TETRA *touch*

All your urgent data in your hand

– Nokia application portal

Nokia THR850

–access all your data from one single handset

Dear Reader,

Most communications systems used by the emergency services simply do not perform well enough to keep the general public safe. This fact is not widely known, even among many people in authority.

The technology of fighting crime and conducting rescues has advanced rapidly in recent years, for example DNA fingerprinting to trace suspects and thermal imaging cameras to detect people trapped in collapsed buildings. Similar advances have been made in radio communications technology, yet these have not been so widely adopted, leaving police, fire and ambulance services and other authorities with out-of-date equipment.

New dangers

Organized crime has reached new levels of sophistication. It pervades every aspect of our society. Criminals use the most advanced technology to achieve their aims. Public order disturbances are more damaging. Even man-made catastrophes wreak more havoc.

What's more, these events have a global impact. Globalization has happened whether we like it or not. Catastrophes we see on television happening thousands of miles away have a real impact on our lives, in unpredictable ways.

It is clear that dealing with all these threats is a shared responsibility that demands co-operation between different emergency organizations and between different countries. Yet, effective co-operation can only be achieved with good communications.

In this digital age, conventional communications no longer measure up. Unlike digital systems, conventional communications are insecure; do not provide the group communications needed for effective cooperation; do not offer inter-organization and cross-border communications; and have no additional features such as data communications.

A window of opportunity to change

Working closely with public authorities and other professional users, the communications industry has designed TETRA to provide all the features that safety and security users need to cope with today's extreme demands.

Considerable investment has gone into developing TETRA by many manufacturers and authorities. There is now a window of opportunity for public authorities the world over to adopt TETRA as their communications system. Yet this window cannot remain open forever. The professional communications industry as a whole needs to see a return on its investment to be able to continue developing and supplying TETRA systems at an affordable cost. It is vital that the importance of modern professional communications systems is quickly recognized and given a higher priority by governments. If not, the benefits of TETRA could be lost forever to those who most need them.

To meet the demanding needs of public safety organizations, Nokia provides a complete TETRA system that has been awarded an ISO/BS security certificate covering not just the products but all our business processes and services. Not only that, but our overall performance has scored highly in recent customer satisfaction surveys.

This issue of TETRA Touch is packed with examples of the advanced communications features that TETRA offers public safety and security users. When reading the stories, please keep in mind the fact that most public authorities are missing out on these vital ways to protect your safety and way of life.

Kari Suneli
Senior Vice President, Professional Mobile Radio
Nokia

www.nokia.com/public_safety

TETRA WORLD

APPLICATIONS

CUSTOMER WIRE

Portal opens onto new horizons

We are on the cusp of a revolution. TETRA digital radio technology not only improves the efficiency of public safety operations, it raises the possibility of entirely new ways of working. Portal usage concept with TETRA, enables organisations to introduce dozens or even hundreds of new applications into their professional mobile radio (PMR) networks with the minimum of disruption.

The latest Nokia mobile TETRA radio terminals can be equipped with browser-type software conforming to open standards, including the Internet Protocol (IP) and the Wireless Access Protocol (WAP). This should give mobile radio users access to any new applications based on these standards, without having to adjust their radios. Any programming changes needed to accommodate a new application can be made centrally. This is equally valuable whether the application is a tailor made package or an off-the-shelf commercial product.

All this is in stark contrast to the facilities offered by conventional analogue public safety radio networks. The few applications that have been available in old networks have been very tightly integrated within the underlying proprietary network technology. Neither standards-based construction nor open interfaces have usually been offered.

Raise your standards

Portal enables for professional users to access applications using Web, WAP and SDS user interfaces, provided their terminals support these standards. A few of the possible applications are listed in the panel below. A further bene-

fit is that the TETRA radio user can call people who are using another network technology entirely, such as GSM, GPRS or 3G cellular phones.

Many of the proposed applications available through portal are only practicable thanks to the advanced features common to all TETRA networks.

For example, only the improved security available with TETRA makes it safe to transmit much of this information. Old analogue radio networks provide little or no protection against eavesdropping, which is potentially disastrous during police operations. Similarly, paramedics could face legal problems if confidential medical information is intercepted. Encryption and the other security measures available with TETRA make transmissions virtually impossible to crack.

The TETRA group call function is another key feature. It combines with WAP Push technology to enable dispatchers to send instant radio bulletins to alert thousands of radio users at once.

As the first digital PMR technology aimed at public safety applications, TETRA has already attracted a host of developers that are busy coming up with new applications. Nokia launched its TWISP program in 1999 to support and encourage these companies.

Portal for professionals means that users should be able to slot any of this ballooning selection of applications into their TETRA networks with the

CASE

Speed is the key

Could the car at the lights be the getaway vehicle from this morning's armed robbery? The police patrol officer knows it's the right colour and model. Perhaps the vehicle has been reported stolen or has false license plates, but in this traffic the police must act quickly. The officer could lose sight of the suspects if they drive off. Equipped with a TETRA mobile radio, the officer simply keys in the license plate and the details of the corresponding car arrive on the built-in display almost instantly. One more push of a button brings up the owner's particulars.

The whole thing takes a couple of seconds, leaving plenty of time for the officer to decide whether to pull the vehicle over.

License plate checks are among the most basic applications that are available to field officers equipped with TETRA radios. It could take minutes to retrieve similar information using a conventional radio, by which time a suspect could be long gone.

CASE

Fight fire with information

By the time the fire crews arrive on the scene, the pharmaceutical plant is ablaze. The plant office has been destroyed and the manager is still trying to supply a list of all the specialised chemicals being used in today's production. How dangerous are they and what precautions should the emergency workers take? Will the fire fighting water now running off the site pose a contamination threat?

Back at the station the dispatcher patches into a database of hazardous materials and sends instructions to all the WAP-enabled TETRA radios being used in the operation. Every firefighter now has instant access to the information they need to deal appropriately with anything they are likely to encounter.

CASE

Identity parade

The suspect is on the move and believed to be heading for the border. Using the WAP Push function, the dispatcher sends a short message to all the border guards via their TETRA radios, telling them to be on the lookout.

One officer has a hunch that the 'salesman' waiting to pass through the checkpoint may not be all that he seems. He glances at the message, which allows him to select various options by pressing a few keys, including pulling up a description of the suspect. The salesman's real identity won't remain a mystery for long.

INFO

Wireless Portal allows professional users to benefit from a wide variety of facilities, including:

- Remote database access
- Image transmission
- WAP and Web http user interfaces
- HAZMAT information retrieval
- Reporting
- Horizontal applications, such as e-mail and calendars
- Workforce management
- Setting up Command and Control at remote sites
- File transmission
- Information push with alert distribution
- Task-related information pull
- Tracking the status of fleet vehicles
- Control and monitoring of equipment
- Monitoring burglar and fire alarms
- Taking environmental meas rements
- Field equipment telemetry
- Video clip transmission
- News services
- Intelligent search engines
- Face recognition
- Tracking

Bringing TETRA networks to life

To help operators move from an-alogue to TETRA technology, Nokia Professional Services offers project management and technology competence for both the roll-out and care phases of a TETRA network.

System Utilisation Support from Nokia brings together customers' expertise in their operating procedures and Nokia's experience in implementing various TETRA configurations when managing the changeover to a new generation communications system.

Services cover the entire process of planning and deploying networks and keeping them operating at peak performance. In addition, Nokia Professional Services can proactively suggest operational improvements to achieve targets for network availability, reliability and security.

Full support for network planning and deployment

Nokia Network Planning Services cover the full scope of planning for TETRA networks, including radio, transmission, switching and IP backbone network planning, helping public safety organisations optimise their investments in and use of advanced TETRA networks.

Project management is the key to efficient rollout and achieving on-time deliveries and high-quality results. Our strengths in this area come from experience - we have a proven record of delivering 17 TETRA networks, more than 150 analogue professional mobile radio networks and 100 GSM networks worldwide. This success is also reflected in our ability to integrate new technologies into existing networks. Nokia has almost 60 public GPRS core network references, including close to 30 commercially launched networks.

Nokia's Network Planning and Rollout Services for TETRA
- Nokia Project Management Service
- Nokia Network Planning Service
- Nokia Implementation Service

Comprehensive care services for network operations

Once the network is operational, Nokia Care Services provide crucial network operations support for the TETRA sys-tem, with special emphasis on functionality and security.

Although our support is particularly active during the critical launch and start-up periods, public safety organisations can rely on Nokia Care Services to support their TETRA networks during their whole operational life.

Nokia Care Services for TETRA
- Nokia Care Management
- Nokia Software Maintenance service
- Nokia Emergency Support Service
- Nokia Help Desk Service
- Nokia First-line Maintenance Service
- Nokia On-site Support Service
- Nokia Process Development Service
- Nokia Hardware Services

Maximise staff and technology resources

To help TETRA network operators maximise their technology and personnel resources, Nokia Professional Services also offers a full range of Consulting and Competence Development Services. These include consulting services for competence development, to assess the needs of operations personnel and developing learning solutions that make the most efficient use of Nokia TETRA network capabilities.

Nokia training services are designed for technical personnel, dispatchers, radio users and network managers, and other groups who work with Nokia TETRA equipment. TETRA learning solutions cover technology training, product-based training and task-based training.

