

Next Generation Media Resources A View From The Clouds

Harnessing Networks
Liberating Communications

WHITE PAPER
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Executive Summary

The communications industry is experiencing one of the greatest revolutions in its history, making a huge impact on both our social and behavioral patterns. Today's consumer expects faster service, richer content, increased network coverage and all at a cheaper price. 'Unreasonable, Unachievable' I hear you cry, but these are the stark facts resulting from advancements in technology that show no sign of slowing any time soon.

New, agile companies such as Skype and Google have fully embraced emerging technology and are riding the crest of a wave without the burden of aging legacy infrastructure. Traditional communication providers are caught in a state of flux as they attempt to justify the cost of new technology while maintaining diminishing returns on previously lucrative cash cows. Such a juggling act has led to:

- Stunted adoption of next generation network growth
- Lack of investment in new communication services
- Over complicated networks that comprise a myriad of technology islands, increasingly difficult to manage and provision.

An extremely important component of any next generation service is the Media Resources that drive important functions from simple Interactive Voice Response (IVR) for a prime time television show voting line, to complex video conferencing, Automatic Speech Recognition (ASR) and Text-To-Speech (TTS). Currently such media resources are used in a silo deployment model that ties them 1:1 with any new service. This has led to large inefficiencies in complex, un-scalable networks.

NS-Technologies Media Resource Broker (MRB) cloud solution, built on exclusive intellectual property, provides immediate efficiencies and savings as well as a long-term path to a next generation network fit and ready for service.

Read on to learn of the Operational and Capital expenditure savings that can be made today and continue to rise as you grow your next generation network.

Introduction

History will view Internet Protocol (IP) multimedia communication as the primary evolutionary step that enabled today's exciting world of multimedia services. Devices such as the iPhone (<http://www.apple.com/iphone>) and services such as Skype (<http://www.skype.com>) have broken down technology barriers, dragging the hungry end users into a world that leaves them wanting more. New protocols such as the Real-time Transport Protocol (RTP), Session Initiation Protocol (SIP) and Real Time Streaming Protocol (RTSP) have provided the foundation for inter operable solutions, important pieces in the ever-growing multimedia tool kit.

Technologists have worked wonders and continue to drive the way we communicate forward. Sadly the underlying infrastructure has not kept up. The situation is analogous to driving a brand new car with an old set of worn and battered tires. Today's communications industry is compared to a brand new tire at a large cost being added to your car leaving three old ones still present. Adding any one of a number of new communication technologies to an existing infrastructure, is like replacing only one tire and leaving the rest alone. You may see better performance and the new tire will not explode but it's really not going to provide the long-term returns you expect.

Innovation at the endpoints, including breakthrough technologies such as the Android (<http://www.android.com>) and Symbian (<http://www.symbian.org>) Operating Systems, pull new applications, and thus revenue, further away from the core of the network. This rapid shift has left a number of large, legacy communication providers out in the cold and they are now fighting over decreasing margins. The battle is on to pull some value back into the network by launching new IP-based services. A combination of apathy and the world financial crisis make it hard to justify a large outlay for new networks and services. This creates a classic 'catch twenty two' situation where communications providers need to invest to survive but are reluctant to spend during times of diminishing returns. Ultimately, to survive in the modern communications landscape some bold decisions need to be made. This white paper introduces new technologies and mechanisms that enable such communication providers to better utilize their existing network media resources, while also providing a suitable migration path that leads to future cost savings.

This white paper first reviews the landscape of communications networks and the resulting challenges of deploying new services with associated media resources. The following section introduces how general cloud computing principles, which have taken the Information Technology (IT) world by storm, can be applied to next-generation networks and media resources. Finally, we introduce the NS-Technologies Media Resource Broker (MRB) cloud solution with a high-level description that shows both its immediate and long-term benefits.

