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## A Paradigm Shift in Acquisition Technology

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### Summary

*Land seismic data is typically under-sampled for a number of technological, environmental and economic reasons, thus compromising the development of onshore hydrocarbon resources. However, a convergence of digital technologies from a broad range of industries are being integrated and brought into the seismic world to create a paradigm shift in the capabilities of seismic acquisition system.*

### Introduction

Despite much of the E&P industry's recent focus on the significant opportunities that lie offshore, reports on the top 25 hydrocarbon-bearing basins in the world demonstrate that the majority of existing reserves and potential resources are onshore. The opening up of countries with significant onshore opportunities such as Libya and Russia, plus recent successes in unconventional land gas plays such as the Barnett shale in the USA and fractured plays in China are leading to an upsurge in land seismic technologies. However, land seismic data is typically under-sampled for a number of technological, environmental and economic reasons, thus compromising the development of these resources.

Traditional cable-based acquisition systems using modern economic electronics have allowed the channel count to grow, but these systems are people and equipment intensive and, together with environmental and physical issues, constrain the ideal sensor deployment needed for improved sampling. This causes costs to quickly rise and brings the inevitable trade-off of low sample densities with modest subsurface resolution. With land acquisition costs significantly increasing over the past couple of years, there is a lot of interest amongst E&P operators for solutions that improve sample density to achieve the improved imaging whilst at the same time reducing costs. Add in parallel developments and interests such as high-density, wide-azimuth and multi-component data and it becomes clear that the

industry needs to make a paradigm shift in acquisition technologies to meet these demands.

Our vision for the future of seismic acquisition is one where we move from the traditionally under-sampled survey of today to a fully-sampled data set with all of the associated imaging benefits this brings. To meet the sampling density requirements, we see a cable-less solution as a means of improving productivity and scalability – increasing station counts without a corresponding increase in manpower requirements, in fact a decrease – as well as reducing the industry's impact on the environment and improving crew safety.

A convergence of digital technologies, including MEMS devices, flash-memory, GPS, LiDAR and new radio technologies, from a broad range of industries are being integrated and brought into the seismic world. The outcome is to provide much more than a simple piece of recording hardware – these integrated technologies form an ecosystem of supporting technologies which create the paradigm shift in the capabilities of seismic acquisition systems and truly allow seismic to become a force in reservoir development.