Nokia Consulting and Competence Development Services
- Competence Development Consulting Services
- Training Services

NOKIA THR850
– access all your data from one single handset

Open the WAP browser of your Nokia THR850 to access your databases on–line. Connect your phone to a laptop to read e–mails or open an application on your company server. And, on top of that, enjoy all the other advances of wireless communication with your TETRA phone, including priority scanning, Dynamic Group Number Assignment, predictive text input for messaging, user profiles, task–journal and calendar. As the first TETRA terminal supplier in the world, Nokia demonstrates all these services live at the 4th TETRA World Congress in Nice, France, in December 2001.

TETRA radio networks provide fast voice communications between team members and individuals. When combined with real time access to data, it can totally revolutionise the way organisations work – suddenly, people have all the information available, wherever they are and whenever they need it. The Nokia THR850 opens up this new world, bringing fast IP connectivity and convenient WAP browsing to professional users.

Advanced WAP functions, easy to use

With the integrated WAP browsing of the Nokia THR850, quick response organisations can access their database information on the display of their compact handset - simply enter the service you require

through the WAP browser of your phone.

WAP deployment is made easy in the THR850 by the settings and bookmarks which can be downloaded over the air from the Nokia Activ Server WAP platform connected to your TETRA network. With the WAP Service Indication feature, it is possible to "push" notifications to the phone screens of field personnel, with an embedded link to a certain WAP page. This is a useful feature for informing people about incidents, giving them the possibility of accessing more detailed information from their server through the link.

TETRA IP is employed as the data transmission bearer and provides instant interaction for the user. WAP is also easy for users to learn when they find it help-

ful in their work and see it displaying exactly the same information they work with every day.

The phone that is also a modem

Some services such as e-mail or tailored applications require a larger screen than that available on the phones. For these applications, it is possible to use the TETRA IP dial-up feature of the THR850. Simply connect the phone to your device's (e.g. laptop PC) serial port using the THR850 accessory data cable. Then, start your communications application and you are ready to use the THR850 as a TETRA IP modem, in a way similar to how cellular phones are used.

This widely used interface makes the application development easy, allowing developers to implement external applications such as location and status queries that can use SDS text messaging. AT command documentation is available in Nokia Developer Netpoint on the Internet.

Data is a vital resource, too vital to be locked up out of reach at the organisation's Headquarters With the Nokia THR850, data is there where it's needed – out on the street.

FIRE
Authorised fire officer in duty defines incident response

Co-operation groups
TETRA enables flexibly selective and controlled cross-communications within each separate organisation when operations require it.

POLICE
Authorised police officer in duty defines incident response

By command

By command

By command

TETRA provides secure and flexible support for demanding operations

The demand for an international, fast, infallible and open communication standard to meet the needs of police, fire and other emergency services has increased along with the pressures for speed and efficiency in emergency handling. The introduction of TETRA came just in time to those employed in such services, and is now replacing slower, more diverse and often proprietary analogue systems. Nokia's range of TETRA handsets and devices make the most of the system's adaptability, whereby it is possible to define the extent of access both within a particular service activity and across a pre-determined geographical operational areas.

Sounds impressive, but how does this work in practice? From the point of view of police, fire and rescue services, the system functions simply on the basis of private, secure communication networks that can be linked up with each other when situation requires. A local or regional police network, for example, would comprise a group of officers "on the beat" or on patrol duty in vehicles. Their communications are controlled and monitored through a manager in charge, either in an office environment or in mobile command unit, at a Windows-based Dispatching Work Station (DWS). Status messages, as well as acknowledgement-of-response messages, are then returned to the DWS via TETRA handsets from the officers in the field. Operational model and responsibilities are repeated across the country, with each region contributing to a national group controlled by national operations.

Of course, an emergency may arise requiring the swift co-operation between and co-ordination of police, fire and rescue, and ambulance services. TETRA has been designed to handle such emergencies, and the ability to communicate in a controlled and predefined way between service groups is a fundamental still unique feature of the Nokia TETRA system. In Finland, for instance, where the use of TETRA is widespread, the national police force is administered in tens of regional districts, each comprising its own TETRA user fleets and contributing to the broader national user formations. Finland's fire and rescue services are located in more than 400 operational areas. TETRA makes it possible to enable selective and controlled cross-communication between these groups, while also meeting the challenge to ensure secure communications within each separate organisation.

Line organisations can be defined, building a virtual system in which this

co-operation between organisations and services is arranged, but an active, command must still be made by the manager in charge authorising access to talk groups by units from other operational or regional user organisations. This means that the manager of any particular group retains the decision-making control and authority as to who has group access. For example, assistance may be required by, or offered to the police from the fire and rescue services in another town. The manager of the incident must grant access for the co-operating services to the talk groups used in the incident by means of a pre-defined line organisation. Another efficient function of TETRA is that, following an emergency and when communication between the talk groups has ceased, the system automatically clears any external, temporary participants if so required.

TETRA could also be adapted to reduce wastage during normal situations when the communications traffic load is low. Organisations close to the public safety services, including security companies, non-critical patient transportation or electricity suppliers operations, can take up the TETRA slack, but on the condition that their use will be automatically reduced to a lower service level when radio capacity is required for heavier police or emergency service use. Typically police, fire and rescue and ambulance services are granted higher priority within the TETRA system.

Nokia's TETRA handsets also include a distress call facility, a very powerful feature that can instantly discard low priority services. Distress calls are directed to receivers that can be redefined dynamically case by case instantly by an authorised system user. In an unlikely event that the TETRA network infrastructure is inaccessible e.g. under ground, or if there are doubts about its accessibility – an example might be a fireman outside a burning house needing to talk to a fireman at work in the basement of the house - Nokia's TETRA phones include a direct mode, enabling one-to-one "walky-talky" communication between the radio terminals directly.

But TETRA, an open infrastructure for which Nokia is a leading manufacturer, has been developed both as the first and last resorts of the police and emergency services, operating on the principle of absolute infallibility. Whatever else fails in an emergency situation, TETRA must keep on functioning.

Nokia TETRA network solutions – protected investments.

Nokia knows networks – hundreds of large national network rollouts throughout the world are compelling evidence for that. This knowledge allows Nokia to achieve the two main conflicting requirements for networks: lowest cost of set up and future-proof structure. Nokia has shown that both of these requirements can be satisfied without compromise.

Being future-proof, flexible expandability and low operational and maintenance costs have been designed in to every Nokia TETRA network element, giving a cost-effective network. The same approach is valid for services as well - customers around the globe are already gaining benefits using Nokia's Online Services for their business.

TETRA is the first technology to allow the building of genuine national communications networks for public safety users. Nokia's broad experience of large networks is extremely valuable and Nokia TETRA network elements are based on the same reliable, flexible and future-proof platforms used in other networks. The importance of the operational and maintenance costs is evident; these costs typically determine what users have to pay for services, so the costs must be kept low.

Nokia TETRA network topology and DXTs

The Nokia TETRA DXT Switching product, the DXT 256, can support up to 256 radio transceivers in 128 base stations while providing connections to dispatching stations and other core network elements. Using two-layer hierarchy, Nokia DXT can provide transmission link savings of up to 20 times compared to solutions where all switches must be interconnected. With Nokia TETRA, speech is encoded throughout the network, giving fast call set-ups, minimum speech delay, and minimum bandwidth requirements for links.

Radio Access (Base Stations)

Nokia TETRA base stations allow you to start small and expand as you want, minimising space requirements. Remote operation and maintenance functions, such as software downloading and remote configuration drastically reduce the number of site visits needed.

However, the biggest impact on lifetime costs for radio networks is the number of sites needed for the required coverage. Nokia TETRA base stations feature the highest receiver sensitivity to cut these costs.

Another major source for operational costs is in transmission links to base stations. Nokia base stations provide multiple transmission topologies that are much more cost-effective than plain point-to-point connections.

Nokia TETRA base stations also support mixed use of leased lines and the operator's own microwave radios, producing a cost-effective transmission network.

The future is safe

Adding functionality to a live network is never simple. For public safety networks these aspects are even more crucial. In the Nokia TETRA network, enhanced functionality is added as software upgrades to achieve minimum downtime. Occasional hardware upgrades are straightforward, causing minimum disruptions.

New Nokia Dispatching Workstation, DWS Concept

Nokia introduces ISDN connected Enhanced Dispatcher Station

The services of a radio network are only as good as they appear to the users on their terminals. This fact has been fueling Nokia's dispatcher station developments.

Nokia dispatcher solutions provide powerful services through a Windows based Graphical User Interface (GUI) in three versions of the Dispatcher Work Station (DWS): the Communication dispatcher, the Management dispatcher and a combined variant, which provides the full range of services. Now all these variants are also available in the new Enhanced Dispatcher Station, or EDST.

EDST has been designed especially for small or single station dispatcher centers. Thus, EDST complements Nokia's existing dispatcher portfolio. Despite being a 'light' version, EDST does not compromise on services, features or performance, providing versatile individual, group and data communication services as well as speech monitoring of up to ten groups simultaneously. EDST also provides powerful tools for group membership management, dynamic regrouping and subscriber administration and provisioning, based on Nokia's advanced organisation block concept. Where different users share the same EDST, each user is granted only the services needed for their job.

