TETRA Touch

Nokia TETRA customer newsletter • www.nokia.com/tetra_touch • Vol. 4 - 2002

Sari Baldauf, President of Nokia Networks sheds light on Nokia's vision for public safety communications

Authority communication gears up to IP with VIRVE

Nokia TMR880 mobile radio completes the 2nd generation TETRA terminal family

CONTENTS 4/2002

30 000 public safety users today are enjoying the advanced digital radio communications in Finland. VIRVE is providing service throughout Finland.

→ Read more on page **19**

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Photo KVB

Nokia DXTip – the new generation TETRA switching family debuts in transportation in Germany. **7**

New handset location solution improves efficiency and security in the field. **35**

TETRA is essential technology for secure, reliable and fast public safety communications. But that's not the end of the story says Sari Baldauf, President of Nokia Networks. **5**

TETRA has proven its usability in Kosovo peace keeping operations says our guest writer Esa Salminen, Lieutenant Colonel of Finnish Defence Forces. **28**

Network Architecture defines the design of the radio network hence it has a significant impact in the OPEX, CAPEX and IMPEX. Learn more about the variations of network architectures to prepare for the most economical solution. **24**

Introducing a new member of Nokia TETRA radio terminal family. Nokia TMR880 TETRA mobile radio is entering the road to completing connectivity offering a compact versatile connectivity for the demanding public safety professionals. **8**

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NOKIA
CONNECTING PEOPLE

TETRA – a proven technology

As we approach the end of 2002, it is fair to say that although still a relatively new technology, TETRA has advanced to the stage of being well-proven and well-established around the world. The TETRA standard itself is widely accepted and fully open; products and services are easy to get with the Nokia TETRA system being available "off-the-shelf"; and TETRA is fully featured to provide advanced voice and data communications for all public authorities.

We present an in-depth review of what is perhaps the most advanced TETRA system in operation today – the VIRVE network in Finland. With 30,000 users and nationwide group calls coupled up with advanced computer aided dispatching, there is much to learn from the experience of this forward-thinking project.

We hope that this issue of TETRA Touch gives you a rounded view of TETRA and that you find it useful and informative. Please write to us with your views and questions and we will do everything we can to answer your queries – see page 38 for some of your recent questions and our responses.

In this issue we feature the Nokia Complete Commitment that we showcase at TETRA World Congress 2002 in Nice. I would like to warmly invite all our readers to participate in the unveiling of products and solutions that will be shaping the future to TETRA.

Matti Peltola
Senior Vice President
Professional Mobile Radio

Finnish authority network VIRVE implementation completed

With the last base station in the VIRVE network switched on at the end of October in Finnish Lapland, roll-out was declared to be complete.

At the event, Esko Rajahalme, VIRVE Project Manager, confirmed the completion of network roll-out and said the service is ready for full scale use across the country. "Now it is time to look to the future for further developments of the service.

Today, VIRVE is in use by 30,000 public safety officers by Fire & Rescue services, Border authorities and many other organisations, with the remaining organisations, including the Finnish Police, joining the service within weeks.

Nokia as a reliable partner

VIRVE comprises 15 TETRA switches, over 1,200 TETRA base stations and 220 dispatcher workstations from Nokia. According to Mr. Rajahalme, Nokia delivered everything on time and cooperation has been very good. "Together, we developed VIRVE to meet the requirements of these demanding organizations," he says.

Users have so far had good experience of the new network. Organisations with previous experience of their own analogue private radio communications networks are satisfied with the quality, security and the ability to share communications between other organisations when needed which digital TETRA brings. Other organisations without experience of any common radio communications are quickly learning the benefits. VIRVE has also enabled a complete reorganisation of the Emergency Response Centres.

A nationwide group call was made to demonstrate the advantages that VIRVE brings to the authorities. The call was made between 6 group members from Jaukkaravaara in Lapland to Helsinki, Lahti, Vaasa, Jyväskylä, Kuopio.

The VIRVE service has also been expanded to cover the coastline of Estonia to support the coastguards of both Finland and Estonia.

➔ Read more about VIRVE on page 19.

VIRVE service is ready for full scale use across the country said Esko Rajahalme, VIRVE Project Manager, Ministery of the Interior on the 31 October 2002.

The last VIRVE base station was switched on in Finnish Lapland in a sunny winter day with -17°C below zero.

TETRA Touch recently caught up with Sari Baldauf, President of Nokia Networks, and asked her to pause in her busy schedule to explain why Nokia, with its many different interests, is involved in TETRA and what advantages the company can bring to public safety communications.

Many technologies – one interest

Nokia is driven by its vision. Over the years, the development of our entire business, our products and our services has followed, without deviation, the path to achieving the vision that we set says Sari Baldauf.

Our vision for public safety communications is to provide a total communications system that will fulfil all the very demanding and widely varying needs of authorities around the world. TETRA lies at the core of this vision. Nokia has been closely involved in the development of the TETRA standard and the technology based upon it. Our work is interlinked with that of all the major players in the market, from users, to application developers and operators. We must all ensure that TETRA meets the mission-critical needs of those in the public safety and security forces that serve us, the general public.

TETRA is the only technology that truly offers the security that public safety users must have. It is the only open technology that brings the powerful group call functions that are essential to coordinating intensive emergency incidents. And TETRA is the only technology that brings the fast call set up that officers in the field need when facing an emergency situation. Many other features of TETRA are purpose designed for public safety use and cannot be offered by other digital communications technologies states Sari Baldauf.

These mass-market technologies can never become the mainstream communications technology for public safety users. Apart from the features that I have already described, TETRA will always be essential because it is dedicated to professional users. In a large-scale emergency, consumer communications systems will become clogged quickly as users rush to spread the news. But TETRA will remain open and secure.

GSM, GPRS, Wireless LAN and the forthcoming UMTS can provide a useful and cost effective complementary IP data solutions and applications to TETRA. Nokia is the company best placed to provide a total solution that integrates all these technologies. Nokia has developed IP based solutions in all mobile digital communications areas and is capable of combining them to provide the best mix of services for public safety users.

