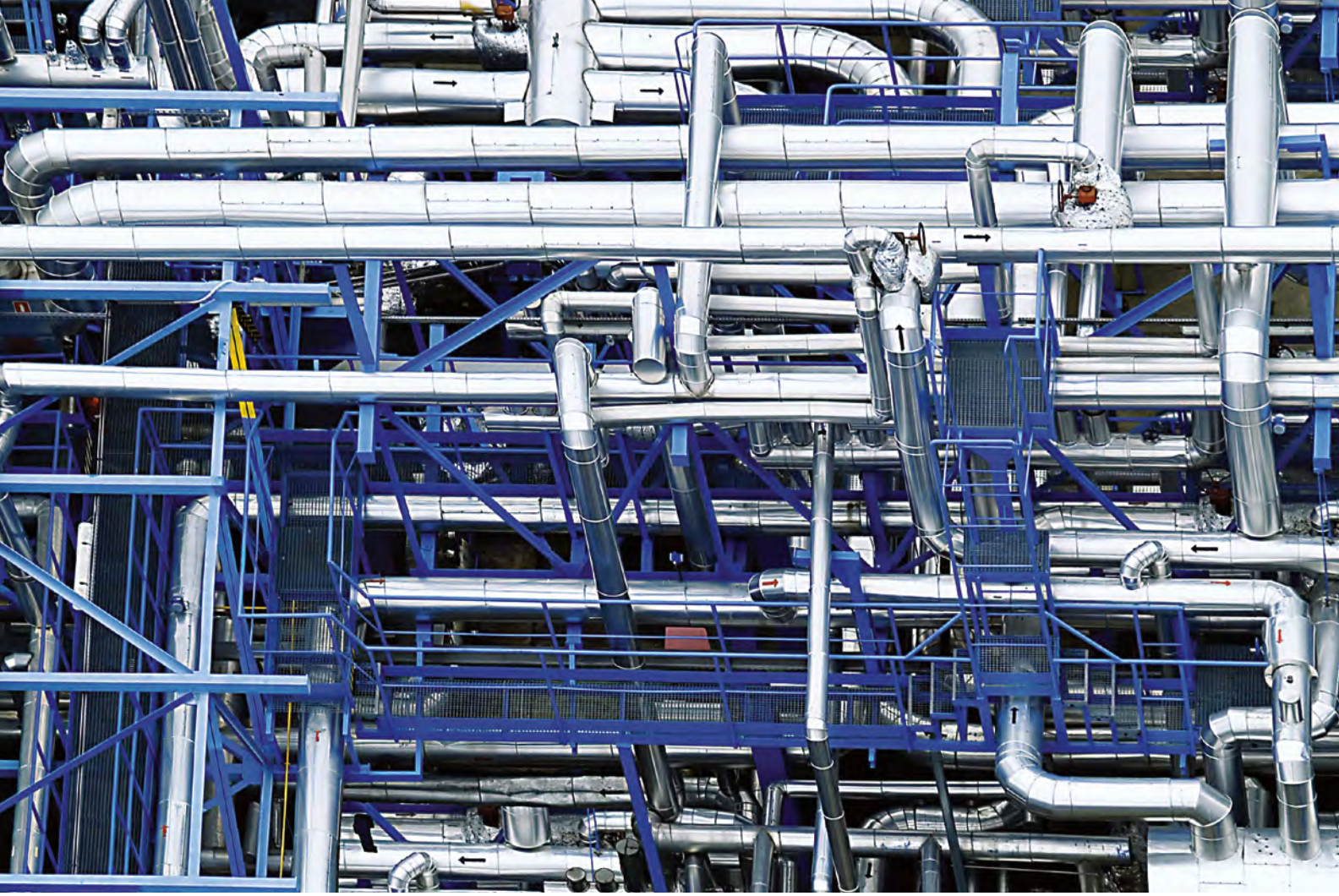


DYNAMIC COMMUNICATIONS FOR OIL & GAS

Reach hydrocarbons faster, farther and safer

Alcatel·Lucent

AT THE SPEED OF IDEAS™

FASTER, FARTHER, SAFER: DYNAMIC COMMUNICATIONS FOR OIL & GAS

Faster, farther and safer. These are the essentials that have placed today's oil and gas industry along a transformational path that utilizes the best of Information and Communications Technologies. Energy operators face extremely rigorous demands as they search for new hydrocarbon sources in ever more remote and hazardous operating environments. Stringent regulatory policy and a highly competitive marketplace means they need to minimize operational risks, leverage existing assets and maximize margins by boosting effectiveness, reliability and productivity – all while maintaining tight control over costs, ensuring worker safety and security and dealing with an aging workforce.

