Cloud Control

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CLOUD CONTROL

Summary:

While "Cloud Computing" is a hot, new marketing term, *the cloud* is an actual thing owned by a company providing a service. A Cloud is formed by spinning applications out into the network and letting them float as needed. The cloud is *network virtualization of applications, and perhaps also of data*. Cloud Computing is Internet-based, shared, service-oriented computing. Specific business features like SLAs are not merely attached, *but embedded in the service architecture*. The primary service value for the customer comes from being able to use an infrastructure that isn't their own. Additional value is derived because the burdensome management of the service is done by someone else – it's someone else's business to make it work. Sounds like an evolution of outsourcing.

But maybe a qualitatively different outsourcing, that becomes a new thing. Cloud Computing holistically fuses many new technologies, systematic use of the network, and a change in business model. We see an opportunity for telecom in Cloud Computing. There is potential for advantage posed by Cloud Computing being network-based that our industry can leverage. But for the cloud to become a dominant telecom service product, it needs the architecture of the *service ecosystem*. This is another way that the world continues to become one big ball of network-resident software; at LTC, we call this future software/network: **TeleGaia**.

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It Clouds my mind

> Everything is vague to a degree you do not realize till you have tried to make it precise.
> - Bertrand Russell

We are an industry of buzz words. To convey something new or dramatically changed, we do sometimes need a freshly created word, acronym, or repurposed word. This is because when we come up with something really new the old words don't get the message across. On the other hand, sometimes there isn't really much new at all – the new buzz words are just marketing spin. "Cloud Computing" is a term that is spreading fast with many different things all being called Cloud Computing. At first glance, Cloud Computing seems to be another recasting of the familiar – just a new marketing term that we can ignore.

> "Cloud Computing is a nebulous term covering an array of technologies and services including; Grid Computing, Utility Computing, Software as a Service (SaaS), Storage in the Cloud and Virtualization. There is no shortage of buzzwords and definitions differ depending on who you talk to. The common theme is that computing takes place 'in the cloud' - outside of your organization's network." Craig Balding's blog.

On the other hand, Cloud Computing may be more substantial than this: a fresh technological concept that has found an image, and a label, that has marketing weight.

Historically, a perfect storm occurs when a catchy new business term is attached to a revolutionary technology which provides business utility and competitive advantage. *The Internet* was just such a name for a new thing: a bunch of computers tied together in a routed global network. *The World Wide Web* successfully conjured up the image of a connected globe, with strands reaching everywhere, catching everything: a destination everyone could go to for data, images, and business portals. *Portal* is an example of a borrowed word: a door through which one can reach (virtually) into a myriad of businesses and services. In each of these examples something very complex, and somewhat threatening to the status quo, is given a "friendly" approachable name.

To catch on, the new thing must also provide business utility. For marketing departments, the product must eventually become something that people will pay money for, and a catchy name is useful for generating interest, the first step on a path to revenue. *The Cloud* offers just such a name, yet what is it really? Galen Gruman of InfoWorld wrote: "… [the cloud] is a way to increase capacity or add capabilities on the fly without investing in new infrastructure, training new personnel, or licensing new software." Certainly sounds compelling to be able to turn that increasingly rare commodity, capital, into an on-demand operating expense. So is Cloud Computing just another form of outsourcing?

Cloud Computing environments do allow customers to run their own applications on the cloud provider's infrastructure. Therefore *the cloud* is an actual thing owned by a company providing a service. The primary service value for the customer comes from being able to use an infrastructure that isn't their own, resulting in capital savings. Additional value from outsourcing is derived because the burdensome management of the service is done by someone else – it's someone else's business to make it work.

