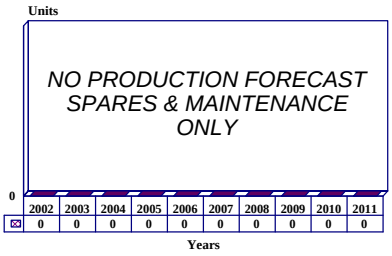
Deltamobile (TADKOM) - Archived 08/2003

Outlook

- Future sales doubtful
- Very slim market to small countries with developing militaries
- Minimal funding for continuing enhancements possible
- This report will be archived next year, 2003

10 Year Unit Production Forecast
2002-2011



Orientation

Description. Tactical battlefield automatic trunk communications system.

Sponsor

Norwegian Army Materiel Command (NAMC)
Oslo
Norway

Contractors

Kongsberg Ericsson Communications ANS
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Web site: http://www.kog-ericsson.com/index.html
(Joint Developer: Multiplexers, Digital User Terminals)

Thales Group
(formerly Thomson-CSF Norcom)
PO Box 22
Okern
N-0508 Oslo
Norway
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Web site: http://www.thomson-csf.no
(Joint Developer: Switches, Crpto, Network Management)

Alcatel SEL AG
Alcatel STK (Standard Telefon og Kabelfabrik) A/S
PO Box 60 Okern
N-0508 Oslo
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Tel: +47 26 38 800
Fax: +47 26 37 944
Web site: http://www.alcatel.com
(Switches, Crypto, Network Management)

DRS RS (Europe) Ltd
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DRS RS (E) House
The Trading Estate
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Fax: +44 11252 734466
Web site: http://www.lynwood.com
(Rugged Multiplatform Computer Systems)

Status. In operational service. Some enhancement and upgrade efforts ongoing.

Total Produced. There are four known customers using fully operational, integrated Deltamobile/TADKOM systems. There are unconfirmed reports that up to 14 countries may be Deltamobile/TADKOM customers.

Application. Deltamobile/TADKOM is a complete tactical communications system for radio link or four-wire telephone cable.

Price Range. The nature of the system, the variability of network size and the conditions under which it has to operate preclude determination of an accurate unit cost. One early integrated system installation was valued at US$22 million.

Technical Data

Design Specifications. Deltamobile consists of decentralized switches (nodes) in a grid configuration. A digital switch, Deltaswitch, is located in each node (trunk and/or access). Each of the Deltaswitches has eight ports with a non-blocking capacity of 240 subscriber or trunk channels and is interconnected via multichannel radio links (UHF or SHF), all of which have a traffic capacity of 30 channels. Deltamobile has an expansion capability that can handle several thousand subscribers. The system uses saturation routing within its own network.

Multiplexers (Deltamux) are node linked either by radio or by cable (four-wire or optical). Each multiplexer has a handling capacity of 15 subscribers, expandable to 30 by connecting two multiplexers in a master/slave configuration. The Deltamobile network is built up around a few portable units that make extensive use of microprocessors. A System Control Unit (SCU) can perform overall network surveillance when the appropriate peripheral gear (display, printer, and keyboard) is provided. The SCU is able to communicate with all the units of the system, including the subscriber access units.

Features

- Automatic search and call forwarding
- Classification of subscribers, with prioritization. Preemption is also available so that authorized persons can make priority calls any time
- Automatic ring-back
- Direction (Follow Me)
- Group hunting (an incoming call is automatically connected to a given group's first free extension)
- Group conference (up to eight subscribers)
- Broadcasting
- Abbreviated dialing (compressed, two-digit dialing codes)
- Number assignment independent of line terminals, meaning that a subscriber can retain the same number while moving around
- Printout of network configuration, telephone directory, network load, and statistics
- Complete self-testing programs (with printout) which do not interrupt regular communications
- Centralized control of traffic routing and number allocation (if desired)

Main Components

Deltaphone. Lightweight digital field telephone which has full EUROCOM (A or C) signaling facilities. The unit features a unique built-in two-wire/four-wire converter (patented worldwide) which makes possible full duplex transmission over two-wire field cables at least 8 kilometers long.

DMU 200 Deltamux. The Deltamux subscriber access unit and multiplexer combines 15 digital or analog subscriber channels for transmission over four-wire cable or radio link (time division multiplexing). Deltamux is completely self-contained and has microprocessor-controlled signaling interfaces for subscribers and network. All access to the Deltamobile network is through the Deltamux.

