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## Communicating seamlessly

Radio communication solutions for the police

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## Executive summary

The general public looks to the authorities to protect them from threats and man-made problems. Today, public safety services face added threats, such as the rise of global terrorism. Growing urban populations are especially vulnerable: something as simple as a power cut can cripple an entire city.

At the same time, the pace of working life is increasing for everyone. With a growing workload each day, officers in the field need the right tools to help them work more efficiently. Above all, they must be able to communicate with each other.

There are ways to prevent some threats, and professionals prepare and practice for major incidents. Efficient co-operation helps minimize any damage to people and property. When the situation is at hand, authorities must be able to communicate both with the officers in the field, with each other, and with the command centre.

The radio communication solutions of Airbus Defence and Space for police enable **seamless communications** – regionally or nationwide. Versatile voice and data services are available in the same system.

Authorized users in the field can easily communicate with colleagues in their own team or command centre, or with other groups or special forces units that are providing additional support.

Field officers can **access all necessary information systems** and use advanced data applications from wherever they are. Vehicle registration checks, person checks and so on can be made accurately within seconds, with directions, target and other information easily received.

The police communication solutions also include **advanced emergency functions** that help to improve personnel safety. The user's own or nearest control room, or own work group, are all available for support through a single-button emergency alarm.

For security, Airbus Defence and Space solutions provide advanced **encryption** of communications, with user **authentication** and ciphering to prevent unauthorised access. Because availability is an important aspect of security, **redundancy** and **fallback functions** have been built into the systems.



Digital, secure radio networks complemented by broadband and integrated to control room systems and other information systems are the choice for modern police organizations around the world.

## Safety and security

Police forces need secure communications to be able to safeguard their personnel and the public they serve. Officers need to be confident that their communications will not be intercepted. Police organisations need knowledge that unauthorised people cannot access the radio system using stolen or misplaced radios.

In many countries, eavesdropping police communication in analogue systems is a hobby for radio amateurs and a handy tool for criminals. Organised crime can easily buy equipment and hire technicians to make sophisticated eavesdropping, interception, masquerading, and manipulation of data and recording.

In systems based on TETRA and TETRAPOL technology, the signals themselves are very difficult to eavesdrop. Even so, police work may require additional security. Complete encryption solutions, including authentication, air-interface encryption and end-to-end encryption fulfil even the most demanding confidentiality requirements.

### Authentication

Authentication ensures that any terminal trying to access the network is genuine. The users do not need to take any actions for the authentication process; the system will handle everything automatically.

But authenticating just the radio terminal is not enough. In the TETRA system from Airbus Defence and Space, for example, the radio also makes sure that the network is a genuine police network, not a pirate system set up by criminals. This is called **mutual authentication**, and it ensures that only authorised users can use police communication groups, in a pre-planned way.

### Preventing eavesdropping

The radio systems from Airbus Defence and Space implement encryption in two ways to prevent eavesdropping. Air interface encryption, based on dynamic keys regenerated each time the terminal is switched on, provides a security level high enough for almost all users. Static encryption keys are not used because of the higher risk.

Air interface encryption prevents traffic analysis and monitoring of selected users using various air interface signal analysers.

End-to-end encryption is an additional measure that protects the information transmitted from one terminal to another, not only over the air interface but also within the network.

End-to-end encryption, however, is not enough to provide a high-security system. Simultaneous air interface encryption is also needed. This is because the sensitive signalling in the air interface can be encrypted by air interface encryption but not by end-to-end encryption.



## **Personal safety**

The radio communication solutions from Airbus DS provide personal safety in many ways.

For public safety organisations maximum coverage is a key requirement – coverage is needed even in sparsely populated and remote areas. Base stations from Airbus DS provide excellent and secure coverage, helping eliminate network blind spots.

Analogue communications are easily drowned out. A police officer on a motorbike with its siren on, cannot make himself heard over conventional radio systems. But the Airbus DS radio system eliminates the background noise from the engine and siren, allowing the officer's command and control to clearly hear his voice.

### **Resilience brings personal safety**

The radio communication systems from Airbus DS are highly redundant, tough, and resilient. They will recover from sabotage or failures in transmission or system units, keeping call connections intact and ensuring the safety of users.