Two's company, three's a cloud

The cloud itself is actually quite complex. As described previously, this is an "array of technologies" each of which is itself new and complex. In fact, the bonding together of these technologies into something we can call "a cloud" has sidelined some of those technologies, so their names (once new and

exciting) are now old hat. Not very long ago, *Utility Computing* was a grand concept; now it just means renting time on a grid of CPUs. *Virtualization* is now just swapping kernel images from one computer to another. *Software as a Service* (SaaS) is simply hosting a product application on an external grid accessed via the internet with your web browser. So in Cloud Computing is some new *architecture* putting together all these different technologies? Or is this a form of advanced IT mashup? Is Cloud Computing, as Ephraim Schwartz of Information World would have it "an architecture whose natural state is a shared pool outside the enterprise" If so, what is that new architecture that ties it all together?

Rajkumar Buyya (in email on cloud-computing@googlegroups.com) describes the cloud architecture as

> "… a type of parallel and distributed system consisting of a collection of inter-connected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements established through negotiation between the service provider and consumers… Clouds are clearly next-generation data centers with nodes 'virtualized' through hypervisor technologies such as Virtual Machines (VMs), dynamically 'provisioned' on demand as a personalized resource collection … and accessible as a composable service via 'Web 2.0' technologies." Bill Snyder in his blog at InfoWorld agrees: "What's enabling it? Nearly unlimited bandwidth, increasingly sophisticated virtualization technologies and multitenant architectures, and the availability of extremely powerful servers."

There is still much debate on just what this cloud architecture is – perhaps because the word comes from Marketing rather than IT. But actually it's necessary to have a new architecture to make Cloud Computing more than an outsourced data center. And the new architecture can't be a simple repackaging of the older notion of utility computing – even if it needs shared resource utilization at its core. There are several reasons for this. Specific business features like SLAs are not merely attached, *but embedded in the service architecture*. The Cloud is formed by spinning applications out into the network and letting them float as needed. The cloud is *network virtualization of applications, and perhaps also of data*. Cloud computing is Internet-based, shared, service-oriented computing. Cloud Computing holistically fuses many new technologies, systematic use of the network, and a change in business model.

Clouds ROCK!

Or as one young developer on the Cloud Computing Googlegroup said, "Clouds RAWK!" There are many reasons why a new technological concept takes off. One of the most important is capturing the interest of the upcoming generation of technologists and developers who will adopt it and use it. The uptake of application server technology by 'generation X' developers carried it to the now dominant paradigm of computing. Is Cloud Computing the paradigm of 'generation Y'?

Yet the established business people with checkbooks are also interested. Bill Snyder in his blog: "Cloud computing, a concept that can be as airy as its name suggests, is piquing the interest of forward-looking IT execs and attracting sizable investments from players like IBM, Amazon, Akamai, Sun, EMC and Salesforce.com. Sure there's a big helping of hype and plenty of reasons to be skeptical, but a growing number of startups -- and a still small number of enterprises -- are moving applications and infrastructure into a third party-provided cloud." But for executives to shell out capital investment there must be an industry pain point that needs a product. For each of these "sizeable investments" someone prepared a business case. Bill Snyder, again: "What's driving Cloud Computing? Out-of-control costs for power, personnel and hardware, plus a shortage of space in datacenters and a desire to speed up and simplify network deployment and management."

Significant bellwether businesses are using capital to build clouds. This means clouds have moved beyond a toe in the water, and beyond hype. Yet the market is still for early adopters. E*lastic usage* is a self limiting market driver. The example that everyone cites for establishing the utility of Cloud Computing is that of a major publisher using a cloud grid to scan their archives of a hundred years of old articles and OCR/PDF them for internet viewing – completing this in the course of two days. (Would have been one day but a coding mistake caused them to re-run everything the next day).

Certainly being able to grab on demand the resources of thousands of servers can be critical when such a need occurs, but what happens between times? For customers to stick around, for this to be the next big wave, there must be more than occasional use. And there must be some overwhelming new value if this is to become a paradigm shifting, disruptive technology. There needs to be constant use of the product. Otherwise it is just greater efficiency, an upward rise in the slope in the curve of incremental value.