TDS 200 Deltaswitch. This digital switch is a stored program-controlled switch with eight ports, each of which carries a time-division multiplex signal of 30 traffic channels, thus providing a non-blocking capacity of 240 channels. The ports can be freely connected to other switches or Deltamuxes. The channels are able to carry speech or data or a combination of both. Deltaswitch can set up connections between any of the 240 channels. The switch's internal structure is non-blocking.

System Control Unit (SCU). The SCU is a computer with peripheral gear such as a display, printer, keyboard, primary and secondary storage, and line interface. The unit's main functions are supervision and control of the network, maintenance and backup of the database in the switches, establishment of special subscriber facilities (e.g., priority), and collection of traffic statistics. A smaller Deltamobile system can function without a traffic-handling capability.

Deltalink. This portable SHF radio link can be set up on a tripod or at the top of a telescopic mast. Deltalink has a transmission capacity of 30 deltamodulated channels at 512 kbit/s, plus a service channel. The operator has a choice of five pairs of communications

bands. Line-of-sight maximum range is about 30 kilometers.

RL-420. This UHF radio link is frequency modulated and operates in the 610-960 MHz frequency band. Typical output power is 15 watts, and the capacity is 7, 15, 30 or 60 telephone channels (with data speeds of 256, 512, 1,024 and 2,048 kbit/s, respectively). Test circuits are built-in, and automatic regulation is included to minimize output power. In line with the simple operation philosophy, no tuning or adjustment is needed. Maximum line-of-sight range is 50-100 kilometers.

CD-410. This digital, microprocessor-controlled bulk encryption unit has 1,092 usable key settings. Careful screening of the electronic circuits prevents secure data from being radiated.

Single Channel Radio Access Unit. The SCRA allows single-channel radio users to connect telephones to their radios in order to get direct access to the switched network. The nearest subscriber access terminal is the access point. The SCRA provides full subscriber facilities to mobile users.

Operational Characteristics. The Deltamobile system's primary mission is to provide automatic switching communications for tactical environment command and control in land operation environments. The system is also designed to be used in modernized mobile headquarters. It can counter electronic warfare, and enhances the mobility of the headquarters by reducing the amount of gear used for communication. Since all subscribers are identified by their telephone numbers only, location is no longer a factor; a user can retain the same number no matter where he is located on the battlefield.

The level of operations for Deltamobile includes division headquarters (higher command if needed), brigade headquarters and all subunits in a brigade, of which a typical configuration would be 5,000 men in a 200 km^2 area. The system can handle almost any type of traffic (voice, data, facsimile, etc.) providing for all the same degree of traffic and traffic flow security. System capabilities include conference, broadcast, and preemption for calls of higher priority.

The Deltamobile system has been designed to be highly mobile and flexible in order to facilitate frequent movement. The system has a full encryption capability, including bulk encryption of all multiplexed connections or end-to-end encryption of digital subscribers (voice and data). Frequency hopping is used to protect the multichannel radio links between nodes.

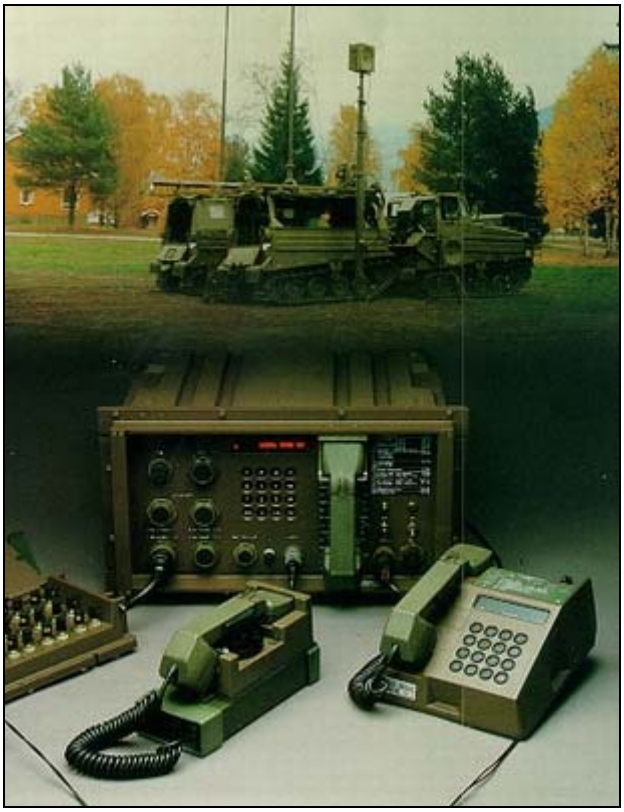
Deltamobile was designed with survivability as the primary criterion. Message traffic will not be seriously impaired by damage to the network from accidents or enemy actions. Because of the network's grid structure, undamaged parts of the network are used to automatically re-route calls. The call will go through as long as a route exists between two subscribers. Each of Deltamobile's nodes is capable of autonomous operation.

