Multi Technology Network Solutions for Oil and Gas Industries

SELEX
Communications

A Finmeccanica Company

Multi Technology Network Solutions for Oil and Gas Industries

Immediate, reliable and secure digital communications for voice and data services to support operational safety and efficiency in pipelines, onshore and offshore plants.

Oil and Gas operators require fully integrated information and communications solutions that are both reliable and robust, and that can operate in extreme and hazardous environments and during critical and emergency situations.

As a response to the growing demands from the Oil, Gas and Utilities industries, SELEX Communications has developed a complete line of professional mobile radio solutions and applications, tailored to meet specific the industry-specific needs and to increase operations' efficiency, security, quality and timeliness.

At SELEX Communications we leverage on our know-how, experience and product-portfolio to supply the Energy Sector with turnkey multi-technology network solutions that integrate a number of communication technologies - including TETRA, DMR and next generation wireless broadband radio – and guarantee transparent user connectivity in all circumstances for safe and efficient operations.

Engineered to operate in harsh and potentially explosive environments, our solutions address both the "traditional" operational requirement for instant and crystal-clear voice communications and the need for a communication solution that is integrated with a Company's control and monitoring systems and able to support data services and applications including SCADA, Automatic Vehicle Location, video-transfer and database-access.

Technologies from SELEX Communications

TETRA

TETRA (acronym for "**TE**rrestrial **T**runked **RA**dio" does not identify any specific product but represents - like GSM - a European telecommunications for Professional Mobile Radio voice and data communications) is the communication standard of choice for those organizations or groups that need immediate, reliable and secure communications. Engineered to provide dedicated, secure and reliable communications for the emergency services it is also an ideal technology for the industrial market where the same requirements are applicable. TETRA is now being deployed by Oil and Gas companies for operational communications, support activities and to maintain business continuity in incidents or emergency conditions. SELEX Communications offers the Oil and Gas sector reliable and secure TETRA solutions for safe and efficient operations even in hazardous environments such as areas with the potential presence of explosive substances. SELEX Communications' **"ElettraSuite"** is a complete modular, scalable and flexible family of TETRA systems satisfying requirements ranging from single-site to national networks. The system is ready for technology enhancements (e.g. the **TETRA Enhanced Data System: -TEDS**) with **full support for IP communications**, and is complemented by terminals (both hand-held and vehicular), dispatching solutions and service applications.

DMR-SIMULCAST

SIMULCAST (Simultaneous Broadcasting) networks are the best solution for professional mobile radio applications for the coverage of large territories with low to medium-low traffic density and only a small number of frequencies available. Unlike networked conventional repeaters, simulcast networks employ sophisticated signal processing techniques and guarantee full mobility communication with automatic RBS handover over the whole zone covered. SELEX Communications design and manufacture analogue and digital Simulcast equipment that is used by primary Italian and foreign PMR organizations in both the public and private sector.

DMR is the new ETSI standard for digital radio communications that introduces a 2 slot TDMA channel access feature, doubles the communication capability and makes simultaneous voice and data applications possible. SELEX Communications "dual-mode" **ECOS-D Simulcast** network is able to work in analogue and digital modes. This unique feature allows the use of existing analogue terminals and the ability to gradually substitute them with new digital terminals as required; the flexibility and modularity of SELEX Communications' technology allows the reduction of capital expenditure and also helps with the gradual introduction of the new technology to the users. DMR networks can be used to support SCADA applications as well as operational communications over large areas using the same physical channel, due to the 2-slot TDMA air interface structure.

BROADBAND

Broadband Wireless techniques are gaining attention in the Oil & Gas sector when multi-media data needs to be exchanged in real time. Monitoring or security (such as video-surveillance applications) may benefit from a broadband wireless network or even a self-forming mesh network to connect sensors to control room facilities. SELEX Communications product portfolio includes broadband wireless equipment both in the licensed or unlicensed spectrum.

NETWORK INTEGRATION SOLUTIONS

We strongly believe that effective network integration is the key for development of effective communications solutions supporting mission critical industry applications. Layered on IP technology and VoIP protocols our network interoperability solution allows multi-technology (i.e. TETRA, Simulcast DMR, Conventional Radio, GSM, PSTN) multi-media communications including typical Professional Communications features such as group calling and priority management.

ElettraSuite SCN-Plus

ElettraSuite BS Node compact

ElettraSuite VS3000-2

ElettraSuite PUMA-T3 Plus

Simulcast ECOS-D

Wi-MAX base station

ATEX terminal

One of the greatest challenges faced by Oil and Gas companies is achieving effective mobile communication in all their subsidiaries and production sites, scattered across a vast region with difficult terrain. Furthermore, the need for terminals that are safe to operate in potentially explosive environments is one that is intrinsic to the industry; hazardous environments are areas with the possible presence of an inflammable or explosive atmosphere.

