

# Communications for Iraq's Digital Oil Fields

A Technology Partners White Paper

TECHNOLOGY PARTNERS

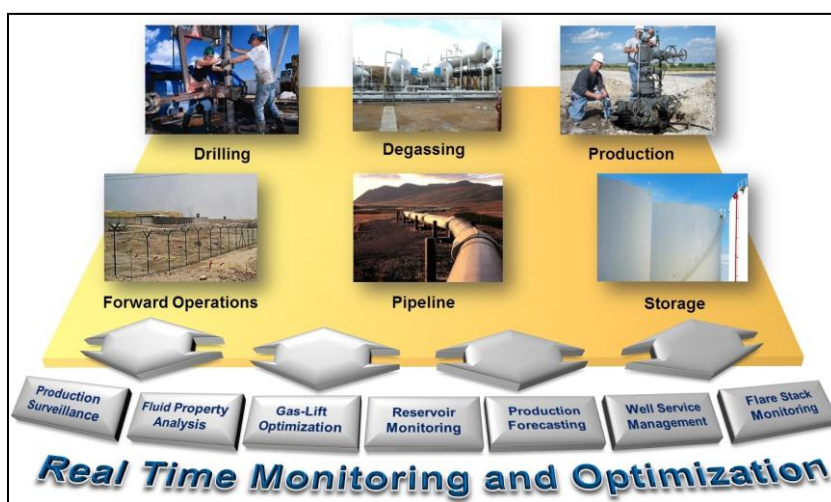
Committed to Building Iraq's Critical ICT Infrastructure

The Iraq Oil and Gas sector is currently going through very rapid expansion, as recently-formed Joint Ventures with the Iraq Regional Oil Companies are expanding operations to meet Iraq's aggressive oil production targets (from the current 2.1 million barrels per day, to a targeted 8-12 million bpd by 2017). Technology Partners is assisting this growth by providing a broad and innovative range of critical communications and security infrastructure solutions.

## The Digital Oil Field

Today, real time measurement and control is essential for efficient oil field operations. The Digital Oil Field delivers proven benefits across all aspects of oil field exploration and production, from drilling to storage and pipeline monitoring.

But real time monitoring and control requires **real time data communications** from widely distributed "end points" – buildings, plant and equipment located across the entire oil field.



Historically, this communication has been achieved by creating individual data links from each remote location to a central monitoring base (or bases). In difficult environments like the Iraq Oil Fields, where we start from a complete absence of basic communications infrastructure, this has often required the use of expensive communications technology such as VSAT for many critical, distributed operations such as drilling rigs, degassing stations, pipeline infrastructure and forward operations camps. These standalone communications links often create single points of failure.

Technology Partners has pioneered the development of very large scale ICT infrastructure for utility Smart Grid and ISP data access solutions in Iraq and the MENA region. From our direct experience of deploying the largest wireless networks in the world, supporting hundreds of thousands of end-points for mission critical applications like SCADA, we know we can deliver similar multi-use infrastructure across the harsh environment of the Iraq oil fields - economically and to optimized performance levels. This White Paper discusses how such infrastructure can be used to provide future-proof connectivity for the entire oil field while improving communications performance, security and resiliency.

Our multi-layer, multi-use infrastructures deliver military-grade security, QoS and reliability to rigorous, application-level SLAs (Mbps mobile performance, 100% coverage, 99.999% availability, for example). We use only industry-standard, proven components with unified and centralized network management applied across all infrastructure layers.



## Digital Oil Field Communications

An oil field-wide, Digital Oil Field network is a complex “network of networks” infrastructure that invariably requires multiple communications layers and technologies such as fibre, VSAT and microwave backhaul, and wireless “last mile” infrastructure. To support the Digital Oil Field’s critical applications this infrastructure has to have extremely high resiliency, security and reliability (often higher than “carrier-grade”), and must deliver complete connectivity to all distributed end-points. It also needs to be a true multi-use infrastructure, allowing traffic over the network to be segmented by application-defined priority, bandwidth and security policies. Fortunately, such technology is now available, proven and cost effective, with many deployment examples around the world, including in the Middle East.

In fact, such technology is not new at all.

