Authority communication gears up to IP with VIRVE

From the time the first elements of the Finnish authority network VIRVE were installed in 1998 and the first live operations were started in 2000, this TETRA network has proven to be an essential platform for the public safety services. Today, the VIRVE network is complete and is the world's only fully operational, IP-based nationwide public safety TETRA network.

With a modern IP architecture based on 1,200 base stations linked to 14 switches, the network serves an astonishing 30,000 users across Finland. The major user groups are the emergency and fire & rescue services, the Police, the Frontier Guard, the Social and Health Services, the Customs Authority and the Defence Forces.

VIRVE brings management of field operations to new era

Yet more than just providing advanced, secure and reliable communications, the VIRVE network has been the catalyst for a fundamental change in the way in which the authorities manage their operations and in particular major incidents and disasters. Full and efficient cooperation between agencies is now possible with seamless voice and data communication across the network. The result is optimum use of rescue resources and faster response to emergencies.

Finland's over 1,000km border with Russia is the European Union's longest with a non-EU country, placing a heavy responsibility on the Finnish authorities to maintain security under the Schengen agreement. Before VIRVE, the country's authorities struggled with an outdated analogue communications system with inadequate security and increasingly unreliable operation. Investing in a modern national digital communications system has proven to be lower cost than maintaining the previous network.

An innovative operating model for more efficient network implementation

An exceptional operating model guaranteed fast and cost effective network implementation. VIRVE Unit of Finnish Ministry of Interior is coordinating the whole project outsourcing the network implementation and operation. The operator, Suomen Erillisverkot, owned by Sonera and Finnish Government utilized existing base station sites as well as sites for the switches and antenna masts owned by Sonera and several governmental and municipal bodies. Suomen Erillisverkot is managing and maintaining the entire network from one central location.

All authorities were closely involved in the early specification stages, helping the government to decide what capabilities were required. It is remarkable that despite its complex evolution, the final system meets all these criteria. The authorities have got exactly what they wanted. What's more, roll out has been completed fully in schedule.

World-leading functions

The network's capabilities are world-leading. Group communications, both voice and data, total security in all communications and seamless integration with all national Emergency Response Centres.

Data communications is improving the efficiency of the authorities. Fast access to intranets enables databases to be searched from the field using WAP. For example, fire services may need information about dealing with hazardous substances before arriving at an accident scene. Transmitting images, particularly a suspect's mugshot, is useful for the police and customs services.

Messaging is widely used as a reliable and rapid means of status reporting and for providing addresses of incidents or other details that may be misunderstood during voice communication. Automatic vehicle location using GPS is widespread and helpful to dispatchers deciding which available units are closest to an incident.

And the control centre's work itself has been revolutionised by computer aided dispatching used as an integral part of the VIRVE system.

The bonus of lower costs

Furthermore, the network's IP-based architecture is highly cost effective when it comes to operational expenditure (OPEX). OPEX is reduced by centralised network management and updating which helps maintain an uninterrupted service with the lowest OPEX. Base station software can be upgraded by centralised downloading, saving the cost and delay caused by sending engineers out to visit base stations, many of which are located in remote regions. This means that VIRVE will serve its users at only € 400 per annum.

And being based on the TETRA open standard means that user organisations have a choice of handsets and equipment from a wide variety of suppliers, helping them to ensure they are getting the best priced products that match their needs precisely. ➜

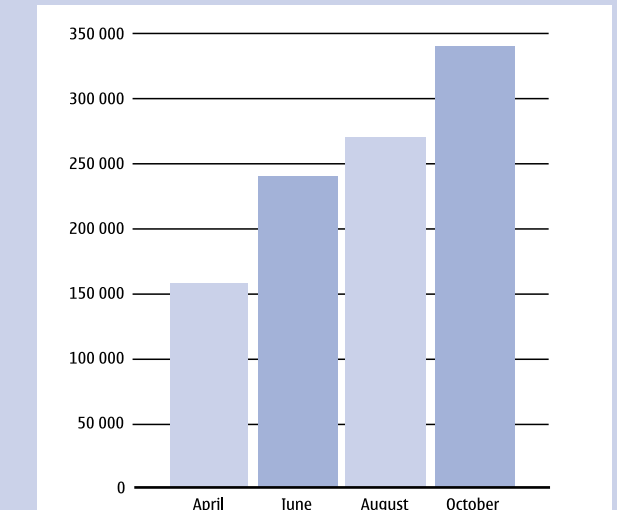## VIRVE network roll-out is completed

Finland has a sparsely populated wide geographical area of 350.000 km2 with the longest outer border between EU- and non-EU countries. With VIRVE Finland can fulfil the obligations set by the Schengen Treaty for border control. VIRVE provides a joint communication infrastructure for all authorities in Finland enabling efficient inter-agency cooperation all over the country. 90% of the population in Finland are protected with VIRVE services today.

Esko Rajahalme, Project Manager, VIRVE Unit says that the modern features such as nationwide group call, base station fall back, DMO and top security are very much valued by the user organizations. The network roll-out has been completed and today there are approximately 30 000 users in VIRVE. The number of users will eventually increase up to 100 000 once all the organisations have taken VIRVE in to use in full scale.

Cooperation with Nokia has been successful. We have developed together VIRVE to meet the needs of these demanding public safety organisations.

Esko Rajahalme, Project Manager, Ministry of the Interior, VIRVE Unit

Expectations of the user organisations have been the driving force for VIRVE

VIRVE is a multiagency network providing service for public safety on both national and municipal level. The most important user groups are the emergency and rescue services, the police, the frontier guard, the social and health services, the customs authority and the defence forces.

Each public safety organisation had their requirements included already in the RFQ '96. One of the most important features was then and is still today availability of the service – neither service breaks nor poor coverage would be acceptable. Security of the communication is both key to successful operations as well as for the occupational safety. Enhanced services in voice and data communications were brought up for more efficient field operations as well as for the command centres. Naturally one issue is always cost of the service: low costs could be reached with an open standard and with open competition.

VIRVE responds to the needs of all user organisations

Nationwide group calls have become reality making wide area operations easier and more efficient. Reliability and availability of service have been complemented by base station fallback and DMO. Seamless multi-agency cooperation helps in savings and operational efficiency. Improved security and safety for the field units with TETRA is unique.

Efficient operating model

An exceptional operating model guaranteed fast and cost effective network implementation. VIRVE network is owned by the Finnish Government and operated by Suomen Erillisverkot, an operator owned by Finnish Government and Sonera.

Pertti Virtanen, Director, Suomen Erillisverkot

Suomen Erillisverkot has utilized existing base station sites as well as sites for antenna masts owned by Sonera and several governmental and municipal bodies.

Pertti Virtanen, Director, Suomen Erillisverkot says that the IP-based network architecture is highly cost effective when it comes to operational expenditure (OPEX). OPEX is reduced by centralised network management and updating which helps maintain an uninterrupted service with the lowest OPEX. Base station software can be upgraded by centralised remote downloading, avoiding the cost and delay of sending engineers out to visit base stations, many of which are located in remote regions. This capability significantly contributes to the fact that VIRVE will serve its users at only fixed charge of 400/user per annum.

The operator is reporting 20% increase of calls every month

A nationwide group call is reality with VIRVE

The rollout of VIRVE network reached completion in October 2002. The implementation was made stage-by-stage starting from the first section being commissioned for testing purposes in 1999 and the last section being completed in late in October 2002.

A nationwide group call was made at the official opening of the network at Jaukkaravaara site on 31 of October, 2002. With the demonstration VIRVE Unit and the operator, Suomen Erillisverkot, wanted to bring to reality the advantages this new technology brings to the authorities. Witnessed by the representatives of several Authority organisations and the media the group call was made from Jaukkaravaara in Finnish Lapland to Helsinki, Lahti, Jyväskylä, Kuopio and Vaasa.

Pertti Virtanen, Director, Suomen Erillisverkot demonstrated a nationwide group call for the media in Lapland on the 31rd of October 2002
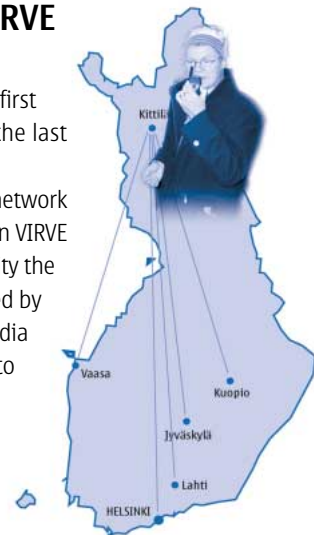
Successful use of VIRVE in major events

Major events are always "a rehearsal" for real catastrophes: a lot of people in limited geographical area for a limited time in special circumstances. VIRVE has been tested many times successfully in big events such as

WRC – Neste Rally Finland 2001 and 2002 with a large organisation, 650 000 spectators and major traffic jams. Another major event with several hundred thousand participants was Pori Jazz Festival during which the social & health department tested how to secure health service when population doubles in the city area. A real catastrophe rehearsal was the biannual Search and Rescue Exercise 2002 with major incident requiring inter-agency cooperation with hundreds of TETRA users.

VIRVE responds to the needs of all user organisations

Nationwide group calls have become reality making wide area operations easier and more efficient. Reliability and availability of service have been complemented by base station fallback and DMO. Seamless multi-agency cooperation helps in savings and operational efficiency. Improved security and safety for the field units with TETRA is unique.

