Enhanced
EUROCOM Solution

THALES

Integrating various applications into one system

Signals

The TAS switching network is normally operated by the Army Signal Corps. A meshed network of communications nodes is deployed in order to provide communications services within the area of operation. Each node will provide the users with automatic voice and data services in the network. The trunk nodes are deployed in the terrain to obtain optimal area coverage. The different units are connected to the trunk network by wire or radio.

Infantry

Infantry units are significant users of voice communication on combat net radio (CNR). In addition to support of CNR networks, the system offers mobile access functionality for interface of modern ECCM type of radios. Such radio systems gives efficient protection against electronic warfare (EW), transfer of electronic messages and direct single channel radio access (SCRA) to the area network.

Cavalry

As for the Infantry, the main requirement for the Cavalry is voice CNR nets. However, in addition to CNR net connectivity, the mobile access functionality of the system offers extended area coverage by mobile radio access points (RAP) for fast re-deployment over long distances.

Engineer/Medical Service/Logistics

The main area of use for these units is exchange of messages. The TAS switching system offers automatic transfer of messages which enables more efficient administrative procedures and thereby less time for response.


Field Artillery

The Field Artillery is a heavy user of communication for fire direction data. The TAS switching system offers integrated voice, data and message transfer, so that the time from target observation to fire commencement can be reduced considerably compared to traditional systems.

Air Defence

The main areas of use for air defence are data transmission between the radars, and from the radars to the dedicated weapons. The TAS switching system offers increased flexibility due to free location of radars and fire units in the terrain for optimal air defence area coverage.
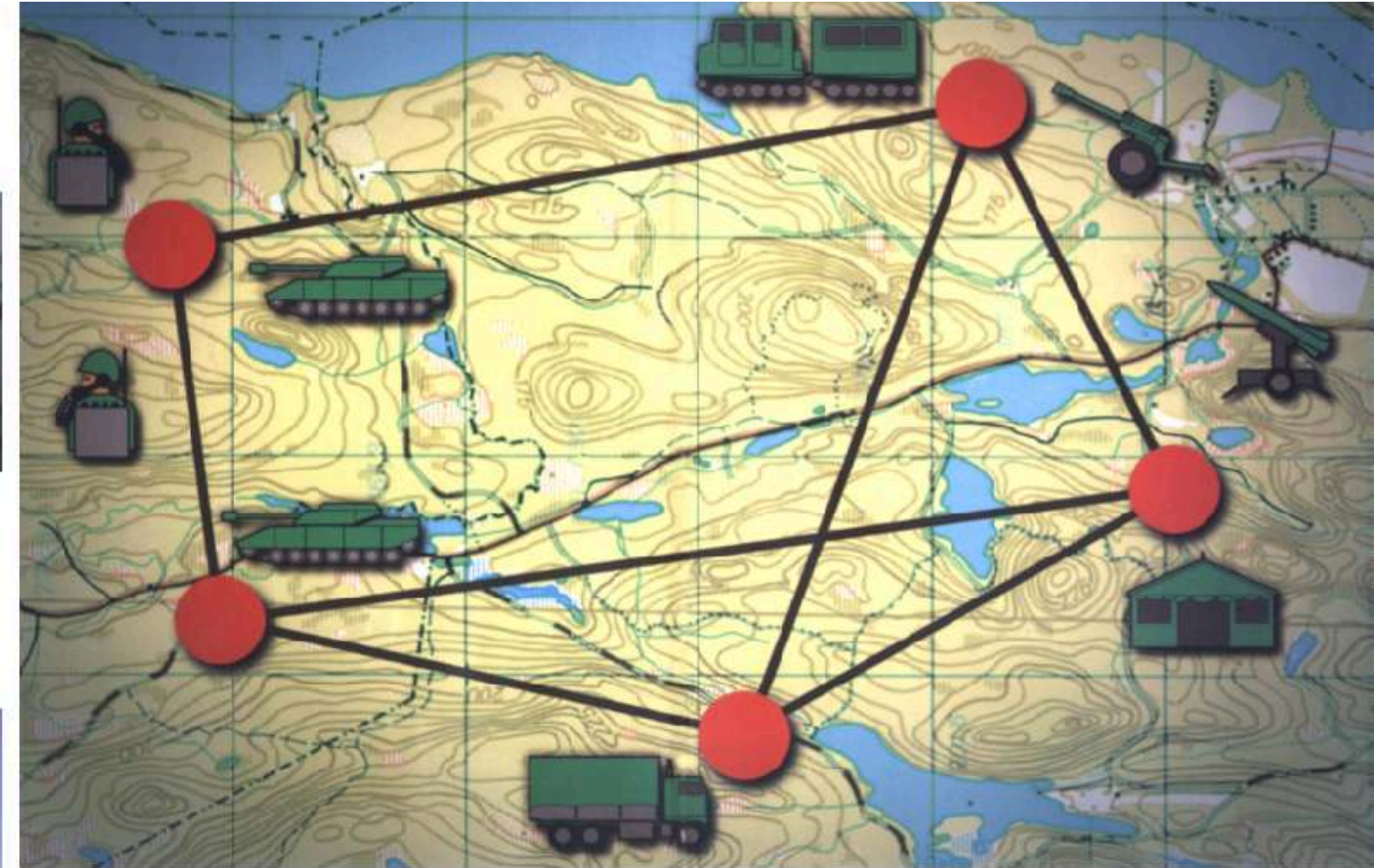
Command Posts