Public safety communications may not be the mass-market communications business that the rest of Nokia is aiming for, but it is a very important niche business and one in which all the strengths of Nokia can make a valuable contribution.

TETRA is proven in service of public safety in many countries, it is here to stay, says Sari Baldauf.

Essential technology, but not the only technology

So, TETRA is essential technology for secure, reliable and fast public safety communications. But that's not the end of the story. There are a few specialist applications suitable for use with other communications systems such as wireless LAN and GPRS. The higher bandwidth of these systems complements the security and reliability of TETRA.

For example, a wireless LAN in a fire station or police garage provides a fast and convenient way to regularly update maps or databases and other information held in vehicle PCs while they are parked inside. Large amounts of data can be downloaded quickly and conveniently while the vehicle is not in use.

There may also be special circumstances in which police or other authorities in the field would want to send streamed video to a control centre or other user. One effective way to achieve this is to use the higher bandwidth available with GPRS.

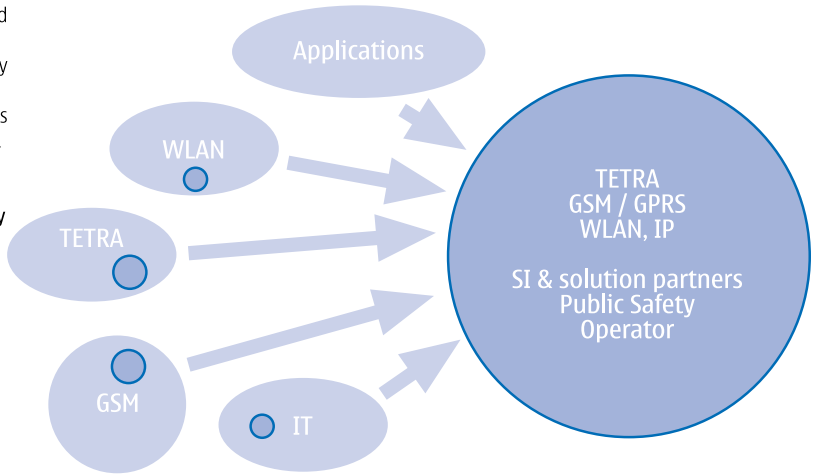
> "NOKIA HAS BEEN CLOSELY INVOLVED IN THE DEVELOPMENT OF THE TETRA STANDARD AND THE TECHNOLOGY BASED UPON IT. OUR WORK IS INTERLINKED WITH THAT OF ALL THE MAJOR PLAYERS IN THE MARKET, FROM USERS, TO APPLICATION DEVELOPERS AND OPERATORS. WE ALL MUST ENSURE THAT TETRA MEETS THE MISSION-CRITICAL NEEDS OF THOSE IN THE PUBLIC SAFETY AND SECURITY FORCES THAT SERVE US, THE GENERAL PUBLIC."

Nokia complementary solutions

In past: isolated communication systems

New integrated public safety communication enviroment

- Communication is not key task for police but it should support main tasks
- TETRA functionality provides officer safety and ultimately reliable and secure access
- Effective operations are built on multi access solutions via TETRA, GSM/GPRS, WLAN and IP communications. Seamless communication & connectivity brings cost savings.
- **TETRA is core part of fully integrated public safety solution**



Seamless services make it easy to use

The future of public safety communications is based on TETRA with additional specialised data services being through complementary technologies, including Wireless LAN, GPRS and UMTS. TETRA for mission-critical services and for group communications that demand fast setup and total security, with other technologies providing high speed data intensive services in non-critical circumstances.

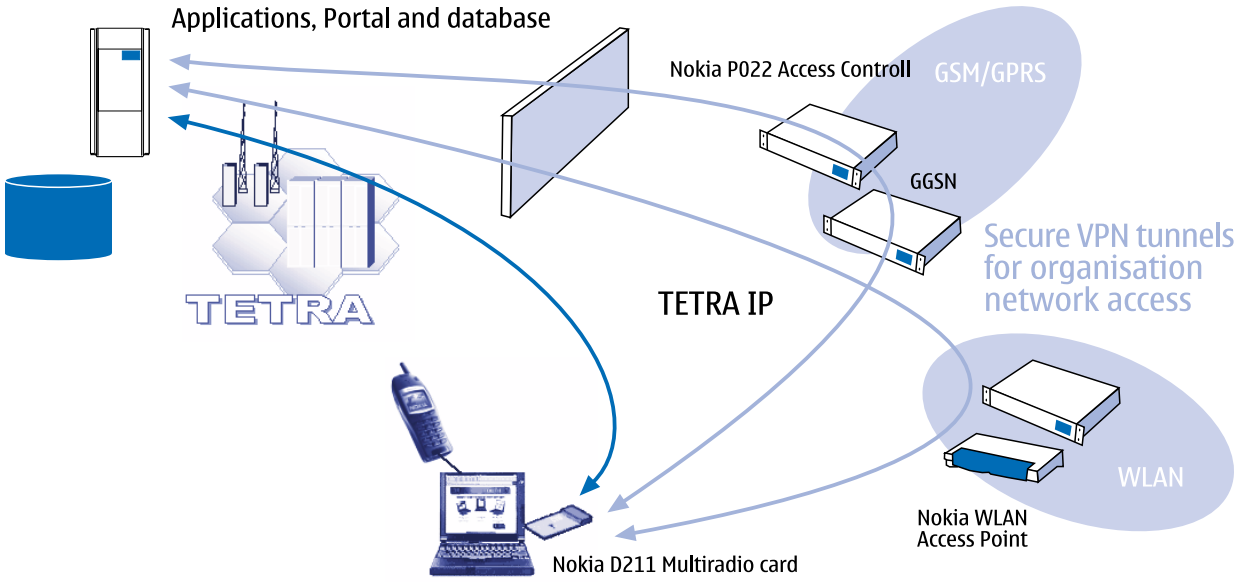
On the face of it, this sounds like added complication for the officer in the field who is often under extreme pressure in emergency situations. For the police officer or firefighter responding to an incident, fiddling with data communications is the last thing on their mind and would be an unwelcome distraction.