VIRVE IN A NUTSHELL

- Owned by The Ministry of The Interior
- Project managed by VIRVE Unit
- Operated by Suomen Erillisverkot (owned by Sonera and Finnish Government)
- Terminal logisitics by Telering
- Network supplied by Nokia
- Multi-agency – nearly 20 organisations sharing the service
- First call made over the network in April 1998
- Entered operational use in May 1998
- Currently there are 30,000 users
- The network contains 1,200 base stations and 14 switches and 220 dispatching stations
- WAP Browsing has been in use since December 2001
- 20,000 terminals in use on VIRVE by the end of 2002
- All Finland uses the same logical network with the same services, no network codes are needed
- Nationwide group calls are easy
- VIRVE costs 400 euros per user per annum to run

TETRA MoU Chair visits VIRVE

Ray Ginman went to Finland in September to see the progress being made in implementing VIRVE, the national Public Safety radio communications project.

Ray made 3 separate visits to see VIRVE in action. The first was in the area of the Airport at Vantaa where the fire and ambulance services were already using the service. As a result of the success of the VIRVE TETRA network, the whole area is being regionalised into a single network with a central dispatching centre by 2004.

A second visit was made to a Finnish/Russian boarder road checkpoint, 180km from Helsinki. Ray comment on the service provided there " It was indeed gratifying to see so many users praising TETRA and who commented on the excellent voice quality, coverage and interoperability available between services. Users at the boarder included the Frontier Guard, National Police, Fire, Ambulance, Military and Red Cross."

Finnish public safety dispatching centres are required to be below ground level and the Chairs last visit was to see the new centre at Rovaniemi, which is on the Arctic Circle in Lapland. The dispatching centre will be for shared public safety use and link all of Lapland as a single region of the VIRVE network. Finnish rescue service is already using VIRVE in most parts of Finland and the police are scheduled to commence use throughout the whole country of the facility in 2003.

At the end of Ray's visit to Lapland, he visited Santa Clause and commented

` Father Christmas may be a Finnish fairy tale, but VIRVE certainly is not. With over 1200 base stations now installed and working on the VIRVE network, 30 000 users today from all public safety organisations participating and common dispatching centres either coming into or in use, the fundamentals of investing in TETRA technology has clearly been realised in Finland'

Project Manager Jukka Kilpeläinen (right) of Nokia demonstrated the base station fallback at Rovaniemi site for TETRA MoU Chair Ray Ginman (middle) and Special Adviser Arto Lönnroth (left) of VIRVE. The recovery was impressively short.

Costs and performance
– how do different network architectures compare?

Although, a network's architecture is invisible to users, it can have an enormous impact on the Total Cost of Ownership (Capital, Implementation and Operational Expenditures).

There is a choice of different network topologies, including hierarchical (traditional), flat mesh (in which every switch is connected to all others) or a mixture of these two architectures. Although the Nokia TETRA System supports these architectures, it can also use the more modern two-layer network architecture, in which the transit and access switch layers are separated, bringing some significant advantages.

To see how much better the two-layer architecture really is, let's look at a theoretical network covering 150,000 km². This would require about 800 base stations depending on the type of terrain – the presence of mountains, buildings and other structures can affect the number of base stations needed.

How do the flat mesh and two-layer architectures compare?

Switches and links
Flat mesh architecture – using switch48 (can accommodate 48 base stations) would require 25 switches for adequate coverage. With a flat mesh architecture, this would require 300 links between switches. Furthermore, if the system does not support automatic call re-routing, a mission critical network would need to be protected and 600 links would be required

Two-layer architecture – using the scaleable Nokia DXT256 switch platform (can accommodate 128 base stations), only 7 switches are required, with two additional transit switches for the two-layer topology. With a system that supports dynamic call routing, only 16 links would be required (8 links without protection).

Comparison – 25 switches with flat mesh versus 9 switches with two-layer. Even taking into account that the cost of a switch48 is about half that of a Nokia DXT256 switch, the capital cost savings with the two-layer architecture are huge. Furthermore, interconnecting the higher number of transmission links in a flat mesh architecture – 300 (unprotected) compared with 16 with protection for two-layer architecture – also means very high annual link costs (OPEX – operational costs). In addition to this the high number of links will consume a great deal of switching capacity and cause long delays in call set-up times.

But higher CAPEX is not the only cost disadvantage with the flat mesh architecture. The higher number of links.

Conclusion – the flat mesh architecture with low capacity switch increase CAPEX and results to extremely high maintenace costs (OPEX) annually! These may be avoided only by using the scalable and high capacity switching platform.

Huge savings and excellent protection can also be achieved by choosing the best method of connecting the base stations to the switches.

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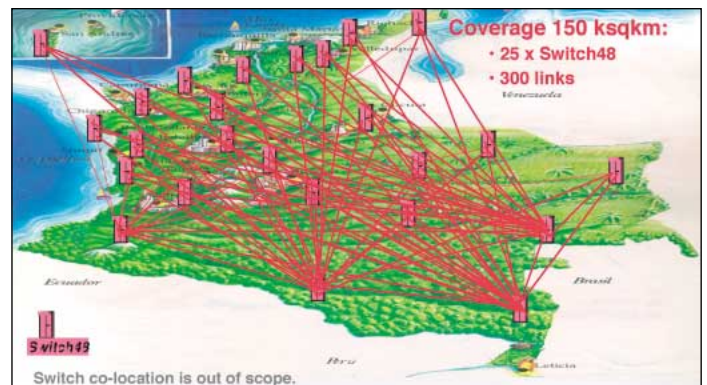
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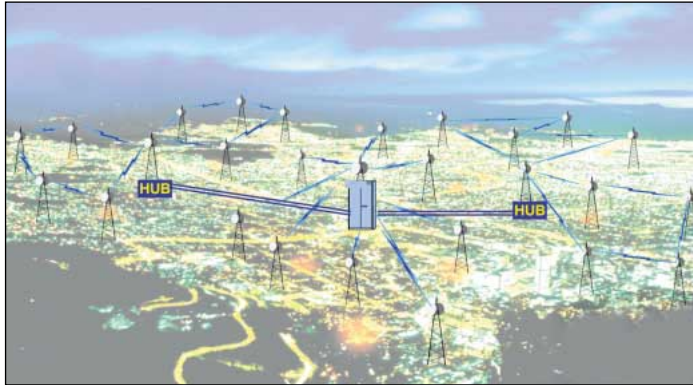
Point-to-point topology
This requires every base station to be connected directly via a dedicated line to a switch. The cost of a leased line depends on its length and capacity. Some base stations will be located far from a switch and the leased line cost will be relatively high. Furthermore, these links are unprotected and leased lines may not be available in rural areas.

In point-to-point topology there is no grooming of traffic. The cost of a leased line is often set so that a single 2MB leased line will cost less than 10 leased lines, each with a 64kB capacity. Grooming reduces transmission costs by enabling the same link resources to be shared.

Protected Loop Topology
The Nokia TETRA System uses protected loop topology in preference to other topologies, which it also supports. Protected loop topology based

Nokia TETRA System uses protected loop topology in preference to other topologies, which it also supports. Protected loop topology based on microwave radios is flexible, fast to implement and economical to operate.
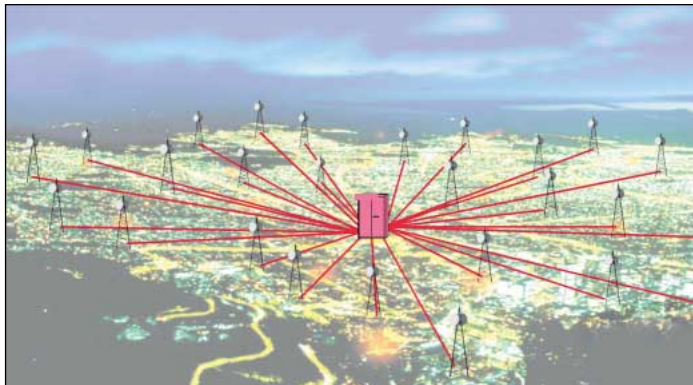
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on microwave radios is flexible, fast to implement and economical to operate. The main advantages come from the concentrator (HUB), which grooms the traffic from several far end base stations (up to 100 base stations) into the two leased line links to the switch (protected).

This means that only a few, higher capacity leased line links are needed, which are relatively lower cost than several lower capacity leased lines. Additionally, the traffic is protected, because five base stations are connected with the protected chain via microwave radios.

With this solution, the need for extra microwave radios slightly increases the CAPEX, but leads to very large annual savings in OPEX.

The performance and overall costs of a TETRA network depend on more than just the equipment that is selected. The vital importance of choosing an appropriate architecture must never be overlooked.

Virtual Private Network (VPN)
– Sharing the physical resources, having own network

With Nokia TETRA System different organisations, either different authorities or other professional organisations or companies are sharing the same physical network they can feel that they have the luxury of their own network. Nokia TETRA System hides the organisations from each other. They manage their own users, groups and organisations but do not see others.

Access to groups can be defined so that only own organisation members can listen and talk in own organisation's groups. Individual calls and data messaging can be limited to own organisation, both sending and receiving.