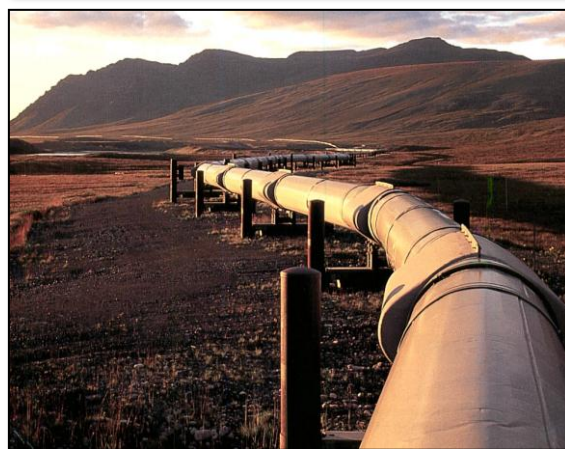
Telecommunications companies and service providers have been delivering service-area wide networks for years. They provide segmented or “virtualized” networks to deliver voice, data and television services over a common infrastructure at multiple levels of priority and security.

Electric utilities around the world are deploying “Smart Grid” networks across entire utility service areas, with coverage measured in thousands of square kilometers.

They are delivering mission critical applications such as SCADA measurement and control of the electric grid and water and sewerage infrastructure. Such networks normally include connectivity to hundreds of thousands of metering end-points, orders of magnitude more than is required for similar applications in the Digital Oil Field.

Technology Partners has pioneered the delivery of Smart Grid networks in the Middle East, and is nearing completion of one of the world’s most complex in the United Arab Emirates. When finished, later in 2011, this network will be the largest mesh wireless deployment in the world, covering over 4,000 square kilometers (1500 sq. miles) of contiguous broadband coverage and connecting over 750,000 metering and SCADA end points. It is a true multi-use network infrastructure currently supporting multiple discrete applications, each delivered to its own application-specific SLA and security policy. These include 100% availability and 99.999% resiliency for meter reading, for example, and sub-15ms network latency and military-grade security for SCADA management.

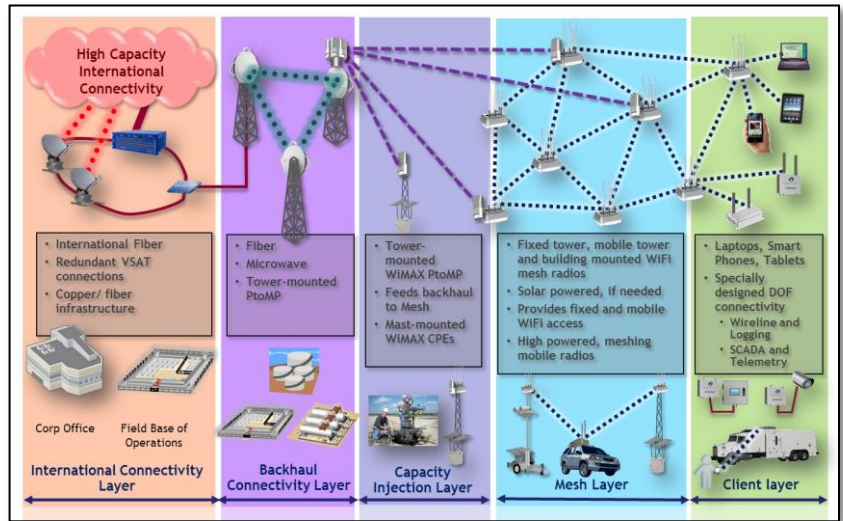
To achieve compliance to such SLAs, multi-layer “network of networks” infrastructures such as these require centralized and unified network management. All components of these networks are manageable down to the client level through a centralized NOC, allowing complete monitoring and management of the entire infrastructure.



## Communications for the Entire Digital Oil Field

Similar multi-layer, multi-use network infrastructure is directly applicable to Digital Oil Field applications, and can be readily optimized for the physical environment.

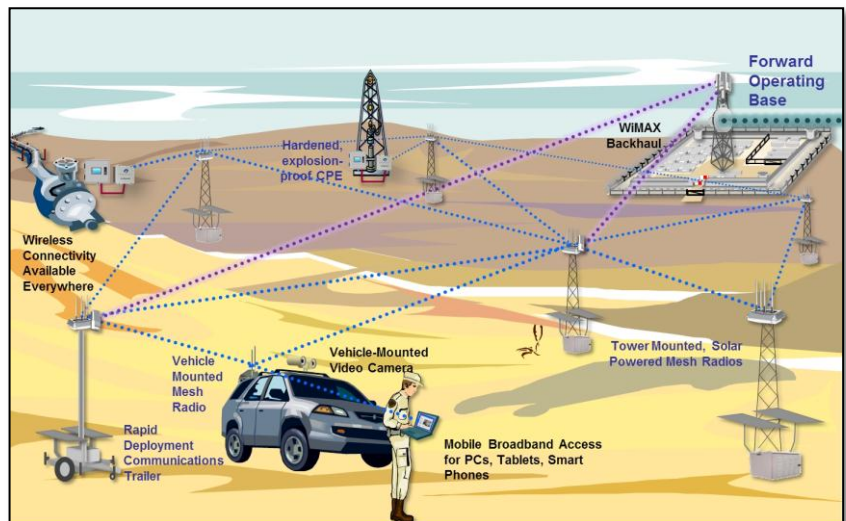
In the absence of available connections to international fibre in or near the oil fields, high capacity, **international connectivity** has so far been provided through multiple (and expensive) VSAT connections. VSAT sites are normally located at forward operating camps which provide the necessary physical and security infrastructure to act as communications hubs.