Nokia is one of the few suppliers with undisputed expertise in all the different communications technologies and is in the best position to provide integrated systems that will work automatically and seamlessly.

Key to the perceived simplicity of the system is the Nokia D211 multi-radio card that fits into a laptop PC's PCMCIA slot. With a third party IP mobility software the D211 seamlessly chooses the necessary communications network according to the prevailing local conditions and preset rules. For example rules could be set to always use TETRA unless coverage is unavailable. Or the network could be chosen on the basis of the best coverage or the cheapest data rate. All this is set by the operator and happens in the field without any intervention from the user.

Simple solutions such as this makes public safety communications flexible, safe, secure and supremely easy to use in the field.

TETRA +GSM/GPRS + WLAN



Next-generation TETRA switching family debuts in transportation

The Nokia IP-enabled TETRA professional mobile radio systems with end-to-end IP data functions have been delivered to the German local public transport companies Berliner Verkehrsbetriebe (BVG) and Kölner Verkehrs-Betriebe AG (KVB).

As Nokia is one of the world's leading mobile communications companies, we are in the best position to take advantage of IP technology development. First time at the heart of the TETRA system is the future proofed Nokia DXTip switch, which enables the IP-based connection of different Nokia TETRA components using an IP backbone. The Nokia DXTip is utilizing the same platform as field proven Nokia 2G/3G switching elements.

Nokia TETRA offers powerful features tailored to customers' needs, including high security and reliability, dispatching, group calls, priority call, direct mode operation and interfaces to legacy systems such as Traffic Operations Centres.

A network in three layers

The Nokia TETRA System comprises three layers - the TETRA radio network, the IP Backbone network and the IP Packet core network, in architecture similar to that of Nokia GPRS and 3G cellular networks.

The core of the Nokia TETRA System is a traditional radio network, consisting of scalable DXTip switches, radio base stations and several interfaces with services such as dispatching, public/private telephone networks and to other legacy systems. In the Nokia TETRA System, the DXTip is the centre of communications, supporting fast call set-up and high traffic throughput. The Nokia TETRA architecture can be scaled up to provide for several thousand simultaneous active instant voice users, to meet the future growth needs.

The TETRA IP Backbone is a reliable, scalable and secure IP network that provides IP connectivity to various TETRA network elements and applications, such as the TETRA Connectivity Server (TCS), Configuration and Data Distribution Server (CDD), Gateway GPRS Support Node (GGSN) and Wireless Application Protocol (WAP) servers. In addition, the TETRA IP Backbone provides an IP connection between the network's DXTip switching sites.

The IP Packet data network provides the same function between TETRA radio users and internal and/or external IP networks and services. The Nokia TETRA System IP Packet Data Service supports point-to-point IP data communication between one MS host and another, or between an MS host and an external host.

All these layers are connected through the transmission network and can be operated and maintained via the Nokia Network Management System, Nokia NetAct for TETRA.

Leading German public transport systems

BVG in Berlin is Germany's leading municipal public transportation company and controls 9 underground lines over 151 km with 170 stations; 163 bus routes over 1,934 km with 2,763 stops; and 28 tram lines over 347 km with 375 stops. The BVG network annually serves more than 797 million passengers.

KVB in Cologne runs 57 lines over 741 km with 874 stops. More than 233 million passengers use the KVB network each year.

Both BVG and KVB join a string of municipal public transportation companies using the Nokia TETRA System, which includes HKL in Helsinki, Finland and Bilbao Metro in Bilbao, Spain.

Investment today in an integrated communication system based on TETRA will bring enormous improvements in the effectiveness of the services.

Photos: KVB AG

NOKIA TMR880

Nokia TMR880 TETRA Mobile Radio

On the Road to Completing Connectivity

Nokia introduced a new member to its TETRA radio terminal family at the TETRA World Congress in Nice on 18th November. The new Nokia TMR880 vehicle mounted TETRA radio offers compact, versatile connectivity and is designed to meet the demanding needs of public safety professionals such as police officers, fire and rescue teams and border guards. With voice feedback, full colour display and high output power, the Nokia TMR880 mobile radio adds a vehicle based member to the Nokia TETRA radio terminal family and will be available during the 2nd quarter of 2003.

Whether fitted in a car, motorbike or boat or in an office, the Nokia TMR880 terminal provides perfect connectivity to the applications needed by professional users. The Nokia TMR880 features 16 programmable input and output pins for connecting to application devices such as status panels, external alarms and telemetry systems, as well as a data interface.

The Nokia TMR880 terminal can also be directly connected to a GPS receiver, making it easy to implement automatic vehicle location applications. The radio can also be controlled from a PC using an Advanced AT-command set, giving convenient control of applications.

Install it where you want it...

Versatility, usability and robustness are key requirements for a TETRA radio and the Nokia TMR880 has been designed to provide these. With its integrated design and compact casing, the terminal can be installed in a DIN-sized car radio slot, on a dashboard or as a desktop installation. An electrical locking mechanism is provided for DIN slot installation, giving added protection and easy installation and dismounting of the radio.

A parallel keypad/display unit can be connected to the Nokia TMR880 radio. For example, in a fire engine this allows the radio to be used both from the driver's cabin and from the rear.

...use it as you want to

Group communication is essential for public safety users and the Nokia TMR880 makes talk group operations both easy and convenient. It can store the details of 1,300 different talk groups, as well as 24 DGNA groups. In addition, the terminal can memorise 255 individual numbers as well as 100 status message mnemonics.

To help speed up communication and contribute to efficient operations, short data messages can be sent to a group or to individuals during a group call.

Wide operational area

Operating in the 380–400 MHz frequency band, the Nokia TMR880 terminal adds to the operational effectiveness of user organisations by providing the long range communication they need. With its high RF transmitting power of up to 5W, the Nokia TMR880 gives extended and more reliable coverage in "thin" networks.

