

Gottlieb's

SATELLITE MOBILITY WORLD

Independent Analysis and Commentary on Maritime, Aero and Land-based Satellite Technologies

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What's Up in the Oilfield?

An Interview with Andrew Lucas, V.P. Mobility Comtech EF Data

With the decline in oil prices, drilling contractors and oil operators are in a constant quest to lower operating costs and improve efficiency. New and improved communications technologies, IoT and "Big Data" are rapidly moving to the forefront as the oilfield races to modernize, streamline and automate operations.

High Throughput Satellites, advances in Hub and Modem technology, IoT and "Big Data" analytics are rapidly taking on a significant role in these efforts to move the industry forward. To get an updated look in the new technologies rapidly becoming available and their impact on the industry, we met with Andrew Lucas, a well known veteran of the oil patch and delivery of satellite communications services to the energy industry.

SM: The price of oil continues to fluctuate and some forecasts expect it could fall to the \$30 per/barrel level. We have all lived through cyclic downturns in the business only to see supplies tighten and within a 3-5-year time frame, prices rise again. Given that offshore drilling is the primary driver of VSAT use and revenue, do you and your colleagues in the oil patch think the activity will continue in its traditional cyclic pattern, or will we see a prolonged low price and a continued decline in offshore drilling activity?

Andy Lucas: I wouldn't like to make any forecasts for the future price of oil, but regardless of its price I would suggest its fair to say that the cycles of the future will differ to the cycles of the past due to the vast oil production potential unleashed by horizontal fracking, the advanced data analytics being used to optimize exploration and extent the life of existing reservoirs, the rise of renewable, electrically powered vehicles and automation.

Whilst the changes are deep, during times of low oil prices, connectivity has been an essential aspect of creating efficient work-flows and satellite, in particular, can take on an even more dynamic role in the future of oilfield operations.

In an evolving IP based model, client operations can be vastly optimized by gathering data from every pump, switch and valve and transmitting it to a central point for "Big Data" analysis and, in turn, transmitting back commands to the field devices to optimize production. In this regard, satellite is an unrivaled solution with respect to the collection and delivery of data, satellite being the most ubiquitous, reliable field connectivity for distant and moving facilities such as deployed within the Energy sector.



SM: If the total number of active offshore rigs declines, have you seen an increase in the use of communication services to lower costs? Considering that bandwidth costs on a megabit basis are falling rapidly and Comtech is deploying a dynamic SCPC platform, how has the use of bandwidth on the rig changed? What new applications are being enabled by these new technologies? Are we seeing an increase in the use of IoT and Big Data applications?

Andy Lucas: Yes, there has been a notable increase in the criticality of communication with respect to improving the clients operations with solutions such as Remote Operations.

There has been a trend to shift to a model in which a few experts can manage many remote sites versus the traditional model that locates many experts at each remote site.

The challenge though is less one of cost, but ensuring the quality of the connections is such that it can be trusted to facilitate such Remote Operations in a safe and reliable manner. Comtech products are particularly well suited for this mode of operation where we can offer the most robust service and CIR guarantees by design within the technology.

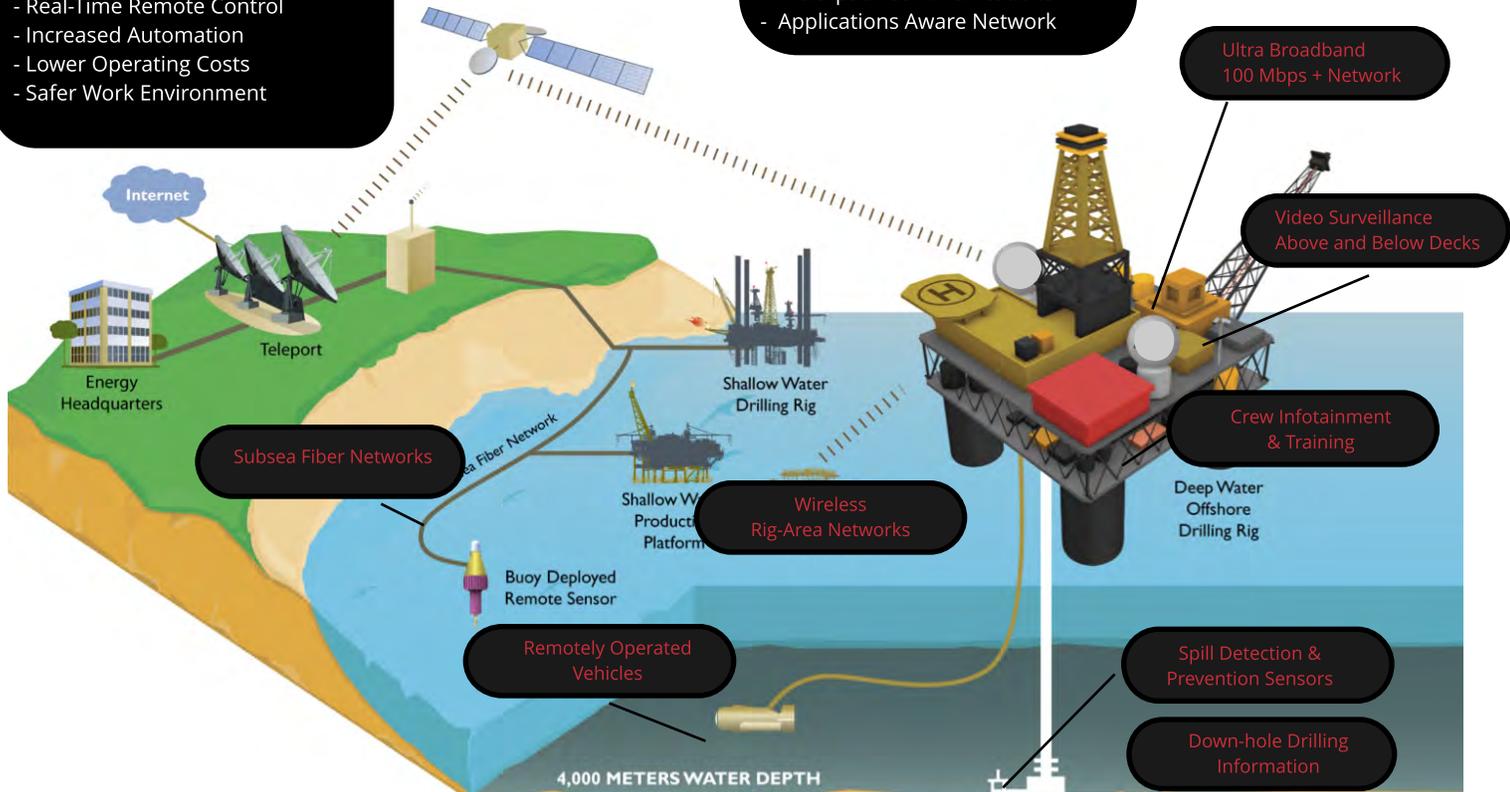
What are typical Mbps requirements on Rigs and OSV's today, and how much do you think they will increase in the next 3-5 years?