The system is connected to other NATO tactical networks not based on EUROCOM specifications through the STANAG 5040 interface.

Because Deltamobile was designed to be run by a mobilization army, there is an emphasis on modular construction, simple maintenance, and Built-In-Test-Equipment (BITE). Only one vehicle (such as a Land Rover) is needed to transport a complete Deltamobile node, which includes Deltaswitches, Deltamuxes, radio links (both UHF and SHF) and terminals. To establish and operate a complete trunk and access node, only two conscript soldiers are needed, with a setup time of 20 minutes.

All components are designed to be one-man loads and are EMP hardened. The main units of the Deltamobile system are water-, dust- and shockproof, and can be used in a temperature range of -40° to +55°C (-40º to +131°F).

Deltamobile acts as the communication system for Improved HAWK systems in various countries and is also used for tactical low-level defense systems. Deltamobile can simultaneously handle communication between radars, radar networks, and various weapons systems. The system offers full security against electronic warfare.



Deltamobile, tactical battlefield automatic trunk communications system

Source: EB Defence

Variants/Upgrades

The original TADKOM system has been upgraded. Under the upgrade, the communications net and the hierarchical network control were provided with cryptographic protection, the networking functions and subscriber services were enhanced, the data and radio communications were revamped with a multirole radio which serves as a combat net radio as well as an SCRA subsystem to TADKOM, and provision was made for the NALLADS (Norwegian Army Low-Level Air Defense System) communications network via packet-switching (which enables the transfer of large amounts of data). TADKOM also acts as the bearer system for the Norwegian Army's brigade level CCIS (Command and Control Information System) and for the ODIN artillery CCIS. A new switching system was introduced in 1992.

Deltamobile products include an upgraded data access point (DAP) and a digital voice terminal. Both of these can use a two-wire echo-canceling technique for two-wire digital connections over regular field cable at distances up to 10 kilometers at a message speed of 16 kb/s.

The Deltaswitch was replaced by a new switch developed by STK and NFT-Ericsson (formerly EB Defense) in conjunction with the Norwegian Army and the Norwegian Defense Research Establishment. The new switch includes a built-in multiplexer, eight ports, and integral encryption, all in a package one-third the size of the existing Deltaswitch. The new switch emphasizes data rather than voice communications.

Program Review

Background. In 1972, the Norwegian Defense Research Establishment (NDRE) and the Norwegian Army Materiel Command (NAMC) commenced a study examining how to use digital technology in the design of a new tactical automatic communication system. One of the advantages of using digital technology is that

digital switches handle the massive information flow of the modern battlefield. The switches can be connected together to form a network with a grid structure, thus ensuring high survivability and enabling the incorporation of special services.

In 1976, EUROCOM identified the specifications for what became the Deltamobile, or TADKOM, based on Deltamodulation. In 1978, NAMC signed a contract with EB (working in conjunction with STK) to develop the Deltamobile system. The Norwegian Army took delivery of the first system in 1982 and it has been in operation ever since.

In 1984, Deltamobile participated in the NATO exercise Avalanche Express and proved its superiority over other known tactical systems. Alcatel STK signed a US$17.3 million contract with the Norwegian Army in 1985 for full-scale development of TADKOM. This award led to a production contract thought to be worth about US$40 million. The shelterized, fixed semi-mobile PCM system uses many of the same components as Deltamobile. The Norwegian Army commenced installation of the PCM network (with an STK Cryptel 265 on-line crypto unit) in 1986. In 1987 TADKOM went into service with the North Norway brigade. The North Norway brigade is the standing force on NATO's Northern Flank. The Norwegian Air Force is also a customer, most likely for air defense applications, since the Army has responsibility for local air defense only.

The Swedish Army also uses the Deltamobile, where it has the designation Tele-System 8000 (TS 8000). The TS 8000 system provides access to Deltamobile from single-channel radios or field cables and supplies data and voice communications to all levels of command. The Swedish Army completed testing of the TS 8000 in 1985.