Alcatel-Lucent's Dynamic Communications for Oil and Gas addresses these imperatives with advanced technical and integration expertise, embracing your existing environments through a unified and secure network-based solution that leverages re-invention and innovation.

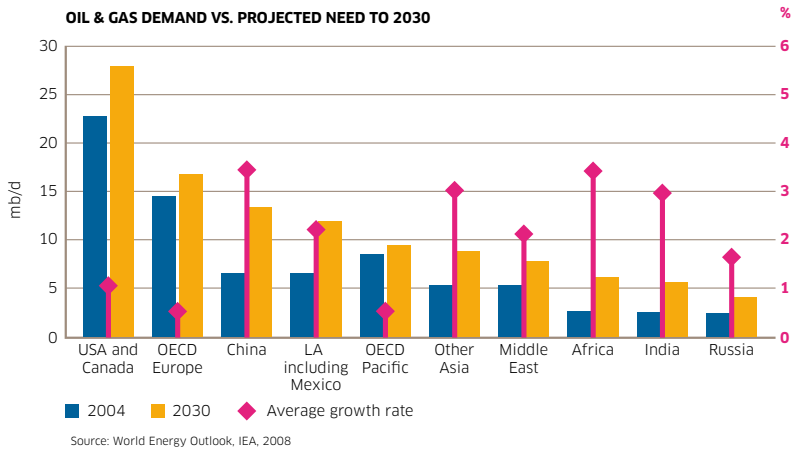
World energy needs are expected to increase by 40% between now and 2030, especially in developing countries led by China and India, according to the International Energy Agency (IEA), with the demand for oil and gas generally projected to increase by 20% and 50% respectively. This relentless thirst for energy is set against an increasingly more difficult business environment for oil and gas organizations. It's a landscape of more regulatory scrutiny related to deep-sea drilling, long-distance pipelines, tar sands mining and other operations; along with fierce competition and rising costs driven by the end of "easy oil," political unrest, refinery capacity and worldwide commodity markets.

Consequently, exploration for hydrocarbons has moved to increasingly remote and hostile environments, requiring more complex and expensive extraction techniques. Maximizing production in these settings has become essential, yet the greater the geological barriers to easy extraction, the greater price, security and safety risks any given project faces.

Challenges are heightened further in remote areas that have to be managed locally and supervised centrally, with increased automation achieved through sensors, SCADA and other distributed control systems that support critical processes. Additionally, a recent survey* has found that 22% of oil and gas companies lack qualified personnel impacting their operations, making a structural transformation toward higher operational efficiency even more important.

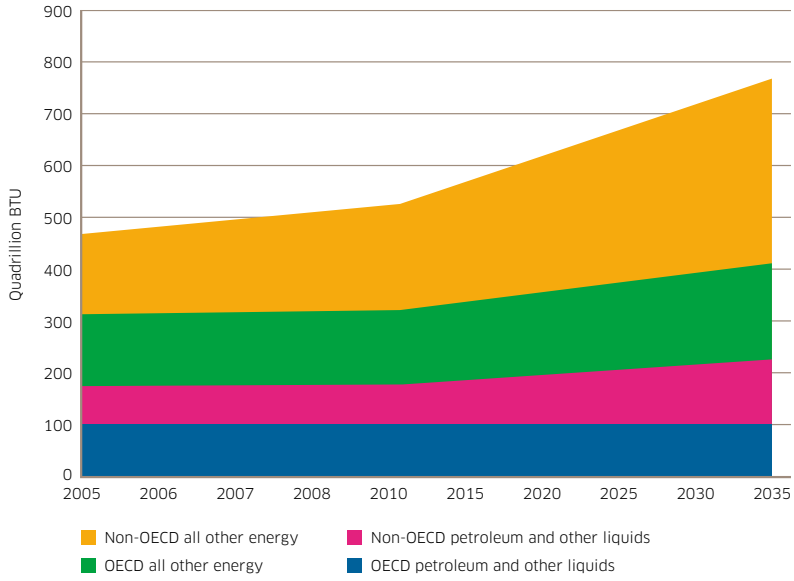
Clearly, the need to minimize risk, ensure the safety of personnel and protect the integrity of plant, pipeline, platform and wellhead projects, plus deal with highly dynamic market factors, has increased the need for new business and operational models. This is where technology serves as the cornerstone for innovative and winning solutions.

