



## Cloud Services: What are they, what value do they provide?

### Executive Summary

Enterprises have traditionally been making new capital infrastructure investments to keep up with growing IT and Web demands. This approach is increasingly cost prohibitive and is becoming so process-intensive that it delays resource availability while users wait for servers, applications, storage drives and network connections to be provisioned. The expenses, processes and wait times associated with this traditional approach don't work in today's dynamic business world, where Web 2.0 technologies and mobile trends have created user expectations for instant IT and communications resources.

This is where the flexible new business model called cloud services comes into play. AT&T defines the cloud as a way for enterprises to quickly and easily tap computing, storage, software, development and network resources on demand. The model offloads the capex burden from enterprise budgets and moves it into a "pay-as-you-use" service model, reducing overall IT spend and service-commitment terms.

This paper introduces cloud services, discusses service offerings and associated benefits.

## Defining the 'Cloud'

The terminology surrounding "cloud services" varies dramatically across the industry. But the main idea is that IT resources become available on demand – without capital investments, lengthy provisioning turnaround times and service-contract terms. Like traditional hosting services, service-level agreements (SLAs) can be attached to resource availability, reliability, performance and security in the cloud.

Most often, the cloud is a pool of hardware, software and operational resources offered by a third party to business users of IT. The environment continually scales; capacity is managed behind the scenes to help ensure that resources are always available to the enterprise.

The buzz about cloud is growing louder now because technology advances such as virtualization and workflow automation have enabled service providers to begin offering flexible new contract and billing arrangements for IT resource usage. These technologies are at work transparently to the consumers of cloud services, who basically can consume and pay for resources as needed and don't have to worry about what's going on at the back end.

In fact, AT&T likens the IT cloud to a utility that has long provisioned electricity without any usage commitments or equipment investments required on the part of the customer. The public utility offers what magically appears to the customer as an infinite pool of energy; the customer takes and uses as much power from the pool as needed and pays for it accordingly. Now, the same purchase and usage model is available for IT resources, as well.

In AT&T's view, then, "cloud" implies a new way of contracting for IT resources that may be less expensive and less financially risky for the enterprise than traditional capex- and contract-intensive models of doing business. Some early enterprises that have used cloud services report significant savings on their IT capex and opex.

### What's Inside the Cloud?

Several types of managed and unmanaged services can be offered from the cloud, depending on what the enterprise is trying to accomplish. Let's look at the primary offerings.

#### Infrastructure as a Service (IaaS)

Generally offered as an unmanaged service, IaaS consists of server, storage and local network resources made readily available to an enterprise and billed based on the level of each resource actually consumed during the billing period.

With an IaaS, the provider gives the business more or less an empty container, in which the business customer installs its own operating systems, applications and storage data. Employees throughout the enterprise then simply dip into the resources in the cloud. The setup saves enterprises from making upfront and ongoing investments in the underlying foundation of servers, storage devices and local network connections as the business grows and requirements change.

Reasons to tap into an IaaS can range from wanting to out-task an entire IT infrastructure to wanting to avoid purchasing an extra rack for new equipment in an already full data center.

### The Silver Lining

The primary enterprise incentive toward using cloud services is economic. But there are other benefits, too:

- **Consistency:** Reliability of repeatable processes and adherence to strict change management procedures deliver consistent cross-regional user experiences and help track compliance with governance mandates such as SOX, HIPAA, GLBA, PCI and others.
- **Agility:** Businesses can fire up a new application or storage drive dynamically as needed without waiting to purchase, install and provision equipment and software.

#### Platform as a Service (PaaS)

This type of unmanaged cloud service is intended to serve the application development community. Whether it is reaching enterprise programmers, large independent software vendors (ISVs) or entrepreneurs inspired by the "app store" model in the mobile industry, these services make available all the tools, operating system platforms, and storage necessary for developers to create new Web applications. Programmers, for example, can leverage new Web services application programming interfaces (APIs) and protocols residing in the cloud to quickly develop a new application.

