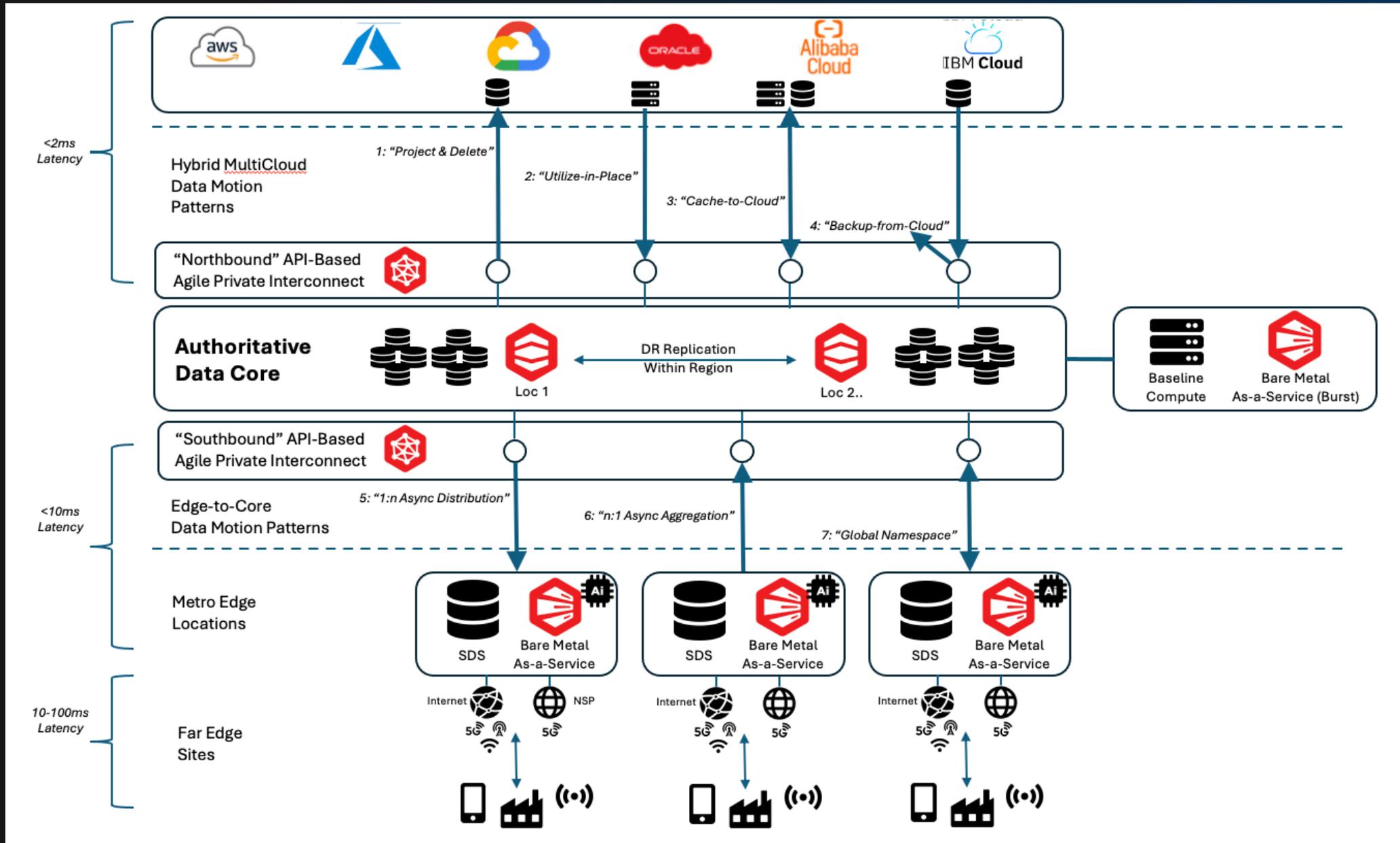
Primary ingredients of the recipe



**End User Custodial
Locality**



**Agile Multi-Cloud
and Private
Interconnection
Capability**



Data Motion Patterns, Described

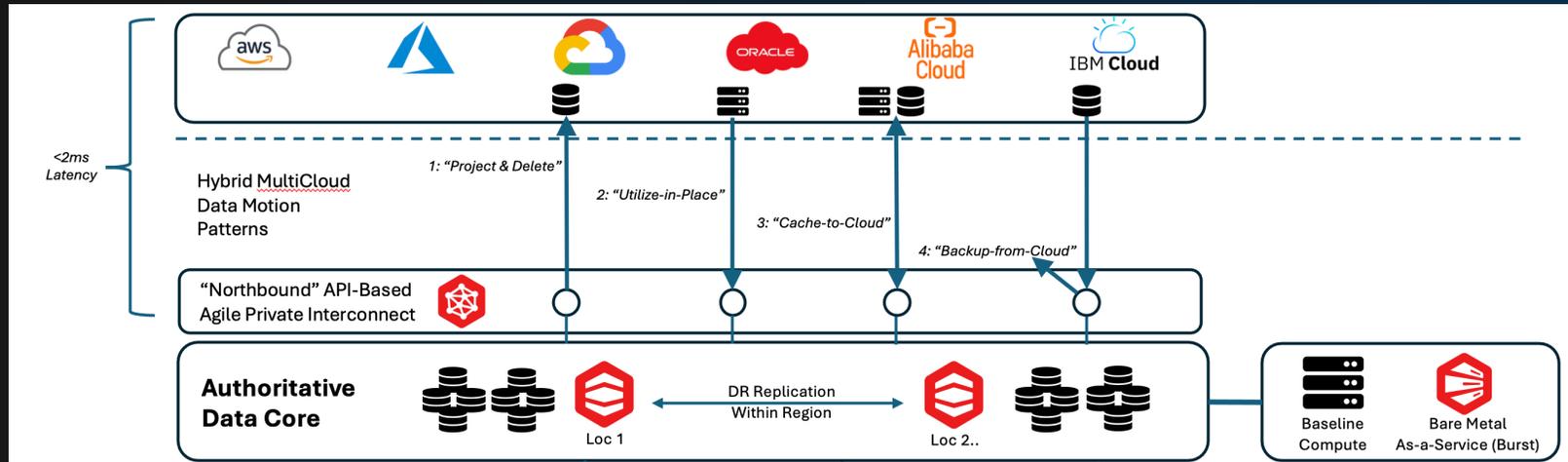
“Northbound” Data Motions – from Core to Cloud

- 1) Project and Delete – Replicate from Core to a read-only instance in Cloud, cloud instance deleted when no longer needed. Necessary when compute requires high-speed access to storage. Egress costs eliminated.
- 2) Utilize-in-Place (Classic Cloud Adjacent Storage) – Cloud compute/service mounts storage in Core directly, over private interconnect. Not recommended for large compute farms or high storage throughput requirements. Egress costs eliminated/significantly mitigated.
- 3) Cache-to-Cloud – Cloud compute mounts cache in cloud, which pulls from storage in Core on cache misses. Cache in cloud deleted when no longer needed. Egress costs eliminated.
- 4) Backup-from-Cloud – For data created in the cloud, efficient data transfer (i.e. deduplication, compression) is used to create a copy of data onto storage in Core. Egress costs not eliminated but fully optimized.

”Southbound” Data Motions– from Core to Edge

- 5) 1:Many Async Distribution – References distribution of data for access by edge devices at low latencies.
- 6) Many:1 Async Aggregation – References acquisition of data from sites for protection, analysis, training, etc.
- 7) Global Namespace – References technologies that provide for distributed locking of data for r/w access across many sites.

The Hybrid Multi-cloud “Pivot Point”



- Cloud Cost Rationalization – moving full-time workloads with established performance profiles onto owned or rented custodial infrastructure
 - Migrated workloads require low latency connectivity to workloads and data that remain in the cloud
- True multi-cloud requires the lowest cost, lowest latency interconnectivity
- The first step in achieving an Authoritative Core methodology
- **We see customers are already doing this- either proactively, or passively**

Equinix is uniquely positioned to help you succeed



Digital Infrastructure Services



Network Edge



Equinix Metal[®]



Equinix Precision Time[®]



Interconnection Services



Equinix Fabric[®]



Equinix Internet Exchange[®]



Equinix Internet Access



Cross Connects



Data Center Services



IBX[®] Data Centers



IBX SmartView[®]



