White Paper

Is Your Head in the Cloud?
The Cloud Services Opportunity

Prepared by

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Executive Summary

The proliferation of cloud services represents a new force in the IP era that has sparked innovation and creativity in the IT world. Telcos have realized that their customers’ adoption of cloud architectures provides major opportunities. As a result, they have carved out a leading role for themselves as trusted partners.

Ongoing service outages and disruptions from Amazon Web Services, Google and others illustrate that many alternate cloud services are not yet up to par. Today, telcos are in a superior position to capitalize on cloud services. Because they own the network, they can provide enterprises with security, scalability, guaranteed quality of service (QoS) and service management capabilities while providing sophisticated management portals to monitor service performance.

With their significant enterprise and public sector customer base, telcos have already had to certify their skills in data security, business processes and governance practices through external audits. That is why service providers such as AT&T, BT, Deutsche Telekom, NTT, Orange Business Services, SingTel, Telstra and Verizon are leading candidates to become trusted cloud intermediaries.

Being a cloud intermediary means being able to facilitate, mediate and manage delivery of cloud services components, including hot-swapping between cloud providers based on business rules for cost and performance. As trusted intermediaries, these telcos will not only market their own cloud services, but also provide converged management of private and third-party services.

In this paper, we will discuss different flavors of cloud services available; why telcos have a great opportunity as cloud services providers; key technical architecture requirements for streamlined cloud services delivery; why telcos need robust BSS/OSS systems to deliver differentiated cloud services; and the key ingredients of a cloud services delivery solution.
Overview of Key Cloud Players

Today’s recessionary times are good news for providers of cloud services and cloud-enabling technologies. The flexibility and lower costs associated with consuming infrastructure and software from the cloud – along with the fact that enterprises need to pay only for the cloud services they use in an opex model – is winning over corporate hearts and minds. Enterprises challenged with market pressure need to make decisions about whether to invest in cloud-based silos or create integrated architecture to support cloud and network services.

Telcos know very well that they are in a prime position to capitalize on the cloud revolution. They have the infrastructure to support the on-demand delivery of processing, storage and network resources, as well as enterprise applications. SaaS versions of enterprise applications can range from hosted versions of popular office suites and productivity/collaboration software to business-critical corporate applications. Telcos have a large opportunity to aggregate such applications so that enterprises can go one-stop-shopping for all their SaaS needs, rather than having to sign up with multiple independent software vendors, which all handle the supplier-customer-tenant relationship and interfaces slightly differently.

Pure-play cloud providers supply XaaS offerings without network ownership. Serving as the central hub that provides users with network resources in the sky, Amazon has successfully established a form of market dominance in the cloud infrastructure service space. Because of their low price point, pure-play cloud providers such as Amazon and Rackspace are growing quickly both organically and through acquisition. However, service outages and disruptions from Amazon Web Services, Google and others have negatively impacted the confidence of larger enterprises, discouraging them from moving their mission-critical systems into cloud environments, however cost-effective that might be.

Figure 1 summarizes the key strengths, weaknesses, opportunities and threats for telcos considering cloud-based strategies for service creation and delivery.

<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
<th>OPPORTUNITIES</th>
<th>THREATS</th>
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<tbody>
<tr>
<td>Telco</td>
<td>Large customer base, network ownership, supporting development/delivery infrastructure, packaged infrastructure and communication service</td>
<td>Closed-garden mentality, lack of credibility as a cloud services provider, slow in adopting new business models</td>
<td>New ways of generating revenues from existing assets and insertion of capabilities in larger number of value chains</td>
<td>Pure-plays, cost pressure, slow to market, lack of differentiated offers, BSS/OSS bottleneck</td>
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<tr>
<td>Pure-Play</td>
<td>Cost-effective, flexible, aggressive business model, first-mover advantage</td>
<td>Reliability, not used to meeting SLAs, cannot provide communications services</td>
<td>Expanded Web presence to drive new service revenues, the ability to acquire new services quickly, increasing customer stickiness and revenues</td>
<td>Undifferentiated services, perceived as low-cost providers, not considered reliable enough to host mission-critical systems, telcos providing cloud services</td>
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Source: Heavy Reading
Categories of Cloud Services

Heavy Reading's definition of the public cloud typically includes three categories: infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (SaaS).