The Challenges of Media Resource Usage

It is understandable that the shift towards a multimedia communications focus will leave the industry in a state of confusion. It takes time for new technologies to be perfected and associated methodologies to be understood. Early adopters who have dipped their toe into the world of new IP-based services have understandably been influenced by their legacy experience. New IP services are generally deployed on a small scale, at first in trial phases. Then some have grown to a more substantial size. A familiar pattern has emerged where deployment of a new IP service has occurred very much in isolation with its own set of dedicated media resources. As the service expands, so does the amount of media resources required to cope with the increased traffic load. Traditional capacity planning techniques are based on peak traffic flows calculated on the busiest hour period of the day. Over provisioning can range from between 10 to 100 times the average amount of traffic that a service is expected to cope with. It goes without saying that when you deploy new IP based services using a silo model, each

service will be over provisioned in isolation to cope with the busiest hour for that service. Such peak periods often occur at different times resulting in a large amount of media resources lying idle for the majority of the time.

Figure 1 provides an illustration of two IP based services that have been deployed in isolation.

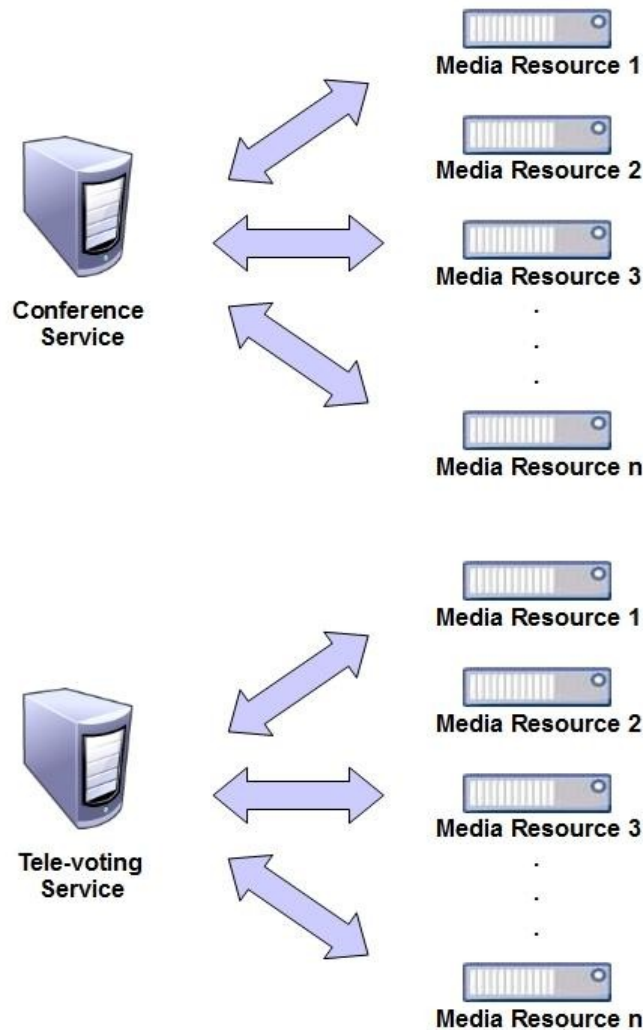


Figure 1: Services are tied to dedicated media resources

As you can see, both have a dedicated pool of media resources that are used by the conference and tele-voting services for functions such as IVR (tele-voting service) and mixing (conference service). For example, the tele-voting service is used to count the votes of an extremely popular show on prime time television that involves the audience voting for their favorite singer. The service fields an average amount of IVR calls during the build up to the show on a Saturday. During the show the amount of IVR calls serviced by the application spikes considerably and the tele-voting service is expected to cope with increased load – and so is provisioned accordingly with the appropriate

amount of media resources. In comparison, the same network also hosts a popular IP based conference bridge. The conference service is extremely busy during the week between the hours of 9 and 5.30. The amount of media resources required by the conference service is provisioned to cope with the upper amount of peak traffic experienced during the working week.

Comparing these two simple services, a couple of obvious points can be made.

Firstly, the amount of media resources required for the tele-voting and conference services is extremely large, especially when you consider the small amount of time peak traffic that is experienced.