The Command Posts require extensive communications for voice, data and message transfer. The TAS switching system offers great flexibility regarding capacity, mobility, disperse deployment and split command post operation.

Command and Control

A modern Army's Command and Control Information System (CCIS) requires fast reliable transmission of messages and data in order to support the commanders in executing the command and control of the manoeuvres. The TAS switching system offer continuous transport facilities for messages and data all through the network from the forward observation post, via the intermediate command posts to the higher command posts, and back out to the level of execution.

Overview

The Enhanced EUROCOM System offered by THALES has been developed since the early eighties in co-operation with our major customers world wide, to meet the requirements for tactical communications in a great variety of systems.

The basic building block of the system is the

TAS family of tactical switches, which is now being offered in its 3rd system generation. This system is the result of an evolutionary design always exploiting the technological trends of the civil communications community, as well as new concepts defined by NATO and other military standardisation bodies.

A tactical communication system consists of a number of subsystems which fulfils the needs of different military users:

- Tactical area communication network
- Command post communication network
- Mobile access subsystem
- System control and management
- Tactical message handling subsystem

The TAS switching network can contain a number of or all of the above listed subsystems in order to support different kinds of communications, such as:

- Voice communications
- Message communications
- C3I applications
- Weapon control applications

The different user applications have different requirements to the services offered, with differences related to delay time through the network, throughput rate, size of data packets, etc. The TAS switching system offers the possibility to set up communications which vary in all these aspects.