**Infrastructure as a service (IaaS)** is the basis for all cloud services from a resource perspective; compute power, storage and hosting services are being embraced the fastest, commoditized and thus being subject to pricing pressures.

**Platform as a service (PaaS)** is essentially a service creation and execution environment in the cloud. A PaaS provider will supply all these facilities for them, hosted in the cloud, including set-up, usage metering and billing.

**Software as a service (SaaS)** allows potential applications with cloud-based application programming interfaces (APIs) to be used by multiple users. Collaboration applications and hosted software applications are currently the most popular.

The key to a service provider's access to such incremental revenue will be based on its ability to match applications to the needs of its customer base through promotions and personalization, embrace the flexibility of zero-touch integration with the product catalog, settlement, provisioning, assurance and service-level agreement (SLA) management systems, and leverage best practices that ensure success. Thus for effective aggregation and delivery of cloud services, directional best practices are listed below:

- Build cloud focus based on two logical business principles – operational efficiency and revenue generation.
- Create a logical cloud view that incorporates access, security, resource management and OSS/BSS.
- Build a strategy that moves quickly beyond IaaS, which will become table stakes for both telco and pure-play providers within 12 to 18 months.
- Develop higher value through the flexibility of cloud services offerings and bundles. Creative pricing models, change services on the fly, flow-through zero-touch provisioning, flexible offer management, robust SLA management, seamless order orchestration and end-to-end service assurance will all need to be pillars of their underlying IT infrastructure layer.

How Pure-Play Cloud Providers Differentiate Themselves

Pure-play cloud providers have built a differentiation strategy and trust with their customer base. They have a dedicated and longstanding cloud strategy and can provide cloud services such as storage, collocation, etc., very cost-effectively. However, to capitalize on the momentum they have built, pure-play cloud providers need to evolve their service strategy to provide PaaS and SaaS services, as IaaS is already becoming a commoditized service. Many pure-play cloud providers have grown through organic expansion, as well as via acquisition, thus broadening the portfolio of services offered to their end customers.

As cloud services evolve, a pure-play cloud provider must be ready with a revenue-enablement strategy that doesn't force any limitations in the way services can be
bundled, priced and monetized. Like every other service, downward pricing pressure on commoditized services forces creativity in the way new services are developed and how existing and emerging services can be bundled and priced.

**Why Should Telcos Become Cloud Providers?**

Telcos are experts as providers of very large-scale "virtualized" network services. Hence for telcos IaaS is definitely the lowest-hanging fruit. AT&T with its Synaptic Hosting Services and BT with its Virtual Data Centre, have already recognized the opportunity. Obvious expectations from telcos are that IaaS:

- Must be delivered ubiquitously
- Must be always available, 24/7
- Must have low latency
- Must have a high level of reliability and QoS

This service will require a telco's connectivity infrastructure and skills, and also promises to deliver a new revenue opportunity that will compensate for the inevitable decline in telephony revenues, as millions of people across the globe start consuming virtual infrastructure across networks. Telcos are starting to sell the next level of shared, yet virtually private, services over their networks through the software-configurable, virtualized connectivity pipes they have established with customers. Such services are typically those that have traditionally been close to the network and can be exposed and delivered to customers over it.

*Figure 2* is based on Heavy Reading's cloud readiness benchmark survey of 247 global operators. The results indicate that communications and infrastructure are the cloud services that telcos are most likely to offer first.
The next generation of IP-based communications services—such as voice over IP (VoIP), Next Generation Intelligent Network (NGIN) services, videoconferencing, telepresence and content delivery—are now being delivered in this way.