Secondly, the peak traffic experienced by both services occur at very different intervals. The conference application peaks during the week between certain hours and the tele-voting peaks on a Saturday night. Media resources are left idle for a large amount of time and are generally under utilized.

Traditional traffic models and the silo model of service deployment simply do not adequately fit the requirements of a modern next generation service and results in costly equipment lying idle for large amounts of time. The reality is that modern next-generation multimedia networks must cope with a far greater scale of variation in traffic peaks and troughs created by seasonal, irregular patterns generated by external events such as TV shows and major sporting events.

A Solution From the Clouds

Cloud computing techniques have been well documented in recent times and have been successfully adopted by major companies such as Google and Microsoft. Wikipedia defines Cloud computing as:

'...the provision of dynamically scalable and often virtualised resources as a service over the Internet on a utility basis.[1][2] Users need not have knowledge of, expertise in, or control over the technology infrastructure in the "cloud" that supports them.'

In essence Cloud computing is the IT world's state-of-the-art solution to the problems of:

- rigid and brittle designs and architectures, which limit the extensibility and flexibility of systems making it difficult or even impossible to modify or integrate with other systems according to consumer and market-driven demands.
- Siloed deployment models, which do not scale optimally or cost-effectively.

These are the very same problems facing the Telecommunications world today, as it continues its evolution from the pre-1980's world of monolithic proprietary solutions

controlled by governments or monopolies, to the utility-led market-forces driven world of today's digital communication networks. It therefore seems appropriate to consider applying certain fundamental aspects of Cloud computing to the Telecommunications world.

The key to understanding Cloud computing's success in the IT world is that it fundamentally breaks the rigidity of systems in several crucial ways, by breaking up a single system into its constituent elements, and then re-constructing a solution from those parts. Critically, it does this without compromising the stability of the solution. If anything the stability is improved because of the increased flexibility.

An analogy would be to consider the human spine - made much stronger and more flexible than a single unjointed cylinder of bone, because of its short vertebrae separated and joined by discs of cartilage. A simplified illustration of this is provided in Figure 2.

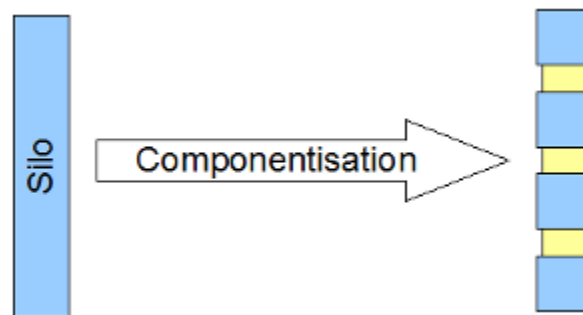


Figure 2: How a system can be broken into component parts

Software Component Models that Led to Cloud Computing

From the early days of Object Oriented Design, the IT world sought ways in which to construct the overall logic of the system from well defined software functional units. Today, these have matured into a variety of widely accepted models depending on the language and characteristics the system needs. However, they all bring with them several advantages over the siloed solution, which have enabled the evolution of Cloud computing:

- Component-based systems can be easily extended with new capabilities, as illustrated in Figure 3.

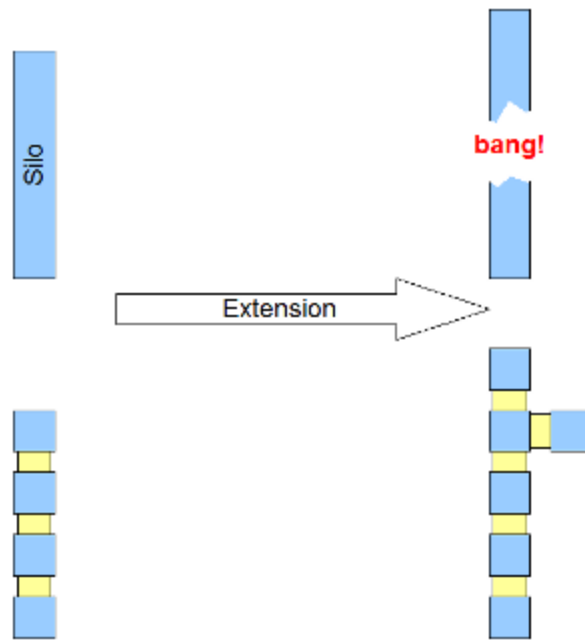


Figure 3: Comparison of extensibility between siloed and component-based systems.