If co-operation between the organisation in the same network is needed, this can be organised in Nokia TETRA System so that neither of the organisations need to reveal their information to other. It is possible to create a co-operation organisation block where the organisations both can have management and communication access. The groups where there are members from both organisations, co-operation groups, are created into that organisation block.
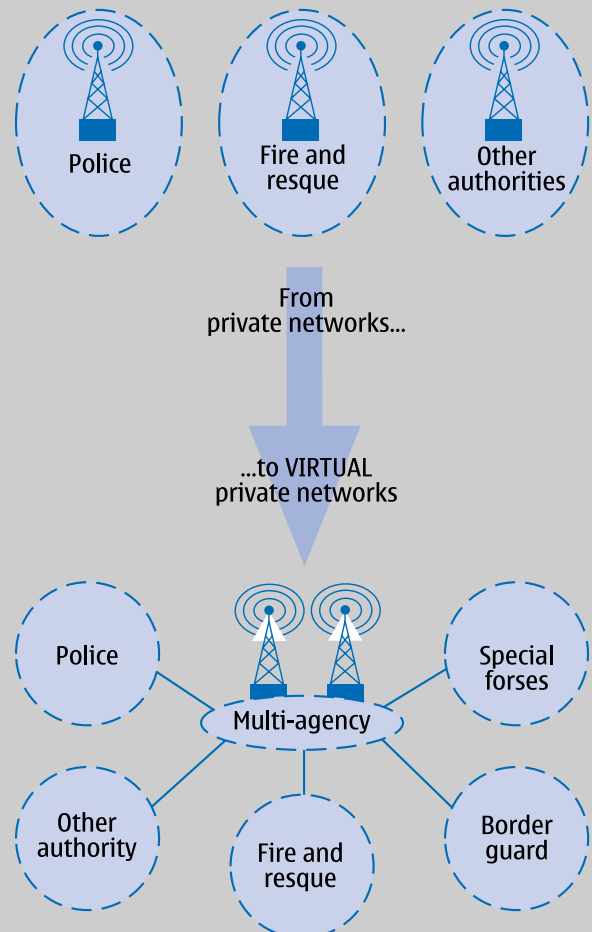
Finnish Emergency Response Centers in major revamp

Finland's Emergency Response Center (ERC) network is being completely overhauled to improve its operational efficiency and cost effectiveness. The old service comprised numerous ERC areas and is being replaced by just 13 local ERC areas covering the entire country, of which seven are already operational, with five new centres coming on stream by 2006.

At the heart of the new ERC system is the Finnish Public Authority Network, VIRVE, which is the main radio communication medium between all the authorities. The whole ERC information system will be renewed as part of the process.

New ways of working

One of the new ERC areas is Satakunta in western Finland. Mr Antti Jeronen, the Emergency Center's Director, explains a key benefit of the new structure: "The most important benefit for the general public is that anyone needing an emergency service only has to dial 112, no matter what the emergency situation and no matter which service is needed. Police, Health, Fire & Rescue – all can be reached 24 hours a day through the common 112 emergency number.

"For the authorities providing the services, on the other hand, the main benefits will come from the major changes that have been made to the way in which the ERC system operates."

Widearea group calls become a reality

Although parts of the VIRVE system have already been in use for two years, the full network is now operational nationwide with numerous Nokia DXT switches and more than one thousand Nokia TETRA base stations around the country.

For the authorities, such a widespread network brings a major advantage – the group call, which the latest Nokia TETRA software enables to be truly countrywide and zone-free.

Jeronen continues: "The Satakunta ERC has four neighbouring ERCs. Every day, the police have to deal with incidents that cross the ERC borders. Both voice and data communication between field units in different areas is crucial. With VIRVE, officers no longer need to be concerned about which channel to use or have to decide which dispatcher to listen to, it is now all automatic.

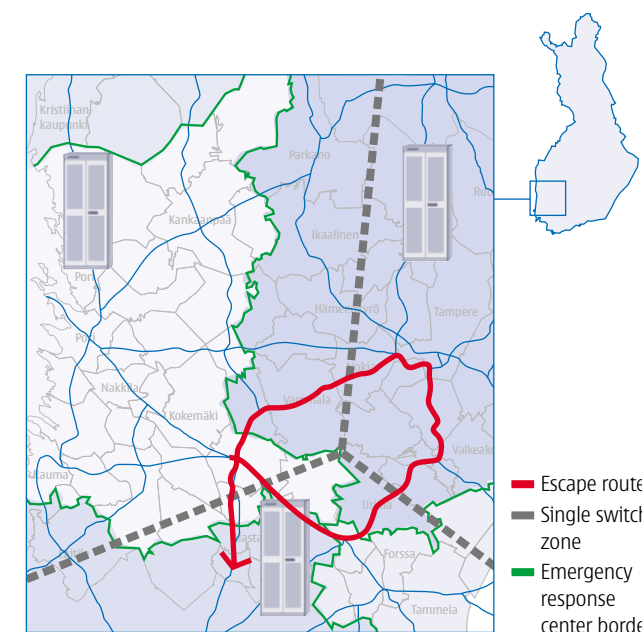Layout of the Emergency Response Center (ERC)

Police HQ

Rescue HQ
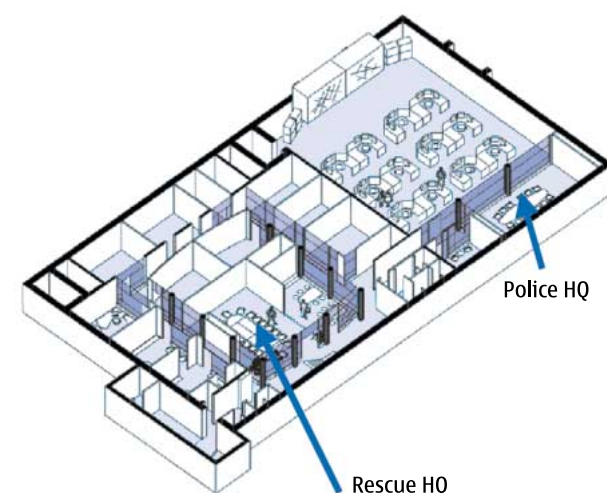
"Prior to the latest software upgrade, group calls were possible only in limited areas. I once witnessed a car chase that criss-crossed between the ERC operational areas. Finally, the car was caught, but managing the radio communication was quite a challenge."

Data plays a greater role

Data communication and its many applications, is also vital to the efficient working of the ERCs. As a part of the overall running of the information system, routine updates from field units are automatically stored in the status database. This eliminates a lot of the work that the dispatcher previously had to handle routinely. Another example of improved efficiency is the use of Automatic Vehicle Location to help get the vehicle nearest to an incident onto the scene quickly. This is particularly important for the ambulance services where every second counts.

Jeronen points out another advantage: "Data messaging is an important tool for improving officers' personal safety. Fast and error-free messaging to field units reduces the possibility of human mistakes and essential background information from an incident scene can be quickly delivered to other arriving units".

The use of new technology in the form of the VIRVE network has helped to bring about a completely new way of working for many in the Finnish public safety authorities. It has been a challenge to achieve, but the network is live and working – and proving its effectiveness every day it is used.

Antti Jeronen, Director of Satakunta Emergency Response Centre has background of nearly 20 years with Finnish Police forces. As Chief Superintendent in National Police Academy he was closely involved in operational and tactical planning and related end-user training of VIRVE. With 15 years of experience as a Superintendent in National Criminal Police he was able to pass real user requirements to the planning committee.

Advanced & optimised alarming in Finland
• Same person handles the whole event chain in the centre
• Managed co-operation and communication at Scene

112 call
112 dispatcher
Field unit
Field commander
Field unit

Escape route
Single switch zone
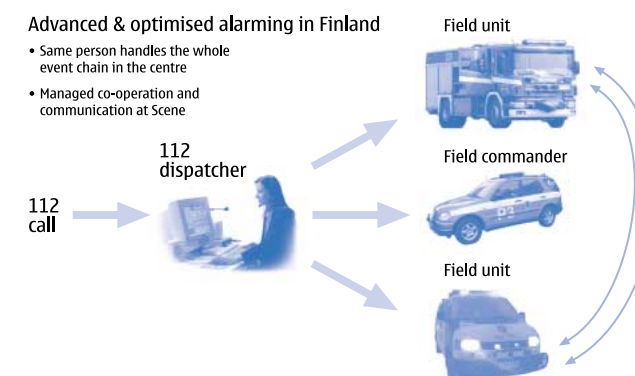Emergency response center borders

The Satakunta Emergency Response Centre (ERC) has four neighbouring ERCs. Every day, the police have to deal with incidents that cross the ERC borders. Both voice and data communication between field units in different areas is crucial. An example from the past is a car chase that criss-crossed between the ERC operational areas, switch zones and municipal borders. Managing the radio communications was quite a challenge with the old conventional radio system and it required too much resources. Today with TETRA these kind of operations are no problem at all: with VIRVE, officers no longer need to be concerned about which channel to use or have to decide which dispatcher to listen to, it is now all automatic allowing them to focus on the operation.

OLD RADIO COMMS IN FAST MOVING SITUATIONS
• The officer need to know where to manually change the radio channel
• The call is cut when changing the channel
• Outside own local area the dispatcher will be changed
• Same radio channel is used by all officers

NEW RADIO COMMS IN FAST MOVING SITUATIONS
• It is all automatic
• The call continues seamlessly
• Same dispatcher connected
• Dedicated talkgroups

Result:
• The officer can concentrate on his job – no need to play with the radio terminal
• secure, reliable and well managed communication – own dispatcher like before, no other disturbing traffic

Finnish peacekeeping battalions have good experience of using TETRA as the radio network in piloting new communication and information systems in crisis management says Lieutenant Colonel Esa Salminen.