Preventing releases of dangerous substances, which can create explosive atmospheres, and preventing sources of ignition are two widely used ways of reducing the risk. Using the correct equipment can help greatly in this.

The communications equipment must be designed and certified for use in these particular environments. SELEX Communications' **ElettraSuite PUMA-T3 Plus Ex** handheld terminal has been engineered to be "Intrinsically Safe" according to European ATEX standards "Directive 94/9/EC (ATEX Directive)" and II 2G Ex ib IIC T4 coding compliant for operations in potentially explosive environments. Conformance to the ATEX standard applies by law in all European countries and is also used as a reference all over the world.

SELEX Communications' PUMA-T3 Plus Ex can also operate as a conventional FM radio and allows users unique-in-the-market feature to communicate with both analogue and TETRA equipment. Engineered for professional users, PUMA-T3 Plus Ex is extremely sturdy, has a large keyboard that is easy to use even when wearing gloves, and is visible in critical light conditions. Thanks to its large loudspeaker and potent amplifier, PUMA-T3 Plus Ex allows for communications even in particularly noisy environments, while its well-placed separate small speaker allows it to be used as a regular cell phone. A feature of particular relevance is the "man-down" safety feature. PUMA-T3 Plus Ex is the only TETRA terminal that signals the dispatcher that a person using the terminal might be in danger.

Numerous Companies world-wide rely on our previous PUMA-T3 Ex for safe and reliable communications. Satisfied PUMA-T3 Ex customers operate mainly in the Oil and Gas industry, refineries and oil distribution companies, in Malaysia, Kazakhstan, Iran, Qatar, the Russian Federation, Netherlands, France and Italy.

The audio performance guarantees crystal clear voice communications in noisy environments. The PUMA T3-plus Ex incorporates the **latest GPS technology** to provide the best accuracy in the acquisition of the user's location. The single chip GPS Location service provides an efficient use of terminal resources and a low current consumption. The transmission protocol of the location data over the air-interface is in **accordance with the ETSI LIP standard**.

The hand held can be instantly switched between analogue FM and TETRA mode. This ability together with the extended switching bandwidth of the PUMA-T3 Plus Ex, allows for a soft migration from analogue UHF to TETRA services and interoperability with legacy technology. The PUMA-T3 Plus Ex's "unique on the market" set of features has been proven as the right choice to satisfy the high demands of users working in hazardous environments.

RUSSIAN FEDERATION

TETRA Communications system for the Baltic Pipeline System (BPS) of TRANSNEFT

CHALLENGE

In December 2001 SELEX Communications, a global provider of advanced communications solutions, became the first company to sign a contract with the Russian Federation for the 410 to 430 MHz frequency band in Oil & Gas applications.

The order, placed by "TRANSNEFT" - the company that coordinates and manages the oil transportation on Russian territory, further consolidates our company position as one of the leading suppliers of TETRA systems and demonstrates the company's ability to deliver systems for this type of applications.

The TETRA network has been deployed in partnership with OOO BERMOS during 2002.

The SELEX Communications ELETTRA system supplies a complete TETRA voice and data communications service, including management, providing coverage of some 800 km of trunk pipeline from Yaroslav to Primorsk with a reliability of 99.9% in one of the worlds most hostile operational environments.

The ELETTRA network elements are interconnected through a microwave (MW) radio link backbone provided by BERMOS.

Radio coverage solution for TRANSNEFT pipeline

Directional panel antennas, with high gain (14 dBi), and direct connection without combiner units, have been used to optimise the coverage performance and provide long distance radio coverage for users operating near to the pipeline.

SELEX COMMUNICATIONS SOLUTION

The system operates in the 410 to 430 MHz frequency band for coverage of the oil pipeline from Yaroslav to Primorsk.

The network infrastructure is composed of an extended switching node (SCN-TX) with Gateway interface and about twenty base stations located along the pipeline with MW link interconnection.

The system is supervised by a network management system complete with remote dispatching stations equipped with a dedicated Graphical User Interface in the Russian language.

The peripheral terminals (hand portable and vehicular) are supplied by a third party.

Two different operational modes are available with the ELETTRA system: - Trunked Mode (TMO) and Basic Direct Mode (DMO).

The basic and PMR supplementary services included in the supplied system are:

- Different type of calls: individual and group speech calls, priority, emergency, late entry, pre emptive priority, and 'Call authorised by dispatcher' (CAD);
- Status messages;
- Short Data Services (SDS);
- Dynamic group number assignment (DGNA).

