

**Implementing telco grade functionality
for enterprise VoIP solutions**

White paper

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Introduction

The facts are clear: VoIP technology has matured, inevitably leading to increased competition, especially from low cost solutions. How do equipment vendors and systems integrators survive? How do they protect the gross margins? How do they keep ahead of the competition? These dilemmas are faced by everyone in the VoIP industry. This article aims to provide insight into where to find the answers.

Technological superiority

One of the differentiating competencies can be achieved by developing a technological superiority. Indeed, many R&D organisations in the VoIP industry invest significant resources in research, and build incredible portfolios of intellectual property in the fields of their expertise. These companies try to create barriers to entry to secure leadership in the chosen market segments.

What could be suitable for R&D organisations doesn't necessarily apply to systems integrators, which usually have no research activity and base their business on integration with components available from suppliers of enabling technologies. In order to stay competitive, this type of organisation has to differentiate themselves by selecting and adopting the right kind of new technologies that allow their businesses to expand to a higher level.

As soon as VoIP technology starts to commoditise and the margins erode, two distinctive industry trends emerge. Firstly, some companies migrate their business into the lucrative telco market segment. Indeed, there is enough business to grab. According to a recent study, Service Provider Next Gen Voice and IMS Equipment, conducted by Infonetics Research, the carrier VoIP equipment market worldwide hit a new high in 2005, topping \$2.5 billion, and is projected to increase 145%, reaching \$6.2 billion in 2009. However, introducing telco grade VoIP offerings into product portfolios is not enough for success. The competition from 1st tier vendors is fierce and many companies, historically coming from the enterprise market, are not able to establish strong market positions in this space.

The other trend relates to companies taking a more modest approach whilst still introducing higher level functionality than competitors. The challenge of implementing telco grade features on the enterprise level solutions mainly relates to the lower cost expectations of the latter market. This requires innovative engineering approaches and new solution architectures capable of delivering more for less.

In either case, the design of new products starts from identifying all the necessary features.

Telco grade features explained

The architectures of telco grade products are designed to support several major objectives for the final solutions: scalability, remote management, interoperability and high availability.

Firstly, scalability is the ability to scale to support larger volumes of calls, connections, end points and users. The increase in the solution size, or capability, should be allowed in cost-effective increments with minimal impact on the cost of the end solutions, without total replacement of hardware or software, and without the need to re-engineer the system to contain additional services.

Secondly, remote management is the capability of the system to be integrated with the standard OSS/BSS solutions and therefore be accessed, controlled and maintained remotely. Standards-based interfaces and protocols, like SNMP, are used to enable smooth integration between the remote management products and the networking equipment.

Thirdly, interoperability is another crucial objective for any telco grade solution, where hardware and software components from a variety of vendors have to operate seamlessly. The interoperability is usually achieved by checking compliance to the appropriate standards and by performing physical testing involving equipment from several suppliers.

The final one, high availability, is the most complex objective. Simply saying, high availability of a solution means that it should always work. In the telco grade environment, the meaning of the word 'always' means that the solution should provide services 99.999% of the time, which leads to a down time of no more than 5 minutes per calendar year. Implementation of several additional system functions, like reliability, resilience, hot swap, hitless software upgrade, redundancy and protection mechanisms, contribute to enabling high availability and service continuity.

The reliability feature is frequently misinterpreted and regarded as a synonym for high quality. Having high quality for a system is certainly important, but in telco grade environments the reliability and resilience usually refer to the ability of a system to perform under critical conditions, which could be, for example, severe traffic load creating control application delays.

Hot swap is a low level feature, which enables removal and insertion of a hardware component from/to the system without the need for powering down and system reboot. This is used for 'live' system maintenance and upgrades. The hot swappable elements of a system usually include interface or media processing cards, switch boards, power supplies, fan units and fan controller boards. Being perceived as an obligatory functionality for telco grade environments, the hot swap capability has been designed into a set of international standards, including cPCI and ATCA.

The meaning of the hitless software upgrade feature can be guessed from its name. The maintenance of the software elements in a solution could require upgrades, which should be done on a 'live' system and without causing an interrupt to the system operation and performance. The capability to perform a hitless software upgrade allows the network to remain available while implementing new functionality and maintaining active calls, therefore significantly reducing 'no service' time for the solution.

The redundancy feature is described as the ability of a system to keep functioning normally in the event of a component failure, by having backup components that perform duplicate functions. The redundancy is all about eliminating a single point of failure by introducing alternative hardware and software elements, allowing automatic detection and recovery from element failures without impacting calls that are in progress. The feature is implemented utilising protection mechanisms according to any of the standard protection schemes.