xScale[®] Data Centers

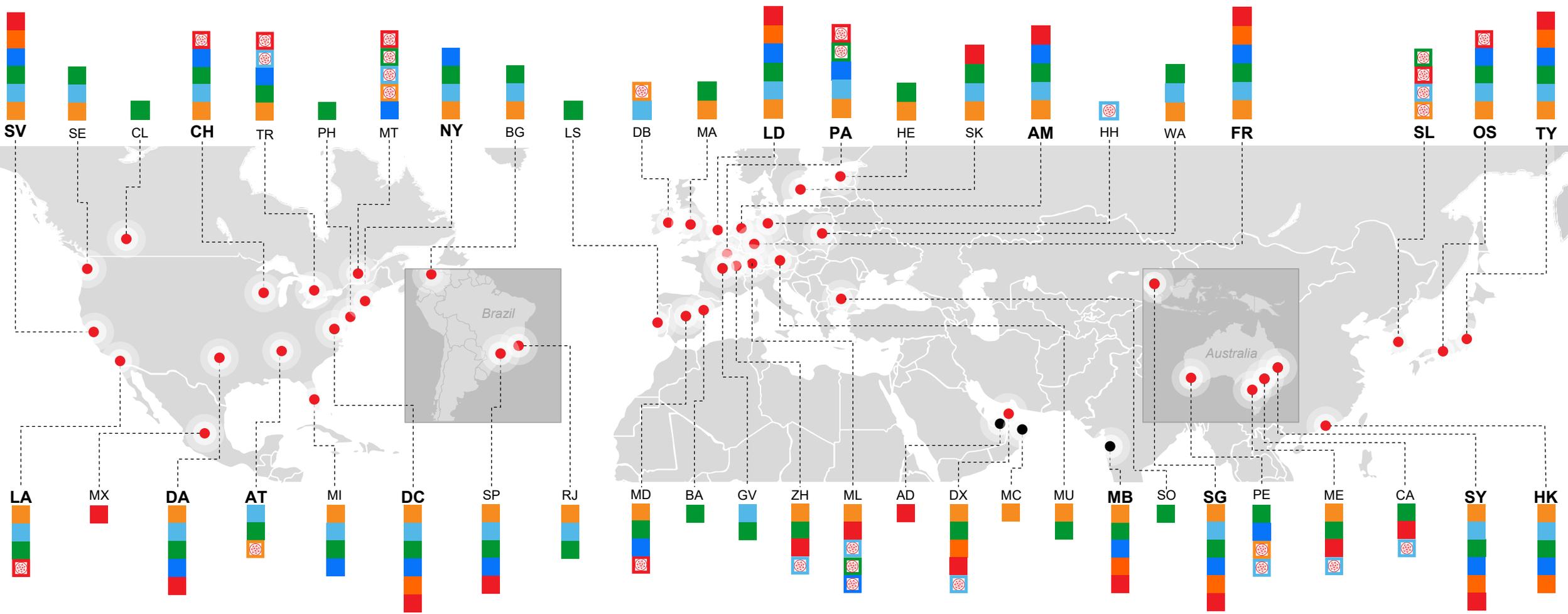
This pattern is already in use by customers

- AI customer at Equinix, awaiting permission to use
- EMEA-based Enterprise architecture, awaiting permission to use