CUSTOMER NEEDS

The Companies typically need to support communications between employees and facilities based across the globe - often in the world's most remote and inhospitable geographies. Equipment at these sites needs to be remotely monitored and the status communicated to control facilities that can be many kilometres away. All communications must be protected by robust security radio channel.

The primary use of the radio system is to provide speech and data service along the pipeline between the control centre and the ground staff, especially the field operators.

- Management of remote parameters through a SCADA interface;
- Remote units data transmission via wireless communication.

BENEFITS

Using the circuit data transmission mode, the system network can provide single and multi-slot-data calls (up to 28.8 kbit/s). Two levels of reliability are supplied with the ELETTRA system:

- In the first level if the SCN-TX is destroyed or disconnected or the transport network is unavailable, the ELETTRA BS works in Fallback mode and the critical TETRA Services are still available (individual and group calls, status messages, SDS, emergency calls, data calls).
- Within a short time a second switch will be installed in S. Petersburg in order to increase the network resilience and availability.
- In the second level when the network infrastructure is completely unavailable, the ELETTRA subscriber radios work in Basic Direct Mode (DMO).

The basic TETRA services, speeches and SDS, are still available, with some limitations only for data calls, for external Gateway calls and supplementary services (Emergency calls are still available)

ITALY

DMR communication system for A2A Milan

CHALLENGE

A2A is the multi-utility company created on 1st January 2008 as a result of the merging and acquisition of some Italian companies and now ranks among the top Companies in Italy in the sectors of waste, electricity, district heating and gas sales, running several energy production plants and distribution networks and serving important northern Italy cities such as Milan and Brescia.

In 2006 when A2A (formerly AEM Milano) decided to upgrade its existing analogue professional communications infrastructure, serving the Milan metropolitan area, in order to be complaint with current regulations the decision to switch to a digital technology was taken.

The prime consideration of the customer was to save its investment looking for a solution, which was able to achieve the gradual implementation of a full digital system ensuring:

- Re-use of the existing analogue terminals.
- Individual crystal clear voice calls as well as "open channel"; voice quality had not to be affected while passing from a repeater to another or in a zone covered by more than a repeaters.
- Data capability on the same radio channel all over the network.

The new radio infrastructure was intended to support the operational activities of maintenance personnel as well as gas related emergency services, which requires a very high availability of the communication system.

SELEX COMMUNICATIONS SOLUTION

SELEX Communications' ECOS-D (Extended Communication System - Digital) Simulcast DMR infrastructure was the solution chosen by the Customer mainly for its

unique feature of being completely and automatically "dual-mode".

This means that an ECOS-D network is able to work in analogue and in digital DMR mode, allowing the A2A personnel to keep using the existing analogue terminals and to plan a gradually substitution with new digital terminals when required; the flexibility and modularity of SELEX Communications' technology allows the reduction of capital expenditure and also helps in the gradual introduction of the new DMR technology to the users. The ECOS-D system is comprises: -

- 3 dedicated and overlapping radio channels in the UHF range to supply all the requested services, each consisting of 5 Radio Base Stations interconnected by a Customer owned transport network.
- 3 different Control Centres with dispatchers for voice management and a - Network Management System (NMS), employing a state of the art SNMP based management system used to perform diagnostic operations and optimize field engineer intervention.

SELEX Communications' ECOS-D DMR Digital modulation uses a built-in error correction technique, offering excellent audio quality of voice over the entire network. Due to the fact that SELEX Communications' ECOS-D Simulcast solution broadcasts the same frequency pair over the entire network, end-users are able to take advantage of significant time and cost savings related to "lighter" frequency licensing.