- Individual components can be re-used when they do common tasks that are applicable to other solutions & scenarios, as illustrated in Figure 4.

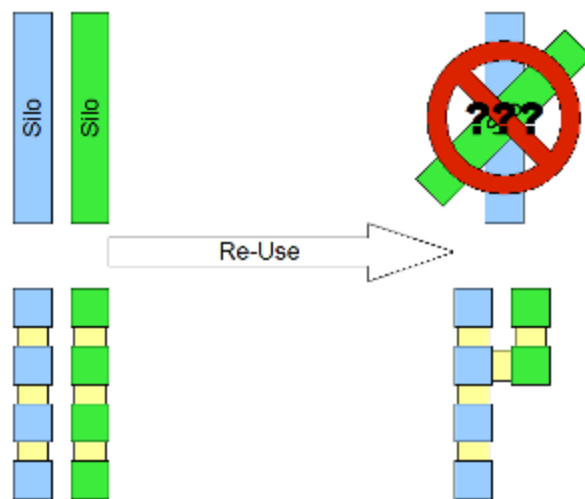


Figure 4: Comparison of re-use between siloed and component-based systems

- Commonly used groups of components are combined into layers to introduce hierarchies of increasingly complex but simple to use logic, as the complexity is hidden within the layer / group.
- Commercial application server platforms have evolved to support the run-time and integration needs of these component models, thus simplifying the complexity of integrating and managing the complete solution.

Resource Abstraction

Evolving out of component models, came the concept of resource abstraction. This allows the system logic to be separated from the resources that it needs, such as CPU capacity, memory capacity, network connections, databases etc. This is illustrated in Figure 5, with the resources represented as gold boxes.

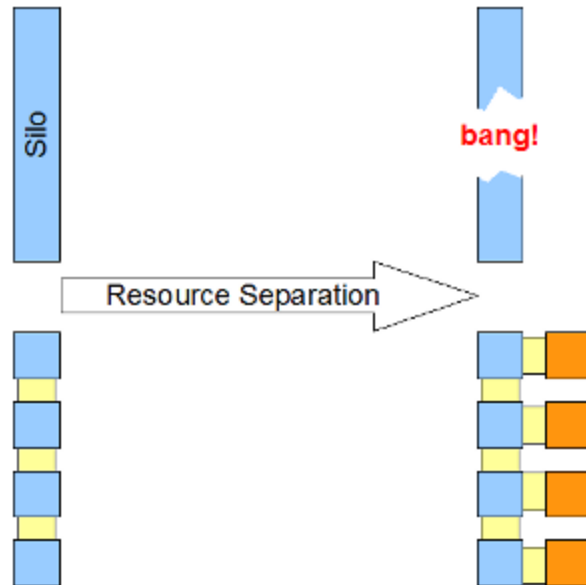


Figure 5: Comparison of resource separation between siloed and component-based systems

This ability to separate and abstract the resources needed by logical components means that:

- Resources can be individually and optimally scaled for each solution, without affecting the system logic of that solution, as illustrated in Figure 6.

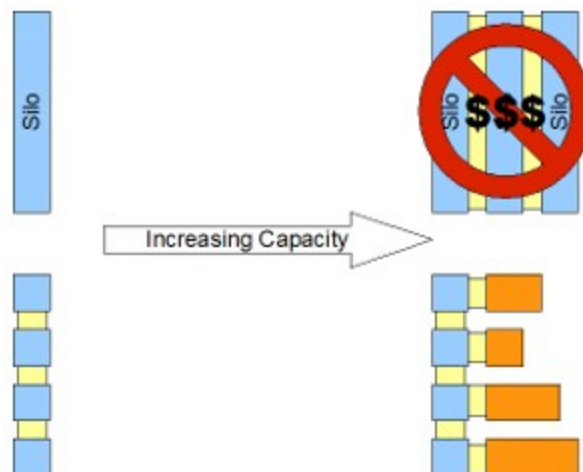


Figure 6: Comparison of resource scaling between siloed and component-based systems

- Spare or common resources can be shared with other systems, solutions or components, as illustrated in Figure 7.