In 1986, the Air Force of an unspecified Middle East country placed a significant order, which it was to use for its HAWK missile air defense system. The US$22 million contract (plus options for another US$2 million) involved permanent and mobile installations, with a delivery date of 1988. EB was partnered with Raytheon in the contract. The most likely candidate for the deal was Kuwait, although orders from the United Arab Emirates and Saudi Arabia were also possible.

In July 1990, NFT-Ericsson (which had absorbed EB) was awarded a major contract worth roughly US$125 million by the Norwegian Army Material Command for the development and supply of the new-generation VHF multirole radio (MRR) for data and voice transmissions. An additional production order was placed in May 1992 which increased the contract's overall value to approximately US$250 million. The first of the prototypes were slated for trials in the spring of 1993, with deliveries in 1995. Deltamobile has been delivered to the Norwegian and Swedish armies and is being integrated with the Norwegian Army's new-generation MRR system.

Significant efforts are being made to design more sophisticated electronic counter-countermeasures (ECCM) for radio transmissions. New narrowband direct sequence spread spectrum and frequency hopping have so far proven to be adequate protection against jammers. This is where the MRR comes into play, as the same basic radio units can be used for single-channel radio access, combat net radio, and packet radio applications.

Deltamobile attracted a good deal of attention among smaller nations that need a decent secure radio at a reasonable cost. The Persian Gulf War certainly helped increase sales of Deltamobile to Middle East countries; NFT Ericsson has declined to release the names of its clients in this region. Additionally, countries in the Pacific Rim area have also become a serious market. The system is rumored to have made an appearance at the 1994 Winter Olympics in Lillehammer, Norway. Anonymous sources said it was being used as part of the communications network handling security at the Olympic sites, which were all being guarded by a number of discreetly placed elite military and police units.

The Norwegian Army is in the process of implementing a series of upgrades to its TADKOM system, having awarded a contract worth approximately US$250 million in total sales to NFT-Ericsson. These upgrades include a new MRR family, which will function as both an SCRA subsystem and a combat net radio, and a packet-switching capability for the NALLADS (Norwegian Army Low-Level Air Defense System) communications network, which will enable the transfer of large amounts of data.

TADKOM upgrades already in the works include the addition of a command-post communications system, hierarchical network control, encryption, Deltaphone digital telephones, and fiber-optic transmission, as well as network function and subscriber function enhancements. NFT-Ericsson and Alcatel STK are collaborating in developing the MRR design. The new radio is being manufactured in Norway.

Project Parakeet. A significant event regarding Deltamobile concerned the Australian effort, Project Parakeet. In 1985, Deltamobile was chosen for the Australian Department of Defence's Project Parakeet, with eventual plans to use Deltamobile-derived switches and multiplexers together with extensive system control software. Parakeet is a tactical trunk communications system that forms the fourth major element of a

complete new range of communications equipment for the Australian Army.

Parakeet was originally scheduled to enter service in the early 1990s in order to supply high-capacity links between major headquarters, the communication link between Project Raven (HF and VHF combat net radio) and DISCON (strategic network to be used by all the services), communications channels for AUSTACCS (a computer-based battlefield information system), and interfaces to the Australian civil telecommunications network.

Racal Electronics (Australia) was originally designated to be responsible for overall system management, with the major subcontractors being Racal-SES (UK), NFT-Ericsson (Norway), Alcatel STK (Norway), and Software Sciences (Australia). The total contract was originally estimated to be worth US$128 million. The Australians chose the Deltamobile-derived system over a system such as RITA or Ptarmigan, because the latter were too complex and possessed capabilities for which the Australians had no requirement.

However, in mid-1988 the Australian Department of Defence announced that it was going to reopen the bidding on Project Parakeet. Among the reasons cited for the shift were changes in the scope and scale of the system, which have resulted in higher costs and scheduling delays. In 1989 Australia selected Siemens-Plessey to supply equipment for its DISCON (Defense Integrated Secure Communications Network). DISCON is based on Siemens-Plessey's MRS (multirole system) integral switching and distribution system for tactical and strategic communications networks.

Norway reportedly continued to enhance its TADKOM in 1998 and 1999 with an upgrade based on the GENESIS SR rugged multiplatform computer and flat panel displays for installation in that country's BV206 vehicles. Many of the enhancements were believed to be commercial off-the-shelf (COTS) technology, used in order to reduce spares, maintenance, and ownership costs.