As well as meeting demanding voice and data dispatching requirements, EDST has other unique features. EDST connects to a TETRA switch via dial-up ISDN subscriber line connections (2B+D). This allows totally new dispatcher applications, which have so far been too expensive to implement with fixed, high capacity data connections. Examples of special EDST applications are remote single station dispatcher centers, temporary or movable dispatcher centers and back-up installations for command and control room applications.

Economical remote, single client dispatcher stations

EDST uses commonly available, easy-to-acquire ISDN subscriber line connections to provide economic dispatcher solutions for small, remote offices, where only one dispatcher client is needed. In most places with an existing telephone line, an ISDN connection can be provided without additional wires or transmission equipment. Because dial-up connection is used, the line is kept busy only when the EDST is needed. For the rest of the time the connection can be closed, saving costs. For organisations with their own ISDN PABX network, the connections will in practice be free of charge.

Temporary and movable dispatching centers

There is often a need to set up temporary command centers to cover long-lasting emergencies, large sports meetings, exhibitions, festivals or other extensive outdoor events.

EDST is perfect for such occasions – a powerful, full-featured line connected dispatcher station, which is also extremely portable. Using a dial-up ISDN connection means that EDST can be moved to any location with an ISDN subscriber line to set up temporary dispatcher stations. All TETRA services and field personnel are available immediately to the EDST user.

For movable EDST stations, it is vital to have security procedures to prevent illegal access to the TETRA network through an ISDN connection. In the Nokia TETRA network, EDST connections are only allowed from the verified ISDN ad-dresses. Once the connection is established, the EDST user and their rights are verified with an identity and password, or optionally with a SmartCard.

Back-up command and control center

In cases of extreme emergency, a command and control room may need to be evacuated. To plan for such events, a back-up center can be equipped with EDST stations and ready configured ISDN dial-up connections to the selected network switches. Because of the dial-up concept, the fixed costs of ready to use connections are very low compared to other transmission methods.

Easy to use – cuts training costs

EDST uses the standard Nokia DWS dispatcher's graphical user interface (GUI). This allows any combination of the Nokia's dispatcher stations to be used in the same organisation and users can move from one to the other with no additional training. This is a significant benefit to organisations where personnel occasionally move from one office to another or when a back up command and control room equipped with EDST must be taken into use suddenly.

To make installation straightforward, EDST is provided in complete, easy-to-install packages with the computer and all necessary audio accessories.

Nokia DMO Link connects Direct Mode users To TETRA network

The Nokia DMO Link extends the operational area of a TETRA network by connecting users operating in Trunked Mode (TMO) within the TETRA coverage and those operating in Direct Mode (DMO). It is invaluable for example in remote areas where TETRA network coverage is not available, yet where a group operating in Direct Mode needs to communicate with the dispatcher or operation commander. The following examples describe some typical situations in which this kind of function might be needed.

- Police are conducting an operation inside a parking lot whose concrete walls reduce TMO coverage. A police vehicle, with a DMO Link installed in it, is driven to a place that has TMO coverage. Now, policemen operating inside the parking lot use DMO and can remain in contact with the dispatcher who is operating on TMO.

- Rescuers are outside TMO coverage trying to find a lost child. In order to communicate, they use DMO. A car with a DMO Link installed in it is placed on top of a hill inside TMO coverage. Through the DMO Link, the leader of the rescue operation in the headquarter can now have speech connection with the rescuers, though he could be far away from the scene.

- Police are controlling traffic during a big public event. They use a DMO channel within TMO coverage. Through the DMO Link, a dispatcher or a police commander can reach them.

The Nokia DMO Link is a solid solution that can be set up quickly and easily by connecting two MCB405 connection units and a switch between two standard Nokia TMR400 mobile radio terminals. Using the switch, one of the TETRA radio terminals is chosen and switched to TMO mode. The team members then agree on which TMO group to operate. The other TETRA radio terminal is then switched to DMO mode and the DMO channel is selected for communication. Now, communication from the Direct Mode group can be heard by the TMO group and vice versa.

With the same hardware it is also possible to have a DMO Repeater type functionality to connect two isolated groups operating in Direct Mode. This is especially useful in remote areas and situations such as rescue operations.

The Nokia DMO Link will be available for deliveries in 1stQ 2002.

Trunked Mode Operation | **Direct Mode Operation**

TMO / DMO switch

Connection box MCB405 | Connection box MCB405
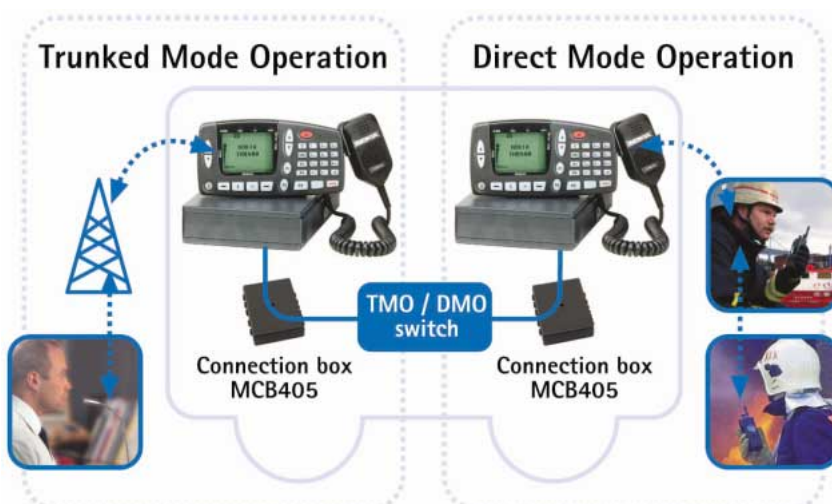
DATA

Nokia DMO Link

- Extends operational range of communication
- Easy to use with a simple switch
- Communicate remotely with a DMO team
- DMO Repeater type functionality in remote areas
- No extra software required for terminals

Managing TETRA netwo
– Ensuring a stable and reliab

John is talking to his son on his cellular mobile phone; suddenly he is cut-off and cannot get re-connected. Although inconvenient, this is not a major problem for John; he waits a few minutes and then successfully calls his son back. In the world of TETRA networks, this sort of situation - being cut-off mid call - could mean the loss of life. The new Nokia NetAct for TETRA is a network management system, designed to ensure that TETRA services are reliable and always available. It is based on the existing TETRA network management system (NMS/400) and the same technology as the already successful Nokia NetAct management systems for fixed and cellular networks. Development of the TETRA network management system has been a customer-driven process, and is done in close co-operation with operators of TETRA networks.

Nokia has developed and sold Network Management Systems for fixed and cellular networks for many years already, with over 300 successful installations. This allows Nokia to provide all its experience of Network Management to TETRA networks, even though TETRA is relatively new technology.

What does network management involve?

Network management involves controlling your network to maximum efficiency, offering end-users high quality services whilst maintaining low operating costs.

By using a network management system, you have complete control of your network. This is largely achieved through a centralised view, which enables you to see from one computer screen a representation of your entire network. From this, you can monitor how your whole network is behaving.

Managing your TETRA network with Nokia NetAct means less downtime in network elements: from one central point you know where the faults are in the network, what they are, and thus can correct them, most of the time before it becomes a problem for the end-users. You also know how the network is behaving, in terms of performance and usage, and can therefore take decisions on how to optimise the network before capacity problems arise.

For the operator this means a more dependable, more reliable communication network.

Optimising network operations with Nokia NetAct for TETRA

To optimise network operations, NetAct for TETRA focuses on fault and performance management, helping operators pinpoint and correct problems with minimal network disturbance. Using various tools, NetAct for TETRA can detect and locate problems in real time. Once the problem has been detected, NetAct for TETRA helps you analyse how it will affect the services. On this basis, the appropriate corrective actions can be taken.

Fault management focuses on collecting and managing problems in your network. With Nokia NetAct for TETRA, problems in the network elements and the resulting configuration changes can be corrected remotely. This avoids costly site visits and enhances the quality of the service as perceived by the actual users.

Performance management helps the operator locate existing and potential problems in the network. Additionally, performance information is required for the cost-efficient development of your network. For example, performance management helps you predict long-

term trends, so you know when and where to add new capacity or coverage.

Radio network management is also an important part of NetAct for TETRA. The powerful radio network management tools allow you to manage all the radio network objects and parameter values. For example, these features enable you to upload the current radio parameter values from network elements, to define and store new parameter sets in the NetAct for TETRA database and to download new parameters to one or several network elements, in one mass operation or split into several sets.

All applications also can be used remotely on PC clients, which access the NetAct for TETRA database through the organisation's own network. This method can be used to decentralize monitoring, or to give end-user groups some information about how the network performs. These applications can even be used on an authorized laptop PC through ordinary telephone lines (PSTN) or mobile phone, which is very convenient for field engineers or for example technical support people on duty at home during nights and weekends.

Experiences of a real-user

Suomen Erillisverkot Oy is the daughter company of the Finnish commercial mobile network operator Sonera. Suomen Erillisverkot is the telecommunications operator for the Finnish public authority network. This network, called VIRVE, is the world's first nationwide authority TETRA network to become operational.

Suomen Erillisverkot Oy are responsible for the VIRVE Management Centre. This centre has 24-hour responsibility for monitoring the technical functioning of the network. The center also

rks with Nokia NetAct™
le service

runs a helpline that gives advice on problems to do with operating the network and in technical problems affecting both the network and terminal equipment.