Understanding protection schemes

In the telco grade environment, protection is usually implemented for all active elements of a solution, both for hardware and software. Therefore, card level, interface level and even system level redundancies are common. Two basic protection schemes exist and they are abbreviated as 1+1 and N+1.

The 1+1 scheme means that for every active element in the system there is an alternative, which operates in a standby mode and is ready for action in case the main element fails. This approach is relatively simple for implementation, but is the most expensive, requiring replication of the entire solution and doubling the cost.

Under the second scheme, N+1, there is only one alternative element operating on the standby mode for a set of N active main components. The approach provides significant cost reduction compared to the previous scheme, but imposes a great implementation challenge, requiring significant engineering skills. Although the concept of this protection scheme is not new to the communications equipment vendors' community, creation of truly redundant

systems, keeping architectural flexibility and a relatively low cost, is still perceived as a notable engineering achievement.

The difference between these protection approaches is demonstrated in the following examples, based on an enterprise level IP to PSTN gateway application. Usually, the enterprise level gateways do not utilise the softswitch architecture, therefore contain the media and signalling gateway capabilities in one device. The gateway is a stand alone chassis, containing hardware cards to deal with the media and signalling processing and a high level control application. The device can be managed locally, or using a remote management system, which in some instances could be a standard web browser.

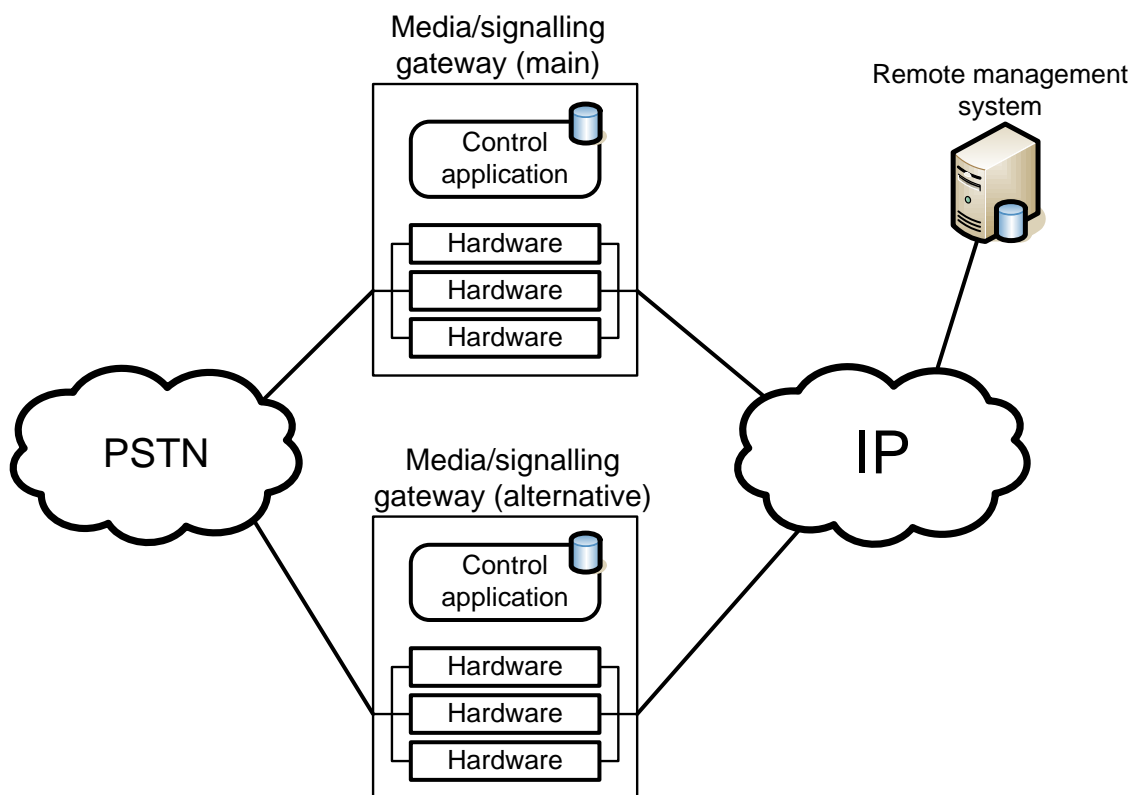


Diagram 1 – Implementation of high availability gateway solution using 1+1 protection scheme

The architecture of the first solution, shown in Diagram 1, eliminates a single point of failure by replicating the main device with an alternative one, which operates on standby and which should take control over the voice media and signalling streams in case of failure. The switching between two devices can be manual or automatic, also known as 'automatic

failover'. It is evident that the total cost of the solution is high as it includes the expenditure for two identical devices.