ECOS-D voting, BS synchronization and equalization special features allow the network to work as a single virtual repeater, cutting out any handover procedure. These synchronization and equalization procedures are completely automatic, making the network an auto-adaptive system, which is both very easy to use and to manage.
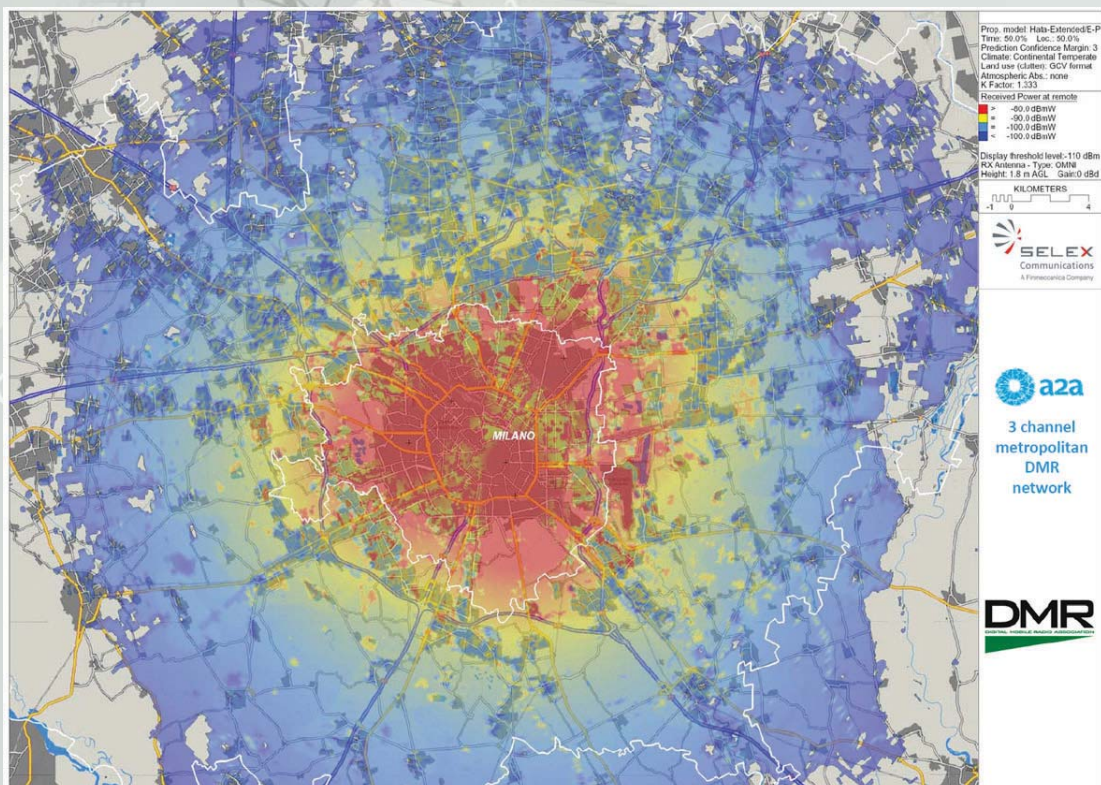
Technologies integration - TETRA and MPT1327 for Gazprom

SELEX Communications has been delivering Russian utilities with communication solutions since the early 90s when it supplied Gazprom with what today still is the world's largest MPT 1327 analogue network extending in excess of 10,000 Km from Western Russia to Siberia.

In December 2001 Transneft awarded SELEX Communications, in partnership with OOO Bermos, with a contract for the delivery of the Russian Federation's first TETRA network for civil applications to guarantee voice and data communications to an 800 Km long pipeline from Yaroslav to Primorsk. Network elements were interconnected through a microwave radio link backbone.

SELEX Communications also contributed to the world's largest Oil & Gas telecom project ever in the island of Sakhalin. The remoteness and size of this project presented many challenges - not least of which were complex logistics and integration with various sub-systems.

The supply for Sakhalin II project includes a total telecommunications solution for 3 off-shore platforms, an on-shore processing plant, a Liquefied Natural Gas plant, 800 Km of pipeline with 110 valve stations.

SELEX Communications' approach is to deploy a TETRA system in a new segment of pipeline, realizing a "TETRA Region" that can operate independently, but interoperable with the analogue systems.

Main advantages of interoperable voice and data networks include the ability set-up individual calls, group calls, and to send SDS messages across different networks utilizing a unified numbering scheme. Easy and efficient interoperability relies on state-of-the-art platforms based on IP protocol suite.

Convergence of TETRA with legacy radio systems, such as MPT1327, or fixed telephone and data networks is achieved through VoIP (Voice over IP) and Mobile IP protocols whereas the interconnection network is implemented utilizing the Softswitch concept.

Thanks to this flexible and advanced approach, users are surprised to communicate transparently through many radio and fixed systems as it was one, where fast voice communications is granted along with multi-service professional features, supervised by integrated control rooms and administered by unified network management centres.

SELEX Communications' recent contracts

SELEX Communications has been awarded in the last weeks two contracts worth around 6 millions of Euro for the supply of TETRA-based radio-communication systems along the SEG (Severo-Evropeiskiy Gazoprovod, North European Gas Pipeline) pipelines in Russia, with which Gazprom, the Russian Energy giant, will supply natural gas to the North West regions of Russia, the Baltic Countries and Northern Europe.

After the two contracts signed in 2008 for the supply of TETRA systems in the region of Saratov, in Southern Russia, the TETRA technology of SELEX Communications has been selected once again by Gazprom as the most suitable to the reliability, integration and security requirements, winning over international competition.

This is a further step in the strategy of SELEX Communications to strengthen the bond with the Russian giant Gazprom.

With this success, SELEX Communications consolidates its leadership in the TETRA market of the Russian Federation and proposes itself as protagonists in the "Oil & Gas" market segment.