Suomen Erillisverkot have been using the Nokia network management system for their TETRA network for 3 years. They cater to the needs of the following users: the Police, Fire and

"The main benefit of the Nokia network management system for Suomen Erillisverkot is the ability to monitor the network 24 hours, 365 days a year. So, if something fails in the network, the operator will receive an alarm from the Nokia network management system. In practice, this means that possible failures are reported and elimi-

"It is a tool we use everyday. This system gives us the capability to monitor the network in dynamic way. As a result, we can reduce response times and help prevent the network from overloading," states Mr. Virtanen.

"When carrying out capacity analysis of the network, we use the Nokia network management system. For example we use it for the capacity analysis of carriers. Also we can use the NMS/400 with complicated faults, involving different telephone parameters settings and base station parameter settings," explains Mr. Virtanen.

"In the case of a fault, with the Nokia network management system we can make a fast analysis of the situation and locate the fault quickly. Then we most often make repairs remotely and only after this, if necessary, will we send right people with proper instructions and spare parts to the correct location," maintains Mr. Virtanen.

Rescue services, the Frontier Guard including ground and sea areas, Customs, Defense Forces and Health Care services. On average, one person monitors the entire Finnish public authority network via the NMS/400.

The main benefits of Nokia's TETRA network management system

According to Mr. Virtanen, Manager of Business Unit, Mobile Networks of Authorities from Suomen Erillisverkot,

nated before the end-user is affected, thus allowing us to offer stable and reliable services. "

The Nokia network management system offers easy access to network elements, allowing you to create, configure and test elements. With a nationwide network covering vast areas, this is very useful for Suomen Erillisverkot as it means the operator can concentrate on surveillance of the network instead of installation procedures.

Thanks to the Nokia network management system, end user announcements and information concerning failures and estimated failure repair time are realistic and accurate.

"We have well tested and trusted method of systematically informing end users of every failure and

configuration changes – the Nokia network management system supplies this information." says Mr. Virtanen.

Rapid cardiac diagnosis application saves lives

Every second counts when treating cardiac problems. For paramedics in the field, achieving a rapid diagnosis is often the crucial part of a successful outcome.

BioUnit a TETRA application from Finnish software house Uniqmed has been developed for just this situation. It measures a patient's vital functions, including Electro Cardio Gram (ECG), oxygen saturation, pulse, blood pressure and exhaled carbon dioxide concentration, and forwards them to hospital using the data services available over Nokia TETRA networks. This enables a faster diagnosis to be made and treatment to begin earlier.

If necessary, a doctor can control the operation of the BioUnit from the hospital. For example, the doctor can change the QRS complexes on display. In addition, all patient-related information can be transferred electronically for review by the doctor.

Every stage in the process of diagnosis is faster than would otherwise be possible. The person taking care of the patient has instant access to the patient's vital parameters on the measuring unit's screen and can ask a specialist on call at the hospital for an immediate consultation if necessary.

BioUnit sends all the data to a server computer at the hospital over the TETRA network. All the communication traffic in both directions is encrypted to ensure that everyone involved is protected legally.

BioUnit relies on rapid TETRA IP

The BioUnit application uses the Nokia TETRA IP data service to transfer information. BioUnit has a TCP/IP connection interface, making TETRA IP the natural choice. TETRA IP is easy to install with the help of the Nokia Professional data suite.

TETRA IP transmission is continuous, even when when an ambulance or other vehicle is on the move and this makes it ideal for a mobile medical application such as BioUnit. With the Nokia TETRA IP service there is no "hand shaking" delay, so BioUnit is ready to transfer data such as ECG readings in under a second.

BioUnit gives healthcare professionals an opportunity to save both lives and money, because earlier treatment of cardiac problems almost invariably makes subsequent care less expensive.

If treatment with the right medication is not started until the patient arrives at the hospital, typically the patient has to spend two weeks in intensive care and three further weeks on a normal ward, costing thousands of euros.

When the paramedics can start treatment at home, the resulting stay in intensive care will typically be less than four days, followed by two weeks on a normal ward.

Furthermore, the longer it takes to put the patient on the right medication, the higher the likelihood is that the injury to the heart muscle will be so great that the patient may not be able to work again. What are the costs then?

So, starting the medication earlier cuts the patient's treatment time and saves on the cost of medical care. Most important of all, the patient is more likely to live and make a good recovery.

Bringing TETRA radio control and CAD together

I/Radio from Intergraph Public Safety makes it easy for dispatchers to contact units in the field. Because it integrates the voice control of Nokia's TETRA radio system with a Computer Aided Dispatch (CAD) system, the dispatcher simply selects the unit to talk to on the CAD screen, and the correct channel is opened.

With a conventional system, a dispatcher would first use the CAD system to decide how to distribute tasks between units and then use the radio console to instruct the units through the appropriate radio channel. With I/Radio, communication is direct and easy, simplifying the dispatcher's job, enabling all these tasks to be done in a single computer environment, resulting in fewer mistakes and a faster response.

I/Radio also helps manage talk group membership. Talk groups can be composed according to CAD entities such as dispatch zones, units or events. When a unit is dispatched to an event that has a related talk group, all radios within that unit are added to that talk group. The system can handle anything from just a few static talk groups, to a dynamic system with task specific talk groups that are downloaded over the air to the radios.

The management system helps the dispatcher too. When a dispatcher logs on to a dispatch zone in CAD, automatically related talk groups are loaded. For the dispatcher, this is all transparent: communication is with units, not talk groups or radio identities.

Status messages speeds operations
I/Radio also turns a TETRA radio into a status message terminal. For example, when a unit hits the "arrive" status button on its radio, the unit icon in the CAD status monitor and on the CAD map will change to reflect the new status. Any radio in the unit can be used, in or out of the car, reducing voice traffic and avoiding errors. The system can also be configured to create an emer-

gency event that pops up on CAD workstations when the emergency button on a radio is hit.

The data communication also works from the CAD dispatcher to the units. When a unit is dispatched to an event, I/Radio creates a configurable SDS message with information about the event and sends this to all the radios in the dispatched unit. This is helpful even for units that use a mobile data terminal, as the SDS message is sent to all radios, including portables, so that information is available to all members of the unit.

Because I/Radio is integrated with CAD, all data related to operations, including radio traffic, is stored in a single database that can be used for analysis, reporting and management.

I/Radio is much more than "another" radio dispatch interface. It simplifies the work of the dispatchers, helps to make optimal use of the trunking capabilities of TETRA, promotes the use of data over voice and helps increase the safety of the units in the field.

TETRA takes the waiting out of image communications

In the bad old days before TETRA, users were often forced to wait hours for images that more often than not failed to make it through the clogged up network. All this has changed with the adoption of Nokia TETRA and the applications it makes possible. One of these is TETRA Image Communication Arena, or TICA, developed for officials looking at implementing a high-speed wireless image system to boost the efficiency of field operations.

Developed by **Guiart**, a pioneer in digital media and a Nokia TETRA Wireless Solution Partner,

TICA comprises two parts, one for field personnel and one for dispatchers. TETRA Image Communication Arena Client (TICAC) is used in the field to download images and relevant image data from a digital camera to a portable computer. These images can then be sent to the dispatcher by connecting the computer to the Nokia TETRA radio network via a Nokia TETRA phone. In a patrol car, a single Canon digital camera can maintain a constant flow of images. While one officer is taking pictures, another can send the images to the dispatcher.

In the control centre, TETRA Image Communication Arena Dispatcher (TICAD) allows several dispatchers to work efficiently with field operator groups or single operators. All that is required is for the customer to decide on an organisational structure that will operate smoothly and adapt quickly when new groups start using the system.

Shift changes cause no delays

The system also gives smooth handling of shift changes and dispatcher regrouping. When a dispatcher logs out and before the new dispatcher takes over, the system buffers all image data and displays it when the new dispatcher is ready for work. Data is processed automatically so the dispatcher wastes no time on data conversions or storing archive data.

Group control also allows dispatchers to use pictures to communicate efficiently with group members, addressing either an Operational Group or a Management Group, or both. This is similar to the Nokia TETRA group communication feature that allows users to simultaneously contact everyone in a given group at the press of a button. The dispatcher is able to publish images through the server for the whole group or for office users for browsing, using any standard browser. TICA im-

ages and image data are always stored in standard Windows formats, following the Nokia policy of supporting open communications systems and avoiding proprietary approaches wherever possible.

Because wireless network bandwidth is a scarce and expensive resource, it needs to be used as efficiently as possible. TICA uses short message codes to indicate common data occurrences inside the system, allowing users to send and receive images and memos by clicking a few buttons.

Data communication is a high priority for the Norwegian public safety services

Police, ambulance and fire department dispatch centres in Trondheim in Norway are piloting a Nokia TETRA system for all operational communications among the three services. The results of the trial are expected to form the basis of a recommendation for a shared nation-wide communication network for all the rescue and emergency services in Norway.

Data a priority

Data communications is a high priority, with Aplicom ICA 2004 vehicle workstations installed by Locus AS in 20 emergency vehicles. The workstations have a 16-line text display for showing the dispatch orders, a compact keyboard for feeding in information and a GPS receiver that are used for automatic vehicle location (AVL). Future developments of the system will include applications such as ECG and pictures.