So is Cloud Computing the future of a significant part of business computing? Robert Stinnett, in email on cloud-computing@googlegroups.com, writes: "Cloud Computing is a radical change … that is changing how we look at IT. I often like to ask two questions, 'What could happen if we tried it?' and 'What do we have to lose by trying it?' Cloud Computing, in our opinion, is going to reshape many IT functions and economics will be the driver behind it. The workplace is changing and so many people do not realize it. We are in a global economy. It's going to be a fun ride...." Do you agree with Robert, and these others, that Cloud Computing is coming and it will be a huge wave of change? Or, as his hyperbole suggests, is he over-hyping it?

Under the Clouds of War

Outsourcing is not a new business story. Remember the rise of UPS and FedEx. Shipping did not provide a way of differentiating companies, just an avenue for goods to market that was cheaper and more convenient for merchants than running their own transport fleets. Is Cloud Computing just an old business story making use of new technologies? Outsourcing succeeds best when there is little core differentiation provided to a business by that which is becoming outsourced. When a company can use something for competitive advantage, they keep it inside the company under close and watchful management. So tasks placed into Cloud Computing either must not be critical to the business, or if critical, there must be several outsourcing providers that can pick up the service at a moments notice. Just like the outsourcing of shipping that UPS and FedEx provide.

With this argument, conversion of internal applications to SaaS in a cloud will occur for software that does not lend itself to (a) customization or specialization at the deployed company and (b) where no particular competitive advantage exists. This is called a "context practice": it delivers business activities that are mostly internal to the company, such as HR services and payroll. So, if the business practice is context and non-mission-critical, then always put it in the cloud; outsourcing then allows the redirection of maintence effort into to competitive differentiators. Salesforce.com is the flagship example of this.

When an internal group fights having its activity outsourced, it tends to introduce a fairly predictable set of arguments. These arguments are mostly based on fear of bad happenings that could come from the loss of control. [Perhaps this is a kind of litmus test to identify the emergence of new modes of outsourcing?] And indeed, we find this type of argument applied against uptake of Cloud Computing. Often cited are issues of "management of the cloud." Specifically, worries about security, latency, service levels, and availability are issues that rightly concern IT executives. Examples of point failures can be used to feed this argument, as in this caution from Paul Wallis at keystonesanddivits: "Given current technological circumstances, and recent events like The Gulf cables being cut and Amazon S3 failing, today the business is being asked to take a leap of faith to put mission critical applications in The Cloud." But in

fact, it could be argued that these service outages were no worse than would have occurred if an internal IT shop had similarly failed. So should we require that Cloud Computing needs to be *more* available than internal IT?

Another type of argument against Cloud Computing is that it is simply more work than it is worth: "As all-encompassing as it may seem, the so-called 'cloud' is in fact made of up several clouds, and getting your data from one to another isn't as easy as IT managers would like. This ties to platform issues, which can leave data in a format that few or no other cloud accepts, and also reflects the bandwidth costs associated with moving data from one cloud to another." (GigaOM)

A related issue is lock-in where the outsourcer controls your fate and can dictate terms and constrain flexibility: "Most clouds force participants to rely on a single platform or host only one type of product. Amazon Web Services is built on the LAMP stack, Google Apps Engine locks users into proprietary formats, and Windows lovers out there have GoGrid for supporting computing offered by the ServePath guys. If you need to support multiple platforms, as most enterprises do, then you're looking at multiple clouds. That can be a nightmare to manage." (GigaOM) This is shown to be empirically true by looking at the average of 18 months it takes companies bought by Google to re-enter the market on Google's proprietary platform. Evidentially they must spend lots of effort adapting to Google's base.

Then there is strategic value worry: applications going to the cloud are one thing, putting your data in the cloud is another, possibly greater, area of risk. Data is often a competitive asset; something you should hold close. But today, data is also becoming a liability. New regulatory requirements and the PR nightmares of theft or unintended data disclosure are significantly raising the cost of management of data. Would it not make sense to outsource storage and management of the data so someone else assumes this liability? Unfortunately today, that is not the case, outsourcers too can lose data, and the collector/owner/user still pays the PR price. So to be successful here, computing clouds will need to provide greater data security and reliability than is found in the current market and at cheaper costs than internal storage and management. And since storage today is cheap, competent management of the data is the key issue.

