TRANSFORM OILFIELD OPERATIONS

With IIoT, HTS and MEO satellite technologies

COSTLY INEFFICIENCIES

Simplifying and efficiently managing well complexity, geographically disperse assets and hundreds of crew members across the oil and gas (O&G) value chain is an expensive, herculean task. It's no wonder the cost to produce a barrel of oil and gas varies so widely for companies throughout oil producing countries (Figure 1). With declining oil prices, members across the O&G ecosystem are seeing margins being squeezed, making more cost-efficient, yet safe operations their highest priority.

While the industry has made many systemic improvements to reduce operational costs across the board, finding areas of long term sustainable improvement must become a priority if companies want to stay competitive in a rapidly changing industry. Obtaining better margins and reducing cost variability are imperative to sustaining cash-flow to support new field development.

Within the O&G ecosystem, there are thousands of operational points, sensors and assets that can be monitored, controlled and optimised to wring inefficiencies from the end-to-end production process.

The process as it stands today, from research and exploration to drilling and production (upstream), transportation and storage (midstream), and distribution of refined products (downstream), is rarely streamlined for maximum efficiency. Consider that most O&G related communications, information technology (IT) systems, and operational technology (OT) systems are still separately purchased and managed across a highly distributed number of locations. Systems don't interoperate. And data is produced in incompatible formats so is not easily aggregated and analyzed across operations to pinpoint costly inefficiencies.
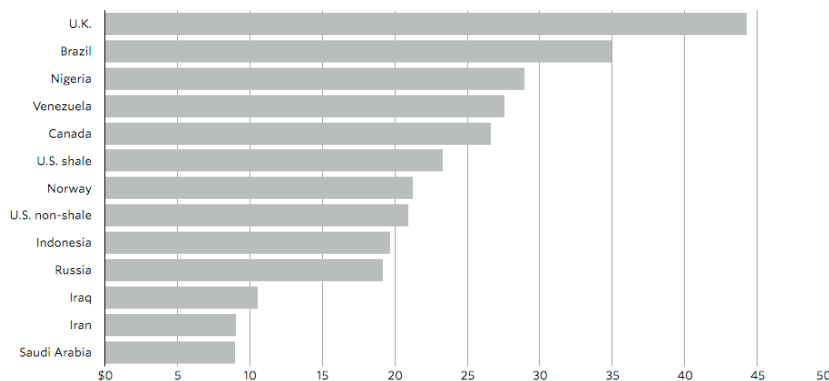
SES^ | Networks

Figure 1
Cost of producing a barrel of oil and gas
Source: Rystad Energy UCube
(via WSJ News Graphics), 2016

DATA-DRIVEN EFFICIENCY GAINS

While the concept of the "digital oilfield" has been around for nearly 30 years, new multi-orbit satellite, networking and cloud technologies are cost-effectively bringing a whole new level of data-driven efficiency to digital oilfield operations. Market leading O&G companies are increasingly leveraging managed connectivity solutions and real-time analysis of converged Industrial Internet of Things (IIoT), IT and OT data flows, to maximise positive business outcomes. Such solutions securely deliver critical information in real-time to and from users and IIoT "big data" analytics platforms that automatically and continuously uncover ways to:

- Reduce non-productive time (NPT);
- Optimise performance of assets and systems;
- Improve safety and reduce risk exposure;
- Drive better data-driven decisions faster;
- Reduce travel, logistics and supply chain costs; and
- Enhance crew communications, collaboration and welfare.

THE IIOT-ENABLED DIGITAL OILFIELD

New IIoT-enabled IDOs, tools and cloud computing capabilities are being used to discover and remove inefficiencies from every part of the production process. Digital oilfields have long used Geostationary Earth Orbiting (GEO) satellites to carry voice communications separately from Industrial Control Systems (ICS) data generated from programmable logic controllers (PLCs) and supervisory control and data acquisition (SCADA) systems to decision-makers in multiple locations. But the hundreds of sensors in devices, heavy equipment, and Floating Production Storage and Offloading (FPSO) systems used today (Figure 2) can easily produce over 205 Terabytes of real- and non-real- time data in one day from a single platform. Because of the expense and level of effort required to aggregate so much disparate data being generated via separate data streams, much of the IT/OT data collected by legacy sensors has gone underutilized.

"With the SES Networks O3b MEO solution, we can setup offshore as an extended environment to onshore support to implement a consistent and efficient management system and improve control of the work, which will eventually reduce operations costs."