The vehicles receive commissions from the dispatch centres, which can send task information and text messages to one or a group of vehicles. Vehicle position data is transferred from vehicle computers to the dispatch centre over TETRA. The dispatch centres are also networked with each other via landline to enable the exhange the position data that has been acquired from the vehicles.

Locus has also delivered the applications for the dispatch centres. Known as TransMed, TransFire and TransPolice, these have been designed for easy operation and cover GIS, fleet management, communication and distribution of data to and from the vehicles. They are also integrated with the administrative systems in the dispatch centres.

As the dispatch centres for the different agencies are all located in separate buildings, it is hoped that the TETRA network and the vehicle equipment will help them work together more efficiently. Co-ordination between the units and the centres has already proved to be faster, safer and more reliable.

Further information:
www.aplicom.com and www.locus.no

Bringing GSM and the Internet to TETRA handsets

Consumer and professional mobile communications are being linked to bring even more power to the emergency services. Software provider Distocraft Oy shows how it could work in this short story....

Downtown, a small fire starts in a warehouse. It spreads quickly and soon the entire building is engulfed in flames.

Chief Fireman Aimo Palo is at home when he receives a short message (SMS) on his GSM phone: "Group Z3 please contact HQ immediately." He acknowledges. Although the message was sent by the TETRA dispatcher, Aimo was off duty and it didn't reach him via his TETRA handset. Instead, the message was automatically sent through a TETRA/GSM gateway to his private GSM phone. Throughout the process, the dispatcher could follow the progress of the message on his screen, ensuring it reached the intended recipient.

Information en route

Aimo rushes to the burning warehouse, first picking up his TETRA handset and reporting "on duty". While he is on his way to the incident, the dispatcher uses group messaging to send Aimo and the other members of his team a WAP push message describing the building. This message contains a link (URL) to further information. Accessing it, Aimo notes that, luckily, the warehouse is not storing explosives. Using the link, he quickly browses the building database using the WAP capability of his TETRA terminal. Because it is easy to use, employing simple menus and WAP links, he doesn't have to remember how to use it - he just browses through the data and gets the answers fast. The building houses a large textile company.

"Now, how should I handle the Press?" he wonders. He sends a short message (SDS) to a group mailing list, which passes on the information as an e-mail message and a GSM short message (SMS) to a selected group of reporters. Aimo is impressed with the speed end efficiency of the system – "That was effective, I informed them all at the same time in 15 seconds!"

There was no time to bring along a laptop, or even to think about using one when fast action is needed. Using a TETRA terminal and its group mailing, the laptop computer with all its cables can be left at home. At last, all the important tasks can be performed with just one intelligent device!

As the last flames go out and his crew is hosing down the still glowing ashes, Aimo is congratulated by the Mayor, who has sent a short message from his GSM phone to the TETRA handsets of the whole team. Aimo thinks it would be nice to get a 'well done' message from the family as well, but he knows that the system needs to block all unauthorised messages. As he drives home, he wonders: "How did we manage before TETRA?"

Rugged mobile computers
for public safety users

Public Safety users have a growing need for mobile computing systems with higher durability, higher reliability and longer life according to a 2001 study published by Venture Development Corporation (VDC).

Xplore Technologies® Corp.'s family of Rugged Mobile Wireless Pen Computing systems including GeneSys® and Ramline® Systems increase productivity and offer the potential to lower the total cost of ownership of a TETRA radio network. The systems include rugged Pen Tablet computers, quick release docking systems and support peripherals and services.

A crucial element of any mobile data equipment is the inclusion of wireless communications. Specifically, the data communications link between wireless-enabled mobile computing devices and central servers or storage elements is integral.

This is a key area in which advances are being made in cooperation between Nokia and Xplore. In particular, Xplore is a member of the Nokia TETRA Wireless Solution Partner (TWISP) programme, which provides Nokia partner companies with the very latest information on developments in the Nokia TETRA system.

TWISP focuses on command & control, messaging and fleet management solutions, telemetry systems or special applications relating for Public Safety and Professional users.

Xplore systems
proven in action

A number of Law Enforcement Agencies such as The City of Flint Michigan Police Department use Xplore's rugged mobile solutions in sophisticated information systems. Xplore's computers give law enforcement officers a wireless interface with federal and state databases, increasing overall efficiencies and maximising the effectiveness of field personnel.

The City of Warren Michigan Police Department has also chosen Xplore as part of a comprehensive automation project. The department's databases are queried by Xplore's rugged computing system via a mobile data communication network, with information being downloaded and uploaded as officers go about their daily activities. In addition, field or community activity reporting is more efficient and timely as reports are generated on-line using Xplore's rugged in-vehicle system.

Meanwhile in Florida, the City of Plantation has selected Xplore's rugged pen-based computing systems as part of a citywide mobile automation initiative. The police and fire departments are installed as part of the city's complete public safety information system. Xplore's advanced solutions are used predominantly for dispatch, reporting and information exchanges to significantly streamline the flow of information to and from emergency personnel.

www.xploretech.com

SEASAM

TETRA helps to keep Helsinki moving

Finnish software company Seasam House develops its OHJA dispatching application to manage voice and data communication between the control rooms and tram and bus fleets of Helsinki City Transport (HCT).

Seasam's OHJA application operates over TETRA networks using the Nokia CIS API and is designed to manage all voice and data communication between multiple control rooms and an extensive mobile fleet. In HCT's case, it covers eight control rooms around the city and the company's fleet of over 500 trams and buses, which operate around the clock.

The application provides the full range of voice communication features, such as individual calls, group calls and emergency calls. The current data communication package also includes short messages and status messages, as well as so-called diagnostic messages.

The OHJA system will continue to develop and will feature wider use of wireless data transmission in the future. In the case of HCT, for example, it will enable the company to recover various measurement data from a particular tram.

Wireless applications made easy with Seasam Time

There are many challenges in developing new wireless applications. The range of mobile devices and the mark up languages they use are just two. These difficulties are compounded by the need to create applications that can retrieve information from databases. To do this quickly and produce a high quality end product, only add to the pressure.

These problems have been recognised by Seasam House, a fast growing Finnish software company specializing in helping developers of wireless applications.

One of the company's main products is Seasam Time, a software package that uses graphics to allow developers to design, implement, test and deploy new wireless applications quickly and simply, with the minimum of programming knowledge.

Using Seasam Time, the developer can concentrate on making the application easy to use, rather than the technical details of programming. Advanced mobile applications, which can include access to databases, can be developed without an in-depth technical knowledge of markup languages, databases, IP technology and web servers.

Applications created with Seasam Time can also be used with any mobile device running any markup language.

Because it uses a graphical method to build up applications and generates all the necessary code automatically, development time can be halved, enabling high quality applications to be brought to market more quickly.

BORMANN
EDV+ZUBEHÖR®

BORMANN Mobile CarPC
=> Demonstrated live by Nokia @ CeBIT 2001

The mobile CarPC was demonstrated with "TETRA Live" at the Nokia Networks stand at the CeBIT 2001 in Germany. In a combined effort, Nokia and Bormann showed a new standard and concept for mobile computing, especially in and around police vehicles.

The Bormann CarPC is an ergonomic solution for police and emergency services. All ergonomics issues, Electro

Magnetic Compatibility (EMC) and crash safety, have been addressed and design approved. Additionally, the mobile CarPC is quickly and easily installed and removed from any vehicle, without making any modifications to the vehicle, leading to considerable cost and time savings.

The use of the CarPC outside of the vehicle offers police officers additional freedom and mobility, necessary during their daily work routine where they need to be able to work anywhere: in

or out of their vehicles, at police stations, at scenes of crime or accidents, etc. The Bormann CarPC meets these requirements with total flexibility and in complete safety.

The CarPC also supports both digital and analogue communication including: TETRA, GSM/GPRS, RAM, and Mobitex.

Bormann is the leading manufacturer and supplier of Mobile Data Terminals (MDT) in Europe. Bormann CarPCs are already in service with police in Germany, the Netherlands and the UK.

800MHz TETRA passes the test in China

The 800MHz version of the Nokia TETRA system has passed MII acceptance tests in China. Requested by Nokia and Quantong, the successful conclusion of the tests means that NTS800MHz now complies with the Chinese Industrial Digital Trunking standard and clears the way for professional use of the technology in China.

Professor Li Jinliang Senior Engineer at MII told TETRA Touch that the Nokia system performed well during the tests. "The Nokia TETRA system has some advantages," says Professor Li. "Redundancy of the system, the Chinese user interface for terminals and dispatcher, base station remote management, interoperability and open interfaces. Nokia also has the advantage of having a common platform with GSM mobiles.

"I want to see the Nokia system become the first commercial network in China."

First Chinese TETRA at PT/ Wireless Beijing 2001

Nokia has demonstrated the world's first Chinese language TETRA system at PT/Wireless Beijing 2001.

The only live demonstration at the event, it showed the ability of the interfaces of Nokia THR850'and DWS to accept and display Chinese characters and receive messages in Chinese.

The demonstration was popular with Chinese professionals and also received many favourable comments from customers.