OIL & GAS DEMAND VS. PROJECTED NEED TO 2030



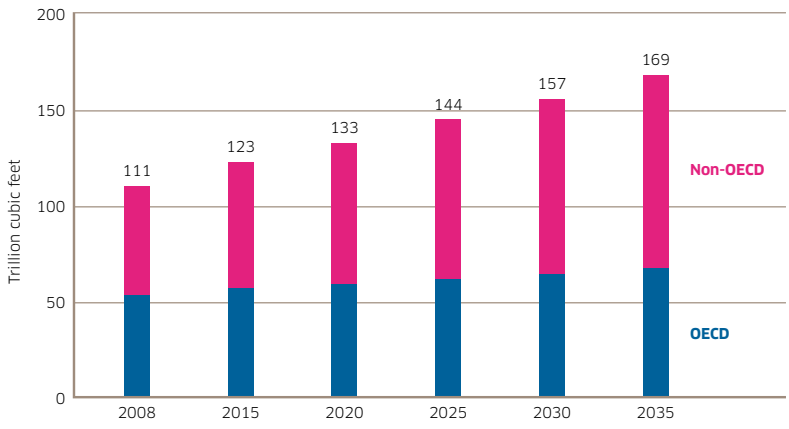
Source: World Energy Outlook, IEA, 2008

EIA'S WORLD ENERGY CONSUMPTION TO 2035, REFERENCE CASE



Source: U.S. Energy Information Administration, 2011

WORLD NATURAL GAS CONSUMPTION, 1990-2035



Source: U.S. Energy Information Administration, 2007

* Source: Ernst & Young 2011 Oil & Gas Sector Annual Report

THE CRUCIAL ROLE OF COMMUNICATIONS IN OIL & GAS

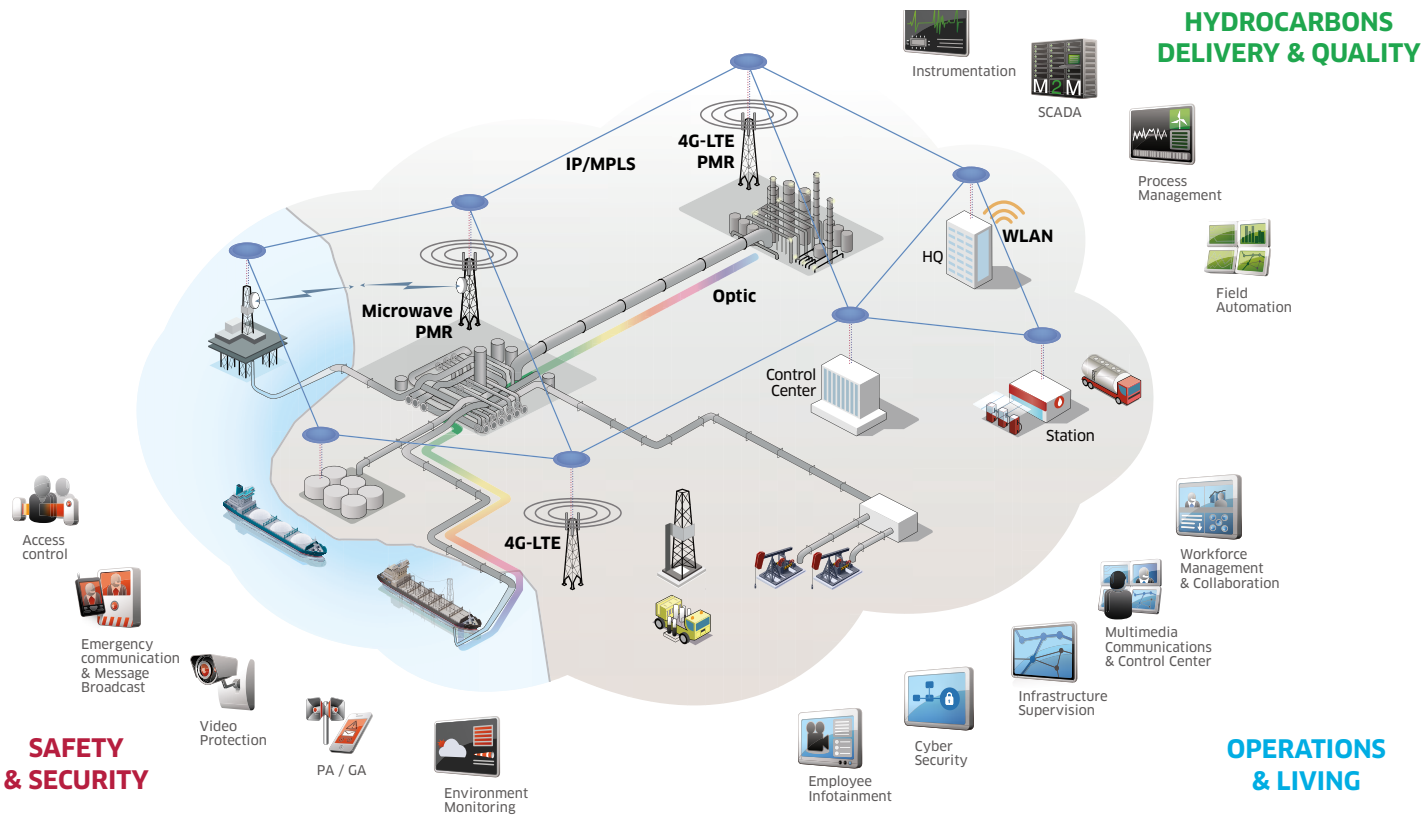
To meet booming demand in such a complex environment, oil and gas companies are turning to sophisticated automation, remote monitoring, real-time asset management and state-of-the-art communications in order to improve productivity within far-flung operations while ensuring site physical and cyber-security and the welfare of their workers. This requires an advanced communication infrastructure as a critical enabler.

The benefits of advanced communications include:

Enhanced hydrocarbon delivery and quality: Highly efficient production is enhanced by a mission-critical communications network that supports real-time workflows and processes, better compliance and energy management, as well as remote monitoring, diagnostics, upgrade and maintenance when needed.

Improved operations and living: Rich, ubiquitous connectivity and communications increase the volume of shared data among all field personnel, fostering critical time and cost reductions through streamlined processes, maintenance and operations, while linking remote oil and gas sites to the outside world. Broadband access ensures home-quality entertainment and convenience through applications such as video on demand, personal video communications and telemedicine capabilities.

Superior safety and security: Reliable and secure voice and data communications support end-to-end security systems that fully protect the workforce and assets with additional checkpoints, measurement, monitoring, control and environment awareness.



"Migrating to all-IP is a significant part of our next-generation network, which will enable us to better manage our piping infrastructure to ensure more reliability, safety and cost efficiency. The Alcatel-Lucent IP/MPLS solution plays a key role in our strategy, which includes continued service delivery improvement as well as support for critical applications such as Supervisory Control and Data Acquisition (SCADA)."

ORLANDO SPENCER, PROJECT MANAGER AND COMMUNICATIONS ARCHITECT FOR WASHINGTON GAS

Alcatel-Lucent Dynamic Communications for Oil & Gas delivers these benefits, supported by next-generation operational systems and real-time applications on a single end-to-end IP/MPLS platform with satellite, submarine, optical, and mobile communications. Reinforced by the full integration capability of multi-vendor equipment, Dynamic Communications for Oil & Gas assures that oil and gas companies can reach and deliver hydrocarbons faster, farther and safer.