Interworking with users of other networks are important in tactical communication systems. The TAS switching system offers all the standardised military gateways, both STANAG and EUROCOM, as well as the new ISDN gateway to strategic ISDN based networks.
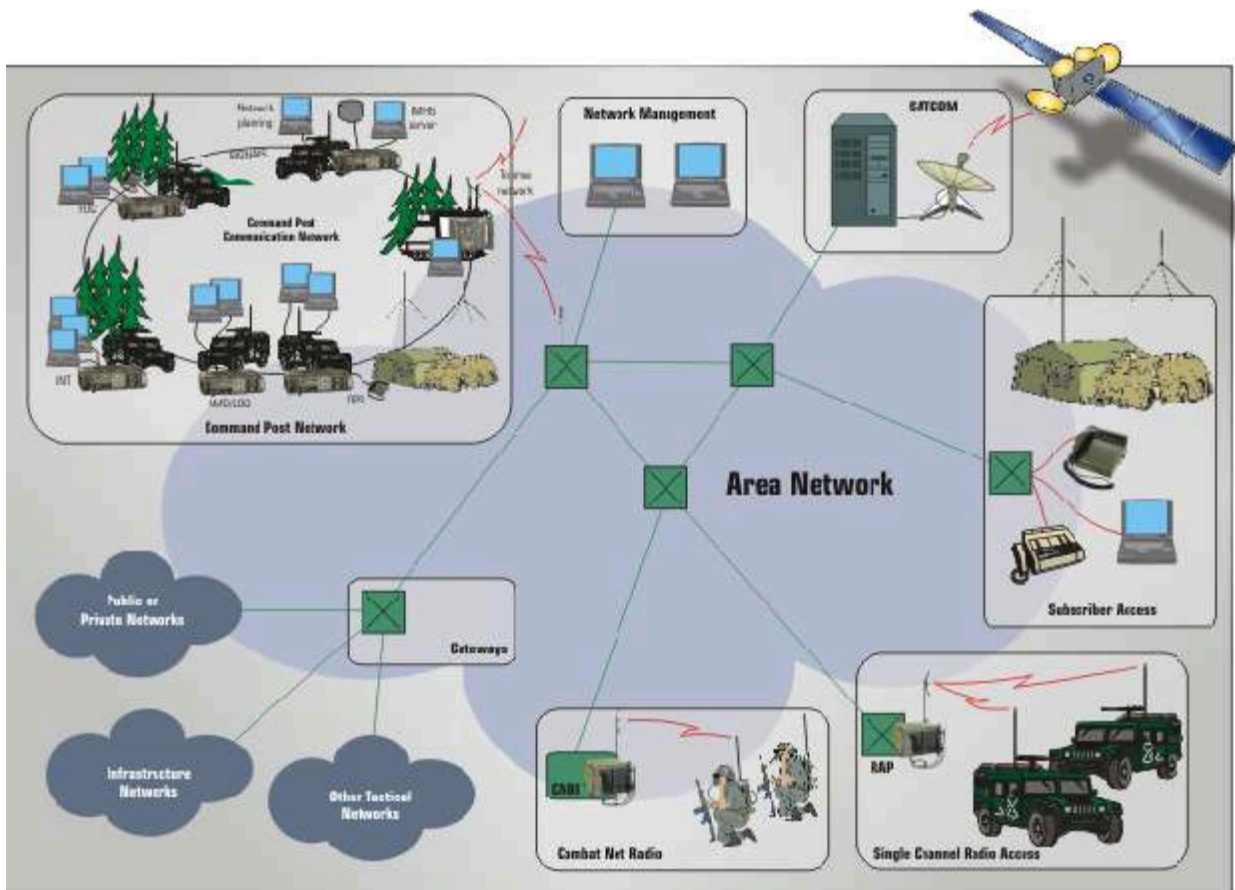
Tactical Area Network

The THALES Enhanced EUROCOM system is the most modern, comprehensive and flexible tactical area network available in the world today.

The Tactical Area Network is based on the TAS300 tactical switch with integrated bulk encryption, connected together by use of suitable transmission equipment and managed by the tactical network management system SYSCOM. The area network connects command posts, radio networks and single voice or data subscribers together into an integrated communications system that supplies all users with sufficient and reliable communications.

Network Structures

With the TAS switching system it is possible to establish meshed networks of several hundred switches. With the great flexibility of the TAS300 tactical switch both small trunk nodes with 3 - 4 radio links and large ones with more than 10 radio links can be established. The small low cost, lightweight TAS300 switch containing up to 8 TDM ports, can easily be installed in several trunk node vehicles, hence distributing the switching function and increasing the survivability and mobility of the node. One part of the node can move to a new location while the other part is keeping the existing links in operation.

Available trunk bitrates are 256, 512, 1024 and 2048 kbit/s. The TAS300 switches have the packet switch functions integrated. Connections between these integrated packet switches are automatically established on all trunks with bitrates up to 512 kbit/s. Forward error correction (FEC) is used on these packet switch trunks with effective bitrates up to 307.2 kbit/s.

The trunks are mainly established by use of multi channel line of sight radio relay equipment (MCR). Most existing tactical EUROCOM compliant MCR equipment have been successfully tested with the TAS switching system.

To link up MCRs in separate vehicles inside the node, electrical or optical line terminal units (LTU or OLTU) are used.

The area network also supports use of satellite or terrestrial infrastructure networks to establish long distance trunks. As a fallback solution single channels may be connected by cable or radio to form a low capacity trunk.

Important Networking Services

- Routing algorithm capable of handling large networks consisting of hundreds of switches. Both saturation search and self learning deterministic search is supported. The routing algorithm takes into account both the subscriber priority and security requirements.

- Advanced synchronisation system that is not dependent on expensive high stability rubidium clocks. The switches have built in crystal oscillator and utilise advanced synchronisation schemes (mutual, plesiochronous or master-slave) to synchronise the network. External high quality reference like rubidium clock may be used in addition.