Cost-effective package

With its highly integrated construction, combining a wealth of features and capabilities into one unit, the Nokia TMR880 radio gives excellent value for money. Consisting of the transceiver, a DIN installation bracket, a desktop mounting bracket, a desktop installation cover, a system cable, a HF microphone, a loudspeaker, a push-to-talk switch and a speaker microphone, the Nokia TMR 880 is a complete package that is ready to be installed and put into use.

The extensive abilities of the terminal can be further enhanced with a range of accessories, supplied by both Nokia and third party manufacturers, including data cables, power supplies, DC/DC converters, antennas, loudspeakers and desktop microphones.

Small on size, big on benefits

Robust and reliable, the Nokia TMR880 is a compact and easy to use TETRA terminal for vehicles, bringing convenience and high specifications to busy field professionals. For organisations, it helps increase operational efficiency and brings cost-effectiveness and improved accuracy to their everyday work.

Nokia TETRA dispatching solutions for

Public safety and security organisations manage their field operations through a process known as fleet management or dispatching. To work effectively, these organisations need the advanced dispatching tools, quick call set up times and group communications facilities that only professional mobile radio (PMR) services can provide

Organisations that use PMR are very incident driven, and their dispatchers and command center personnel are the focus of their activities. As well as allocating the most suitable units or groups for each task, dispatchers also create and manage groups and keep a close eye on incidents as they develop. They are the key to effective field operations.

What are your dispatching needs?

Nokia TETRA dispatcher solutions can be used in a variety of ways by a wide range of organisations. There are three dispatching solutions to choose from: DWSe1, DWSi and DWSr

Nokia DWSe1 for command and control rooms

The Nokia DWSe1 is designed for dispatching centers that have several dispatchers working together to manage the fleet. Information is automatically shared between the dispatcher stations, cutting the need to make specific requests. DWSe1 stations are also equipped with professional audio accessories.

The DWSe1 concept gives the best economy with an existing E1 connection, yet, since it can serve several dispatcher stations, even setting up a new E1 will give a reasonably short time payback time.

Nokia DWSi for small dispatcher centers

DWSi was designed with small or single station dispatcher centers in mind. Despite being a "lightweight" version, it makes no compromises with services, features, or performance.

DWSi connects to a Nokia TETRA switch via dial-up ISDN subscriber lines, meaning it can be used in ways that are simply too expensive to set up using fixed, high capacity data connections. Typical uses include remote single station dispatcher centers, temporary or movable dispatcher centers, and back-up installations for command and control room applications. With an existing telephone line, an ISDN connection can be provided without additional wires or transmission equipment.

Nokia DWSr - radio data dispatcher

The wireless Nokia DWSr brings dispatching on the move, allowing a field officer in a command vehicle to take control of an incident.

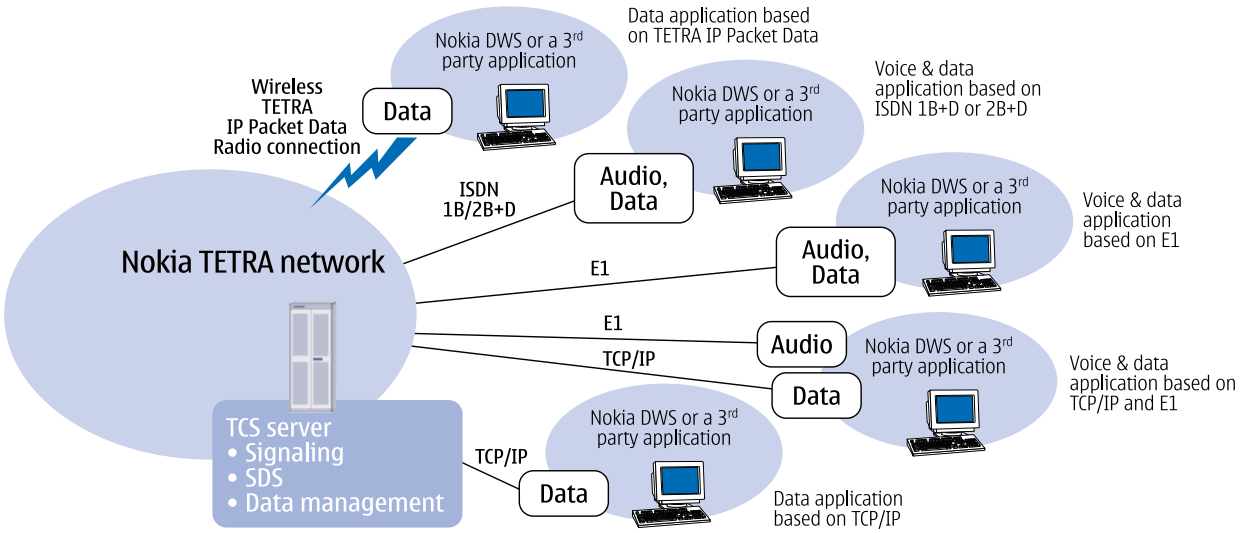
Although the air interface limits the services that can be used, the key ones are still available: sending and receiving status and short data messages, group and group membership management, monitoring subscriber status and event monitoring for group calls.

Wireless solutions are the choice when line connected dispatcher stations cannot be used. Wireless DWSr is also an option for offices where functional requirements are not high and costs need to be kept under control.

Customised dispatcher applications

For customised dispatcher applications, the Nokia TETRA system provides an easy-to-use Application Programming Interface (API) through the TETRA Connectivity Server (TCS).

With the aid of the TCS API, customised applications such as Computer Aided Dispatching (CAD) or Automatic Vehicle Location (AVL) can



Nokia dispatcher workstations (DWS) can be connected to TETRA network in multiple ways thus, optimizing transmission costs in each installation. In all alternatives the DWS application is identical and the mode of connection is hided from the user. Thus the user may flexibly move from one dispatcher to another. In addition of standard Nokia DWS, 3rd party applications can similarly utilize all the described transmission options.

various needs

benefit from the Nokia TETRA system by combining system data with data from external computer systems.