Figure 2
MODEC's FPSO Cidade de Caraguatatuba MV27, Lapa oil field in the "pre-salt" region of the Santos Basin off the coast of Brazil

Next-generation High Throughput Satellites (HTS) and Medium Earth Orbiting (MEO) satellites connecting converged virtualized IT/OT systems have become instrumental in powering a more efficient and intelligent IIoT-enabled digital oilfield. With more software-defined GEO and MEO satellite connectivity options powering evolved packet core (EPC) transit and 4G/LTE access, cloud-scale networks, and data flows from IIoT sensors, O&G customers have gained real-time visibility into, and remote control over offshore assets, operations, and systems from virtually any location. MEO satellite-enabled fibre-equivalent internet and private network connectivity is also providing crew members with mobile access to onshore support, superior performance for business-critical cloud IT/OT applications, and real-time communications and collaboration capabilities -- all over a single managed low latency (<150ms satellite data round-trip) virtualized connection.

Connectivity at fibre speeds allows IT and OT personnel on and off-site to:
- Assess current operational conditions, flow rates, temperatures, inventories and more
- Manage assets, upgrade systems proactively using automated rules, and improve asset utilization rates
- Optimize energy savings/consumption in real-time
- Record and analyse sensor data across operations

INDUSTRIAL STRENGTH VISIBILITY WITH ADVANCED CONTROL

Satellite network-driven IIoT-enabled IDO solutions deliver industrial strength visibility into pain points in existing processes and systems. These intelligent solutions leverage easy to obtain, inexpensive IP-ready sensors embedded in heavy drilling equipment, pressure and temperature gauges, and all types of monitoring systems. They also provide operators with advanced control over these components (Figure 3). For example, IIoT sensors deployed on and around rig fleets and on production platforms, produce real-time and near real-time simultaneous flows of data from sources such as security cameras, safety monitoring equipment, down-hole multiphase sensors, measurement-while-drilling (MWD) applications, multilateral completions, and down-hole separation. An IIoT-enabled IDO automatically aggregates, prioritizes and securely transports ecosystem IT/OT data and HD quality IP video feeds using 3G and 4G/LTE access networks powered by MEO and GEO satellite uplinks and downlinks. Where latency is a major concern, MEO satellites can more quickly move video images, SCADA, RFID and IIoT data at fibre speeds to and from rigs, production vessels, onshore data centers, medical resources, and subject matter experts located virtually anywhere -- at data throughput rates of up to 2Gbps.
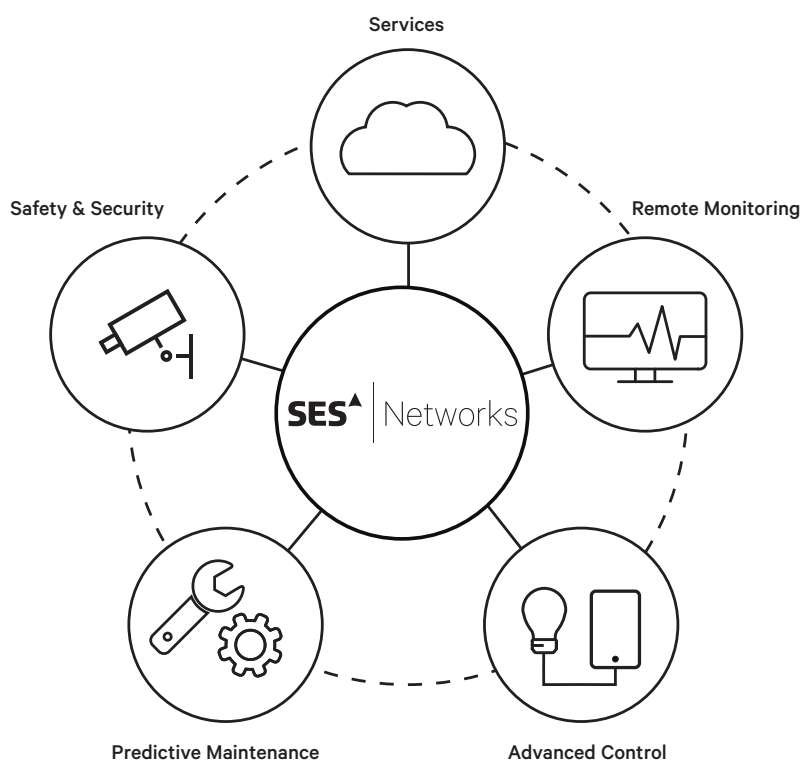

Figure 3
Industrial Internet Consortium, http://www.iiconsortium.org/vertical-markets/energy-utility.htm

Resilient high performance, low latency satellite-enabled connectivity for IDOs allows O&G stakeholders to:

- Gain real-time industrial strength visibility into and control over network traffic:
- Provision bandwidth on-demand when and where it is needed, especially in remote areas and where physical access is difficult;
- Remotely conduct predictive maintenance tasks, safety and security inspections, device and system changes, and view real-time video from any location;
- Glean insights from cloud connected IIoT platforms such as GE Predix, IBM Watson, Microsoft Azure for IIoT, and others for automated big data analysis on large converged data sets;
- Use more cost-effective 4G/LTE communications services such as VoLTE and ViLTE;
- Provide real-time video calling so remote teams can benefit from coaching and industry, technical and medical experts at other locations; and
- Reduce safety incidents through early warnings to shut down faulty systems before an accident occurs.