The Finnish Defence Forces choose TETRA as a crisis management system

As part of the European Union's crisis management capability package, Finland is participating in international co-operation to strengthen security and stability in the United Nations, the OSCE, the European Union and within the framework of Nato's Partnership for Peace Programme, with emphasis on Nordic co-operation.

Requirements set by command functions in crisis response have constantly increased. At the start of a peace support operation, emphasis is placed on tactical mobility and operational security but later, when the operation has become established, military expediency sets the requirements on the CIS.

According to the Finnish Chief of Defence Admiral Juhani Kaskeala, the requirements set on communication and information systems (CIS) in crisis management are constantly increasing. In Finland this change has become obvious in connection with the operations in the Balkans and Afghanistan. This development poses new challenges to CIS:

How to maintain the CIS system and how to build close cooperation with civilian crisis management and local authorities?

Finland has a long tradition of contributing to Nordic co-operation. On the basis of divided responsibilities as agreed on in NORDCAPS (Nordic Coordinated Arrangement for Military Peace Support), Finland develops a C3 system for the Nordic crisis-management brigade.

Finland focuses on communications solutions, an area in which we have extensive know-how and experience. Our starting point is the use of commercial products and common industrial standards applied as widely as possible. We try to find an as cost-effective approach as possible to all CIS solutions.

NORDIC BRIGADE using TETRA in Kosovo

Finland is responsible for the communication and information systems of the Nordic Brigade. All of the Nordic countries plan and design together the CIS system, but Finland has the main operational responsibility. The aim is to build with COTS technology an integrated system which includes digital switches, microwave links, access point units and a digital TETRA (Terrestrial Trunked Radio) radio network.

Practical system for leading field operations

Today we have a Finnish battalion in Kosovo piloting the CIS capability. The radio network used in CIS is based on TETRA.

To mention only a few of the findings of this pilot project in which the troops have been using the TETRA system, I would like to point out features such as enough of talk groups, a wide selection of other services for the users, SDS. Furthermore, the system is easy to maintain after the installation and set up. In their feedback the users have praised the voice quality, the user-friendly and versatile dispatcher work stations and a good variety of safety features such as the emergency button, the simultaneous call of all radio sets and the encryption. All equipment is easy to learn to use.

In this work Nokia has played a key role in developing the command and control concept. Together with microwave links, the TETRA network is about to replace a tactical field communications system, which has served well but which is not cost-effective to maintain in a PSO. The experiences so far show that the road we have chosen is the right one.

We are also about to start a study on extending the use of TETRA technology in the Finnish Defence Forces. The Defence Forces are already now one actor in the joint TETRA based network of Finland's security authorities called VIRVE including the fire and rescue services, Police and Frontier Guard and many more. The network is covering the entire country today, which will make its use possible in national crisis situations. We consider Nokia as the most important network and terminal supplier in creating the national security co-operation networks.

The Defence Forces are also taking part in the ITCM (Information Technology and Crisis Management) project led by President Martti

With TETRA it is possible to connect command posts with fixed sites as well as moving convoys
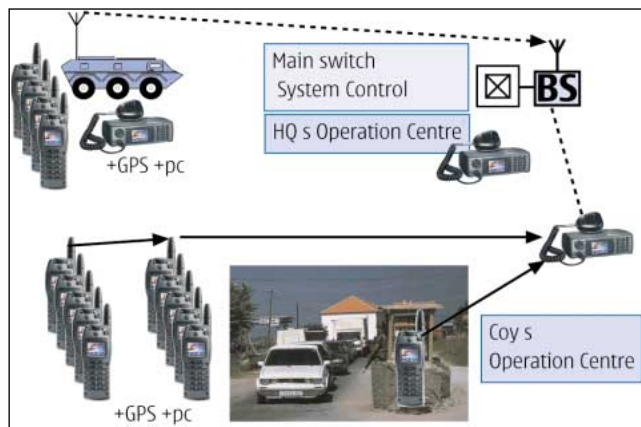
The TETRA terminal is at the same time both a telephone and a hand-held radio.

Ahtisaari. The project's aim is to compile from existing COTS products an information system that could improve civilian and military interaction in crisis management.

TETRA provides required functionality for peacekeeping

The TETRA system was chosen for the Finnish Battalion because of its special features matching with the needs of both individuals and those of the troops. The technology was originally designed for public safety ; hence it has some limitations for military use. However, the high quality of equipment and services with an easily maintainable system supported the selection of it. To start with, we thought of the individual soldier. He has different tasks to do; to man checkpoints, patrol in urban and rural areas carrying his personal and platoon equipment. The weight of the radio, batteries and accessories, incl. data terminals, becomes an issue. It is very important that the weight of the whole radio system is light. The TETRA radio system is connected to the GPS system which makes it possible to follow the movement of the troops . TETRA is a digital trunking system which enables , for instance, . fast call set-up time, good group communications support, direct mode communication between radios, packet data and fast data transfer services and encryption.

It is clear that not even TETRA can fulfil all the operational and technical requirements the military has since it has not been designed according to those requirements. Its ECCM (Electronic Counter Counter Measure) capability is rather poor. Another weakness is that TETRA is

based on a fixed network structure. To create mobility and flexibility to COTS products is a real challenge to the industry.

Interoperability requirements are at a completely different level than before. In the future, TETRA technology could respond to some of those challenges which crisis management has, especially in civil-military interaction . The CIS system of the Finnish Battalion in Kosovo represents one way of approaching the issue and in which COTS products play a central role.

C3	Command, Control & Communications
CIS	Communications and Information Systems
COTS	Commercial Off-The Shelf
PSO	Peace Support Operation

The writer, Lieutenant Colonel, G.S Esa Salminen, Lic.Tech works as the Chief of the Communications and Information Systems Branch, Army Staff in the Finnish Defence Forces (FDF).

Positron Power IWS and Nokia's TETRA join forces

An emergency situation can quickly turn into chaos if it is not properly handled and the response teams are not given adequate orders and updated information. Confusion and indecision take precious time when transferring relevant data to the pertinent officers, and this unnecessarily increases the danger level of an otherwise manageable situation.

The valiant efforts of policemen, paramedics and firefighters are severely handicapped, and perhaps ultimately obliterated, by the impossibility of receiving proper commands, the latest information and adequate orders in critical life or death situations.

To prevent these situations, it is vital to always plan in advance, and having an integrated solution that provides information-sharing capabilities between the different organisations simplifies this process enormously.

Positron combines its Power IWS family of Intelligent Workstations with Nokia TETRA Radio System to enhance the operations of Emergency Response Services.

This system combines the functions of TETRA radio networks and terminals with all the essential features of Call-taking (Power 911); computer aided dispatching (Power CAD), Mapping (Power MAP), Power Mobile and Management Information Systems (Power MIS), offering an integrated end-to-end solution.

A Faster Response

Nokia TETRA network supports these needs with a very fast set-up time and rapid transmission of information to field forces, in the form of messages, "mug shots", fingerprints, queries to vehicle or suspects databases, and more.

Using data communication over the radio, ensures that the information gathered and distributed is accurate, and most importantly, updated on a real time basis, with voice only being deployed when it is really required.

The positions of field personnel are shown automatically on the Power MAP application. Vehicles transmit their GPS based position information over the TETRA network into the mapping system, keeping the resource location information up-to-date on a quasi real time basis.

The call taker screen shows the incident address and map details of emergencies as well as the nearest available unit even before the call is answered. The dispatching officer can assign a task to a unit by simply clicking on the resource, and this in turn automatically sends the address, task description, collected information and other critical details to the unit's mobile terminal and radio by using the TETRA SDS service.

The integration provided by Positron Power CAD means that dispatchers can communicate with officers in the street directly from the CAD graphical interface (GUI), without ever going to the radio console screen. This cuts the response time to a particular emergency.

In addition to this, dispatching and radio communications can also be initiated from the MAP display, providing the dispatcher with several options for selecting the best resource, both graphical and numerical.

Power Mobile also communicates seamlessly with Power CAD to query or access a person's details, vehicle information and licence plate numbers, site/location information, confidential and public information.

By using Positron's Power Mobile and TETRA radio, the officer is "connected to the local network" in the Emergency response centre, even though he or she could be hundred of miles away.

Units on the street can send messages to the centre or other units in the field, update their status automatically, request back up, pass information about major crisis events. This offers a real time operation, and optimises the functionality of the resources on the street.

Partnering for progress

Positron Public Safety Systems (PPSS) claims it is a recognised world leader in the engineering and manufacturing of Integrated Emergency Response Systems. More than 3000 installations worldwide attest to the quality that Positron dedicates to its customers.

Positron Public Safety Systems is a member of Nokia Wireless Solution Partner (TWISP) program.