Into this mix, telcos are also adding services including: IPTV; managed security services, such as managed anti-virus and intrusion detection; managed IP private branch exchange (PBX); unified communications services; storage-area networking services; content delivery services and backup; and load balancing and disaster recovery services.

Service providers can "inject" onto its IP layer IP-based applications built by third parties—content delivery services from suppliers such as EdgeCast, Bitgravity and Limelight Networks, unified communications and MediaRoom services from Microsoft and TelePresence from Cisco.

Key considerations that will force enterprise and business customers to either choose telcos or pure-play vendors as their cloud services providers will depend on a few critical factors:

- Speed to market
- Automation
- Delivery
- Revenue enablement/monetization
- Visibility

Figure 3 compares each of these critical factors, comparing both telcos and pure-play providers in terms of their "readiness" around cloud services.

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<th>TELCO</th>
<th>PURE-PLAY</th>
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<tr>
<td>Speed to market</td>
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<td>Automation</td>
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<td>Delivery</td>
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<td>Revenue monetization</td>
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<td>Visibility</td>
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</tbody>
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(* "not at all prepared"; ** "minimally prepared"; *** "fairly prepared and able"; **** "prepared in most aspects"; and ***** "completely prepared and able")

Source: Heavy Reading

Obviously for telcos there is incremental revenue, which has not traditionally been in the business of selling IT applications. This includes:

- Providing network connectivity fabric for efficient QoS guaranteed cloud services delivery
- Telcos can position themselves as one-stop shops for enterprise customers that can provide communications service plus storage, IT and security managed services
Telcos that are looking to move into cloud services should learn from past mistakes, both from a business model and a technical development perspective. Cloud infrastructure is best served if it is built into a greater business transformation strategy that focuses on eliminating service silos and increases operational efficiency. In the past, typical new service launches were solved via the implementation of entirely separate technology stacks for service creation, design and monetization. This increased the difficulty of eventually offering higher-value service bundles.

For telcos, cloud services provide an additional revenue stream opportunity, but they need to have focused approach. They need to go beyond the silos they have on the network side and be able to provide more consolidated offerings that combine cloud-based service with communications services.

In order to do that, telcos need to provide highly efficient automated processes, efficient platforms and back-office systems to efficiently orchestrate and deliver cloud-based services. In some cases it will be beneficial for telcos to partner with OTT cloud players to host enterprise customers' non-critical services and applications on their cheaper platforms and host mission-critical SLA-driven services and applications on their telco-grade data centers at a much higher price point.

Key Technical Requirements for Cloud Services

Cloud services represent a very different proposition from traditional Web hosting for companies that consume IaaS and for service providers that offer it. IaaS is a highly scalable, high-volume and potentially high-margin business where virtualization, automation and standardization are needed to drive down cost, including headcount cost, and to reduce the very large level of operational complexity.

Below is a summary of core requirements for IaaS, as identified by service providers that are rolling out IaaS services, along with the infrastructure capabilities that need to be in place to achieve those requirements. They are:

- **Scale**: Process automation and management tools need to support hundreds and even thousands of companies, and potentially millions of end users, and also provide the highest levels of customer visibility, control and end-to-end assurance.

- **Converged network and IT capacity pool**: Virtualization and service management tools need to span IT and network boundaries, so that the pool appears seamless and both servers and network work together to support end-to-end user and application SLAs.

- **Self-service and on-demand capacity**: A customer portal that gives customers visibility into and control over "their" virtual IaaS environment. Process automation and management tools to enable customers to turn infrastructure resources up/down in software, on demand, without needing to dispatch a technician to provision more capacity is also critical. Hence automating the entire process from self-service to resource layer becomes critical, which helps eliminate manual processes.
The ability to provide integrated management of virtual and physical environments will be critical to the way a telco can differentiate its IaaS offering. "Over-the-top" IaaS, such as Amazon’s Elastic Compute Cloud (EC2) or services built using Enomaly’s Elastic Computing Platform, is designed to be highly available and resilient from an IT virtualization perspective, but does not have the same ability as facilities-owning telcos to leverage the inherent availability, resilience and class-of-service management capabilities of the underlying IP network.