Nokia TETRA for Hong Kong Fire Department

Nokia and Singapore Engineering Software are to supply a Nokia TETRA network to the Hong Kong Fire Services Department. The contract covers the complete Nokia TETRA solution including digital switches, base stations, dispatcher equipment, network management system and terminals.

"The Nokia TETRA solution provides the most advanced, reliable and proven voice and data communications solution for public safety organisations," saysTopi Kinnunen, Director, Customer Operations, Nokia China "With cost-effective solutions, proven leadership in TETRA technology, innovative terminals and a strong local TETRA support team, we have continuously strengthened our leading position in the local market, supplying the best wireless digital networks to Hong Kong Police, CLP Power and the Fire Services Department."

First Nokia TETRA for railway in Bilbao

The first Nokia TETRA system for a railway is to be supplied to Metro de Bilbao in Spain.

Consisting of a control centre, base stations and dispatching equipment, as well as fixed and handportable terminals for locomotives, the complete system will be supplied for Metro de Bilbao's Line 2 by OMNILOGIC Telecomunicaciones.

OMNILOGIC also recently completed the installation of a Nokia TETRA network for TRADIA in Cataluña, a region in the Northeast of Spain and is currently installing a TETRA network in the Canary Islands.

Norway's TETRA pilot goes

The Norwegian Public Safety community reached a major milestone at the end of August 2001 when the city of Trondheim brought its Nokia TETRA System into full operational use. TETRA Touch recently interviewed some key figures involved in this important project to get an overview of the many benefits the system is bringing and how the future looks now...

Police communications achieve greater security

The city's police force is now experiencing the benefits of this modern technology – an added bonus is that the system has suffered very few technical problems.

"To ensure a smooth migration phase, a VHF channel from the old network was combined with a dedicated TETRA talk group for cross communication", explains Police Chief Superintendent Jan Klüver . "This functionality is still available for non-TETRA users, but all normal traffic is now on the TETRA system."

Mr Klüver identifies security as being one of the key benefits, with officers now able to talk openly on the network without danger of someone eavesdropping using private police-band radio scanners. "Previously, sensitive information had to be communicated on GSM phones - this kind of information is now shared effectively with the whole talk group as well as the dispatcher", Mr. Klüver says.

"Another benefit is that users will be able to make calls from a TETRA radio to the PSTN/GSM network and it can even be used in internal extensions to the Police Office phone exchange. This makes operations easier and reduces the costs for GSM usage.

"The most positive feedback from the field is that the coverage is excellent. Users experience very good signal strengths in areas earlier known to be problematic, like shopping centres and underground parking lots. As the first phase is now implemented, the time is

Police Chief Superintendent Jan Klüver in the Police Communication Centre

right to introduce mobile applications. The project is currently looking at solutions for vehicle and database queries from TETRA radios or monitors in vehicles."

Practical feedback highly valued

Tor Helge Lyngstøl is the Project co-ordinator for the pilot study. He told us why it was so important.

"As part of the feasibility study for introducing TETRA as a technological platform for a new shared-communication network for public safety in Norway, the use of a pilot system has proved to be very important. The sharing of a TETRA network by independent organizations that have been used to having full control over their communication system implies challenging organizational changes that need special attention. It was thus decided to introduce a pilot system to be used operationally in one of the major cities in order to ensure strong user involvement in the planning process before implementing a national system.

"The pilot activities have already generated valuable lessons. The cross-functional team spirit and the involvement of more than 100 people representing various professions working across organizational boundaries has been innovative. Practical use of TETRA by police officers, fire fighters and health workers has given a focus of attention that would not have been achievable if the TETRA process had only been an interdepartmental academic exercise. Likewise, the feedback from 600 users will be very valuable in the specification and planning process for implementing a national system, which will take place in 2002. Understanding which activities must be carried out in order to implement the TETRA system in the Norwegian Public Safety organizations is the main benefit gained from the pilot process."

Health and fire services authority look forward to full integration

The health authorities have the largest integration challenges when migrating from their current analogue national radio system to TETRA. Similar to the Police and Fire departments, the Health department has implemented a new TETRA

live
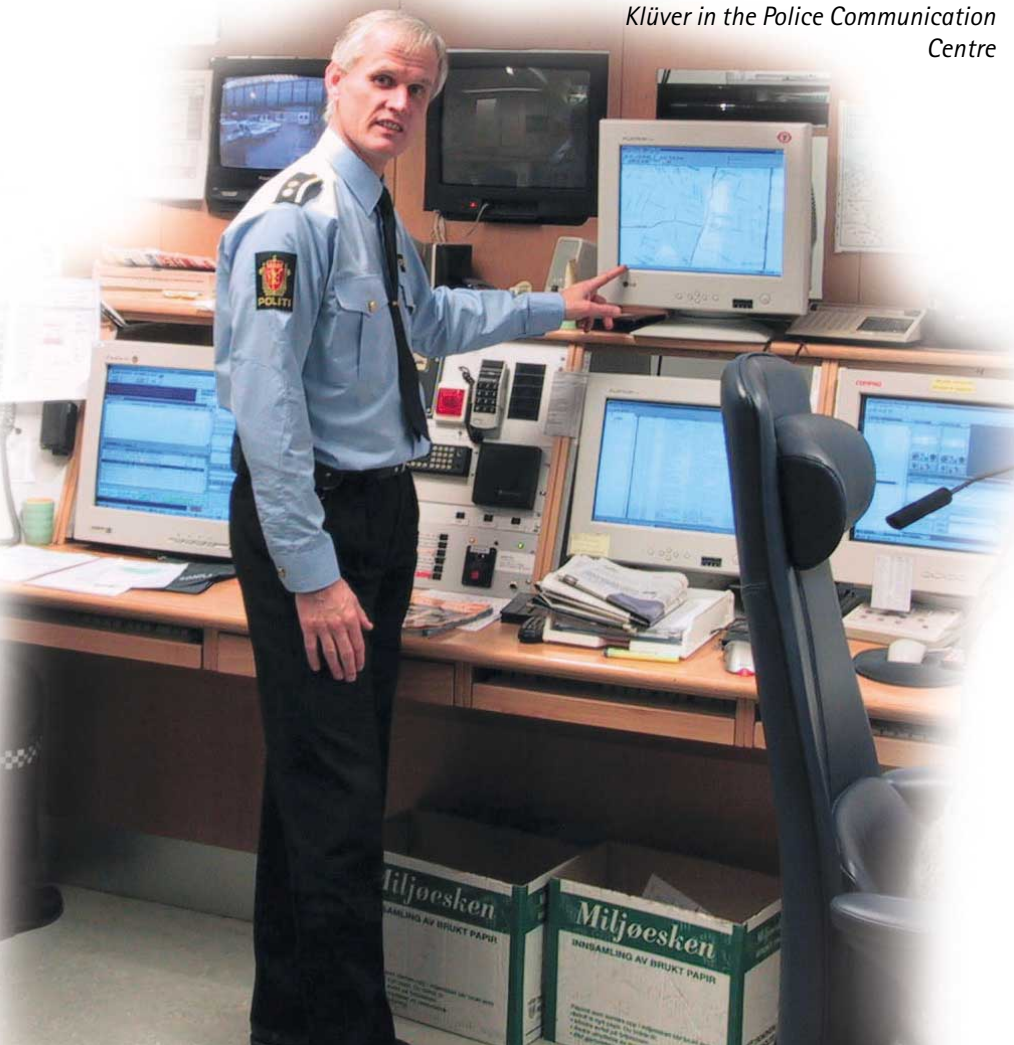
based fleet management system and a new Call Centre solution has been installed as a basis for further integration. A customised TETRA messaging system called TITAN from Telenor Radio Systems will be installed at the end of 2001, enabling health personnel to make full use of the Nokia TETRA system.

The Fire department has installed an upgraded version of its current alarm and dispatch system from Telenor Radio Systems, which includes integration of TETRA voice and data message communication functions with telephony and its current analogue radio system. The system will be in full operation in Q4 2001.

Meanwhile, operational management is being provided by the defence ministry, NODECA, which finds itself as the first point of contact for users. Gunnar Kristoffersen, NODECA's project manager for the TETRA project explains: "We handle all kinds of queries on things such as terminal handling and use of the TETRA system, as well as first line support. We have developed very good co-operation with Nokia and Telenor and together we can ensure that the system can meet the operational requirements of the Public Safety organisations."

Telenor tackles the network's integration

Clearly, the users of the pilot system are more than satisfied with their experiences so far. But what is the feedback from those involved in the supply and implementation of the project? Arnt Mestvedthagen, Manager TETRA technical operations for Telenor, explains how his organization managed the integration of the various Nokia TETRA components into a complete network: "Technical operation and integration of the TETRA network is handled by Telenor Mobiles' GSM network centre.

"The Nokia TETRA system is based on the same technical platform as the GSM elements. This gives benefits because the same people handle both technologies. The TETRA network has the highest support priority, and WAP based mobile solutions have been developed to provide service personnel with access to TETRA network information, distribution of work orders and spare parts ordering. The result is a TETRA technical operations unit with efficient and rapid support, high

availability and which is well prepared for a large-scale domestic network."

Telenor also believes that an important result of the project has been the success of the turnkey delivery by the partnership between Nokia and Telenor – "a winning combination where ambitions and strengths match," says Knut Erik Aas, Telenor's Project Manager for the TETRA project.