- End to end echo cancelling both for analogue and digital voice connections. This allows for usage of modern MCRs with frequency hopping and bit interleaving which introduce echo. The same apply to satellite communications.

- Free numbering plan. The same subscriber number may be used for both circuit switch and packet switch connections, and a subscriber keeps his number independent of how and where he moves. The numbering plan is normally based on EUROCOM/ STANAG, but is fully customer definable.

Tactical Switch TAS300

Command Post Communications Network

The Command Post Communications Network (CPCN) supports military field Command Posts with internal voice and data communications facilities as well as access to the

tactical area network. The TAS switching

system based CPCN provides a wide range of basic and supplementary services as well as standard telephone and data interfacing capabilities. The modularity of such a CPCN permits reuse of the same elements at low and high level echelons.

The CPCN is based on the TAS family of military digital voice and data switches. Strong routing and selfconfiguration functions are incorporated in the TAS switches to provide high service availability in harsh, mobile environments. The small TAS350 switches can easily be integrated in staff vehicles which can be interconnected to form resilient, local networks inside a command post.

Voice access can be provided via standard telephones or MLT300 voice terminals.The MLT300 permits the user to access several combat radio nets and voice calls simultaneously through a headset or handset.

The CPCN can also be supplemented with local area networks (LAN) for attachment of office type PCs. Robust IP routers can also be offered to permit data transmission across military wide area networks between LANs.

Command Post Network
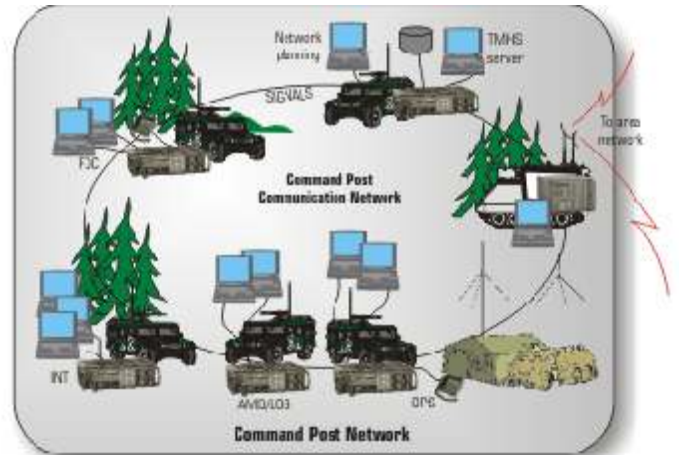
convenient voice access to combat radio nets. In addition electronic message services and datacommunications for e.g. weapon control applications may be required.

Large command posts

Large command posts at brigade level and above have similar requirements as the smaller command posts, however due to the number of staff vehicles a trunked network is required between the TAS switches in the staff vehicles. In addition a LAN infrastructure is often required inside the command post. The LAN infrastructure may consist of interconnected LAN nodes based on ethernet or ATM technology. Routers can be added to provide data communications between LANs in different command posts via the robust wide area network services.

Small command posts

Command posts at battalion level and below typically require internal telephone services between local command post positions, telephone access to higher echelons, as well as

Tactical Mobile Access System

The Tactical Mobile Access System gives the area network subscribers mobile access for both secure telephony, and circuit switched and packet switched data services. The TAS switches has integrated mobile switching and thereby the network provides wide area coverage.

Addressing and numbering plan are common with the area network. The network supports automatic and managed mobile roaming for optimised area network access. The distributed mobile switching gives durable access. For graceful degradation to 'last resort' operation the access system supports automatic transition between area network access and autonomous radio system operation.

Control and management are common with the area network with over-the-air COMSEC, unit and subscriber control and management. The access installations supports efficient utilisation of the network through distributed switching and dynamic transceiver allocation.

A tactical radio messaging system for narrow band communications is supported as part of the tactical message handling system - including a gateway to STANAG 4406 users.

Supported Radio Systems

- PR4G utilises frequency hopping (FH) as EPM. Bi-mode operation combines CNR mode operation with area network access. Secure half duplex telephony, data and mobility services are offered.

- HYDRA utilises FH as EPM. Secure full duplex voice telephony, data and mobility services are offered.