Let us take a look at few critical requirements for an IaaS management capability:

- **Ability to model services** as sets of components that can be assembled in different ways. The service model must understand the relationships and interdependencies between service components and physical infrastructure resources, including applications, data center components and physical and virtual network components.

- **Correlation of management information** across the range of physical and virtual components participating in IaaS to understand the impacts of change/drive root-cause analysis and to make proactive changes to prevent disruptions to service levels.

- **Need for an end-to-end, business-level view** of IaaS SLAs and performance through unified dashboard.

- **Propagate policies** from business level down to the individual component level to support contractual obligations and control operational risk.

- **Automate IaaS management processes**, with the goal of creating a self-managing, self-healing, zero-touch environment.

It is unlikely that a service provider will be successful at providing IaaS unless it has brought together its IT and network management organizations. An IaaS service model will cross organizational, functional and technology domains, as will IaaS management processes. IaaS is a customer-driven service, and IaaS providers will need a united view of virtualized network and IT components to give customers assured control over individual virtual environments.

### The Need for a Robust BSS/OSS Fabric

The pressure is very high on operators to provide differentiated, profitable cloud services. A streamlined, automated BSS/OSS system will play a pivotal role in enabling service providers to quickly create, deliver and monetize differentiated cloud services.
Some of the essential characteristics of efficient back-office systems that will be critical in order for telcos to provide efficient, flawless cloud services are illustrated in Figure 4.

**Customer & Business Management Layer**

A CRM-like self-service and customer care solution is needed to manage customer expectations and needs. Both the customer and the customer service representative (if applicable) should have access to a broad range of service-level data, related usage rates and metering characteristics.

**Revenue Management**: Billing and charging need to be linked directly to a mediation-like layer to capture all metered records and provide the necessary chargeback to individual or departmental levels. They also need to interface with the self-service engine to provide the necessary usage/chargeback information to users. The flexibility of pricing, complex bundling capability, embedded business intelligence to provide customized offers, etc., need to be critical features of a revenue management solution set.

Different charging/rating scenarios need to be supported:

- Usage-based consumption (duration, events, etc.)
- Chargeback
- SLA violation calculations
- Storage (GB-month, million I/O requests, etc.)
- Bandwidth (public Internet in/outbound, same cloud, regional cloud)
- Computing (CPU hours, RAM hours, service units, etc.)
- Configurable server instance types
- Partner management, contract management to determine individual terms with each partner on a per-service basis
- Model contractual clauses in all aspects of the financial relationship, including payment terms, disputes, taxation and currency requirements
- Commission calculations for value-added resellers and agents, as well as referral fees for referring partners
- Allocating SLA penalties across the value chain based on fault
- End-to-end subscriber management, which includes account relationship, terms, real-time balance management, customer hierarchies, subscription type, etc., should also be part of the revenue management solution set.

**Cloud Analytics:** To provide analytics capability to provide reporting, analytics and data-mining capability. Data can be pulled from an existing CRM system, self-service portals, or from the resource management layer itself to gain insight into:

- Customer usage patterns
- Trend analysis of service consumption and changing demands
- Capacity planning of existing resources, ensuring future cloud services requirements can be met

**Service Management Layer**

**Service Fulfillment:** Streamlined fulfillment system need to feed requests from the self-service engine through the resource management platform to provide access to the required cloud services (storage, computing power, etc.).

- Cloud provider will need flow-through provisioning capability
- Seamless ordering and orchestration capability
- Zero-touch activation and self-care
- Customer lifecycle management

**Service Assurance & Performance Management:** The performance and service assurance layers need to manage top down from the application end user's perspective things such as performance, availability and behavior patterns, which will help in SLA/QoS management for private clouds. Integrated SLA and class-of-service management to support customer requirements for different application types, such as business-critical or non-business-critical.