Again, the development platform and tools become available to developers on a pay-as-you-use basis, without requiring the hefty upfront investments that can get in the way of entrepreneurship and stifle innovation. Still another cost barrier to entry comes down when developers store their code and data in the cloud, using and paying for only as much storage space as needed.

In addition to making the appropriate tools available on demand at an affordable cost, the PaaS also enables developers to push their code out to the cloud when it is ready and immediately make it available on an Internet-wide scale to internal users, consumers and other customers, some of whom may choose to deploy it, in a software as a service (SaaS) model, described on the next page.

#### Software as a Service (SaaS)

In this type of cloud service, software applications become available in the form of a network-based service, in that users access them across a wide-area network. This provides an alternative to an enterprise buying software licenses, loading the software on a self-built and self-maintained computing infrastructure and having to keep pace with software patches and version updates.

In other words, SaaS is a cost-effective way for enterprises to procure rights to use software as needed. By using on-demand licensing, enterprises get the benefits of commercially licensed use without the associated complexity and potential high initial cost of equipping every device with application software. Given this description, SaaS can be thought of as a fully managed service. The provider maintains both the software and hardware environment on behalf of the enterprise customer with no requirement for enterprise IT personnel to do any customization or version tracking, patching and updating.

## Comparison with Hosting Services

Cloud services sound reminiscent of hosting services. The difference between them is fundamentally that they are purchased and financed differently. In the hosting model, the customer and the hosting service provider find the right balance in the investment risk: The enterprise estimates its resource needs and contractually commits to a certain amount of usage for an agreed-upon period of time with the provider.

Generally, there is an upfront capital cost to the enterprise for the required hosting equipment, its installation and the associated hosting of any application software. From there, the service provider maintains the care and feeding of the server(s) and/or software on the enterprise's behalf for a predetermined, contractual period of at least one year.

By contrast, in a cloud model, the service provider assumes the equipment and software risk. It invests in the entire IT resource pool of equipment and software itself, upgrading the pool ahead of enterprise needs. The enterprise customer no longer foots the bill for necessary equipment and software up front.

In addition, the dedicated hosting model doesn't allow for subscriber resource reservation. In other words, enterprises, in conjunction with their providers, traditionally determine ahead of time the level of resources that are required, then buy, install and provision them. If the enterprise's use surpasses those resources, it will have to wait while more are purchased and provisioned.

In today's cloud, however, virtualization technology makes it possible to pre-provision hardware accessible to users in a pay-as-you-use model. It does this by decoupling hardware and software components from one another to optimize the utility of any given resource, allowing users to tap a far more vast resource pool. Between this capability, a service providers' own usage predictions, and new workflow automation tools, the cloud provider is able to remove the enterprise's risk of "running out of resources" and having to wait while more are provisioned.

## Network Access Alternatives

If using one or more cloud services, the enterprise must select a cloud access network. An enterprise's cost/risk profile likely will drive its decision about how its employees will access cloud service resources. For example, there are several point-to-point private network options for accessing the corporate cloud based on T-carrier and SONET technologies for companies that are the most risk-averse.

Virtual private network (VPN) WAN services options such as Multiprotocol Label Switching (MPLS) VPN services are another option for accessing cloud services. While each enterprise's traffic traverses an MPLS virtual network "cloud," that cloud is controlled completely by one carrier. Each enterprise's traffic is distinctly partitioned from other traffic and the MPLS core network is kept secured from any other entity.

3G and forthcoming 4G cellular networks also provide secure entry into the cloud. A single operator owns the particular frequency band in which these networks run. That sole operator oversees these networks from access network to core, and the over-the-air portion of the cellular network is encrypted.