These counter arguments are becoming strident as Cloud Computing becomes a force in the marketplace. Microsoft will offer desktop services as SaaS starting next year, joining Google's Gmail and Yahoo's Zimbra. ZoHo, a startup SaaS desktop services provider currently in beta, is pre-integrating with name-brand CRMs and plans to launch commercially quite soon. Desktop services and CRM are the bread-and-butter of today's IT departments. This represents a significant destabilizing force in corporate IT environments.

Every cloud has a silicon lining

For those of us involved in new telecom products and in telecom operations, how will Cloud Computing affect telecom? Is there an advantage posed by Cloud Computing being network-based that our industry can leverage?

A key issue is the relative cost of computing vs. transmitting information and connecting to networks. We even see costs effects in simple local networking which can flip a cloud from grids (lots of simple computers networked together) to supercomputers. Nicholas Carr, author of The Big Switch, tells us "IBM has launched an ambitious initiative, called Project Kittyhawk, aimed at building 'a global-scale shared computer capable of hosting the entire Internet as an application'. " What is shaping up is a technical race, a war of supercomputer vs. grids vs. clustered servers. However, all these can fit within

the business context of Cloud Computing. Few companies need, let alone can afford, a Kittyhawk, so likely it will be used as a shared cloud. But nowhere does networking determine advantage, only cost.

From the network point-of-view, it does not matter if it we connect big computers or big clusters; all the important activity happens in the islands, and the network between them has value only in providing connectivity. [As some telco executives see it, this is "marginalization" of the network, although how something can be marginalized yet remain indisputably essential is an interesting topic for discussion, but not here today.] However the cost of telecom networking can easily be more expensive than computing costs in a cloud architecture, so networking costs become a strong argument against the cloud. Paul Wallis points out: "This has implications for how one structures Internet-scale distributed computing: one puts computing as close to the data as possible in order to avoid expensive network traffic." For cloud computing, that makes the relative cost of telecom services (bandwidth and connectivity) vs. the cost of buying and maintaining compute power and applications a key economic driver for Clouds to succeed. The more attractive the cost of bandwidth and the availability of services, the faster the business uptake of cloud computing.

Add this to the related requirements for cloud computing – it has to be better than the home grown product, must provide features that are very costly on the home business campus and cheaper on the cloud utility, and must be ready to provide these services on demand, every day or as needed.

An example of a high cost, occasional-use service that demands high availability of traditional telecom is disaster recovery. But disaster recovery is not a Cloud Computing product! This is because fundamentally Cloud Computing is *more* than utility computing. By embedding SOA, SaaS, and service-level agreements, by incorporating virtualization and grid resiliency, Cloud Computing effectively eliminates the need for disaster recovery. By spreading the redundancy throughout the cloud, the only point of failure is that narrow network path that provides access from the user to the cloud. But today's telecom service providers offer many different networks and access avenues. When these are seamlessly linked with SIP or IMS infrastructures, getting to the cloud anywhere, anytime, anyway is realized – and provided via a service provider product. The Cloud Computing people understand this; witness the high-profile contributions of Microsoft's SCF team to the TMForum's Service Delivery Framework project.

Paul Wallis, again: "There has been talk of a two tier internet where businesses pay for a particular Quality of Service, and this will almost certainly need to happen for The Cloud to become a reality… In such a climate [of network failures] it will require asking the business to take a leap of faith to find solid footing in the cloud for mission critical applications." Service providers have the opportunity to twist the notion of security from a blocker to a driver. Is something more secure because you control it? Or more secure because it has network resiliency and unified focused management? For this argument to succeed, technology which is new and far from universal must become commonplace in networks and clouds. For real security, SAML might not be enough, and we might need dedicated or virtual networks running protocols such as secure-RMI. However, some security advantages are obvious: as soon as a cloud provider patches a security vulnerability, all its customers are immediately protected.