POSITRON

Mobilizing services

Mobliz Ltd, based in Espoo, Finland, provides software solutions that allow rapid provisioning and management of services. The company's customers include TETRA network operators and users, as well as GSM operators and service providers.
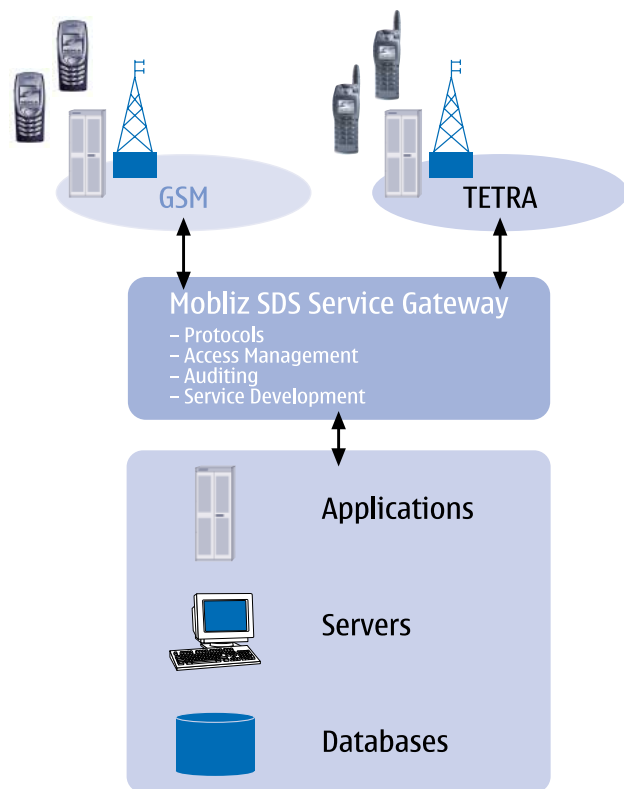
The SDS Service Gateway allows any application to be quickly integrated with TETRA-SDS messaging. Possible uses vary from providing text message based alerts and queries to end-users, to routing location data from terminals (cell, GPS, etc) to AVL and other unit management applications. TETRA/GSM message routing is also supported. The SDS Service Gateway removes the need for any cumbersome network API development, substituting instead a high level HTTP interface. As a standard product, the SDS Service Gateway meets the needs of any TETRA network operator or user organisation as an application infrastructure base for SDS/SMS traffic.

The TETRA Network Information Base is a billing mediation and network data management solution. It manages usage and subscriber data efficiently, allowing network optimisation, usage reporting and rapid detection of inconsistencies in data to aid security monitoring.

Visit us and see the demo at the TETRA World Congress 2002 Application Village!

➜ www.mobliz.com

GSM

TETRA

Mobliz SDS Service Gateway
- Protocols
- Access Management
- Auditing
- Service Development

Applications

Servers

Databases

Dispatching added to Novo's tracking system

A complete back-office support system for police, fire or ambulance personnel is now available from a single supplier, following the Scandinavian Novo Group's acquisition earlier this year of Mertor Oy, Finland's leading provider of dispatching software for emergency services.

Thanks to the buy-out, Novo has extended its mTrack tracking and communication family to include an alarm and dispatching system. Dispatchers can monitor, control and dispatch developing emergency situations and personnel in the field from one standard system. All functions are accessible through a range of user interfaces that cater for different types of dispatching station, from large integrated emergency centres, to smaller local or temporary dispatch centres and command vehicles.

The vehicle side is also well served. Own position, group members' position, routing and other GIS information based on a comprehensive access rights system can be delivered to a range of mobile terminals. The vehicle application allows access to databases with, for example, protocols, patient or suspect databases, as well as comprehensive billing and reporting functions. Organisations that use multiple radio networks are also served, as the system can deal with multiple terminal protocols and radio interfaces in the same environment.

Novo says that one of the main characteristics of its Public Safety Solution is its support for shared use of the system. For example, a local police chief using the system can normally only see the position of his own vehicles. If required, however, he or a dispatcher in a regional emergency centre, can use the same system to get an overview of the positions of many vehicles from many separate organisations that are operating in the same area.

novo

VIRVE goes underground in Helsinki

The VIRVE project has reached some new depths by providing TETRA coverage underground for the Helsinki Metro.

Two complete TETRA networks have become operational in the Metro's demanding "indoor" environment - a VIRVE network for Authorities and a commercial TETRA service for public access users. TETRA signals are injected to achieve a high level of redundancy across the whole Metro area by using wideband repeaters.

A highly cost-effective total communications system for the Metro area has been achieved by implementing the GSM and UMTS networks into the same air interface as the TETRA networks. Combining all of these projects in one has proved to be a successful decision.

Benefits quickly realised

Rescue personnel soon discovered some useful benefits of the new TETRA network implementation during rescue simulations.

Firstly, replacing the old, separate communications systems used by different authorities means that rescue personnel can now communicate easily with police forces without the need for separate communications. Closer coordination of operations and better control during incidents has been achieved.

Secondly, the old system relied on radios that were not used outside the Metro area, which limited the number of handsets available. This sometimes caused communication difficulties during rescue exercises. The new small TETRA terminals that most of the 400 operational personnel now carry are always ready and available for use during emergencies.

The new Metro coverage was implemented jointly by VIRVE, HKL, DNA, Suomen Erillisverkot, Nokia, Elektrobit and Eltel Networks.

During 2001, 52.78 million travelers used the Helsinki Metro and the volume of traffic is increasing.

ELEKTROBIT

Interoperability
– guarantee of a true multi-vendor market

Nokia is dedicated to interoperability, but dedication alone would not be enough if it were not combined with meeting the most demanding customer requirements.

Nokia continues to maintain a leading position in TETRA interoperability (IOP) as the only company awarded all possible TETRA Interoperability Certificates. ISCTI – the TETRA IOP Certification and Testing Body – has recently issued new IOP certificates for Nokia, covering the new Nokia TETRA System, Software Release 3. These certificates also prove that in addition to Nokia terminals, terminals produced by a number of other vendors have achieved support for authentication and packet data functionality.

Aiming for further IOP certification, Nokia has requested that Nokia TETRA System's compliance to the highest security classification of the TETRA standard be verified. The features thus being tested will include encryption with dynamic keys, end-to-end encryption, and ambience listening. Nokia has been ready for the tests since this summer, but other vendor terminals do not yet support these advanced features. The ground-breaking Nokia TETRA terminal THR880 is also being certified for interoperability with other vendors' systems – as far as their system functionality allows.

On the way to full interoperability

TETRA interoperability specifications define the common principles for implementation. Vendors are not the only ones who benefit from the specifications: TETRA customers can also demand features that have been implemented according to the specifications – features that are interoperable. Interoperability, in turn, is the guarantee of a true multi-vendor market.

Several new TETRA specifications have just passed the TETRA Members' Enquiry, and so TETRA manufacturers have the basis for implementing more interoperable functionality. One of the most significant of the new specifications is the TETRA Interoperability Profile (TIP) for Service Interaction. It defines, for example, how packet data and voice services relate to each other – how a fire fighter on the way to the incident scene can make or receive a call while downloading a map or a floor plan of the target. Another important new specification defines the principles of implementing classification of base stations for certain users. This, in turn, makes it possible for the vendors to implement base stations that prefer to serve air borne TETRA terminals, for example, or to implement new methods for controlling and managing capacity in the network.

TETRA Interoperability Profile specifications define the TETRA interfaces and the options used. The related test plans define how the interoperable features can be verified: specifications without the test plans are thus like an omelette without the eggs. This is why the annual IOP prioritising workshop, held in July, set creating test plans as top priority for interoperability work for the next twelve months. Since then, several test plans have already passed the TETRA MoU Members' Enquiry stage and more have entered it.

The next steps toward full interoperability are to write further test plans until every TIP specification has been covered and to create new TETRA interoperability specifications to cover functionality such as multi-slot packet data, and group communication over the Inter-System Interface (ISI).

Getting e-mails
– one click is all it takes

Normally, e-mail alerts are sent to TETRA mobile phones using SDS – these alerts might contain the message "New mail has arrived". But how important is the e-mail you have just received – is it a standard message that can be read later or something really important from HQ?

The e-mail connector software used with Nokia's TETRA Professional Portal package allows WAP-enabled TETRA phones to receive alerts from an authority's e-mail systems while officers are either in the field or at the station.

However, with this software, the alert is not simply a SDS message but a WAP Push Message that takes the user directly to the new e-mail. No time is wasted in navigating to your e-mail inbox then logging into a new WAP session - with the WAP Push e-mail message you simply click the link and this automatically starts a WAP session, retrieving your new e-mail in one direct action!

From a WAP enabled TETRA terminal such as the Nokia THR850 or Nokia TMR880, either the user or system administrator can set the e-mail inbox to either allow e-mail notifications to be received or block them. If e-mail notification is set to On, the priority can then be set to either "All" or "Important Only" e-mails. There is also a "Default" setting, which if selected allows the system administrator to determine whether "All" or "Important Only" e-mail priority is to be used. Note that for some authorities' groups, it may be a requirement that e-mail notification is disabled and the system administrator can achieve this remotely.

What does this mean for TETRA users in the field? Here is an example:

A police officer in the field receives a priority e-mail sent by a HQ dispatcher to a multi-authority group of which the officer is a member.

The Nokia TETRA Professional Portal e-mail connector software senses that new mail has arrived and immediately sends a WAP Push Message to the officer concerned.

Each officer in the group receives the same audible alert and visual message that new e-mail has arrived. With just one click of the phone's Send Key, the priority e-mail is retrieved and displayed on the phone in seconds.

Making extensive use of standard authority abbreviations and acronyms makes the e-mail message concise and more readable on the phone's screen.

The e-mail may also contain links to other information, links to enable the officer to make a call (MC) or even include the field commander's name and phone number as a phone book entry (PB). The e-mail may even conclude with an ACK or WILCO link as required.

The Nokia TETRA terminals give fast and easy navigation via the Scroll Keys, as well as link activation with just one click of the Send Key.