The Nokia TCS is flexible - transmission options for third party applications include fixed lines, dial-up PSTN/PABX, or wireless connections. One application can also be used on different transmission options.

Choice in Dispatcher

Workstation variants...

Nokia TETRA provides three variants of the dispatcher application SW, matched to the needs of dispatchers:

- DWS Communication (voice and data communication services)
- DWS Management (subscriber, organization block and group administration services)
- DWS Communication and Management (combination of all of the above services)

... and in transmission alternatives

Nokia TETRA dispatcher solutions provide several transmission alternatives, from fixed high capacity connections to wireless connections:

- Fixed line connections: TCP/IP 10/100Mbit/s or E1 2Mbit/s PCM
- Dial-up PSTN/PABX connections: ISDN 2B+D or ISDN 1B+D
- Wireless connections: TETRA IP packet data or GSM/GPRS data

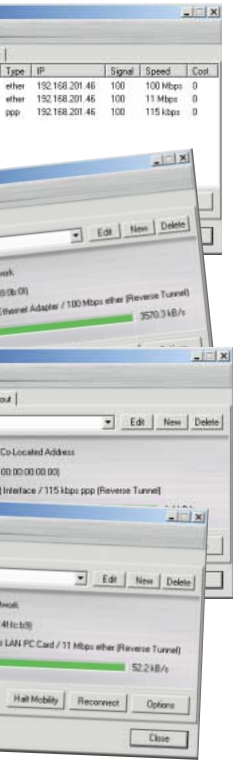
Nokia TETRA dispatcher solutions can save you money by letting you select the best connection type for each location.

LOOKS FAMILIAR
– the harmonised dispatcher interface

All Nokia dispatcher solutions use the same graphical DWS user interface, based on Microsoft® Windows™. This makes it familiar and easy to use and means the dispatcher has no need for additional training when moving from one dispatcher station to another.

Dispatching environment Dispatching solution	Control rooms and centralised alarm centers	Remote and small dispatching locations	Temporary and movable dispatching stations	Wireless dispatching stations
DWSe1	X	(X)		
DWSi	(X)	X	X	
DWSr			X	X
Customised dispatcher applications based on Nokia TCS	X	X	X	X

Mobile IP stays in touch in challenging situations



Picture this: A car carrying a group of wanted bank robbers is detected on the highway. A police officer in a patrol car Starts to follow the suspects' car and announces this over the police radio. A command unit vehicle speeds out of the police headquarters' garage: it will control the chase directly from the field.

The command unit must be kept fully updated on developments. The garage has a connection to the police network, but what happens when the unit is on the move?

Even for a moving unit, several possible communication networks are usually available. But far too often, the user must stick with the one that has been chosen as the best or with connections that need to be changed manually.

Maintaining a connection

Ideally, the terminal will automatically choose the best possible available network connection for each situation. For example, in the police headquarters' garage, the command unit would receive the latest information about the chase via the local network, over an encrypted WLAN connection. Yet, this link to the home network would not be lost in the field: on leaving the garage, the connection would automatically be handed over to the best possible network available on the streets - the Nokia TETRA System.

Such a solution is made possible by a mobility management system that is based on Mobile IP - the most used and the only internationally standardised technology. The technology keeps track of the terminal's movements and redirects the required information to and from the terminal wherever it is located.

Based on the Mobile IP standard, Secgo's Mobile IP products enable mobile users to take their Internet address and all open Internet sessions with them whenever and wherever they choose to connect to the Internet. Secgo's mobility management solution makes moving in and between networks transparent: the user has a connection that does not break when on the move or when changing the link media, for example from WLAN to TETRA.

Secgo Group develops and supplies high-grade secure networking solutions available both as systems supplies and turnkey services. The solutions are aimed at large and complex networks characterised by strong security demands and a wide range of applications.

→ www.secgo.com

secgo
JUST BETWEEN US

Providing for advanced passenger transport management

Carris, the Lisbon Public transport operator with 900 buses and trams, has one of the most advanced AVL/RTPI systems running over TETRA. The system has been running successfully since 2000.

Each year, Carris transports 385 million passengers and covers more than 100 lines with 2,100 bus stops and approximately 2,000 drivers. To improve customer service, Carris decided to implement a system that would permit resource optimisation, ensure timetable regularity, driver regulation, provide information to passengers on waiting times and eventually to increase on-board security and ensure a reduction in operational costs.

To achieve this, Carris turned to Tecmic S.A, which supplied its XTraN Passenger system. Recent developments of the system include deploying new features such as in-bus multimedia systems (sound and video transmission), IP implementation, ticketing integration and interfacing with city traffic light systems, ensuring the best possible flow management on main streets.

XTraN Passenger helps operators increase their service quality and driver and passenger security levels, attracting more customers. It also allows companies to be more competitive, because it offers tools to effectively manage all human and material resources involved. An extension for communication with public order forces has been implemented in Lisbon and quick intervention is possible if a public order disturbance occurs.

For the public order and emergency forces themselves, Tecmic has developed XTraN Enforcement, which allows these forces to have a complete knowledge of area and scenario data, securely offering the most relevant information for decision-making purposes. The system's

features include Distribution of Occurrences; Resource information; Occurrences and Theatre Management; and Reliable Analysis.

Founded in 1988, Tecmic currently develops fleet management systems, which enhance operations and reduce costs, optimising resources across a range of enterprises. Tecmic strongly believes in its solutions, which bring to the heart of a company all relevant information concerning personnel, vehicle and equipment activities on the outside.

The World outside, Inside your Window !
tecmic

Nokia NetAct™

gives lowest network management costs

The aim of network management is to control a network to achieve maximum efficiency, offering users high quality services whilst maintaining low operating costs (OPEX).

Lower OPEX, but how?