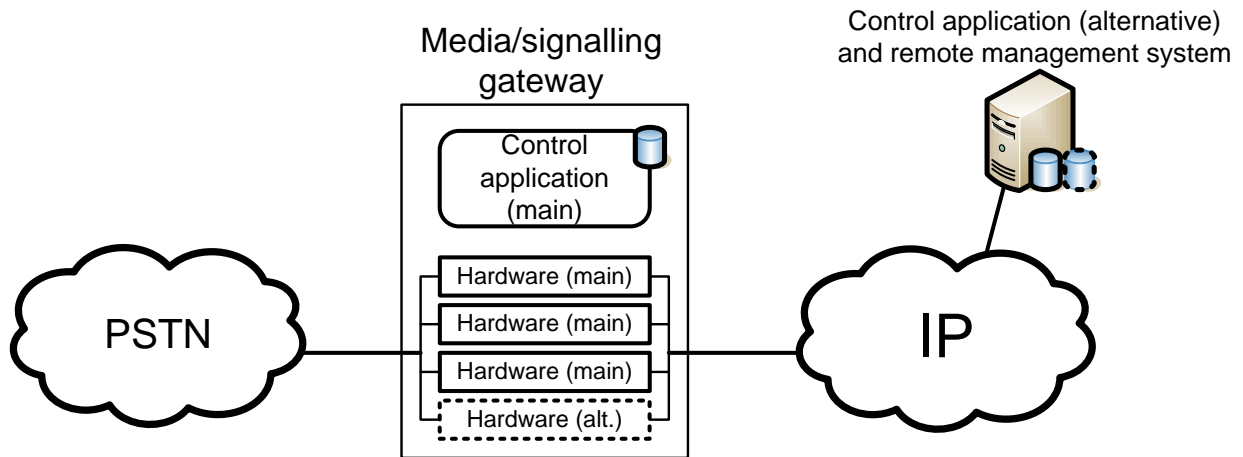


Diagram 2 – Implementation of high availability gateway solution

using N+1 protection scheme

The architecture of the second solution, shown in Diagram 2, eliminates a single point of failure by introducing minimal additional hardware and software elements and retains only one physical device. It makes use of the inherent strengths of the IP world to create distributed applications, allowing the alternative control application to be remote from the hardware. This example provides the same level of availability for the final solution as the previous one, but with the lower device count and total cost of ownership, therefore realising significant cost savings.

Deliver top-class solutions with Aculab

Aculab is a leading supplier of enabling technologies for VoIP and PSTN communications solutions, providing developers with a wide assortment of media processing platforms, TDM connectivity cards and signalling protocols.

All Aculab products support creation of 1+1 protection schemes. However, the new architecture of the IP core-based media processing platform, Prosody X, enables implementation of systems with distributed elements and N+1 protection scheme, making it the preferred choice for the development of cost effective, telco grade, feature-rich solutions for the enterprise market. Organisations developing applications with Prosody X benefit from the innovation offered by Aculab, allowing them clear technology-based differentiation and the ability to grow their businesses in the commoditising VoIP market place.

Conclusion

Equipment vendors and systems integrators, designing and building VoIP solutions for the enterprise market segment, are constantly looking to differentiate from the competition. Finding it difficult to sustain barriers to entry in the maturing VoIP industry, these companies have a straightforward option to progress their business by adopting technologies and practices from the telco market segment.

Thanks to Aculab's Prosody X products, the implementation of telco grade functionality for enterprise solutions is now feasible. Utilising distributed architecture inherent to the IP environment, innovative organisations are able to create highly available, interoperable and scalable solutions for lower cost, while guaranteeing telco grade performance and full reliability for highest quality services. The flexible integration of functionality delivers Capex and Opex reductions through minimising networking equipment count and simplifying operational processes.

The introduction of the improved functionality becomes imperative for enterprises to enhance their converged network platforms for the delivery of innovative, next generation services for their organisations and customers.

1. About Aculab

Aculab enables developers and systems integrators to produce a variety of high performance communications solutions. Aculab's portfolio offers an exceptional mix of capabilities that are easy to integrate and bring real value – reduced costs, increased customer satisfaction and competitive advantage. A complete range of open standards building block technologies for use within telco or enterprise environments, as well as essential support services, are offered. Products include media resources, digital network access, VoIP, fax, speech processing and conferencing. Support is available to help developers through each stage of their product's life cycle including pre-sales consultancy, technical support, training and marketing.

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