But is all this really possible, right now? Yes it is, and if you would like to know more about these and other advanced Nokia TETRA features, please contact your local Nokia TETRA representative and discover just how easy it is to implement this powerful combination of e-mail notification via WAP Push in your TETRA network now.

Rugged new PDA stands up to rough treatment

The Honoh LionRock is a new PDA that features a rugged construction and extensive data facilities for use over a TETRA network to help the emergency services in their every day field duties. The PDA offers a range of data functions that are easily accessed in a handy, tough unit.

Featuring a built-in camera, the LionRock is small enough to be used by police officers to discreetly photograph suspects and quickly send the image over the TETRA network to a central control facility for formal identification. The PDA is also equipped with a card reader to quickly take details of suspects by swiping their smart identity cards and transmitting the information back to headquarters.

With either method, field officers can quickly receive vital information back on the PDA's screen telling them whether suspects are dangerous and whether they should be detained.

What's more the PDA's manufacturer claims that the device is tough enough to withstand a drop of more than one metre onto a hard surface and even being stepped on without damage. Such harsh treatment is often inevitable in pressured field situations.

HONOH

Working together – TETRA Inter-System Interface

With European integration eliminating borders across the continent, law enforcement and public security authorities are facing new challenges. The TETRA Inter-System Interface (ISI) provides a powerful tool to meet these new demands.

The Schengen agreement and related documentation has not only created a need for crossborder operations, but also set the regulations for them. To define common rules, a standard solution was needed. This task was given to the European Telecommunication Standards Institute ETSI, whose ETSI Project TETRA specified the TETRA inter-system interface (TETRA ISI).

Cossborder operations demand that officers in the field can communicate without a hitch. Crossing a border, they need to be able to access the local country's network using their own mobile radios to stay in touch with their own control room and talk groups, as well as contacting the local country's control room and officers.

Yet, as with all public safety operations, the communications need to be strictly secure. Every network wants to control which mobiles are allowed to visit and which resources they can access while visiting. Security of information cannot be compromised. Currently, the Three-country Pilot Project between Belgium, Germany and the The Netherlands is refining and detailing the operational requirements.

Not only for cross-border operation?

The TETRA ISI standards define extensive cross-network functionality. They have been developed with crossborder operations in mind, but the functionality could serve other application areas as well.

For example, networks from different suppliers can be connected together to construct a nationwide multi-vendor network. This is possible, because the TETRA ISI provides transparent communication features even though a significant part of the management functionality may be supplier specific.

Another application would be to link two private TETRA networks, using the inter-system interface as a traffic gateway. If the coverage of the two networks were to overlap, roaming would very likely not be needed.

TETRA ISI development today

ETSI has already defined and published the TETRA ISI standards, while work to develop interoperability has been proceeding according to priorities set in TETRA MoU sponsored workshops. The inter-system operation of the following functionality has already been agreed in TETRA Interoprability Profile (TIP) documents:
- Migration (mobile roaming to the visited network)
- Mobility management
- Individual calls
- Telephone type calls
- Status and short data messages
- Priorities
- Emergency calls.

In addition, the inter-system operation of group calls is approaching approval.

The current status of the TIP specifications already provides a solid technical basis for product implementation.

Time for practical co-operation

The TETRA ISI guarantee that networks by different vendors can function together, but this has little meaning if a vendor works alone. The next logical step is to start testing the way that different vendors have implented TETRA ISI. This is crucial to verify the inter-system functionality, but also to obtain interoperability certificates to proceed to commercial deliveries.

Nokia is well positioned in ISI development and is inviting other network suppliers to start discussions on testing schedules.

TETRA handset location solution improves efficiency and security in the field

Knowing precisely where an emergency service's field personnel are at all times is vital to the efficient management of the service and for allocating units to incidents. Finding the nearest unit to dispatch in emergency, or optimising the geographical availability of people and resources can bring high savings in cost or save lives.

The traditional method of locating field personnel on the move is with GPS-location. However, most of the TETRA handsets are not equipped with a GPS module. That may be due to the high cost of the modules, the inconvenience of carrying separate antennas and bulky batteries or the limited indoor coverage area.

Nokia and its application partners introduces now new network based method to locate TETRA handsets and mobiles. This advanced network location system is a natural add-on to any Nokia TETRA network service. It provides the geographical location of all the TETRA handsets everywhere in the network area, including indoors and underground tunnels. The officer's normal TETRA handset becomes a device not just for communication with other colleagues and the dispatch centre, but it can provide accurate locating too. Tests in live networks show that locating accuracy is not as precise as with GPS based position, but network based location match for the requirements of many agencies.

As well as being practical for the officer, this solution is also highly cost effective. Field units can be effectively equipped with just the TETRA handset, saving considerable investment and operational costs.

The new TETRA location system also improves the security of public safety personnel by making possible for the dispatcher's locate them for example in emergency situation.

The efficiency of the ambulance services can be increased. Vehicles with TETRA handsets, but no GPS devices, can be seen on the dispatcher's screen when they complete a previous assignment. They can then be assigned easily to a new task without having to return to base. When an emergency call for help comes in, the nearest ambulance or suitable unit can be sent directly to the scene. First aid arrives more quickly and the dispatching officer saves time by not needing to request the location of units by radio.

The solution utilizes network wide TETRA data messaging services, Nokia TETRA API interfaces, Nokia partner's location server and Nokia TETRA terminals. It does not load the network unnecessary because terminal location is calculated only when the location information is needed.

Nokia Partners

Locus Portal Corporation has developed the location system for the TETRA networks. Locus TETRA Location System can provide the accurate location of the TETRA handset for any application.

MS Location Ltd's versatile MSL Nexus™ Positioning Platform is used by teleoperators as well as logistics-, security and health care companies and organisations. MSL Nexus™ has now been extended to TETRA handset positioning, which offers a new and tested solution for public safety organisations using TETRA handsets.
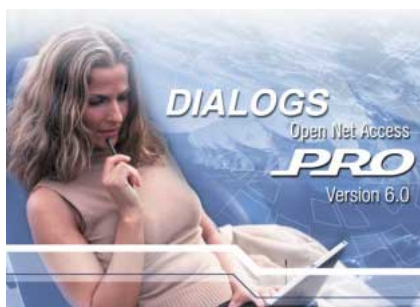
➜ www.locusportal.com
➜ www.mslocation.com

Investigations via wireless data at the LKA Bayern

An extremely modern and efficient method for investigations and searches is being used by the Bavarian Police. Via wireless data inquiries for investigations are handled by means of a product called Open Net Access Professional (ONApro) developed by the DIA-LOGS Software GmbH.

ONApro makes a mobile access on central data possible by wired and wireless communication media like GSM, ISDN, GPRS and TETRA, in particular. The communication is optimised by product features like Short Hold Mode and Crash Recovery.

The Landeskriminalamt (LKA) Bayern (Investigation Department of the Bavarian Land) equips especially those investigation units with laptops, who are able to do the complete investigation work in a record time and mobile by means of the Open Net Access professional. Maximum quality, velocity and a persistent steady link are given. The system fulfils by all means the entire safety conditions required by the Landeskriminalamt. Thus the officers are able to check a car within the scope of undisclosed searches.

DIALOGS creates the technical conditions to carry out inquiries and investigations very quickly and minimises by this the danger for the investigating officers.

➜ www.dialogs.de

Automated administration and usage reporting for TETRA

As the number of TETRA terminals and users increases, the need for an operator to manage the organisation and operational costs multiplies. Efficient usage reporting and customer care becomes vital. The operator needs an easy-to-use solution, to make the TETRA technology transparent for administrators and terminals.

TETRA network customer and usage cost management are similar to the needs of a traditional telecom customer care and billing system. What is needed is a compact solution that focuses on the key requirement of flawless TETRA communication during incidents. Information on the users, their units and access permissions are stored in the TETRA customer care system. Insertion and modification of data must be simple and viewing all the terminals in a unit must be easy – without the need for technical knowledge of the network.

Usage collection and reporting is essential when there is a need to follow the costs of usage per organisation or per terminal. How many calls or data sessions were made? What did those sessions cost? The TETRA operator, or in some cases the people responsible for individual units, must have easy access to the answers – again without the need to understand the network's call detail records or event records.
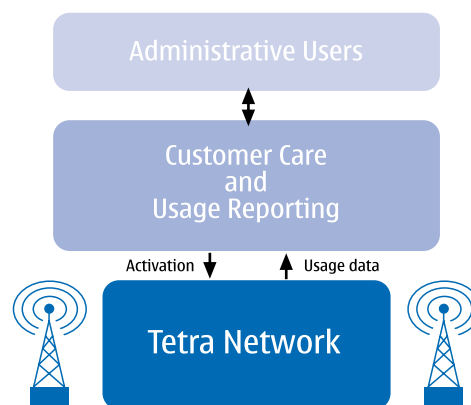
Similar reporting can also be used to analyse the communication of an incident. Who called whom at the incident site? When did the group on site make their first connections? When did communication in that group finish? These are just a few examples of the information that can be retrieved from the TETRA network's event records.

Comptel's packaged solution for customer care and usage reporting for TETRA networks is based on the company's 16 years of experience in provisioning and mediation of telecommunication networks with over 200 operator customers in 56 countries worldwide.

➜ www.comptel.com

Iceland's environment takes TETRA to the limit

A workforce and fleet management system based on TETRA has been developed to operate in the harsh Icelandic wilderness. Called TracScape, the system is the result of a cooperative project started in 2001 between Icelandic Adventure, Tetra Iceland-communications and TrackWell Software.