Energy Trends: Emergence of the Digital Oilfield

- Improved Situational Awareness
- Faster Decision Making
- Real-Time Remote Control
- Increased Automation
- Lower Operating Costs
- Safer Work Environment

- 100 Times the Bandwidth of Today
- Every IP Device Connected
- Multi-path Communications
- Applications Aware Network



Ultra Broadband
100 Mbps + Network

Video Surveillance
Above and Below Decks

Crew Infotainment
& Training

Deep Water
Offshore
Drilling Rig

Spill Detection &
Prevention Sensors

Down-hole Drilling
Information

Subsea Fiber Networks

Remotely Operated
Vehicles

Wireless
Rig-Area Networks

4,000 METERS WATER DEPTH

Andy Lucas: There is a wide variation on bit rate depending on client needs, but we do expect this to continually grow over time with new demands such as real time, high definition site video surveillance, ROV video streaming, Remote Operations, increased use of Industrial IOT and associated data analytics. For example with ordinary communications the data rates can vary from hundreds of Kbps to tens of Mbs, with on demand requests in support of occasional use for video streaming or rapid file delivery becoming commonplace. Comtech EF Data technologies flexible architecture is particularly well suited for handling these wide varieties of speed and usage requirements.

As a key design principle, Comtech EF Data Heights modems are designed with considerable CPU horsepower to allow upgrades to be introduced in the future, thus allowing the technology to grow as the clients demands evolve.

SM: TDMA has been overwhelming popular in the offshore oilfield. Will Dynamic SCPC displace TDMA technology?



Andy Lucas: Dynamic SCPC (dSCPC) is particularly useful where high levels of performance, best latency & jitter, best efficiency and CIR guarantee's are required, but it does come with limitations around how flexible it responds to bursty traffic.

Recognizing that clients want the benefits of both SCPC and TDMA, Comtech EF Data has announced the imminent availability of its third generation return access scheme, H-DNA Heights Dynamic Access, HDNA combines the best characteristics of SCPC and TDMA creating a high performance environment which eliminates the compromises a client in the past was required to make, that is between the performance & efficiency of SCPC , and the flexibility of TDMA. With H-DNA, CEFD offers the best of both worlds. It offers the high speed reallocation of network resources like TDMA but with the advantages of lower overhead and the higher throughput of SCPC.

SM: Reasonably priced flat panel, Ku-Band phased array antennas will soon enter the market. Considering that Ku-Band LEO constellations are in the works and that the flat panels can access two

satellites simultaneously, how will the availability of low latency, HTS LEOs combined with these antennas effect communications? What is the future of this technology combination on rigs, offshore service vessels and cruise vessels? Will they displace HTS GEOs?

Andy Lucas: Both LEO constellations and flat panel antennas are an exciting new proposition which will greatly increase the addressable market for satellite communications. These advanced technologies will create new applications for satellite delivered solutions which today would not be viable. In particular, considering the complexities of installing traditional VSAT antennas, which is a barrier to entry for the satellite industry, the use of flat panels greatly simplifies this aspect by virtue of their real time, automatic self pointing feature.

Equally, these solutions will be complimentary to the existing GEO networks and the most successful offerings will likely be a hybrid of LEO, MEO and GEO where the best characteristics of each are leveraged to the best effect.

For example you could conceive that when the user clicks a link that the click itself is sent via LEO or MEO for responsiveness, however the 4K video stream that is initiated is delivered via GEO as that has the best economics.

So no, I don't believe the new technologies will displace GEO, but I do believe the industry will embrace hybrid solutions that harness the best aspects of each discrete technology, creating more effective, easier to use and more user centric solutions.

SM: In maritime markets, modems have traditionally accommodated vessel movements by beam switching based on the location of fixed beams. How difficult will it be for modem manufactures such as Comtech to accommodate beam switching in a LEO model?

Andy Lucas: Beam roaming with LEO is more complex as there are more moving components. GEO roaming itself rapidly creates sophisticated beam rules, particularly when you consider HTS satellites with the many overlapping coverages they create, resulting in significant more complexity. So considering LEO constellations have far more satellites, the satellites now move, and there are far more beams to consider making network design is more challenging.

In this regard, CEFD has been providing beam