**Network Resource Management Layer**

Necessary hardware, software and services to create shareable computing power, development environments and applications. It also provides IT resource management, application lifecycle management, database management and usage metering.
Conclusions

It is clear that operators are looking to the cloud as a new business channel and hope to fill any gaps left by the established cloud providers, such as Amazon and Google. The established providers, having had issues with disruption of service, leave some skeptical and looking to a cloud provider that may have closer ties to the network and a better grasp on security, scalability, QoS, service management and performance monitoring.

In order for telcos to take advantage of this opportunity, they must get past their legacy systems, which may not live up to the real-time expectations of cloud customers, and work with a comprehensive vendor that will enable them to provide cloud services quickly and securely. Telcos must determine their target market, create an overall value of cloud services through infrastructure and software as a service, and create strong and automated cloud enablement capabilities for the stack to ensure that the investment in cloud is future-proof.

Telcos should play on their strengths when it comes to which type of service they provide. All operators are strong candidates to provide IaaS and PaaS, since they would be able to leverage their own network and remove the burden of managing the infrastructure from their customers, while at the same time allowing those customers to reap the benefits of a high-volume, scalable product that allows for bandwidth and data storage. The reduced cost of not having to maintain this infrastructure is also appealing.

The differentiator in the service provider's execution and delivery will be the ability to provide integrated management of virtual and physical environments, compared to Amazon's EC2, which does not have the same ability as facilities-owning operators. It will also be crucial for telcos to bring their IT and network management organizations together and have a united view of the virtual network.

A streamlined, automated BSS/OSS system will be of the utmost importance, and customer, revenue, network, service and performance management, service fulfillment and assurance will all have to be executed flawlessly in a cloud environment. To do all this, telcos will have to align themselves with a comprehensive cloud stack provider that will enable them to provide cloud services with the security, agility, QoS and continuity that cloud customers are looking for. If telcos are able to do this, then they will be able to gain market share in this space.
Background to This Paper

Original Research

This Heavy Reading White Paper was commissioned by Oracle Corp., but is based on independent research. The research and opinions expressed in the report are those of Heavy Reading.

About the Author

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Banerjee's research focuses on the service provider IT sector, examining the breadth of software used by communications service providers in customer, business, service and infrastructure management. His area of focus includes all aspects of BSS, OSS, SDP, digital commerce, revenue assurance, service assurance and elements that span both the infrastructure and network software markets, such as data warehousing, analytics and business intelligence.

Prior to joining Heavy Reading, Banerjee was the VP of Next Generation Software Systems at Yankee Group, leading and overseeing all aspects of telecom software research. He also worked for the billing and customer care division at Lucent Technologies, and subsequently the global software and services group at CSG Systems. He has worked for utility companies in Asia and Europe in a number of business development and technology functions.

Banerjee speaks regularly at leading communications industry events around the world. He holds a B.E. in electronics and communications from Manipal Institute of Technology in India and an M.S. in computer information systems from Bentley College. He also holds an M.B.A. from the University of Glasgow Business School. He can be reached at banerjee@heavyreading.com.

About Heavy Reading

Heavy Reading (www.heavyreading.com) is an independent research organization offering deep analysis of emerging telecom trends to network operators, technology suppliers and investors. Its product portfolio includes in-depth reports that address critical next-generation technology and service issues, market trackers that focus on the telecom industry's most critical technology sectors, exclusive worldwide surveys of network operator decision-makers that identify future purchasing and deployment plans, and a rich array of custom and consulting services that give clients the market intelligence needed to compete successfully in the $4 trillion global telecom industry. As a telecom research arm of the Light Reading Communications Network (www.lrcn.com), Heavy Reading contributes to the only integrated business information platform serving the global communications industry.

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