TracScape helps Icelandic Adventure to monitor and communicate with all its super-jeep vehicles to improve tourists' security and enhance the agency's scheduled activities.

According to Mr. Arngrimur Hermannsson, CEO and founder of Icelandic Adventure, the company has specialised in customised adventure tours of the Icelandic wilderness for more than 15 years, using super-jeeps, snowmobiles, boats, horses and helicopters.

"Up to 300 people can be escorted in several vehicles to and from Reykjavik daily, requiring us to coordinate all the expeditions and vehicle locations as well as meeting a strict agenda for all our activities," says Mr. Hermannsson. "Iceland's unpredictable weather can easily disrupt our schedules and increase our costs, particularly when all our communications are made via VHF radios and mobile phones.

Lower costs, higher safety

"TETRA enables us to communicate with several touring groups at the same time and brings much higher sound quality for tour guidance compared with the old VHF radio system. Vehicles travelling together can also be given tour guide information in several languages. TracScape tracks the geographical position of each vehicle and automatically monitors specific areas, which has also increased the security of our customers.

"Without doubt, TracScape running on the TETRA network has reduced our expenses and increased the accuracy of our schedules, giving our customers more reliable services and better safety. Relying on two specialists to build the best communication system in the world allows us to focus on what we do best," Mr. Hermannsson concludes.

TETRA air interface encryption
– when system security cannot be compromised

When security cannot be compromised, TETRA air interface encryption protects the network against eavesdropping, analysis of traffic patterns, and unauthorised use.

Analogue mobile communications systems are notoriously vulnerable because they use radio to connect the terminals to the network, a medium that is very easy to intercept. Digital telecommunications systems, whether based on GSM, UMTS, or even TETRA, are also vulnerable to security threats, such as eavesdropping, unauthorised use of the network, analysis of traffic patterns and spoofing.

Today's public safety and security users constantly face new challenges to secure communication in the network. For demanding police, ambulance, or rescue organisations, high security is essential.

To meet the highest security classification of the TETRA standard, the system needs to implement not only authentication, but also encryption based on dynamic encryption keys.

Confirming the terminal

Authentication is the main concept in preventing unauthorised radio users from using the system and its services. Authentication is a function that allows the infrastructure to check that a radio terminal is a valid one and not an illegal clone.

Without encryption, the air interface is the weak link in system security.

The main reason for air interface encryption (encrypting the transmission over the air interface) is to hide the payload, the actual contents of the calls or messages. This makes eavesdropping impossible. Air interface encryption is also useful because it encrypts the user identities and thus prevents traffic analysis and monitoring of selected users using a TETRA signal analyser.

Air interface encryption is a method where signaling and coded speech sent on the radio path is ciphered using encryption keys (cipher keys) and an encryption algorithm. Only authorised recipients know the cipher keys and only they can decode the encrypted speech and signaling.

End-to-end encryption improves the security of the payload, typically voice traffic, inside the fixed part of the network. However, using end-to-end encryption does not protect the users in any other way inside the fixed part of the network: for example, signaling or call details are as secure as for calls without end-to-end encryption. Also, end-to-end encryption affects only the service it is designed for: if the terminal provides end-to-end encryption for voice, it would not, for example, provide an end-to-end encrypted SDS service.

Therefore, end-to-end encryption, while providing full protection against interception, is an enhancement to security, not a replacement for any other security measure in TETRA networks. Authentication and air interface encryption are very much needed even with end-to-end encrypting terminals.

The Nokia TETRA System provides all these security functions: authentication, air interface encryption, and end-to-end encryption.

There is a choice of three air interface encryption algorithms. All are "secure enough", but there are some differences in their implementation. These are:
- TEA1 for commercial networks
- TEA2 for public safety and security networks in Europe
- TEA3 for public safety and security networks outside Europe

The TEA1 algorithm can be used without a license. For any other purpose (such as studying the algorithm) and for the other algorithms, a licence is needed. The Dutch Police IT organisation grants TEA2 licences, and ETSI, the European Telecommunication Standards Institute, grants TEA1 and TEA3 licences.
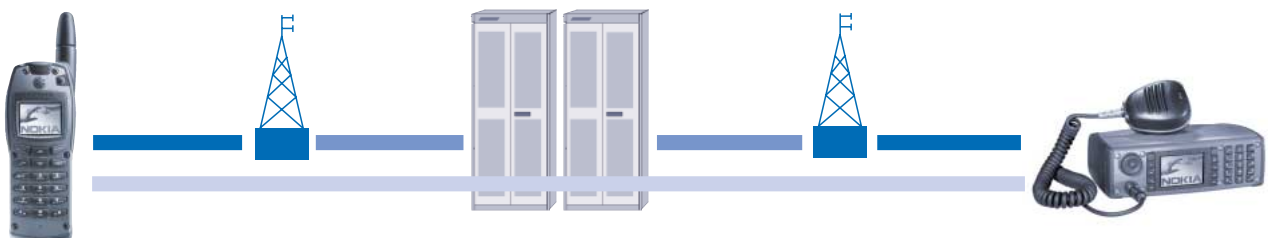
■ **AIR INTERFACE ENCRYPTION** protects against interception, analysis, and misuse on the radio path

■ **LINE ENCRYPTION** protects against interception, analysis, and misuse on lines and microwave radio links

■ **END-TO-END ENCRYPTION** provides full protection against interception, but does not protect against analysis and misuse

Figure caption: Different encryption schemes meet different encryption needs.

Earlier this year, TETRA Touch published an article based on the TETRA MoU's of the TETRA and Tetrapol technologies. This is a hot topic it seems, with readers responding with much positive feedback, but also raising some valid questions, particularly about DMO (Direct Mode Operation) spectrum efficiency.

TETRA vs Tetrapol – an update

Here we address and clarify the issues.

Briefly, TETRA works by using TDMA technology to provide four independent traffic channels in a 25 kHz RF channel. Tetrapol, on the other hand, uses FDMA technology to provide one traffic channel in an RF channel of 12.5 kHz.

What does this mean in practice?

Assume that in an incident area (DMO area if network coverage is not available) that 15 traffic channels are needed for police officers. To simplify this comparison, let's assume that traffic is always using 15 traffic channels (TCHs).

Tetrapol IM performance

Tetrapol uses one carrier per TCH, so 15 carriers are needed as well as one control channel, making a total of 16 carriers. These 16 carriers will cause a great deal of localised transmitter IM (Intermodulation Interference), which creates interference on the radio spectrum and Tetrapol system. Therefore, this interference will limit the practical operational range.

TETRA IM performance

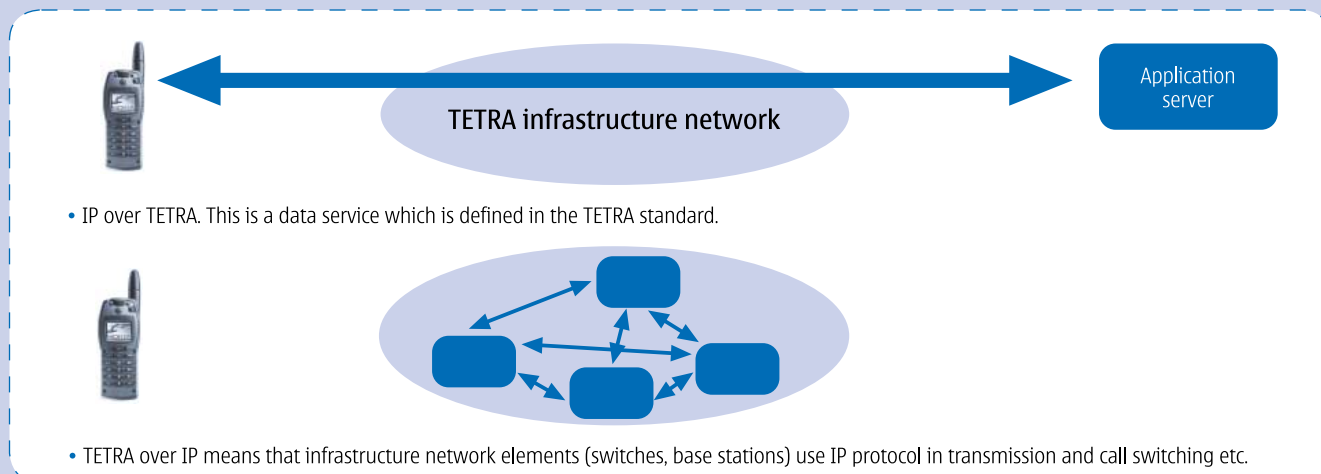TETRA uses four TCH per carrier and there are two options:
a) 16 (15+1) TETRA carriers with one TCH (time slot) active (3 time slots are not used). This means that the probability of IM occurring is much lower, because signals are active only 1/4 time (not all the time as in Tetrapol). In this scenario, these 16 carriers will cause less IM than in Tetrapol and therefore will limit the operational range much less than in Tetrapol.
b) 4 TETRA carriers with all four TCHs (time slots) active. These 4 TETRA carriers will cause far less IM compared to Tetrapol's 16 carriers and therefore will also limit operational range much less than in Tetrapol.

Over the last few years, the TETRA community has seen an increasing use of IP protocols in TETRA networks. Some readers have found the terms used to be quite misleading – here, we set out to clarify them.

"IP over TETRA" or "TETRA over IP"?