Being able to procure the desired network access service as part of the overall cloud service package is one reason that using a large network service provider as a cloud services partner is particularly

appealing: The single entity can manage resources and network access collectively as part of the same package, which may deliver better volume price points to enterprises. In addition, end-to-end control also helps improve the SLAs offered for network and service availability, performance, latency, number of transactions supported and other metrics.

A public Internet VPN service partitions corporate traffic from other Internet users by using data encryption. Considered to be a viable access alternative, public Internet access to the cloud is available to companies:

1. Whose cost-saving goals trump their concern over risk
2. For external consumers of an enterprise's rich media content

However, traffic does share resources with everyone on the public Internet, and control of the traffic might fall to more than one carrier entity. So the risk of a breach at one or more network intersection points is slightly greater than with the other two access options described.

## Business-Grade Attributes

An enterprise cloud relies on enterprise-grade facilities with private network connections, security, end-to-end visibility and other characteristics that business customers require (see box). This distinguishes enterprise clouds from consumer-grade cloud services offered by large Internet search and e-commerce companies, which have worldwide network reach, but may fall short in terms of the operational visibility, support, security and consultative expectations of large established enterprises.

A business-grade cloud service does several things for enterprises:

1. It eliminates new capital investments in data center equipment as the organization grows and as technology changes.
2. It eliminates ongoing capital expenditures for upgrading, refreshing and patching components of the computing environment.
3. It eliminates the requirement for enterprises to hire workers with expertise in the many infrastructure product and technology components.
4. It provides enterprises with visibility into all operations down to a granular view, likely through a Web portal. This allows IT personnel and auditors to track processes and communications and to determine who has touched data (often to fulfill the compliance requirements of corporate governance mandates).

### What to Look for in a Cloud Provider

- Repeatable, auditable processes
- SLAs for reliability, performance, security
- Business-grade processes
- Granular enterprise visibility into the cloud
- Network access services as part of the cloud package

### Budgeting for Pay-as-you-Use Services

The cloud setup allows enterprises to control their IT costs through usage. Paying only for the resources an enterprise uses sounds like an attractive model, though many network and IT managers are concerned with predictable budgets and wish to avoid “surprise” invoices. The cloud model enables enterprises to try things out with no upfront cost or commitment and get a feel for what a monthly usage bill might look like.

This type of model avoids the requirement for enterprises to build and pay for “worst case” infrastructures – those optimized to handle peak loads when the peaks are the exception rather than the rule. This is often the case, for example, in the retail industry, which often sees more than a magnitude increase in activity on its Web sites during the holiday months.

### Redundancy and Business Continuity

Varying levels of redundancy are built into cloud services, contributing to an enterprise’s overall business continuity strategy and design. All hardware and software resources become one big virtual pool that users can tap. Should a hardware or software resource become unavailable, a user request is simply sent elsewhere in the pool for fulfillment.

In the event of a disaster, the latest data center virtualization software also controls access to cloud storage such that the active memory and precise executin state of a virtual machine is rapidly transmitted over a high-speed network from one physical server to another in another data center location.

The cloud, of course, is just one component of an enterprise business continuity and contingency plan; its attributes, however, can support the no-single-point-of-failure philosophy of such strategies.

### About AT&T Cloud Services’ Strategy

AT&T defines its cloud services as network-resident capabilities delivered over a highly reliable, intelligent network with global reach to any device. AT&T is delivering cloud services in ways that fundamentally transform how its customers consume IT services.

### Conclusion

Cloud services represent a new relationship between enterprises and service providers that may save the enterprise money, reduce contract terms and provide the agility to get new services and resources up and running instantly.

A network operator has an advantage over other types of cloud service providers in that it controls the access network to the cloud and can assume responsibility for the entire cloud service package, including diverse-site redundancy. Having control over the end-to-end virtual infrastructure enables the network provider to offer more stringent SLAs to enterprises for resource availability, application performance, security, latency and many other important computing and networking variables.

Look for more educational information coming soon from AT&T that describes use-case scenarios as well as different types of cloud services, including private, public and federated clouds.

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