Such sentiments are backed up by the Nokia personnel involved. "We're all very proud of the results achieved so far in the project," says Dagfinn Sjøvik, Nokia's TETRA Account Manager in Norway.

The pilot project has chosen Nokia TETRA terminals to ensure the best possible use of the functionality in the TETRA network. Vehicles have TMR420 radios with a variety of installation kits, while handheld communication is provided by the rugged THR420 and the GSM type THR850. Other types of terminals will be tested for special uses, such as the Thales covert radio.

Telenor's Arnt Mestvedthagen describes their technical operations consepts
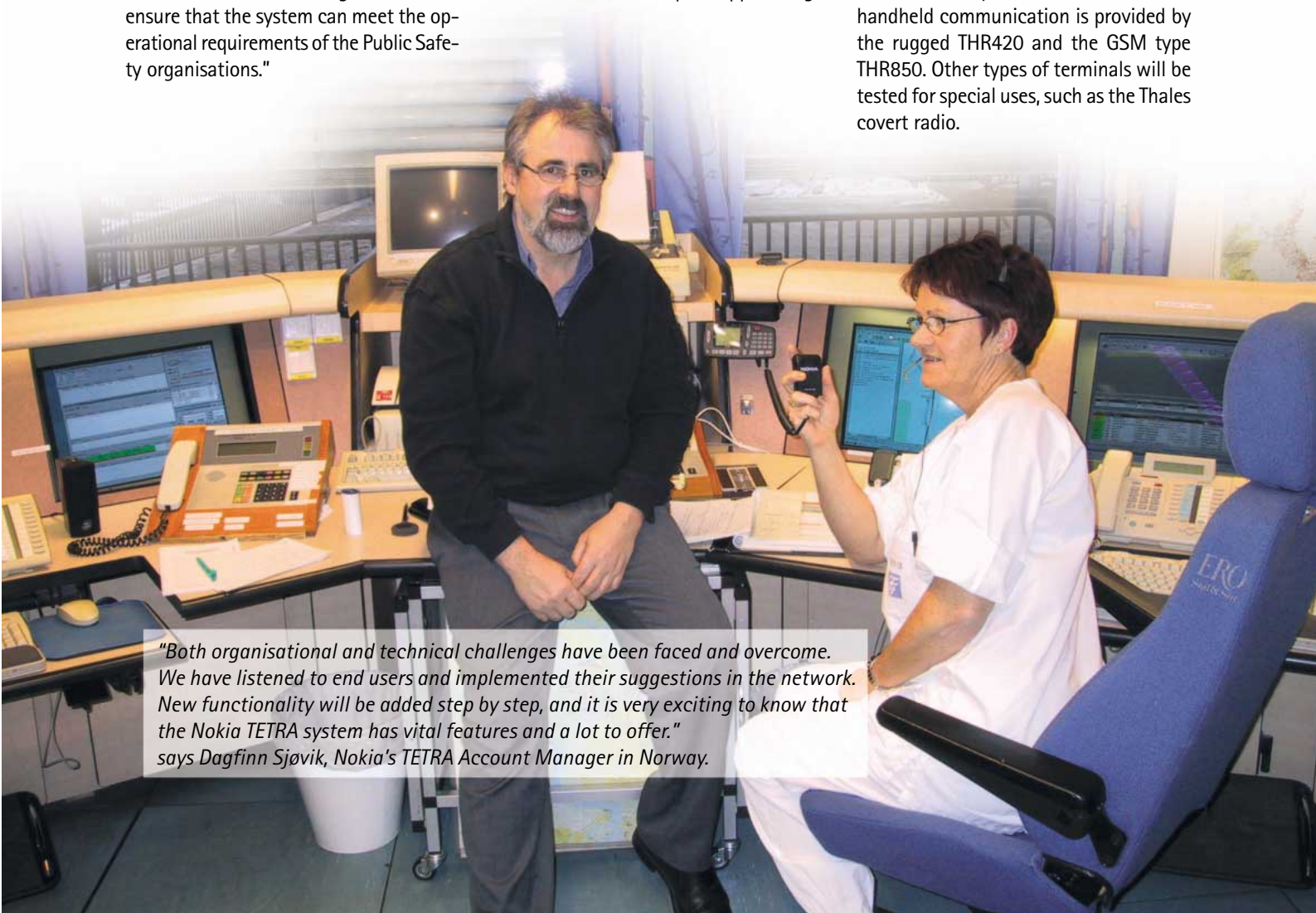
"Both organisational and technical challenges have been faced and overcome. We have listened to end users and implemented their suggestions in the network. New functionality will be added step by step, and it is very exciting to know that the Nokia TETRA system has vital features and a lot to offer."
says Dagfinn Sjøvik, Nokia's TETRA Account Manager in Norway.

TETRA to the rescue

This story could come true within a few years if Sweden and Norway follow Finland in selecting TETRA for their public safety networks. The Finnish network, VIRVE, is the first nation-wide TETRA network to serve public safety organisations. Here we see how the three networks could co-operate to save a skier.

It is January and snow covers the landscape of Finnish Lapland.

In Kilpisjärvi, Marko, a Finnish border guard, is patrolling on his snowmobile, close to the Swedish and Norwegian borders. He likes his job and with a new snowmobile equipped with a TETRA mobile radio, a rugged PC and a GPS system, he feels confident that he can communicate with his colleagues and with headquarters, however remote he may be.

Suddenly, in an isolated area of the mountains, he finds an exhausted skier. The man is clearly in a bad way – he can't even speak.

Marko gives the skier first aid, which revives him a little, but he is still unable to say his name. Checking the skier's pack, Marko finds the man's driving licence. His name is Erik and he is Swedish.

As well as a TETRA mobile radio installed in his snow mobile, Marko also carries a Nokia TETRA handheld terminal in his pocket. It is WAP enabled and gives immediate and secure access to data using a TETRA packet data service.

Marko accesses a European-wide personal ID database and discovers that Erik is a diabetic from the small Swedish town of Kiruna, close to the Finnish border. As Erik already has a low temperature, Marko decides that he needs immediate medical care.

Without closing his packet data connection to the WAP server, Marko makes an emergency call to his home base dispatcher. Marko's exact location is displayed on the dispatcher's screen, sent to him by the Automatic Vehicle Location application in the snowmobile.

During the emergency call, the dispatcher discovers that Kiruna's town hospital is 150 km away from the snowmobile and that the closest rescue helicopter is in Tromsa in Norway, 100 km away.

Without disconnecting Marko's emergency call, the dispatcher makes two other TETRA calls – one to the rescue helicopter in Norway and the other to the hospital in Sweden, giving them some basic information on the skier and his condition. This is only possible because the three countries have implemented the TETRA Inter-System Interface, allowing national TETRA networks to be connected together.

With a few clicks on his screen, the dispatcher sets up a temporary talk group for himself, Marko, the hospital in Sweden and the Norwegian rescue helicopter.

Marko guides the rescue helicopter to a landing in the forest to pick up Erik.

The helicopter is equipped with UNIQMED, a system that uses TETRA packet data to transfer information to the hospital. The doctor in the hospital can follow the skier's condition during the rescue flight.

Finally, Erik is taken to hospital - the rescue operation is over and the temporary talk group is deleted. Marko continues his patrol, knowing that he saved a man's life, with the help of TETRA.

COVERAGE OVER SEA

VIRVE, Finland's nation-wide public authority network, the first in the world to become operational, is bringing real benefits to Finland's coast guards.

Responsible for patrolling the vast Finnish archipelago with thousands of small islands, all coastguard boats have now been fitted with TETRA terminals. In addition, officers have handheld radios for use when they are performing their duties away from their boats.

Part of Finland's national frontier guard, the coastguard has a wide range of duties, including passport control, border surveillance, maritime rescue as well as surveillance of fishing and the environmental actions at the sea.

Instant communications for fast rescues

When it comes to rescues, things need to happen fast. Emergency calls are received at the communications centre and there are only minutes available to act. The first priority is always to save lives and secondly to save the vessel if possible. In such a situation, cooperation between different authorities is vital. For example it may be that a fishing boat in distress will be attended to by a police launch because that happens to be the nearest available rescue vessel.

"The best thing about VIRVE is the co-operation between different user organisations, such as the rescue authorities, customs, police and coast guard," says Lieutenant Timo Auranen of the Finnish Maritime Rescue Centre. "It is a real luxury to be able to communicate instantly in a shared radio network, in order to be able to operate quickly in an emergency. We are also using data communications much more in place of a lot of our traditional communications."

Good coverage provided by TETRA is another key benefit. The experience so far is that coverage over the sea is excellent. Yet with so many islands even the VIRVE network cannot penetrate all the areas patrolled. In such situations, Direct Mode Operation (DMO) that allows individual TETRA radios to communicate with each other independent of the network infrastructure can be a real life-saver.

"In a rescue operation at sea where the conditions may be very tough, particularly during winter storms, a good reliable radio communication system with excellent voice quality is fundamental, explains Lieutenant SG Tuomas Saarilehto. "And security is another important issue. With VIRVE and TETRA we can communicate the most delicate issues in all confidence."

Lieutenant SG Tuomas Saarilehto thinks that security is another important issue: "With VIRVE and TETRA we can communicate the most delicate issues in all confidence."