For example, if the transmission between the switch and the base station should be cut off, the base station can work on its own. The base station is said to operate in fallback, and it will handle the communications in its coverage area.

If the situation becomes so bad that even the base station covering the area is out of action, for example in a disaster situation, communication is still possible in Direct Mode Operation (DMO). DMO means that radio terminals communicate with each other directly.

# Communication by voice

Police forces need a variety of voice communication methods to efficiently deal with their tasks. The digital radio communication systems from Airbus Defence and Space have been developed to meet the special needs of public safety users.

## Group calls – talking to a group

Group calls, which reach several radio users at once, are based on grouping users into **talk groups**. These groups can include a small local organisation, a larger regional one, or even extend to include users from across the country. A group call is the way to keep all informed.

Users may belong to several talk groups. They can select one to be an active group for their communications and set the others to be scanned for traffic.

To make a normal group call, the user simply presses the push-to-talk (PTT) key on the radio and can be heard instantly by the rest of the group, no matter how large or small. If someone is already talking in the group, pressing the PTT will put the user in a queue.

If the user has a higher priority than the others in the queue, he/she will get the turn to speak first.

## Priorities

Priorities ensure that vital calls get through.

Some users can be given a higher priority, and their calls will have preference if there is a queue. It is even possible to enable the highest priority users to drop a call by low priority users. This is called pre-emption.

Priority scanning can be used to set which talk group has the highest priority. This can ensure that the users do not miss any relevant communications.

## Background group for broadcasting

When it is necessary for a radio to scan a talk group at all times, the group can be defined as a background group. The user can always hear the traffic in the background group.

Background groups work for the benefit of the dispatcher. When the dispatcher wants to broadcast an announcement to all users in the background group the announcement is certain to go through. If the announcement is urgent the dispatcher can even break in to current traffic to get the message through.

Background groups can be defined according to users' organisation or their location. This way, for example, all traffic patrols downtown can be given an urgent message.

## Emergency calls

When an officer is in imminent danger, there is an instant way to call for help. An emergency call is made by pressing the special emergency (red) key on the radio. The system immediately opens communication and guarantees network resources for the call, clearing other calls if necessary.

As a rule, the emergency call goes to the selected group (own colleagues) or to a dispatcher, clearly visible and audible on the dispatcher's workstation screen. The radio terminal in the



emergency situation can be pre-defined to send for a time, so that the receiving end, for example the dispatcher, can hear what is happening around the terminal.

The TETRA system from Airbus DS makes extra sure that emergency calls will get through. To ensure that no emergency call goes unnoticed, emergency calls in the TETRA system from Airbus DS can have **three possible targets**.

For example, a police officer's emergency call could first go to the group currently selected on the radio. This should alert the officer's current partners. If no one responded, the backup might be another group or officer. If there's still no answer then the final recipient could be the 112 emergency response centre, where there would certainly be a response.

## Individual calls give privacy

The police on duty mostly communicate in groups, but when a private one-to-one call is needed, it is also possible to make an individual call.

These regular phone type calls can take place between two users in the radio network, but users can also be allowed to call any number in the fixed or cellular network. Radios from Airbus DS are easy to use like mobile phones.

Access to public networks can be defined separately for each user, making it possible also to completely prohibit access.

## Express call

Express call is the quickest way to give an order or directions to a person. It is a special individual, call, similar to an intercom call where somebody just presses a button and talks. The one making the call just presses the push-to-talk (PTT) key on the radio and starts talking. The speech can be immediately heard at the other end, with no alarms and no waiting. Because this is an individual call nobody else can listen in on it.

## Direct mode communication (DMO)

In places where network coverage is uncertain, such as deep basements, thick-walled buildings, or outside the network's normal coverage area, radio terminals can connect with each other in direct mode.

In direct mode, communication is established directly between the radio terminals, with no connection to the network itself.

## Better dispatching when systems work together

Controlling multiple field units is both demanding and vital. The dispatcher at the command and control centre is at the heart of the action, needing to track and manage many tasks simultaneously.

To help dispatchers focus on getting the right resources to incidents, systems from Airbus Defence and Space can integrate the radio communication and command and control systems into a seamless entity.