- MRR utilises narrow band DSSS and adaptive distributed multihop PR as EPM with area network access. The PR protocols are also useful for applications with realtime requirements. Secure message, half duplex telephony, data and mobility services are offered. CNR mode operation, including hybrid DSSS/FH as EPM, is part of the system and is also integrated in the access system.

- STARCOM utilises FH as EPM. Secure half duplex telephony, data and mobility services are offered.

Through gained experience with supported systems we are able to offer cost effective integration of common radio systems and our area network system also for radio systems which are currently not supported. The mobile access system may also be used to extend to full area coverage in an existing EUROCOM switching systems.

SYSCOM

SYSCOM is the overall network management system for the TAS based tactical network.

SYSCOM has a hierarchical structure which means that full control of the communications network is possible at Node, Brigade, Division and Corps level.

The system architecture is in line with the EUROCOM system control and management structure with SEP, OSC and FC at the different management levels.

SYSCOM is based on modern standards for systems management and easy to use graphical user interfaces.

SYSCOM Architecture

Up to three network management levels can be defined; node, region and network.

A very flexible network management structure means that SYSCOM can be used in any tactical communications system, from large networks of an Army Corps via smaller networks of autonomous Brigades, even to networks of single nodes.

SYSCOM Products

TNC300/FC is used for control and supervision of a single switch, larger nodes containing several detachments, or even several nodes that is managed together.

TNC300/OSC is used for control and supervision of a region of the network (typically the network of a Brigade) or the entire network (typically the network of a Division or Corps).

SEP300 is used for planning of the network deployments, and contain very powerful tools for topology planning together with radio propagation analysis and network simulation, as well as frequency management for multichannel radio (MCR) links and VHF radios (SCRA/CNR).

SYSCOM Functions

The SYSCOM units contains tools to assist the Signals Staff in:

- Pre-planning and mission planning of network resources
- Network deployment planning and relocation of resources
- Frequency management for the radio systems
- Generation of orders/instructions to the node teams
- Control and supervision of network equipment
- Supervision of network status and alarms
- Management of subscribers and services
- Management of gateways
- Management of COMSEC resources
- Operator assistance

As a feature for increased survivability of SYSCOM the hierarchy of TNC300 units has a built-in standby mechanism, which updates the databases of the standby units automatically, and takes over when communication is lost to the master unit. Similarly both TNC300 and SEP300 has step-up features making it possible to move the active command to a step-up location in a controlled way when relocating.
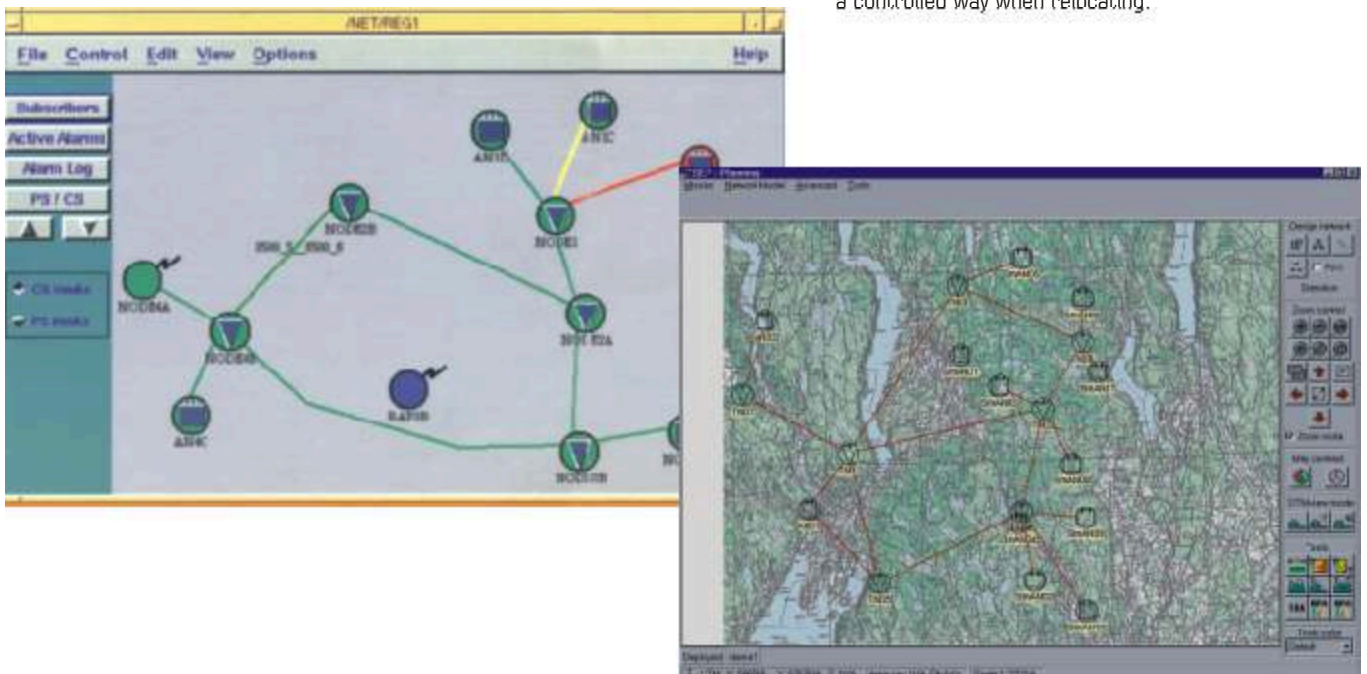
Tactical Message Handling System