FASTER

ENHANCING HYDROCARBONS DELIVERY & QUALITY

Speed and efficiency are critical to the success of oil sector companies working under the demands of engineering challenges, market pressures and hazardous, often remote environments. The faster oil and gas sector companies can identify, access and transport hydrocarbons, the more successful they will be. This requires seamless and high-data-rate connectivity among distant sites and the central office. However, many operators do not have the required level of bandwidth, control and resiliency in their communication networks to achieve optimal results.

Dynamic Communications for Oil and Gas provides real-time and highly resilient solutions to ensure that overall project schedules and operational efficiencies, no matter where activities are taking place, are not hindered by communications needs. Built on highly disciplined systems engineering methodologies, this end-to-end infrastructure supports powerful and flexible IP-based mobile and wireless systems, including SCADA for pipelines and wellheads, VoIP and full radio network convergence towards 4G broadband, including customization to each company's needs and goals, with a future path to upgrades.

"Redundancy and robustness is of great importance due to the remote locations of the equipment and our customers need a high-quality communi-cations network to enhance the efficiency of operations. With new and improved high-capacity data services, Alcatel-Lucent's IP/MPLS solution will enable us to serve the oil and gas industry even better."

PER HELGE SVENSSON, PRESIDENT OF TAMPNET

"We are pleased to partner with Alcatel-Lucent as our new telecommunication systems supplier on this major oil & gas project in Algeria. Alcatel-Lucent has excellent expertise and industry-leading project management skills for the integration of telecommunication systems. We expect this project to become the basis of our long lasting partnership."

TOKUTARO NOMURA, ASSOCIATE EXECUTIVE OFFICER SENIOR MANAGER PROCUREMENT DEPARTMENT PROJECT OPERATION SERVICES DIVISION OF JGC CORPORATION

Dynamic bandwidth adjustment (QoS) optimizes assets for maximum value, providing faster hydrocarbon recovery, accelerated production and reduced downtime. A fast flow of essential real-time data streams provides the instant correlated information necessary to automatically detect and address anomalies, pressure gradients, earthquakes, tsunamis and severe weather events, leaks, and spills in far-flung oil and gas well and pipeline environments, enabling more rapid mitigation and lower liability costs.

The result: Ubiquitous, end-to-end real-time monitoring and supervision of all operations, reducing diagnostic time while improving responsiveness to safety, security, and mission-critical operational events.

REDUCING OPEX TO SPEED PROFITS

Oil and gas companies face considerable pressure to deliver fuel to market and returns to their shareholders in a timely manner. A key factor in that equation is making sure that operations run at peak speed and efficiency.

Dynamic Communications allows companies to significantly reduce their capital and operational expenses by minimizing the types of cabling and platforms required for new projects. This is accomplished using a converged architecture, with migration of aging and disparate networks to a cost-effective, single multi-service, QoS-enabled network. An integrated control and management solution provides the capability to efficiently monitor and control all network systems in real time.

In a critical situation, such as submarine wellhead problem, a picture or video with contextual information speaks more than a thousand words. Operational efficiency can be enhanced further through cutting-edge innovations such as augmented reality (AR), which combines mobile technologies with real-time video and superimposed computer-generated 3-D graphics and data. Using AR, central management and field forces gain immediate, detailed knowledge and understanding of specific situations at remote and hazardous sites such as oil rigs, buried wellheads and drills, submarine cables and sub-sea vessels. Managers then can make critical and timely decisions in situations when they count the most.

FARTHER

IMPROVING OPERATIONS AND LIVING CONDITIONS

Today's oil and gas companies must reach farther than ever before in the continuing quest for hydrocarbons, managing the risks associated with construction, drilling and pipeline operations spanning up to thousands of kilometers, while ensuring comfortable and convenient living conditions of valued workers at remote sites.