Integrating voice and data communications to a Computer Aided Dispatching (CAD) system with advanced applications enables many functions to be automated, leading to faster response times and greater capacity to handle more incidents.

With the Airbus DS solutions, dispatchers can, for example:

- monitor groups
- take part in group communication
- follow on users' status
- send messages to groups and individual users
- modify groups
- grant call rights and define priorities for users
- establish temporary groups for co-operation between different agencies.

### Adapting to changing needs

The Airbus DS solutions also enable dispatchers to tailor talk groups quickly and easily to fit an organisation's changing situation.

For example, when backup patrols from another operational area arrive, new talk groups can be set up over-the-air. This will allow users to talk with members of another group during an incident, using their own terminals in the same way that they are accustomed to. When the visiting patrol leaves, the temporary talk groups can be automatically cleared from their radios.

New talk groups can be set up over-the-air, allowing users to talk with members of another agency during an incident, using their own radio terminals in the same way that they are accustomed to.

Dispatchers can even combine talk groups to allow users to talk to all the members of many groups and all without the users needing to adjust or set up their radios.

These co-operation groups mean that the members can communicate together when needed. This is a very useful feature, for instance at an incident site where police, fire and rescue and ambulance personnel need to communicate temporarily with each other.



## Using data

For organisations used to conventional analogue communications, digital radio offers an amazing new world of possibilities. Data, in particular, offers a whole new set of communication tools that can greatly improve the efficiency of police organisations.

While data communications will never replace voice as the main means of contact, it is a powerful complementary service that helps the police better deal with the demands they face.

Exact, timely information, sent to and from field units, means much more than accurate data. It means a possibility for the organizations to use their available resources where they are needed most, and make the whole service more efficient and effective.

In addition, smartphones and other smart devices are so common today that there have to be ways to include their users also in professional operations. Special solutions from Airbus Defence and Space now make it possible to use smart devices the right way in professional group communications.



### Updating one's status

Units can report their status to the Command and Control centre (and even to other units) with a status message. Status messages such as “at the scene” “en route” and “task completed” are used many times each day.

A variety of different status messages can be sent by pressing one key on the radio, so the dispatcher knows what situation the forces are in.

Dispatchers can send task details to patrols as short data service messages to groups or individuals. In this way voice communicating resources are not affected at all and information about for example a stolen car in the area is readable in the terminals within milliseconds. No notes need to be made about the information because it's documented in the data terminal.

## Database queries

Officers in the field can benefit enormously by fast and advanced access to data. In Airbus DS systems, users can have access to data from wherever they are.

The applications are private as well as publicly available online information are practically limitless. Police officers can look up critical information such as:

- vehicle registrations
- fingerprint and identification information
- background checks
- missing persons' information
- latest wanted persons list.

## Empower officers on the move

Research by the Home Office in the UK, for example, established that uniformed officers spend between 35% and 40% and detectives between 60% and 65 of their time inside police buildings. As a rule, citizens would prefer officers to be more visible on the street.

When the police can access information on the move, and when filling out forms is made easier using intelligent, electronic forms, these figures can be improved substantially.

## No breaching security

The ability to implement its own applications is critical for a security-conscious organization. Police forces cannot allow external persons even to see the confidential information in some of their databases. With currently available middleware applications, police organizations can easily and quickly design and implement new data services.

## Complete location

Knowing the whereabouts of police patrols can add significantly to the security and effectiveness of operations.

Automatic Vehicle Location, AVL is perhaps the most common, and it can be based on a separate GPS device or on a radio.

Using AVL it is possible to follow moving vehicles on a map in the command and control room. Knowing the exact location of available units enables the dispatcher to commit the nearest suitable units to an incident, increasing operational efficiency and cutting emergency response times.

Integrating GPS into radio terminals has made it possible to introduce Automatic Person Location (APL) applications – using location information to put field personnel on the map.

## Location on radio

Finding one's way to a specific location can be easier, thanks to the "Where are you" feature and the Waypointer guide.

Instead of relying on explanations by voice, the 'Where are you' feature in the THR9-series and THR8 radios from Airbus DS provides automatic positioning between radio users during a call.