TMHS offers a complete message handling system on the battlefield. This includes official departmental messages, journalising, security, subscriber mobility and unofficial e-mail to private users.

The TMHS is based on the NATO standards for message handling (STANAG 4406).

- The TMHS consists of the following main building blocks:
- Tactical Message Server (TMS) containing message transfer agent (MTA) functions, including automatic rerouting and queuing.The TMS also includes the Message Storage (MS) containing the users' mailboxes.
- XO Mail Clients which handles presentation of messages to the users. The XO Mailclients communicates with the MS in the TMS. Clients may also be collocated at the server.

Each major headquarters should have a separate TMS, allowing decentralised access to the MS. Remote access to the TMS is offered via a router network for lower level command posts, or via the mobile access system for single mobile users.

Communications between the TMS of the major headquarters may use the tactical packet switched network. The TAS switching system has built-in X.25 packet switches in every switch. Hence connectivity of the TMHS is already taken care of. The TMHS network topology is flexible and can be configured to satisfy operational needs. The system automatically switches between primary and secondary routing paths.

TMS software runs under the UNIX operating system. To be operational in the tactical

network the TMS software should be installed on ruggedised UNIX platforms.
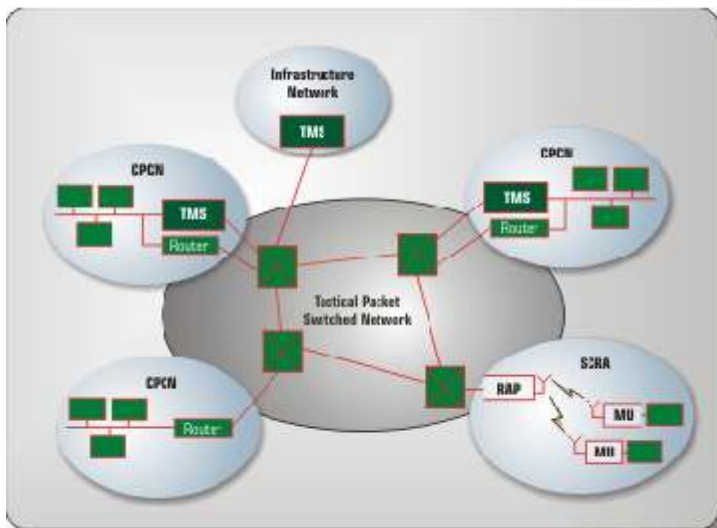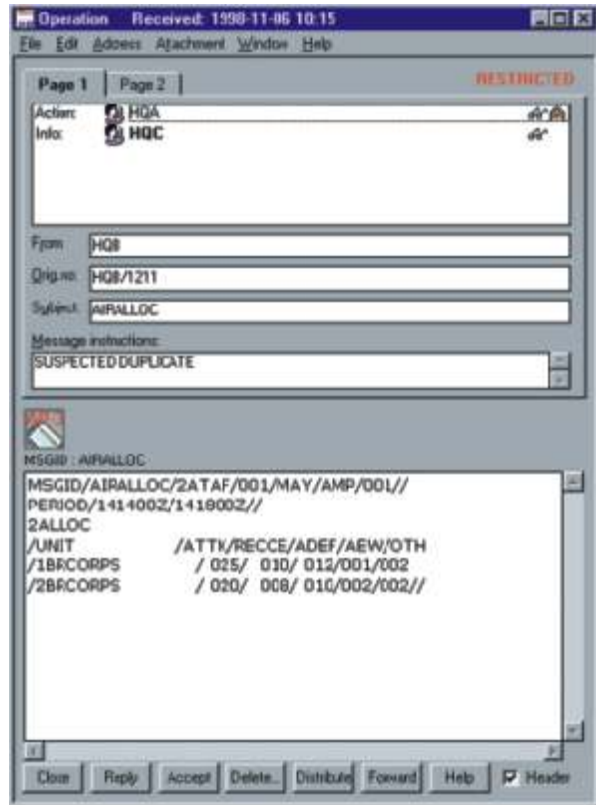
The XO Mail Client can be installed in several ways. On the same UNIX workstation as the TMS, on a PC in the same command post connected via LAN, on a PC in a remote command post connected via LAN and router, or on a PC connected to a mobile unit of the mobile access system.