When working across great distances, reliability and 24/7 real-time supervision are essential for productive and cost-effective operations. Challenges include monitoring and troubleshooting remote and hard to access wellheads, pipelines and collection points; interpreting and correlating the constant flow of data coming from numerous sources; gathering logs, coordinating and reacting to alarms and events generated by systems in separate locations; as well as defining workflows and assignments. Just as important is the ongoing comfort, and productivity of one of the most valuable assets of any company – its workforce.

PRODUCTIVE GLOBAL OPERATIONS

Dynamic Communications for Oil and Gas relies on experts in mission-critical applications, QoS requirements and carrier-grade network design to provide best-in-class planning, deployment and management services. Combined with products that have been proven for the oil and gas environment, these services result in superior connectivity with coordinated, real-time SCADA-supported applications for central control room monitoring and data correlation, wellhead and platform automation, process management, enhanced workforce management and collaboration, environment monitoring, and emergency communication and message broadcasts – all with comprehensive infrastructure supervision. Working seamlessly together, these elements create a powerful, intelligent solution that extends and enhances a company's reach among all on- and off-shore assets, enabling highly reliable operations with low risk.

Floating liquefied natural gas (FLNG) is a revolutionary technology that will allow Shell to access offshore gas fields that would otherwise be too costly or difficult to develop. Prelude FLNG (100% Shell) is the world's first FLNG development.

(SOURCE: SHELL WEB SITE)

EMPLOYEE SATISFACTION AND PRODUCTIVITY

Recruiting and retaining a skilled workforce is essential to the oil and gas industry. The demands of the job being extraordinary, companies must go the extra mile to recruit and retain these important employees. Although much manual work has been replaced by automation, significant parts of operation still rely on human input. Working and living conditions are therefore crucial to stable production and supply from distant locations. Productivity and satisfaction can be increased with a range of mobile workforce tools and secure remote access.

Cutting-edge communications, information and entertainment services can ease the rigors of the job, thus helping to ensure not only workers' satisfaction, but as a direct result, their productivity as well. The superior speed and flexibility of an IP-MPLS network combined with innovative solutions allows commercial-grade triple-play (video, Internet, telephony) and customized multimedia services assures that workers, no matter where they're located and for how long, will be able to enjoy quality entertainment and stay in touch with friends and family. Whether employees on a drilling platform or remote well site want to celebrate a birthday with family members, take care of bills and other personal business, or just relax with a game or first-run movie, the services made possible by Alcatel-Lucent's advanced technology will provide both satisfaction and peace of mind, allowing them to concentrate better on their professional responsibilities and performance.

LOCAL KNOWLEDGE AND GLOBAL PRESENCE

Combining extensive local knowledge with a strategic global presence, Dynamic Communications for Oil and Gas augments its technology base with rigorous detailed documentation and proven engineering and management to assure alignment with corporate best practices, monitoring and quality standards, as well as approved equipment lists, compliance with local, regional and national regulatory requirements and reliable auditing of security and reliability.

SAFER

GUARANTEEING SAFETY & SECURITY

Safety and security will always be top concerns of oil and gas companies whose assets are spread out around the word, especially when facilities are in locales that are geographically challenging or politically unstable. Are systems and their data prone to cyber attacks, especially when the site is operating in an area that is strategically sensitive or a focus for national security? What are the risks of theft or vandalism? Does the environment or the product create specific risks to field personnel health and safety (cold, heat, sour gas, etc.)? Are there environmental issues that must be monitored and carefully managed? Is the site a hundred miles at sea, or is the topography flat or hilly? Is the climate severe? Are there other local economic or political issues that could impact security of the operations?

A flexible and robust service-aware communications network that ensures the end-to-end safety of data, physical assets, people and the environment. The network must measure up to high technical standards, supporting legacy, IP and Ethernet applications without jeopardizing system availability and security. Existing and new applications must support a large variety of traffic profiles and interconnection topologies, maintaining separation and bandwidth while restricting unauthorized access to configured ports. It needs to be reliable and resistant to cyber security attacks, and must support all control/surveillance sub-systems, ensuring the interoperability of equipment along with compliancy with industry and regulatory norms and standards.