In the THR880i TETRA radios from Airbus DS, , a police officer can receive a waypoint – or GPS coordinates – as an SDS (Short Data Service) message. The waypoint only needs to be saved on the radio, and the Waypointer arrow will guide the user in the right direction.

## **Java™ for more**

Police organizations can also introduce mobile access to information using the Java platform in the TETRA radios from Airbus DS. Thanks to Java, organisations can introduce applications that have been tailored to their needs.

Java makes it possible also to introduce applications for a fixed time, such as during a major event. Event-specific applications can be distributed to all relevant users over the air and removed from the radios once the event is over.

## **New possibilities with broadband**

Today's professional mobile radio networks can be complemented by broadband networks. This combination is called a hybrid network and in such an environment, smartphone users and other smart device users can also be included in professional group communications.

In short, the talk group members can communicate together whether they use a TETRA radio or a smart device. The smart device users can talk to the group by pressing the PTT key on the smart app; they hear the other members; and all members can also exchange messages in the group.

In addition to connecting talk group members by voice, the following professional communication services can be available for the smart device user:

- Sending and receiving status messages
- Sending and receiving SDS messages
- Making and receiving a direct call
- Making and receiving an emergency call. What's more, the system will intelligently route and re-route the emergency call if the first recipient is unavailable.

## **Examples**

High ranking officers can choose to carry only a smart device and still be able to directly participate in the communications related to an operation.

A doctor on call may occasionally need to communicate in a certain talk group. For this, she only needs the special app in her smart device.

Volunteers in a search for a missing person, for example, can also use their familiar devices and still be able to communicate with the professionals who manage the operation. See this use case on video at <http://youtu.be/Ntz39ml0ZOW>

## Where police forces depend on Airbus DS solutions

Police organizations around the world use radio communication solutions from Airbus Defence and Space.

Germany's BOS digital radio network serves more than 400,000 radio communication users within the police, fire and rescue services. BOS is regarded as one of the world's largest TETRA networks.

Finland's VIRVE public safety network serves around 34,000 users in different organizations and agencies, including the police. VIRVE is one of the largest authority networks in operation today, and it has been in use since 1998.

ASTRID, Belgium's nationwide shared public safety network serves the priority services, including police organizations. This shared network has been safeguarding 10,500,000 citizens since 2000.

RAKEL is the countrywide public safety network in Sweden. Covering the entire 450,000km<sup>2</sup> country, it is the world's geographically largest TETRA radio network.

Chinese authorities relied on radio communications from Airbus DS during the Beijing Games in 2008. The smooth running of the world's biggest ever sporting event involved nearly 90,000 people from the police, event security and other organizations.



**“There are always demonstrations, but secure communications mean that the protestors won't know which routes the police are taking or when they are coming. With old analogue systems, protestors could use a low cost scanner to hear everything the police said.”**

**“Authorities can be sure of the required network capacity with the required priority.”**



## The reliable choice

Secure radio communication is a must for police officers. Field units need to communicate with each other and with their dispatchers wherever their tasks take them, with no fear of eavesdroppers. Police organizations can rely on the professional radio systems from Airbus Defence and Space to deliver security throughout the network, combining encrypted communication with special authentication schemes.

In addition, several organizations can share the use of one TETRA radio communication systems from Airbus DS without compromising their privacy. These systems enable seamless communications – regionally or nationwide. Versatile voice and data services are available in the same system.


The digital radio communication systems and radios from Airbus DS continue to serve police organizations today and in the future.

Choose the fully-featured radio terminals from Airbus DS. They support open standards and are designed particularly to capitalize on the features available in Airbus DS's radio systems.



Find out more about Airbus DS digital radio systems: [http://www.defenceandsecurity-airbusds.com/en\\_US/web/guest/radio-communication](http://www.defenceandsecurity-airbusds.com/en_US/web/guest/radio-communication)

Be in touch: send your question to [marketing@cassidian.com](mailto:marketing@cassidian.com)



Reliable, seamless radio communications enable police forces to coordinate their response. And when control rooms and radio communication systems work closely together, they deliver a full picture of the situation. Airbus Defence and Space has extensive experience of integrating control rooms with radio networks.

Complementing professional mobile radio with broadband networks is now possible. In such a hybrid network, smartphone users and other smart device users can also be included in professional group communications.

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