"The best thing about VIRVE is the co-operation between different user organisations, such as the rescue authorities, customs, police and coast guard," says Lieutenant Timo Auranen (right) of the Finnish Maritime Rescue Centre.

Nokia
–the most reliable partner in Publi

With years of experience of professional mobile radio communications, Nokia 's ability to deliver digital TETRA networks is best summed up by one fact – Nokia is the only supplier to have delivered over 4,500 operational TETRA base stations and more than 100 digital exchanges, most of which are working every day with law enforcement and rescue services. Nokia's unbeatable experience in implementing large national mobile communication is a compelling reason to choose Nokia. The high scalability and fast rollout of our TETRA networks is based on Nokia 's extensive experience of large GSM rollouts that typically include thousands of base stations in each.

EUROPE

Finnish Public Safety System, VIRVE, Finland
380-400 MHz in operational use
Owned by the government, built using Nokia equipment and operated by commercial mobile network operator Sonera, VIRVE provides secure digital radio communications to user groups including Finnish police, emergency rescue services, health and social services, Finnish board of customs, border guards and defence forces. Each organisation has a Virtual Private Network of their own with maximum security and privacy within the shared Nokia TETRA network.

Helsinki Energy HelenNet, Finland
410-430 MHz in operational use
The Most Innovative Application Development of the Year 2000. (TETRA World Congress)

The world's first WAP service over TETRA boosts the efficiency of Helsinki Energy's field workers. Operations that might have taken half an hour earlier can now be done in only a couple of seconds!

ElTele Öst, Norway
410-430 MHz in operational use
Nokia delivered a complete TETRA network to Oslo Energi Tele, including a switching centre, base stations, dispatcher station, network management system, antennas and terminals. The network was taken into operation at the start of 1998.

RBA, Norway
380-400 MHz in operational use
Over 600 police, fire brigade and health care personnel are using the Nokia TETRA installation to explore the organisational challenges and improvements that can be achieved using TETRA. Nokia's partner Telenor Mobile is responsible for the technical operations. The project has chosen Nokia TETRA terminals to ensure the best possible use of the networks functions.

Stikla, Iceland
380-400 MHz in operational use
Stikla is extremely satisfied with the Nokia TETRA network, particularly as it took only 4 months from the date of the order for the network to be in full operation. Stikla was impressed further by the fact that the Icelandic TETRA network appears to be earthquake proof, as it survived the South-Icelandic earthquakes that struck on June the 17th and 19th and measuring 6.6 on the Richter scale. This further enhanced Stikla's confidence in TETRA as a system and the quality of workmanship in the network implementation process.

EUROPE

ASTRID, Belgium
380-400 MHz in operational use
The Most Innovative TETRA Service of the Year 2000. (TETRA World Congress)

The Nokia-built ASTRID network in Belgium is the world's only system in which radio, telephone and Computer Aided Dispatching (CAD) are fully integrated in a single environment. Since June 2001 the local police, fire department and municipal government have been using a state-of-the-art technological system for their radio communications. The emergency and security services of the city of Sint-Niklaas enjoy having a reliable, top-quality means of communication.

Dolphin Telecommunications, United Kingdom
410-430 MHz in operational use
The Most Innovative TETRA Service of the Year 1999. (TETRA World Congress)
Dolphin went live in the UK in August 1999. It is the most advanced

EUROPE

Bilbao Metro, Spain
410-430 MHz being implemented
Consisting of a switch, base stations and dispatching equipment, as well as handheld radios and mobile radios for locomotives.

roll out of a national, commercial TETRA network in Europe, covering 97% of the British population.

GARDAI,
Ireland
380-400 MHz being implemented
Police in Ireland is piloting with the most secure Nokia TETRA network with sophisticated AVL systems.

Dolphin
Telecommunications,
France
410-430 MHz in operational use
Several regions in France have been able to enjoy TETRA services since late 2000 and early 2001.

Walky Talky Telecom in
Burgenland, Austria
410-430 MHz in operational use
Walky Talky has been operating a TETRA network supplied by Nokia since 1998. The good experience of the relationship, reliable Nokia services and a secure Nokia TETRA solution gave it confidence to build up this service for the FIS Alpine Ski WM 2001.

Catalonian Fire brigades,
Spain
380-400 MHz in operational use
All 90 busy fire stations in Catalonia have relied on TETRA as their radio communications service since June 2000. Today, other emergency and security services are also sharing this service, which is operated by local commercial operator Tradia.

CHINA

Hong Kong Police,
China Hong Kong
380-400 MHz in operational use
As one of the most technologically advanced law enforcement agencies in the world, Hong Kong Police chose Nokia to supply a Nokia TETRA Solution for direct and instant access to all the categories of information they need – whether voice, data or image- both locally and citywide. Hong Kong Police and Nokia have co-operating closely to develop the TETRA solution. It now provides: easy-to-use voice and data access; fast set-up & response time; service availability across the whole operating area; easily tailored access and priority arrangements; flexible management and modification of talk groups and connectivity to dispatching services and other communications and IT systems.

Hubei Quantong Telecom Co
Ltd, China
810-864 MHz in operational use
The first 800 MHz TETRA network up and running in mainland China.

Canary Islands Public
Safety, Spain
380-400 MHz being implemented
El Hierro and La Palma will be the first of the Canary Islands to have their emergency services and public security systems co-ordinated by a TETRA mobile radio communications system by the end of year 2001.

CLP Power,
China Hong Kong
810-864 MHz being implemented
CLP Power supplies electricity to over 5 million people in the Kowloon peninsula and New Territories areas of Hong Kong. The Nokia TETRA system will integrate trunked mobile radio, mobile phone and pager functions in one solution for CLP's operational staff.

Tianjin Water Conservance
Bureau, China
810-864 MHz being implemented
Tianjin Water Conservancy Bureau chose Nokia to supply the most advanced TETRA network for its reliability.

Hong Kong Fire Department,
China Hong Kong SAR
810-864 MHz being implemented
Nokia and Singapore Engineering Software Pte Ltd have signed a contract to supply the Nokia TETRA solution for a Wireless Digital Network for the Hong Kong Fire Services Department.

MIDDLE EAST

Dubai Police,
United Arab Emirates
380-400 MHz being implemented
The project includes the supply and installation of a complete Nokia TETRA system for the Dubai Police Head Quarters - the first of its kind in the United Arab Emirates.

Office National de la
Tèlèdiffusion (ONT), Tunis
410-430 MHz in operational use
North West Africa is to get its first Nokia TETRA network. ONT is a new operator and its new network incorporates advanced wireless data applications.

TIPs are top for interoperability

One of the major strengths of TETRA is that it is an open standard that everyone in the industry can work with.

Nokia supports open standards of all kinds because they have real benefits for everyone in the industry. TETRA was created by many organisations working together, not just one company working on its own. This has resulted in a standard that has far more functions than a proprietary standard developed by a single company could ever achieve.

However, one of the biggest benefits is interoperability, or IOP. The goal of IOP is to allow customers to purchase TETRA components from any vendor, safe in the knowledge that they will work together. This makes the whole market much more competitive because buyers can pick and choose equipment from different manufacturers to suit their own needs and budget. Not only must suppliers ensure they offer competitive prices, but they must also provide a service better than their competitors'.

Yet IOP cannot be taken for granted – it must be worked towards by every party interested in its success. A major part of the process of securing TETRA IOP is the TETRA Interoperability Profile, or TIP. This is a TETRA specification document which:
- clarifies the TETRA standard
- acts as a bridge between standard editions

- guides implementation
- acts as a binding document for the manufacturers

TIPs are being produced for infrastructure manufacturers, terminal manufacturers and customers.

Testing has been performed centrally at Tele Danmark, on live infrastructures in laboratory conditions – from Nokia, Motorola, Marconi, Simoco – and on terminals from six manufacturers- Nokia, Motorola, Marconi, Simoco, Cleartone and Teltronic. Certificates are awarded to manufacturers based on these tests.

Recent TIP testing and certification has seen TIP v. 2.1.1 upgraded and improved. This has been issued to Nokia, along with DMO TIP v. 1.0.3. This year also saw the testing of TIP v.3 and the first part of the re-testing of the DMO TIP. Results of the tests are expected at the end of the year.

Efforts are being made to decentralise testing in order to save time and allow more efficient management of the tests, with Nokia leading the search for a new site.

This year's TETRA World Congress saw IOP demonstrated on all infrastructure manufacturers' stands.

True cross-border communication

The TETRA Inter-System-Interface (ISI) makes crossborder operation a reality in the near future. ISI is developed to provide connection between TETRA systems enabling the police and other public authorities to efficiently co-operate throughout Europe.

As the leading vendor of TETRA systems, Nokia has already implemeted the first step: the TIP v4 part 6: Air Interface Migration signalling. Using this and the currently available network interfaces Nokia has committed itself under the frame of 3-country pilot to connect ASTRID of Belgium, C2000 of the Netherlands and the German TETRA pilot in Aachen jointly with Motorola to offer an operational platform to gain experience on multi-organisation crossborder operation and to ratify the Schengen agreement using TETRA as the crossborder communication standard.

The following step is to introduce the ETSI specified Inter-System Interface with primary voice and data communication services like group calls and status messaging as well as security features like auhtentication.

NOKIA
CONNECTING PEOPLE