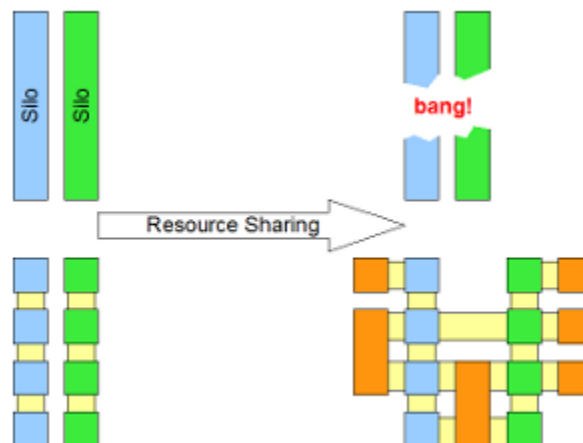


Figure 7: Comparison of resource sharing between siloed and component-based systems

- Specialized high-availability and scalability technologies can evolve according to the specific characteristics for each type of resource. This is often referred to as Visualization.

Standardized, Open APIs, Connectors and Protocols

Finally, the emergence and extensive support for standardization bodies such the Internet Engineering Task Force (IETF), World Wide Web Consortium (W3C), the Java Community Process (JCP) have been critical in the evolution of Cloud computing. These bodies help to define and guide the way in which the different components not only expose and publish their capabilities, but also how they can be re-combined, through the

use of open Application Programming Interfaces (APIs), network communication protocols, component composition models, etc. These technologies are represented by the yellow connectors in the preceding diagrams, and include:

- Web Services
- Service Oriented Architectures (SOA)
- XML and its derivatives
- SIP and its associated technologies (SIP Servlet API, SIMPLE, MediaCtrl)

Read on to see how these concepts which allowed the IT world to break free from siloed solutions and into the world of open Cloud computing, can be applied to Media Resources in the Telecommunications world.

The Media Resource Cloud Solution

Based on the information provided in the previous section it seems a natural progression to apply cloud computing principles to media resources used in conjunction with new and existing multimedia services. You might remember from our earlier illustration (discussion accompanying Figure 1) that each unique service is assigned its own set of media resources, that are independently provisioned and managed. NS-Technologies has worked within the industry to apply cloud methodologies to such media resources. This has resulted in a new network entity called a Media Resource Broker (MRB), which acts as a network wide accumulation point for media resources. Figure 8 illustrates an MRB after its inclusion in a multimedia network in contrast to the silo view in Figure 1.

