



F5 White Paper

# Unified Application and Data Delivery: A Model for Creating Dynamic IT Infrastructure

Align IT capabilities with your business needs by adopting a fluid and responsive architecture for application and data delivery.

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## Executive Overview

For many decades, the essential business relationships between users, applications, and data remained static. IT administrators controlled IT resources, operations, and access methods manually. This resulted in a tightly bound physical and operational infrastructure that increased cost, and more importantly, slowed the organization's ability to respond to change. New business requirements now strain this traditional IT infrastructure's ability to deliver applications and data effectively. It is no surprise, then, that CIOs routinely express frustration at their inability to align their IT function to business needs.

A new paradigm in data center and networking design must emerge—one that enables the enterprise to add, remove, grow, and shrink application and data services on demand, regardless of their location. This new infrastructure for application and data delivery must dynamically optimize the interaction between user and resource in the face of rapidly changing conditions. It must equalize organizational pressures for security, data protection, ease of access, market responsiveness, low cost, and high performance.

This paper outlines F5's vision for a new approach to Unified Application and Data Delivery Services, explores the business benefits of such an approach, defines an architecture to deliver those services, and outlines a roadmap for implementation.



# The Challenge: Aligning IT to Business

No longer viewed simply as a cost center, an organization's IT function now clearly affects its ultimate success. Managed thoughtfully, a responsive IT infrastructure creates sustainable competitive advantage for the enterprise and helps drive the business forward.

CIOs often list the need to align IT to the business as their top priority, and because of this, they pursue infrastructure programs focusing on:

- Consolidation: Reducing hardware and fixed costs by focusing on necessary services and resources.
- Shared Services: Eliminating the isolated resources and moving to a shared utility model.
- Reducing Cost: Saving CapEx and OpEx associated with maintaining existing infrastructure and launching new technologies.

These new IT initiatives originate from the need for rapid deployment of revenue-generating technology and applications, which also make better use of information, help control budgets, and manage change. With an agile IT infrastructure in place, organizations can take advantage of new trends, offers, and market fluctuations more quickly and efficiently.

A flexible infrastructure then becomes the critical lynchpin that helps IT align to the needs of the business.

## Limitations of the Traditional Data Center

The inflexibility of the traditional data center infrastructure results from decades of enterprise computing evolution.

Historically, traditional, physical data centers have focused on managing dedicated IT resources—servers, storage, and networking. The central data center requires an elaborate physical infrastructure. Supplemental sites provided disaster protection, but also significantly increased cost and management complexity.

Creating and maintaining parity between multiple data centers necessitates additional capital. Managing the synchronicity of multiple locations increases operating expenses exponentially.



More importantly, operational complexity makes this model extremely inflexible, as:

- Adapting to change requires arduous rebuilding of infrastructure, causing downtime.
- Adding new applications can take months or even years.
- Requesting new access methods and client devices calls for application modifications.
- Establishing new branches requires structured and cautious planning, testing, and implementation, slowing the organization's ability to respond to new market opportunities.
- Addressing requirements for regulatory compliance increases storage and networking costs.



# The Need for a New Computing Model

While improvement initiatives such as consolidation, service sharing, and cost reduction represent the CIO's goal of aligning business and IT, they do not provide a systematic roadmap for achieving alignment. A single initiative or effort might provide resolution for a given situation, but the business will inevitably face additional disruptions.

The long-term answer lies in an architectural approach that anticipates change and enables rapid adaptation to any situation. Such an approach moves the focus from the IT resources themselves to the business services these resources provide.

This new model must concern itself with:

- Applications rather than servers.
- User access rather than networks.
- Data protection rather than storage arrays.

Economic and technical sensibility requires that such an architecture:

- Incorporate preexisting resources without requiring wholesale upgrades or significant downtime.
- Enable seamless integration of new technologies as they become available.
- Operate in real time, providing near-instantaneous response to change.
- Accept and adapt to new business policies easily.
- Offer simple centralized administration.
- Provide both predictive and operational reporting.

And, of course, it must be inherently scalable, available, and secure.



# Introducing Unified Application and Data Delivery

F5's Unified Application and Data Delivery architecture represents the advent of a new computing model. This new architecture allocates portions of discrete resources for application and data delivery, and decouples logical access to these resources from physical locations and boundaries such as servers, storage, and data centers.

Virtualized physical resources—such as computing (CPU, RAM, bus), network (bandwidth, VLANs, routes), and storage (controllers, disk, tape)—deliver services that are managed by specialized Application and Data Delivery Controllers.

Network-based Application and Data Delivery Controllers connect these virtual resources. Acting as strategic points of control, these specialized devices monitor all interactions between resources and users, and enforce established business policies wherever and whenever resources exchange information.

When a change occurs to the application delivery environment, the controller makes the necessary adjustments to maintain the best possible operating scenario. When business requirements change, the administrator simply enters the new business policy for enforcement.

In either case, Application and Data Delivery Controllers make appropriate changes to maintain alignment to business policy—provisioning new virtual servers, replicating data, modifying security policies, adjusting access controls, and a host of other potential actions. Rather than requiring constant manual intervention, the infrastructure itself becomes agile, intelligent, proactive, and in a word, dynamic.