There are still a lot of outstanding issues. Because the cloud originally was a technology concept and then started becoming a business, it was not designed from the bottom up to meet specific business requirements. When MCI designed the Global Service Ecosystem, an early telecom version of Cloud Computing at MCI, the team (which included Wedge Greene) built in a data layer architecture that overcame the latency issue by dynamically positioning data into storage near the user access point (something like the way Akamai positions streaming close to the user access point.) Telecom can continually track the movement of users, and user movement is always slower than network transfer speeds. Dynamically mobile code and forward replicated business data objects, reflecting a global data

service, coupled with network's knowledge of where the user is, can always put applications and data very near the mobile user. Latency is no longer an issue. Further, the reliability issue was addressed through a survivable application grid, a technology now common in today's service-oriented grids. But for this we need "routed" applications, not the point-to-point applications, which are typically used in clouds today. In effect, for the cloud to become a dominant telecom service product, it needs the architecture of the *service ecosystem*. Currently, this is not the architecture for Cloud Computing, but it is a possible path of strategic evolution: the telecom industry just needs to provide strategic direction and marshal resources to shape this outcome.

Send in the Clouds

There is enough going on with Cloud Computing that we, as the telecom industry, need to think through the implications and develop a strategic response. Cloud Computing will become more than outsourcing management of "context practice" applications, it will be the outsourcing of *that which needs to be managed*. Service Providers (and by implication the rest of us as consultants and vendors in telecom) need to investigate the cloud from two perspectives, as a *user* of and as a *provider* of Cloud Computing.

As a user we need to assess the:

- Use of the cloud to provide management platforms/applications for our networks;
- Migration of telecom services into the cloud.

As a provider of Cloud Computing services to other businesses, we need to determine:

- How this will shape the structure of our changing market/ecosystem; and
- Are we ready to invest in service ecosystem approaches in order to create market differentiating products?

Even to seek answers to these strategic questions we need rare skills. Today a key blocker to formulating strategy and also to cloud uptake is the need for broadly skilled people: people with experience developing on the web, plus knowledge of highly distributed programming, plus SOA. For Microsoft, the challenges in providing large-scale SaaS services for business "requires significant expertise in high availability, security, multi-tenant architectures, network topologies and problem resolution," Cain writes in the Gartner report on Cloud Computing. In our articles we have noted again and again that, today, computer platforms, applications, and network architecture go hand-in-hand. Each involves tradeoffs and synergies with the other. This requires a rare individual who is experienced in the creation of architecture for all three and who additionally embodies the skills of the business analyst. We call this person a *polyarchitect*. The polyarchitect leads a collaborative team of business analysts and service matter experts in the various technologies.

Reuven Cohn at elasticvapor.com says: "As for what is Cloud Computing, I boil it down to simply 'Internet centric software' or any software that has a network centric component to it. Which in the near future will probably be all software." Here at LTC, we also see the world becoming one big ball of network-resident software; we call this future software/network: **TeleGaia**.

Fundamentally, how much do networks actually differentiate as competitors in telecom today? As service providers, we originally competed on quality; then we competed on access; now we compete on cost. This is the downward spiral of an industry nearing what physicists call heat death, telco CEOs call marginalization, and investors call commoditization. It is the evolution from growth company to dividend paying utility. It opens telecom up to dangers, possibly extinction, at the hands of edge applications and big datacenters controlling the path of cloud computing. If so, rough seas are ahead for telecom.

> “Even so my sun one early morn did shine; With all triumphant splendor on my brow; But out, alack! he was but one hour mine; The region cloud hath mask'd him from me now.” (Shakespeare.)

Cloud Computing, with the opportunities and threats flowing from it, is just another facet of the edge vs. core argument we explored in *Edge/Core Collaboration: Navigating the Ocean (Pipeline Feb 2008)*. We need to not just chart the course on this ocean, but to develop the early monopoly on the navigators. Strategically, this requires adding the early Cloud providers into the membership of the *Collaborative Garden*. Fundamentally, we can choose whether telecom becomes just a pipe between the edge and the user, or whether telecom collaborates to spread the edge into a cloud, resident in the telecom domain.

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