The overall operating cost of the TETRA network, as well as how it is managed, can vary a great deal depending on the vendor and the network architecture.

Two completely different architectures are shown in figures 1 and 2:

- A centralised system with sufficient redundancy, such as Nokia NetAct™ for TETRA
- A traditional distributed system consisting of area based networks and different hierarchical layers required for the network management system

A centralised view allows the entire TETRA network to be seen from one location, whereas with the distributed system, several regional network management centres may be needed, requiring more staff and increasing costs.

Another important component of the operating cost is hardware and software maintenance. Traditional distributed systems consist of a number of servers managing different network elements in many locations and in many hierarchical layers. The maintenance costs of such a traditional system are significantly higher than the centralised Nokia NetAct™, which provides an advanced, multi-technology network management system with full scalability and redundancy.

Nokia NetAct™ makes it happen – Better service at a lower cost

Nokia NetAct™ for TETRA is tried and tested technology. Based on the Nokia NMS Core platform with more than 300 successful installations, Nokia NetAct™ for TETRA is a state-of-art system to manage multivendor, multiservice and multitechnology environments. With NetAct™ for TETRA, the operator can concentrate on network management, not on the management system.

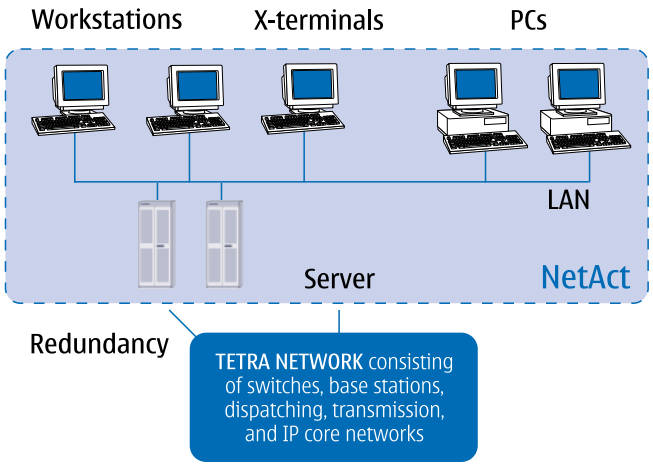


Figure 1. Centralised Network Management System: Nokia NetActTM

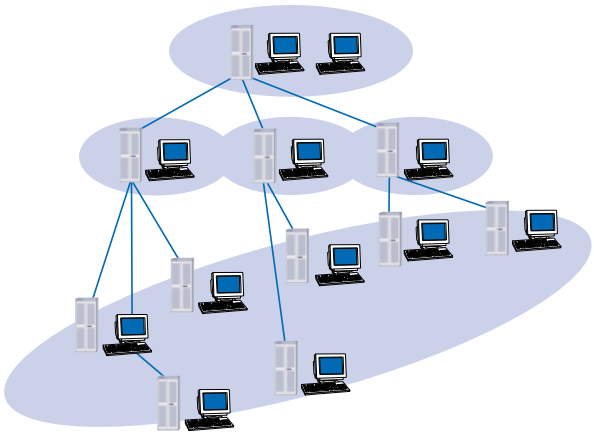


Figure 2. Typical PMR-type Network Management System

e-Policing – a vision of mobile data

Research by the Home Office in the UK has established that the average time spent by front line police officers in police buildings is between 35% and 40% for uniformed constables and as high as 60% to 65% for detective constables. The use of mobile information systems offers a way for front line officers to spend less of their time in the office completing paperwork, and more time providing an effective and visible policing service.

The Police Mobile Data User Group defines Mobile Data as "The provision of pre-defined information to operational officers as a means of enhancing the officer's ability to operate away from police premises."

APD Communications has actively responded to this requirement and APD's TORUS offers a suite of mobile data applications, specifically designed to meet the requirements of front line officers. It is both hardware and bearer independent so delivers information to terminals as diverse as handportable radios, PDAs to ruggedised Mobile Data Terminals. Radio bearers include TETRA, Mobitex, GSM and GPRS.

As Paul Friday, Head of Information Technology at West Yorkshire Police says, "The police service is under pressure to be more effective and more visible. We have valuable information in our computer systems but we keep it locked up in police stations." APD's TORUS software is helping police forces across Europe unlock this information to help deliver the vision of mobile data.

APD Communications

Multi Network Environments and Event Data Logging – More Coverage, More Safety

distocraft

TETRA is superb technology for public safety and security, but it can't be left as an island of communication. Voice still dominates in command and control during field operations, but there is a growing need to use the network for data communication as well.

Messaging is one subset of data communication and it is a very effective way to spread instant notes and notifications to users. It would be even more useful if it could also reach users in other networks like GSM, GPRS, IP and paging systems. This feature has now become a reality with the products and solutions developed by Finnish-based Distocraft Oy.

Distocraft has developed a solution called DC2000 that not only connects different networks at the messaging level, but brings other benefits as well. The store/forward feature guarantees message delivery even if the user is out of reach momentarily. Even more control is achieved by getting acknowledgements of both delivered and failed messages. All the messages are stored for audit trails. The work of the dispatcher is efficient, as he only needs one user interface to manage all the messages in all the networks.

There is a growing need for TETRA operators to get accurate information of the usage of the network by different organisations or user groups. Distocraft DC6000 is a CDR (Call Detail Record) data warehouse and reporting system for event data. It supports long-term storage of aggregated event data to enable the trend and the historic data reports of the network user behaviour. TETRA user organisations can use the stored information to later trace and analyse the events they need. There are many ways that DC6000 can be used to maximise network performance. Some typical cases are tracing faults, fraud detection, analysing group traffic, comparing traffic to capacity and allocating costs.

Up and running to a more secure future

Networks are more than the sum of their parts. By orchestrating the entire delivery process, Nokia builds synergies and brings networks to life.

Nokia offers project management and technology competence for both the rollout and care phases of network operations. From site assessment to network planning, rollout, integration and optimisation, Nokia provides comprehensive services for planning and deploying networks.