Unified Application and Data Delivery enables IT to:

- Operate beyond the physical constraints of computing sites.
- Easily incorporate exogenous resources (for example, SaaS or cloud computing).
- Manage all infrastructure elements as fluid resources.



## Core Functions of the New Model

In addition to separating logical access from physical location, the infrastructure must also manage itself automatically and contextually.

Therefore, the core functions performed by the new architecture include:

- Unification: Efficient allocation of services requires the integration of previously isolated functions such as acceleration, optimization, workload balance, network and application security, servers, bandwidth, and storage. Integration in the data center ensures visibility into the complete session and the ability to take appropriate action. The location of some of these functions outside the enterprise further complicates synchronization.
- Visibility: The new model must intercept and understand all interactions between resources and users.
- Context: In addition, it must put these application and data streams into context, determining their relation to the current environment, use, and point in time. The infrastructure must recognize user, device, location, network type, application, data, and more, and must apply that knowledge to optimize the delivery of services.
- Action: The architecture must correlate visibility, context, and understanding of business policy. This helps determine and direct appropriate responses by managing and manipulating infrastructure variables such as traffic redirection, data placement, security, performance, and provisioning.



## F5's Unified Application and Data Delivery Architecture

The core functions above require deployment of specialized devices at the intersections of people, applications, and data. Application Delivery Controllers and a newly emerging class of device, Data Delivery Controllers, strategically located in the infrastructure provide unification, visibility, context, and action.

Virtualization capability within these strategic control points increases resource management flexibility for data centers, links, servers, and file storage. Without the static bindings that once tied it down, the IT infrastructure becomes fluid and dynamic, creating complete application and data mobility. However, while virtualization technology plays an important role in this new architectural model, virtualization alone provides only part of the solution. Breaking these physical binds potentially improves provisioning, utilization, and reduces disruption, but it also increases the frequency and intensity of change, making management of the virtual environment that much more difficult.

Fortunately, this decoupling provides the ideal location to perform value-added services on behalf of the user, application, and data. Because of their strategic location, Unified Application and Data Delivery Controllers make the ideal platform for implementing business policies ranging from access control to acceleration to data protection and beyond. By automating management, these appliances help organizations meet service level agreements for application availability, recovery point objectives, data and storage availability, utilization, and security, even as virtualization drives the scale and complexity of the infrastructure beyond the ability to manage it manually.



# Unified Application and Data Delivery in Action

The unification of services provides greater visibility into resource, data, and application interaction, helping administrators simplify contextual, policy-based actions.

For example, in an effort to reduce cost and disruption, an organization wants to implement a data retention policy to migrate all files not modified within the last 90 days onto lower-cost Tier 2 storage. In a tightly bound infrastructure, the identification and movement of these files would continually disrupt users and exhaust manual resources. With F5® solutions in the environment, however, administrators instruct the data delivery layer to monitor file aging and move files per the policy. The monitoring and movement of files occurs automatically and transparently, with no impact to users or applications.

In this F5-enabled environment, Application Delivery Controllers (ADCs) can create a dynamic policy for the prevention of DoS application attacks. This security-targeted policy leverages the integration of previously isolated functions—application load balancing, and management of bandwidth and connections. Observing the resulting behavior of the client, administrators see each session contextually and take appropriate actions when the system reaches thresholds determined by business policy.

In another example, a large airline runs a holiday promotion, offering attractive discounts for purchases made through its corporate website. Demand spikes beyond expectations and customer response times begin to suffer as a result. Fortunately, the company's ADCs recognize the developing problem and warn administrators when performance drops below pre-established thresholds. The airline's IT team identifies supplemental servers that are currently running a lower-priority flight tracking application. The airline decides to prioritize revenue traffic over flight tracking. The IT organization quickly shuts down several flight tracking servers, replicates the ticketing application to these servers, and reroutes traffic across the broader server farm. When the promotional traffic begins to ebb later in the evening, the operation reverses and returns to normal. The entire process occurs with ease, and without user disruption.