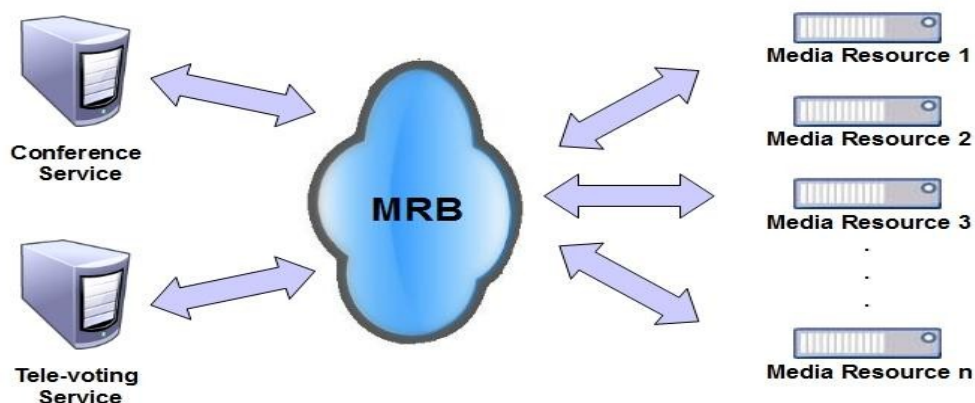


Figure 8: Services using the NS-Technologies MRB cloud

The right-hand side of Figure 8 illustrates Media Resources connecting to a general cloud, fronted and managed by an MRB. The MRB collects important information from each Media Resource such as its availability for service, its currently available and total capacity, and its capabilities. This information then allows the MRB to construct a holistic view of all Media Resources under its administration. The left-hand side of Figure 8 illustrates that existing and new services are no longer deployed in isolation with Media Resources but use the consolidated information provided by the MRB. This allows Media Resources to be utilized more efficiently. Ultimately providing a far more efficient and responsive provisioning model as compared to traditional methods.

NS-Technologies has worked within the industry to provide an MRB solution that meets the needs for any emerging next-generation multimedia network. Through our leadership NS-Technologies has produced an MRB solution with standards-compliant interfaces to media resources that ease integration. This is achieved through authoring the MRB international standard in the Internet Engineering Task Force (IETF). Housed within the NS-Technologies' MRB is exclusive intellectual property driving a powerful solution including a customizable and flexible rules engine for implementing appropriate selection policies that will meet any network's needs. The solution also provides a pluggable framework which allows deployments to link into legacy and third party systems if required.

The NS-Technologies MRB solution will not only change the way you provision your media resources in next generation multimedia networks, it will also open up opportunities for deploying new services on existing hardware.

Read on to discover the huge benefits you can enjoy as you grow your network with the NS-Technologies' solution managing your media resources.

The Benefits of an NS-Technologies Media Resource Cloud Solution

NS-Technologies Media Resource Cloud Solution delivers enormous benefits to next-generation networks capable of competing in an increasingly ferocious market place. The solution provides many benefits, which include:

Operational Expenditure (OPEX) savings: The Media Resource Cloud Solution from NS-Technologies consolidates the operational view of media resources. The MRB accumulates previously disparate network resources and provides a single view of availability, capacity and capabilities across heterogeneous media resources.

Capital Expenditure (CAPEX) savings: Utilizing media resources during idle time and combining into a single view allows for optimum usage of existing capital expenditure and an efficient architecture moving forward into a world of high demand, next-generation multimedia services.

Reduced complexity of topology and management: Multiple media resource vendors with varying capacity and capabilities can already be a pain point in network planning

and deployment. The NS-Technologies MRB solution provides centralized topology management, which simplifies the view of the network and reduces deployment pain.

Legacy support for existing services: The NS-Technologies MRB solution supports existing services already deployed. It seamlessly fits into any network and provides a moderated level of consolidation for legacy services and media resources. The ability to deploy and reap the benefits of the MRB solution today allows for immediate cost savings and a migration path for deploying new services compliant to industry standard interfaces.

De-risk newly deployed services: A major concern amongst owners of communications networks today is the financial risk of deploying new services. Using the NS-Technologies' MRB solution, you can deploy new services at an appropriate level with the intention of using idle media resources in the cloud. If the service succeeds you can increase the level of media resources. This in turn promotes increased live deployment of new services.

Manages peak traffic spikes: The MRB cloud solution has the ability to monitor individual media resources on a per service basis. Using its advanced policy engine it can also appropriately handle peak traffic spikes with selected algorithms depending on the service level. For example, the MRB might choose to reclaim some idle resources from a lower priority service. Ultimately, the MRB will act as a defender of media resources in the case of traffic flood or avalanche restart.

Summary

For owners of networks who intend on competing in the next generation of services and applications, NS-Technologies' Media Resource Cloud Solution revolutionizes legacy network provisioning methods and unlocks the full potential of your multimedia resources.

NS-Technologies reduces inefficiencies today, enables new services to be deployed on existing hardware, and provides a solution fit for the future. To find out more about the NS-Technologies' Media Resource Cloud Solution, visit <http://www.ns-technologies.com/mrb> and contact us today.



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