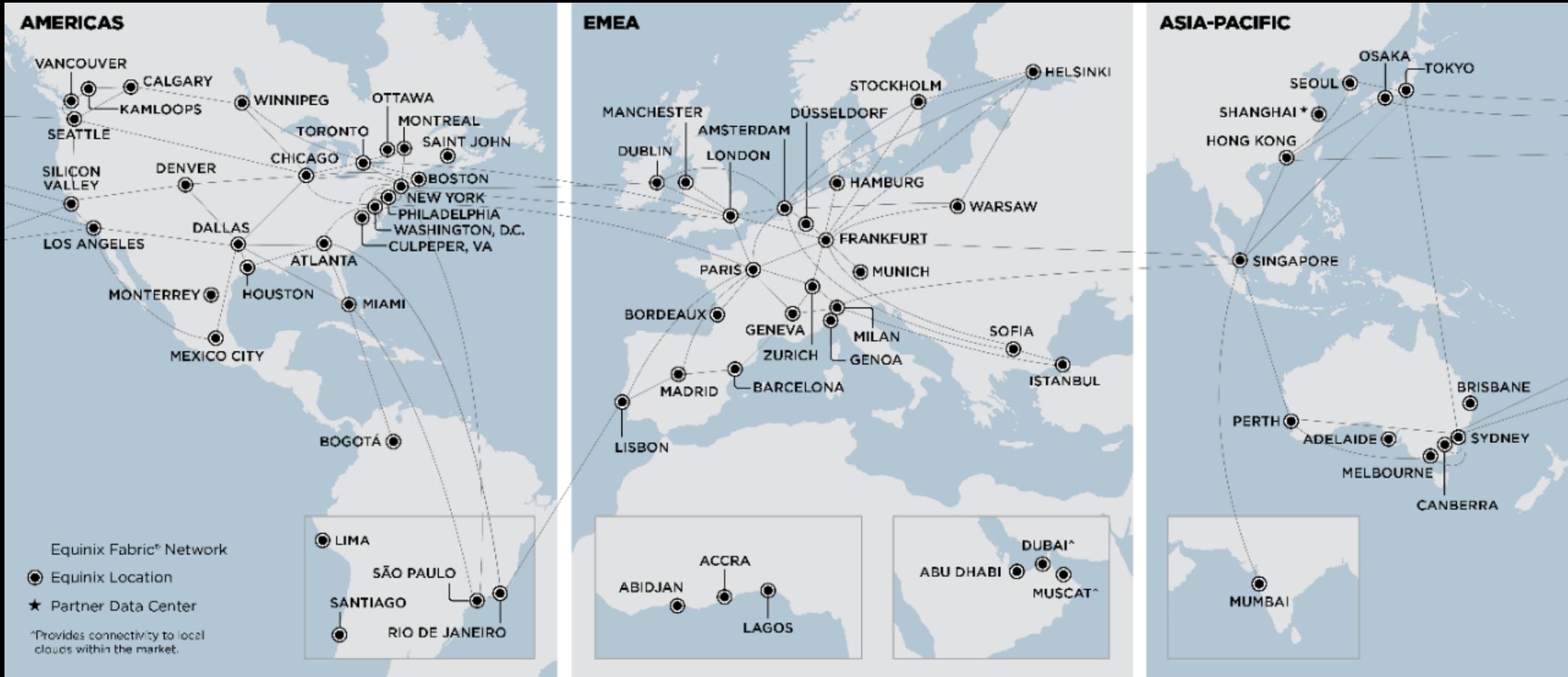
EQUINIX CLOUD ON-RAMP AVAILABILITY

#1 worldwide share of native on-ramps

CSP		On-Ramp Availability	Equinix Fabric
AWS	IBM	Equinix On-Ramp	Available
Azure	Alibaba	Equinix Fabric Local On-Ramp Access	Unavailable
Google	Oracle		

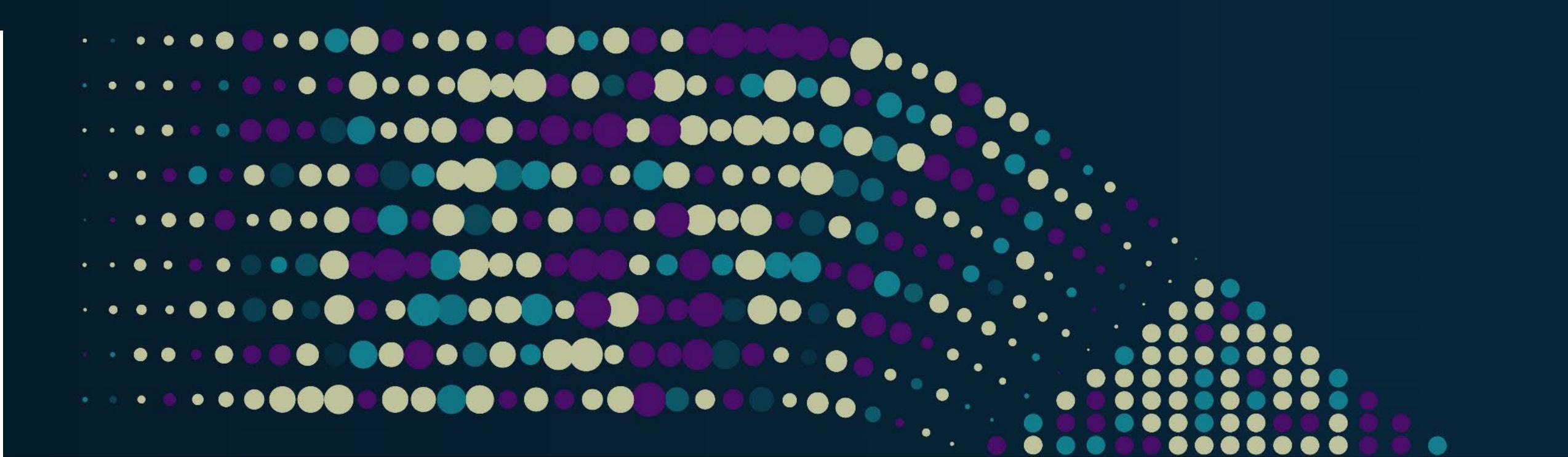


Locality and Latency Matter



How can the storage industry help?

- When designing higher level functionality and data motion functions, consider HOW data will be transported from instance A to instances B through n.
- Consider implementing logic and functionality to give storage instances awareness of their geographic locality, or utilize SNMP or other protocols to populate variables of queryable APIs, to obtain interconnectivity possibilities
- Especially in the context of public cloud storage-centric data mobility, consider integrating with APIs (such as Equinix Fabric) to instantiate/manage the connectivity between storage instance A and instance B, to ensure the shortest, least-latent, and private path.
- Automate the implementation of data motion and replication patterns that help your customers avoid public cloud egress costs, as well as take advantage of multi-cloud opportunities.
- Consider automation for provisioning Bare Metal infrastructure (such as Equinix Metal) as you would cloud infrastructure for remote software storage instances, as these are smaller but very powerful private cloud platforms that customers are looking to use to create these outcomes.
- **Swordfish:** Look to advance the adoption of these patterns into storage management frameworks to allow customers to more easily execute on these patterns and reduce complexity in deployment and management of these outcomes



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