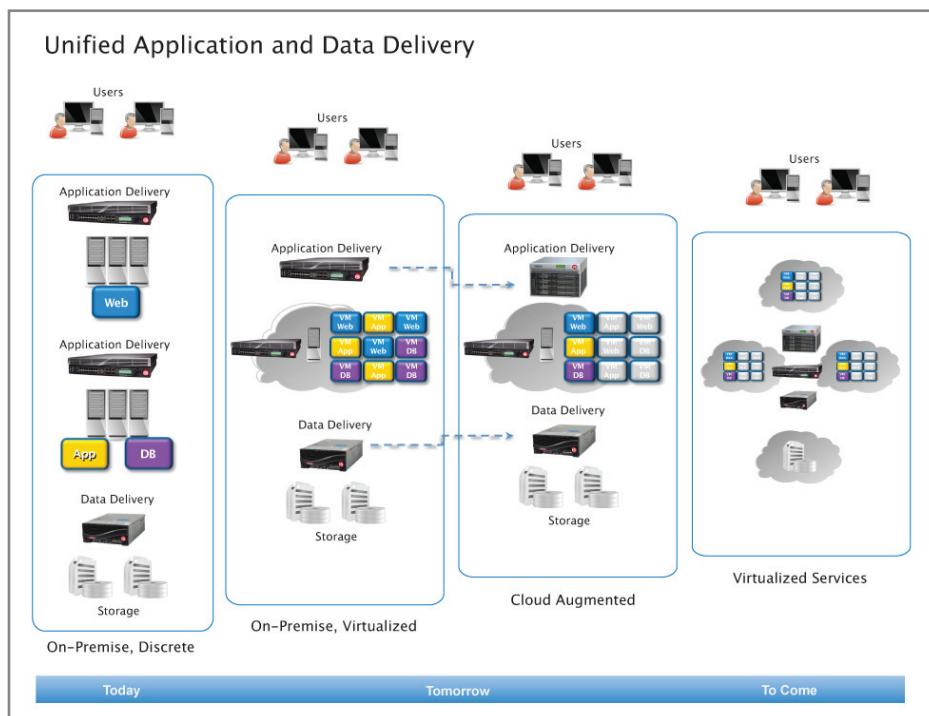
The alternatives to Unified Application and Data Delivery increase expense and reduce agility. For example, administrators might create a customized policy like



the one above by manually manipulating an acceleration appliance and a server load-balancer, or possibly by rewriting code in the application. Such an approach, however, breaks when change occurs, and typically requires repeated manual tuning. With a dynamic infrastructure enabled by strategic points of control, organizations apply policies not for just one application or situation, but across all application types regardless of equipment, vendor, or virtualization state.

By addressing the challenge of dynamic IT infrastructure from a holistic architectural-rather than a client, network, or application-only-perspective, IT organizations improve their ability to accomplish critical functions in the most operationally efficient manner. This same principle applies to a wide variety of design issues, from user access, data migration, storage tiering, storage utilization, and application acceleration to user experience.

A Unified Application and Data Delivery architecture approach provides flexible access to applications and data for users, and helps architects and administrators to employ policies today, tomorrow, and in the future that improve security, availability, utilization, and performance.





# A Roadmap to Dynamic Infrastructure

Many organizations already own server load balancers or Application Delivery Controllers. Proper use of these devices provides a first step in developing a more dynamic infrastructure. To extract maximum benefit from Unified Application and Data Delivery, organizations need a highly extensible device capable of supporting additional service modules. This unified appliance then provides a platform for intelligent services, reducing the need for additional networking devices.

The recent and rapid adoption of server virtualization is also helping organizations achieve operating system and application mobility. Integration of the server virtualization environment with the legacy environment is the next logical step in achieving a dynamic infrastructure. However, as virtual machines proliferate, management complexity increases, making the benefits of Application and Data Delivery Controllers even more compelling.

As pressure mounts to reduce cost and increase efficiency, external shared services can offer relief. A dynamic and agile IT infrastructure must access new, cost-efficient services that live outside of the organization's control, such as cloud computing and Infrastructure- and Software-as-a-Service (IaaS and SaaS). The strategic point of control provided by the Application and Data Delivery Controllers enables the IT organization to quickly establish and maintain policies such access to cloud resources, authorization of cloud providers, and the protection of data and applications out-tasked to the cloud service.

## IT agility. Your way.

As the market-leader in Application Delivery Networking, F5 helps organizations take advantage of cutting-edge technologies and services, such as emerging cloud services and SaaS. F5 solutions take into account your history, investments, culture, and objectives and are as agile as the infrastructure they help create. F5's global traffic management capabilities includes unique technologies to secure federation among distributed devices, enabling you to use third-party resources to increase flexibility. Thousands of organizations worldwide count on F5 to ensure IT agility in their infrastructure, extend their current capabilities, and maintain accountability and control.

# Conclusion

Traditional IT infrastructure evolved over time to meet the needs of business in a relatively static environment. That model now hinders IT's ability to quickly respond to changes in the business and technology environment.

A dynamic, self-managing infrastructure senses internal and external change and adapts according to pre-ordained business policy. Such an intelligent infrastructure reduces IT reaction time, making the process of aligning IT to the business as simple and quick as injecting new business policies into the infrastructure.

No longer a tepid vision or futuristic idea, the dynamic IT infrastructure can exist today. Widespread adoption of virtualization technologies at the server, network, application, and storage layers have laid the foundation for this new approach—one that offers significant benefits in agility and cost.

F5 and its partners provide the tools to develop, deploy, and manage the extended data center as a service. With F5 Application and Data Delivery Services providing distributed, strategic points of control, this infrastructure can provision servers, reconfigure networks, manage threats, protect data, add applications, and respond to myriad other changes both external and internal to the business.

Service delivery migrates between physical and virtual data centers, in and out of the cloud, and transparently as needed.

The business benefits of such an approach are clear: reduced cost, higher utilization, more rapid response, and greater flexibility.

In short: IT agility. Your way.