Our proven sourcing solutions, comprising supplier management and integration, an extensive subcontractor network and optimised manufacturing capabilities, further strengthen our delivery capability.

Once networks are up and running, **our services help ensure operational excellence and efficiency**. Driven by network availability, reliability and security requirements, we are committed to helping you make the most of your investment.

Speed comes down to project management: example from Germany

Project management is the key to efficient rollout, supporting on-time deliveries and high-quality results. Our strengths in this area come from experience. We have completed a record 25 turnkey deliveries in 21 countries, as well as delivering more than 100 GSM networks worldwide. This success is also reflected in our ability to integrate new technologies into existing networks.

In a record achieved 3 years ago, Nokia completed one of its fastest ever network rollouts ever, for the O2 mobile communications network in Germany, installing 2,000 base stations in 10 months.

According to Jürgen Peetz, Account Director at Nokia Networks, close co-operation with O2, especially in site acquisition, was instrumental in helping to complete the project on such a strict time schedule. Large urban areas such as Berlin, Leipzig, Nuremberg, Munich, Frankfurt, Stuttgart, Cologne, Dortmund, Hannover and Hamburg were connected to the O2 network, as well as several medium-sized cities and the German autobahns.

By orchestrating the work of several subcontractors, Nokia set up approximately 300 new base stations each month. Regular discussions and implementation planning well in advance contributed to the success and speed of the network ramp-up.

Ralf Hetkamp, Nokia Care Manager comments: "One key success factor was: Keep it simple! At the beginning we in-stalled only one base station configuration, so that all equipment could be used on every site."

Building on these experiences Nokia has adopted even more efficient global processes and ways of working throughout the entire delivery chain. The results show in **the quality and efficiency of more recent network ramp-ups. For instance, Nokia recently integrated about 1,000 base stations for one project in just one month**, providing clear evidence of the continuous improvement in our delivery services to meet today's market challenges.

The current world situation presents special challenges and needs for reliable and effective communications to assure safety and security. Achieving fast network availability is crucial both for commercial mobile as well as TETRA operators. Nokia is well positioned to help orchestrate a smooth migration to digital technology for public safety trunking systems for use by law enforcement and rescue services in their everyday work.

→ www.nokia.com/services_for_operators

Nokia THR880 TETRA phone – a treasure waiting to be discovered

TETRA Touch transports you back to a recent fine summer's day in Finland when something extraordinary happened...

10:30 AM

A group of people find themselves in a desolate landscape. Surrounded by vast rocks and quarries, they can see the looming shapes of gigantic quarrying and drilling machines.

The people are Nokia's VIP guests, the venue is a pit used to test quarrying machines – but what is about to happen here?

10:45 AM

The group is led through long tunnels, deep into an underground mine. They can see very little in the darkness and the air is cool and humid.

Two miners appear up ahead – suddenly, the darkness and quiet is shattered by a flash of light and the rumble of an explosion, followed by clouds of smoke and dust that billow out to fill the narrow confines of the mine. The smoke gradually clears and people can make out what looks like a treasure chest. What could be in it?

The lid of the chest is swung open and the hidden treasure is revealed – dozens of new Nokia phones, which are distributed to the waiting guests. Yes, this is the launch of the new Nokia TETRA handset!

11:00 AM

During a welcome speech by Kenneth Björklund, Director of TETRA Terminals, a gigantic Nokia THR880 phone stands in front of the audience, its colour display shining in the darkness.

03:30 PM

After presentations about the new phone's many features and functions and following a tasty lunch in the mine, the guests head off to visit the Safety and Security Exhibition in the nearby city of Tampere. The Nokia stand is crowded by visitors, eager for their first glimpse of the new Nokia THR880 phone and its many features – voice commands, colour display, 1300 groups, robust and resistant construction – and so easy to use!

04:07 PM

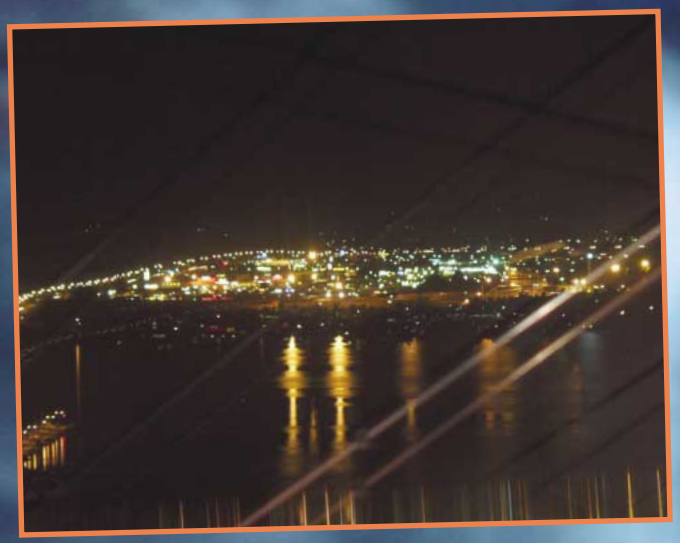
What the fashion conscious TETRA user is wearing – at a workwear fashion show, a model wears a safety vest and a Nokia THR880, complete with hearing protector set by Stopnoise, a Finnish company specialising in professional audio accessories.

07:10 PM

From deep underground to the top of the world! The Nokia group gathers for dinner atop the168 metre high Näsinneula tower in Tampere. The highest building in Finland, it gives an unforgettable view over Lake Näsijärvi.

22:20 PM

Tampere by night seen from the Näsinneula. The end of a beautiful late summer day, filled with memorable experiences.



Unit Alert feature integrates paging to Nokia TETRA Terminal

The new Nokia Terminals THR880 and TMR880 as well as Nokia THR850 now have a revolutionary feature, which combines paging and TETRA radio into one terminal unit. For users this means cost savings because of investment to just one Nokia unit instead of separate pager and TETRA terminal. It's also cheaper to use, no need for separate pager network. With the new Unit Alert feature the user can receive a special SDS message, which activates alarming even when the terminal is set to silent mode, e.g. when a person needs to be reached in special emergency situations.