Telephony services

The TAS switching system offers a comprehensive set of telephone services to the officers and soldiers in the tactical theatre

Services and features are comparable to a modern PABX, including Operator Assistance Position.

Military services and features (precedence and pre-emption, security, broadcast, remote CNR access).

Network wide services, no need to worry about where the other subscribers are connected.

Military mobile telephone services through the selected mobile access system.

Direct dialling to and from subscribers in other networks:

- Other tactical networks
- Military infrastructure networks
- Public networks

High call completion rate:

- Saturation routing in a meshed network ensures that your call will be completed whenever there is an available route to the called subscriber.
- Automatic load control prevents a high traffic load from non important users to overload the network
- Precedence and Pre-emption means that calls with lower priority will be cleared to let the important calls be completed.

- Re-affiliation and call forward services means that calls to subscribers that travel across the battlefield also will be completed.
- Optimised allocation of capacity: Voice coding is according to military standards. Each connection will occupy bandwidth in accordance with the requirements (16 or 32 kb/s).

Support of conventional analogue telephones (Local Battery or Central Battery, Dial pulse or DTMF), or digital telephones with extended features and functions.

The Multi Line Terminal MLT300 can be connected to a group of analogue lines. A group of MLT300 can be inter-connected. The MLT operators can share the monitoring and operaton of telephone lines and locally connected radios.

Datacom services

Data communications capabilities are integrated in the TAS switching system. Both voice and data communications was integrated in the system from the start and the TAS switching system offers integrated voice and data communications functions working together as one system.

Packet switces are integrated in the TAS

switching family. The packet switch resilience and error recovery procedures are used to give reliable data communications in a tactical environment.

IP Routers connect LAN users (using IP/Internet applications) to the tactical networks using the tactical packet switch for reliable transport of data in the network.
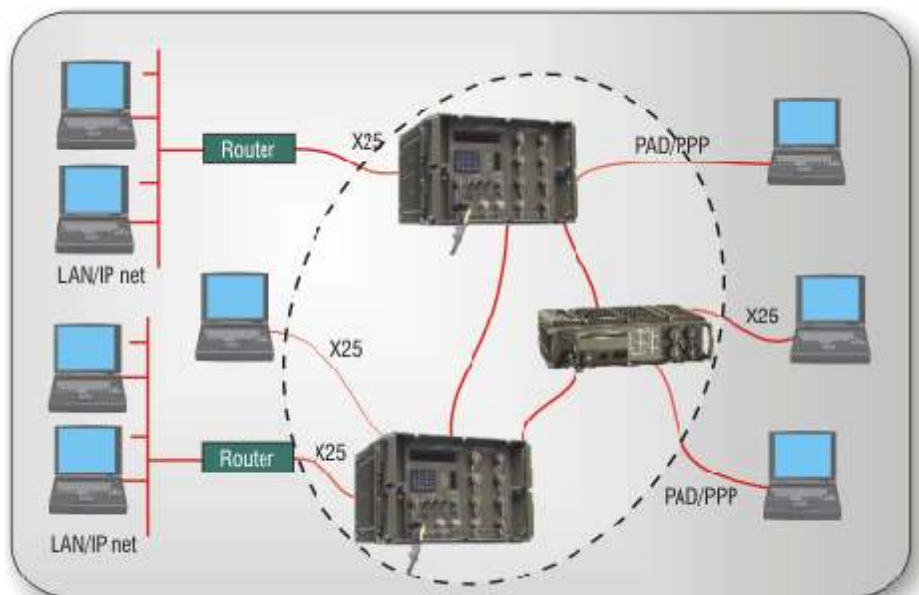
Packet switch network