CONNECTING TO THE HEART OF OPPORTUNITY

Upstream, midstream and downstream providers who want to connect to the real heart of opportunity in a rapidly changing, more competitive energy environment, must leverage satellite-driven IIoT-enabled IDOs to remove costly process inefficiencies. Only by doing so and by applying insights from big data analysis platforms, can O&G companies obtain higher margins, protect the cash flow needed to support new oil and gas field development, and thrive.

Every day, SES Networks' Oil and Gas Solutions help producers, service providers and their customers improve efficiency, productivity and profitability using multi-orbit satellite system IIoT-enabled Intelligent Digital Oilfield (IDO) technologies.

Learn how SES Networks can help your oil and gas related business benefit from:
- Increased worker, asset and facility productivity and revenue;
- Reduced discovery, drilling and production costs;
- Prevention of production, service and safety incidents through proactive maintenance; and
- Reduction in non-productive time (NPT).

COVERAGE MAP
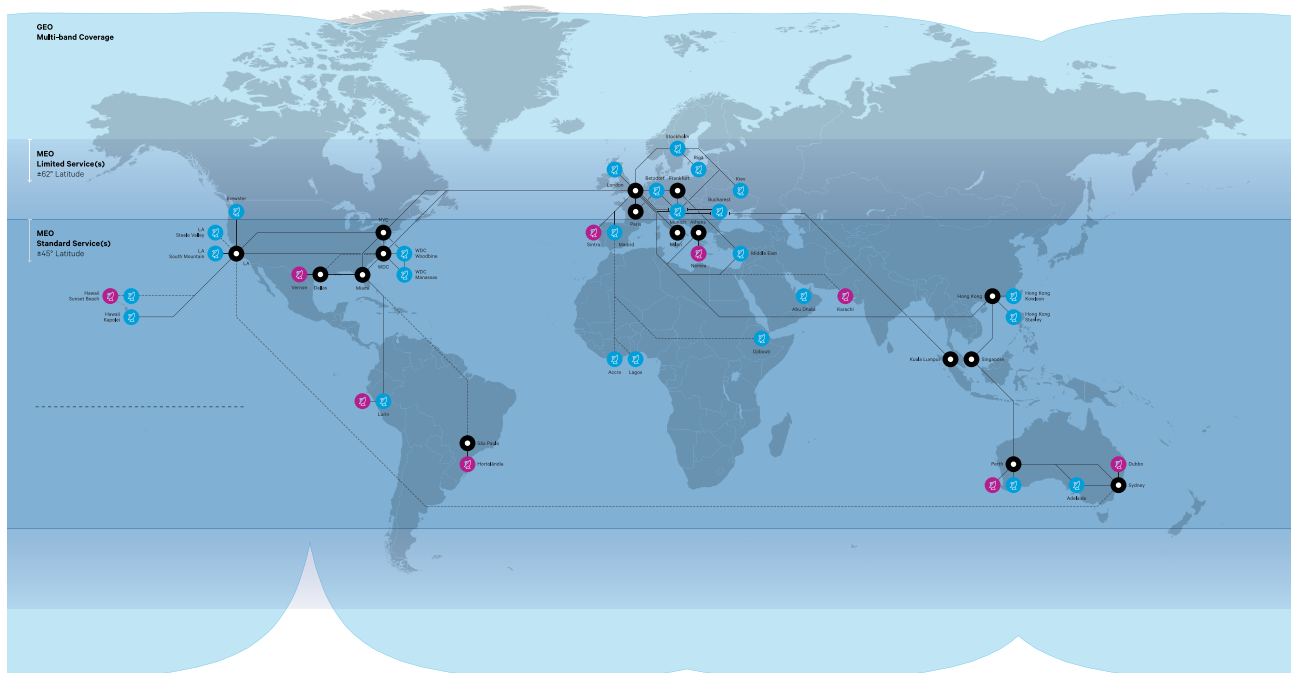
TRANSFORM OILFIELD OPERATIONS

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