Recent Contracts

Contractor	Award ($ millions)	Date/Description
STK	17.3	Oct 1985 - Contract for full-scale development of TADKOM.
Racal	2.9	Oct 1985 - Contract from Australian DoD for first part of Project Parakeet.
EB	22.0	Apr 1986 - Contract for Deltamobile system for unidentified Middle Eastern country for its HAWK missile system.
NFT-Ericsson	125	Jul 1990 - Contract from the Norwegian Army Material Command for the development and supply of new-generation VHF MRR for data and voice transmissions.
NFT-Ericsson	125.0	May 1992 - Increase to contract to develop and build frontline radios. Prototypes tested in spring 1993, with deliveries in 1995.
DRS Technologies	NA	Sep 1998 - Contract from Norwegian Army Materiel Command (HFK) for rugged computer systems based on GENESIS SR for TADKOM. DRS will deliver three different variants of the GENESIS SR as well as associated peripherals and technical services.
Thomson-CSF Norcom (now Thales)	NA	Jun 2000 - Contract from the Royal Norwegian Air Force Materiel Command to supply four secure communications systems to four Norwegian Air Force Control and Reporting Centers. This is part of the upgrade of the Allied Command Europe. The secure communications system is part of the Air Command and Control System ground-based communications linking the Control and Reporting Centers, the air defense radars, and the UHF Remote Radio Equipment Management System with fighters, Airborne Early Warning aircraft and other elements of the Air Command and Control System. One Norwegian Control and Reporting Center was equipped with a secure communications system in October 1999.

Timetable

Month	Year	Major Development
	1972	Design studies on the use of digital techniques in new tactical automatic communication systems
	1976	EUROCOM selected as basis for Deltamobile
	1978	Deltamobile development contract awarded to Elektrisk Bureau (EB) and Standard Telefon og Kabelfabrik
Aug	1982	First Deltamobile system delivered to the Norwegian Army
	1985	Australian Project Parakeet contracts awarded
	1985	Deltamobile selected as the complete communications system for the Norwegian Improved HAWK air defense system
	1986	Contract announced for Deltamobile system for an unnamed Middle Eastern country
	1987	TADKOM enters service with the North Norway brigade
	1988	Scheduled delivery of Deltamobile for Middle Eastern country
	1988	Australians announce that Project Parakeet will be recompeted
	1989	Final implementation phase for NOAH system application
July	1990	Contract awarded for development of MRR
	1992	New switching system for TADKOM
May	1992	Contract increase to NFT-Ericsson MRR development
May	1993	Prototype testing for VHF MRR
	1995	Delivery of VHF MRR to Norwegian Army

Worldwide Distribution

Australia, **Norway**, and **Sweden** are all known customers, in addition to an unidentified country in the **Middle East**. While the companies involved are not commenting specifically, as many as 14 countries are said to be Deltamobile customers. The majority of sales comes from the Middle East, where Thales (formerly Thomson-CSF) and Ericsson are considered reliable suppliers. The Pacific Rim basin also has the potential of becoming a significant marketplace.

Forecast Rationale

The market for the Deltamobile digital tactical communications system (TADKOM is the original home name of the system as it was first developed upon request by the Norwegian Armed Forces) appears to have run its course. Although it is a decent system, the rapid technological advances in defense electronics and communications have overrun the design of the Deltamobile/TADKOM system for many of today's information technology-demanding militaries.

Although upgrades have extended the service life of Deltamobile for several years, major system procurements are not predicted for either the near- or far-term. Additionally, European customers seem to be actively pursuing TADKOM replacements and one could say that only involvement in joint operations has kept the system in limited use. Communications compatibility remains vital in NATO cooperative efforts, as displayed in the Balkans (Croatia, Kosovo, and Macedonia).

Yet, the Deltamobile/TADKOM system does have one major selling point - simplicity in use and repair. It has proven itself to be a reliable command post system, deployable to extreme climates. Designed specifically for the mobile military, in which command posts are hastily deployed and redeployed, the short setup time remains crucial to modern commanders. This single advantage could prove a selling point to a few potential customers looking for a good deal on a communications system. At the present time, the Middle East and Pacific Rim nations (many African nations just don't have the funding) represent the most probable Deltamobile market over the next decade, but even that is now slim due to the advances in communications technology and the availability of lower cost COTS equipment. Future sales are restricted to spares/repairs and minor procurement by lesser equipped militaries.

Ten-Year Outlook

Production complete. Only minor spares, maintenance, and enhancements are foreseen at this time; therefore, the forecast chart has been omitted. Barring any sudden surge of program activity, this report will be archived next year, 2003.

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