Any TAS switch has an autonomous integrated packet switch. Both the routing system and the databases (subscriber profiles) are distributed in the network resulting in a network with high fault tolerance.

The routing system will automatically route new calls according to the network topology and load as well as changes in the network. The routing system uses both span tree search and saturation search.

Data communications functions:

- X.25 packet switching with military extensions
- Precedence and pre-emption
- Security
- "Fast Select with restriction on response" with "lifetime" and multicast
- Re-affiliation and de-activation by using procedures based on X.32
- Subscribers can move in the network
- without changing address
- PAD (Packet Assembly and Disassembly, X.3/X.28/X.29) X.75 gateway to other packet switch networks
- Circuit switch data connections
- Interworking with radio nets with data communications capability
- Tactical router with Internet protocols
- Ethernet LAN
- IP protocols
- PPP protocols
- Several other protocols supported by Cisco

Interoperability with the Internet/IP

LAN/IP users can access and utilise the reliable tactical packet switch network by integrating the tactical router with the TAS switching system.

The rugged tactical router TIR300 is based on the commercial Cisco 2520 router using standard protocol stacks. Through a co-operation with the world's leading router supplier, interoperability with users and applications by means of the internet/IP standards is secured.

Interoperability

One of the great advantages with the TAS switching network is the simplicity in establishing gateways with other networks and hence be interoperable with combat units from other nations.

The TAS300 is designed in accordance with the EUROCOM D/1 standard, the only existing standard for tactical area networks, as well as applicable NATO standards and ITU recommendations, providing excellent transport facilities for TCP/IP as used in tactical internets.

The TAS family of switches have built in functionality for all commonly used tactical gateways as well as gateways to strategic and infrastructure networks as part of the basic switch configurations.

The only additional equipment required is a line terminating unit to adhere to the relevant physical and electrical characteristic of the interface.

The following gateways can be offered with the TAS300 tactical switching equipment:

- STANAG 4206 (multichannel gateway between NATO networks)

- EUROCOM D/1 IIA (multichannel gateway between EUROCOM networks)

- STANAG 5040 (single channel analogue gateway between NATO networks)

- STANAG 4249 (packet switch gateway over STANAG 4206)

- STANAG 4578 (ISDN primary rate gateway between tactical and strategic networks)
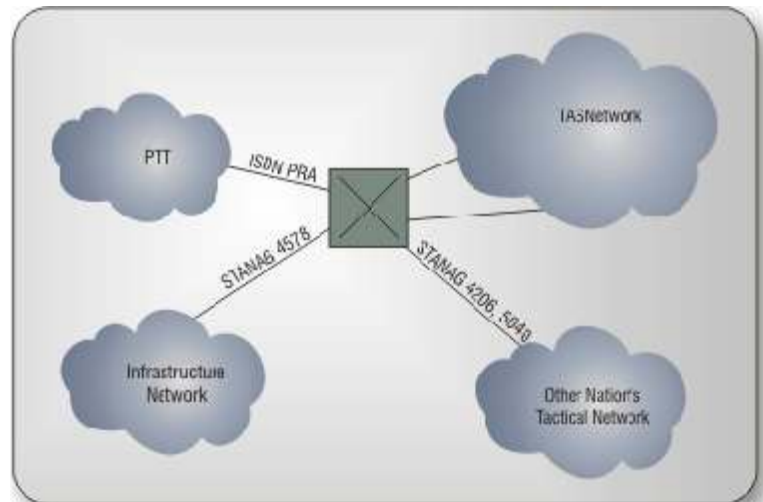
Tactical Gateway Line Unit GLU300

COMPABILITY

THALES

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