Dynamic Communications for Oil & Gas ensures security and safety with more connectivity to extend reach along pipelines, onshore plants and off-shore assets, incorporating IP-based video surveillance (CCTV) with intelligent video analysis; perimeter intrusion detection; access control and personnel on board; public address/general alarming [PA/GA], emergency communication and message broadcast, as well as environment monitoring and a full compliment of physical security systems.

Security is enhanced further with a LMR/PMR mobile radio solution that dispenses with the isolated mobile radio "islands" created by traditional, propriety mobile radio systems, thereby allowing key personnel in the field to remain contactable even during unexpected events or in the most challenging conditions.

Integrated Communications for Control Centers (ICCC), a centralized control solution, provides operators with call management and centralization of all voice communications along the pipelines. An intelligent routing system tracks all calls, identifies them, applies priority rules based on the emergency degree, manages waiting lines and broadcasts audio messages. An agent interface allows the visualization of all calls in progress and offers specific functionalities to answer them in the best conditions.

To protect the network itself, advanced design with IP/MPLS can provide a multi-tier security concept that makes full use of intelligence, flexibility and control, featuring intrusion-detection checkpoints even for administrators, including such features as centralized authentication and logging, security policies for each service through access control lists, MAC-pinning, IP and bandwidth filters and comprehensive password protection at different levels, which allows users to be quickly isolated and locked out if necessary.

PARTNERING IN EVERY STEP OF YOUR COMPANY'S TRANSFORMATION

A trusted partnership is an essential element for transforming your company's capabilities and productivity through advanced communications. As a system telecom integrator Alcatel-Lucent provides end-to-end expertise, including feasibility studies, initial conception of the communication network and services, front end engineering and design (FEED), detailed design engineering, procurement, supply, implementation, operation and maintenance. Alcatel-Lucent works with best-of-breed products from leading manufacturers to ensure optimal solutions, including:

- A converged, multiservice, mission-critical Wide Area Network (WAN) composed of microwave, optics and IP/MPLS products
- A mobile/wireless network (WiFi/WiMAX/3G/4G/LTE, TETRA/P25, Analogue UHF/VHF, Dispatchers and Applications)
- Corporate communications (Local Area Network (LAN), mobility, unified communications, telephony, multimedia conferencing)
- Integrated SCADA
- Integrated CCTV and physical security
- Integrated navigational aids, meteorological instruments and entertainment systems
- Integrated operations control center (network operations center, integrated network management system, security management, tailored application servers, production and transmission control centers)

"We depend on Alcatel-Lucent to provide reliable solutions for our mission-critical business backbone. Alcatel-Lucent has exceeded our expectations, delivering a comprehensive solution that includes best-in-class equipment as well as planning, installation and commissioning services."

PHILIPPE ARMAND, PRESIDENT DIRECTOR OF TOTAL E & P INDONESIE

Alcatel-Lucent offers the expertise to assume complex projects, integrating many subsystems, with a central point of technical and operational accountability using reliable products proven for the oil and gas environment; re-using customer's existing corporate standards and approved equipment lists; auditing security and reliability and adopting world's best practices; dealing with experts in QoS and carrier-grade network design; and ensuring rigorous detailed documentation and proven engineering processes.

Network consulting, multi-technology and multivendor integration solutions, project management, deployment and network operations services – all are designed to help oil and gas companies most effectively evaluate their options, determine the best course of action and select the right technologies from the right vendors, freeing them to focus on their core businesses.

ALCATEL-LUCENT COMMUNICATION SOLUTIONS FOR OIL & GAS

Alcatel-Lucent is the trusted transformation partner of oil and gas operators and Engineering, Procurement and Construction companies (EPCs) around the globe, having managed more than 2,300 network migration projects across multivendor platforms. With a global presence in 130 countries and a history of successful deployments in highly challenging mission-critical environments, Alcatel-Lucent leverages the unrivalled technical and scientific expertise of Bell Labs, one of the largest innovation powerhouses in the communications industry. Its knowledge of the stringent requirements and demanding conditions that characterize the oil and gas industry enables Alcatel-Lucent to deliver integrated Dynamic Communications to every oil and gas companies and EPCs.

When working with Alcatel-Lucent, you can be sure to have the right partner you can depend on to operate faster, farther and safer.

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