"IP over TETRA" means packet data services as defined in the TETRA standard air interface and TIP-3 part 5. It provides TCP/IP and UDP/IP interfaces for end- to-end data applications. No voice is transmitted using IP over TETRA. The Nokia TETRA packet core provides an IP over TETRA service to intranets that is secure and efficient. Nokia is the only vendor whose customers are using IP over TETRA network-wide in operational multi-switch networks.

"TETRA over IP" means that TETRA network elements such as base stations, databases and switch elements use the IP protocol in transmission, both between each other and internally in call switching and so on. Many vendors in the TETRA industry, including Nokia, use IP both inside network elements or between them.

TETRA infrastructure network

Application server

• IP over TETRA. This is a data service which is defined in the TETRA standard.

• TETRA over IP means that infrastructure network elements (switches, base stations) use IP protocol in transmission and call switching etc.

TWISP

a worldwide network of solutions

The Nokia TETRA Wireless Solution Programme (TWISP) helps developers to produce applications for the Nokia TETRA System. The many benefits of the programme can now be accessed via an e-channel, with e-learning solutions among the newest additions.

The Nokia TETRA System is often complemented by customised applications, which take advantage of the system's data and other features to bring additional value to users. Examples include solutions for various Public Safety fields, from Command & Control systems, messaging systems, WAP applications, and browsing and location solutions, to telemetry applications and TETRA operator solutions.

What is TWISP?

The Nokia TETRA Wireless Solution Programme (TWISP) helps its members develop applications to complement the Nokia TETRA system. To be successful, third party application developers need to understand the key issues of TETRA WAP, IP packet data, and application programming interfaces (APIs) and TWISP provides the detailed information, simulation tools, and documentation they need to achieve this.

TWISP benefits for members

Membership of TWISP is free and brings significant benefits, in the form of both Nokia TWISP material as well as development tools. These are now available via an e-channel, from the TWISP pages in the Forum Nokia extranet. This allows members to choose the material they want to download, gives access to the latest versions of documents and provides Frequently Asked Questions.

The latest feature is an e-learning solution for the Nokia TETRA Connectivity Server (TCS). TCS provides an easy-to-use application programming interface, known as the TCS API, giving a window to the Nokia TETRA System for third party application developers.

The e-learning solution is available to TWISP partners free of charge via the Forum Nokia extranet and provides:
- understanding of the Nokia TETRA Connectivity Server (TCS) and related technical documentation
- the principles of programming applications for the API
- a summary of what needs to be considered when application programming interfaces are used

Like all e-learning, the Nokia TETRA System TCS API e-learning solution is self-paced. It provides expert knowledge, presented in an approachable manner, and its visual outlook and animations make the content more memorable. After completing the course, the material can be used as a refresher or quick reference material.

The course is divided into six modules: Nokia TETRA System, TETRA Connectivity Server, TCS 3.0 SDK, Data Messaging, Voice Call and Data Management.

TWISP benefits for TETRA user organisations

The benefits to TWISP members are evident, but TETRA user organisations also benefit from the TWISP programme: they have the latest information on available solutions worldwide and thus can select the best from a range of proven, tested solutions. Come and discover if your application partner is TWISPed with Nokia at TETRA World Congress 2002.
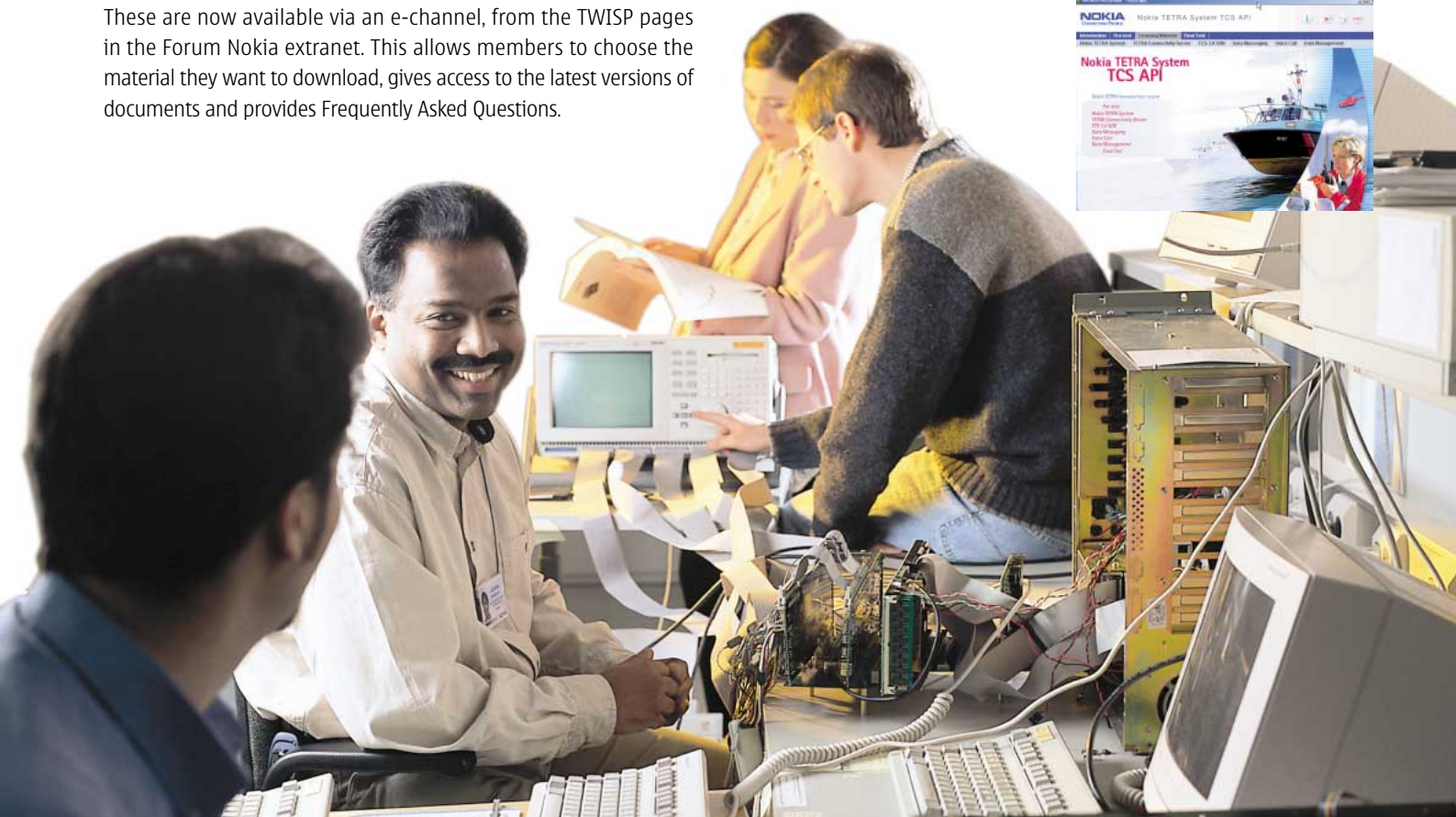
International Youth Fire Fighter Camp
27th July – 3rd August 2002 in Hamburg, Germany

The Youth Fire Fighters of Hamburg have organised an international summer camp for 771 girls and boys between 10 and 18 years of age. The group of youngster were taken care of by 350 helpers. In addition to Fire Fighters from several Federal States of Germany, there were participants of 10 different countries – from Nicaragua to Russia! They all came to Hamburg-Allermöhe to up their tents at the Eichbaum Lake and to experience "Games, fun and red fire engines". The organisers offered a full range of activities: visits at the fire and rescue station, visit at Hamburg's school of fire fighting, sport competitions, canoeing in the Dove-Elbe river, presentations, sightseeing in Hamburg, bonfire, night hiking...

The Nokia TETRA Team from Germany supported this global event by setting up a real TETRA system and handing out TETRA terminals. Five user groups were programmed in the system to ensure communication between different groups. "It was really great that the Nokia TETRA system offered the possibility to communicate in full duplex mode," says Marcel Steinhäuser, head ot the Youth Fire Fighters of Hamburg. The young fire fighters also experienced the advantages of the TETRA technology and were very happy to chat with each other.

The Youth Fire Fighters belong to the Voluntary Fire Brigades and consist of currently 700 members in Germany. The youngsters are especially interested in the fire-fighting technology, together with adventure, lots of team spirit and the willingness to help.

➜ More information about the activities of the Youth Fire Fighters Hamburg can be found at www.jf-hamburg.de.

Enhancing public safety communications in Venezuela

Nokia provides a digital TETRA radio system to Monagas State government in Venezuela to enhance security communications to Monagas state police, civil defence, fire department and other municipal and national security offices.

Monagas State, which has a population of around 600,000 people is a new customer for Nokia and the system is the first Nokia TETRA system in Venezuela.

Under the terms of the agreement, Simtel, the Nokia Value Added Reseller for TETRA Telecommunications Systems in Venezuela, will oversee the implementation of the system, including supply, installation and commissioning.

Nokia will provide its TETRA solution and support Simtel in maintaining the competitiveness of the TETRA network after roll-out with care services and a package of training services for developing staff competencies.

Nokia will deliver TETRA switching equipment, a number of base stations, dispatcher stations, and Nokia TETRA handsets.

In addition to network equipment, Nokia will provide its Network Deployment Package, which covers implementation, commissioning and project management; the Nokia KeyCareä Package, which maintains the competitiveness of the network after roll-out; and a package of training services for developing staff competencies.