Nationwide expansion of the TETRA network in Tunis

Nokia is providing a nationwide TETRA professional mobile radio system with end-to-end IP data functionality network to Tunisian TV broadcaster L'Office National de Télédiffusion (ONT), the country's sole TETRA licence holder. The deal represents a nationwide expansion of the ONT's existing TETRA network in Tunis, also supplied by Nokia. Deliveries have already begun and the system is expected to be operational by the end of 2002.

ONT is the national TV broadcaster in Tunisia and diversified into the TETRA market to initially support the 2001 Mediteranean Games which were held in the city.

Nationwide TETRA network to Kingdom of Bahrain

Nokia is delivering a TETRA network to the Kingdom of Bahrain. The agreement confirms Nokia's leading position in the Middle East.

Deliveries have already begun and the TETRA network is expected to be operational at the beginning of 2003.

Atlas, the Nokia Value Added Reseller for TETRA Telecommunications Systems in Bahrain, will oversee the implementation of the system, including supply, installation and commissioning.

The first TETRA network in Bulgaria for the Border Police

Nokia delivers a complete TETRA network using IP technology to Bulgarian National Service Border Police. The implementation has already started and the network is expected to be operational during spring 2003.

This new TETRA network will cover the border area between Bulgaria and Turkey providing advanced applications such as Automatic Vehicle Location solution for the border authorities.

National TETRA licence for Moratel in Morocco

Nokia and Moratel have signed a contract of a complete Nokia TETRA system using IP tehcnology including TETRA switch and base stations, dispatcher work stations, antennas and installation support. Moratel will use this network to demonstrate TETRA capabilities in Morocco. TETRA service is expected to be available by the end of 2002 in Casablanca.

Scenario reconstruction
becomes more complete with TETRA recording

Trunked radio can provide better information from recording systems, but only if the old ways of recording with analogue radio are changed.

Recorded calls are often the starting point when emergency services need to find out what really happened during an incident. Before TETRA, recording from analogue systems could only identify which group had been talking, not who in the group. The information simply was not available.

Trunked radio can provide more information, but how the recording is done needs to be re-thought. Most recording solutions simply rely on recording the audio. In doing this, key information is lost. In addition, not everything you would expect is recorded.

Working with system manufacturers, Thales Contact Solutions has built a TETRA recording and replay solution that captures all the key information, providing much more detail and opening the way to greater application integration. Already this is providing far more comprehensive information when trying to understand what really happened in an incident.

The future potential of the technology is great. For example, by linking recording information with other systems, such as GPS, a detailed and precise account of exactly what happened and when can be created.

THALES
CONTACT SOLUTIONS

TETRA – competitive into the future

Every technology must fight for its position on the global map of evolving alternatives and solutions – the winning technology has to provide true value for its users. Its unique characteristics and techno-economic merits have already made the TETRA standard the number one choice for the most demanding PMR users. Yet, to keep its lead, the TETRA standard must respond to users' evolving needs.

Future-proofing TETRA

Two years ago, the board of the European Telecommunication Standards Institute (ETSI) decided to secure the future of TETRA, starting a programme to develop what has since become known as TETRA Release 2. The goal of the programme was to agree on enhancements that secure the users' investments, satisfy their new requirements and ensure a seamless fit with the third generation of mobile systems.

The main enhancements in TETRA Release 2 are related to high-speed data, radio performance – including air-to-ground solutions – and interworking with next generation public networks.

High-speed data

Fast data transfer is increasingly important in the world of wireless mobility, the Internet and multimedia messaging. Users want the benefits of applications such as transferring images and video clips or digital mapping. With these facts in mind, the target of TETRA Release 2 work was to improve the data transfer rates tenfold. Two solutions within TETRA Release 2 were adopted: the so-called TAPS and TEDS standards.

TETRA Advanced Packet Services (TAPS) was created to meet the needs of commercial operators by use of a GSM-like radio channel. TETRA Enhanced Data Service (TEDS) has recently been agreed as compatible with the earlier TETRA Release 1 systems and approved to use multiple 25-kHz radio channels with multi-carrier modulation. Control channel signalling remains compatible, aiding terminal compatibility. This, in turn, protects the investments that organisations have already made. While the TAPS standard is already agreed, there is still considerable technical work to be done to produce the TEDS standard.

Complementary technologies

It is clear that TETRA will remain the preferred voice, dispatching, and messaging solution for Public Safety organisations, for example. Indications from the market, however, suggest that users would like to try several data services in parallel, depending on service availability and cost. It may well be that – with a properly designed data application – a radio will use TETRA IP data in the countryside, switch to a wireless LAN at its home base, and even use UMTS in city centers. This way of operating throws down some new challenges to both application and middleware developers, but it can be achieved if the market wants it. This would also give users a quick way to evaluate higher data rates in practice and verify any improvements to their operational work.

Whatever route the markets choose, TETRA is future-proof and will responds to users' needs.

VIRVE revolutionises Finland's public safety operations

There is only one country in the world that can benefit from a nationwide IP-based TETRA network built exclusively for public safety and security use. That country is Finland, sometimes dubbed the world's mobile communications laboratory.

The world-leading network is called VIRVE and having been rolled out ahead of schedule is now changing the way in which the Finnish authorities are working. Why? Fundamentally because the network enables group communications, both voice and data, across the entire country and between all its many different authorities. The old model of each authority having its own independent communications system is being swept away. The benefits are substantial: more efficient use of resources and faster response to emergency situations – even major catastrophes covering a wide area.

Being the first has meant the world's public safety authority spotlight is firmly focused on VIRVE. To date, the network has stood up to the test, having repeatedly proved its value to users and their organisations, its operator, the government and the general public.

Public authorities in other countries are beginning to sit up and take notice. In the following pages, TETRA Touch attempts to give you a flavour of this most advanced of TETRA networks.