Forward operating bases are frequently linked together using high capacity microwave to form a redundant **backhaul connectivity layer**, while the power and tower mounts used for the microwave links also form the anchor points for the “last mile” mesh solution that delivers ubiquitous wireless coverage to the Oil Field area.

WiMAX point-to-multipoint technology is used to connect these anchor points to the mesh radios as a “**Capacity Injection**” layer. The WiFi **mesh layer** extends the WiMAX coverage and provides the resiliency needed to support mission critical SCADA and other applications. The selected WiFi mesh technology has been successfully utilized in over 800 deployments in 35 countries, and in the world’s harshest environments, including Middle Eastern deserts.

The mesh radios are very high powered (4W) and this fact, together with the wireless-friendly environment, allows them to connect effectively over a sparse mesh topology – typically from low cost towers spaced at 1-2 Km (0.6 - 1.2 mile) intervals. As each mesh radio can effectively “see” around 20 others, resiliency is preserved even in the case of multiple mesh or backhaul radio failure.



The use of multi-band WiFi provides around 250MHz of spectrum that allows the meshing optimization software maximum flexibility - it automatically adjusts mesh routing, band and channel selection, air time and transmitted power in real time.

The use of WiFi also enables compatibility with the greatest number of client devices. These range from standard laptops, tablets and smart phones, to security and application-specific wireless connection devices developed for the increased security and environmental demands of the Digital Oil Field.

**Mobility** is a key advantage of this technology. The availability of vehicle-mounted, high-powered meshing radios enables continuous mobile broadband connectivity at speeds of over 100 Km (60 miles) per hour and at distances of several Km (1.5 - 2 miles) from the mesh towers. These mobile mesh radios also create localized hot zones around each vehicle, enabling local connection to dismounted laptops, smart phones and tablets.

The radio characteristics and low power draw of the mesh radios enable them to be mounted on solar-powered towers at approximately 8 meters (25 feet). These towers and the power units are available as easily installed, off-the-shelf components. The radios also provide a PoE facility that can be used to power other tower-mounted devices such as the WiMAX CPEs or video surveillance cameras. Self-contained, trailer-mounted towers are available for temporary extensions to the mesh coverage area.

The entire network system is manageable from a centralized NOC, which monitors connectivity down to every client device. The NOC provides the normal management functionality of remote alarm monitoring, remote configuration, and statistical reporting.

The prevalence of industry communications standards, and the availability of robust, Commercial Off-The-Shelf (COTS) components now makes this infrastructure surprisingly affordable, especially when key Digital Oil Field assets such as Forward Operating Camp infrastructure and existing plant is utilised. The creation of multi-application broadband infrastructure across the entire oil field enables unlimited expansion, optimizes CAPEX and minimizes OPEX. Technology Partners supports all of our deployments in Iraq with a complete range of backup services, from on-site technical support to managed service contracts. These are delivered by our dedicated in-country Iraqi engineering team to minimize operational risk and costs.

## Getting it Right First Time

A reliable, secure and high performing data communications infrastructure is the key to Digital Oil Field communications. The technology is now economical, available, and proven. Building communications capability is an integral and critical part of the modern oil field, and with the huge investment being made in Iraq oil field development, there is a strong business case for getting the communications component right first time.

### About Technology Partners

*Technology Partners FZ, LLC* is a full service communications and information technology (ICT) integration and solutions company. Technology Partners focuses on very large scale telecommunications and network infrastructure, applications and services which are designed, deployed and supported by our highly skilled technical and management team. These solutions are created from best-of-breed, industry-standard components, acquired through international partnerships with the world's leading technology vendors. The company delivers complete solutions from requirements analysis through design, procurement, development, integration, testing, and end-user training. The Corporate Head Office of Technology Partners is in Dubai, United Arab Emirates, in Dubai Media City. TP also operates from branch offices in Maclean, VA in the USA, and Baghdad, Erbil and Basra in Iraq. Further information on Technology Partners is available at [www.tpfz.com](http://www.tpfz.com).

