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COMMUNICATION AND INFORMATION SERVICES FOR NATIONAL SECURITY AND PUBLIC SAFETY

White Paper

Adapted communication services and advanced information services, utilizing public network infrastructure, e.g. 2G or 3G mobile networks, have a great potential to improve the efficiency of National Security and Public Safety operations in everyday work as well as in major crisis situations.

Contents

- 1 Executive summary 3**
- 2 Introduction 4**
- 2.1 An illustrating example 5
- 3 Communication and information services 7**
- 3.1 Architecture 7
- 3.2 Services 9
- 3.3 Infrastructure 15
- 3.4 Terminals 17
- 4 Benefits of the approach 18**
- 5 Application areas and solutions 21**
- 5.1 Emergency dispatch and command centers 21
- 5.2 Agency collaboration support 22
- 6 Conclusions 24**
- 7 Glossary 25**
- 8 References 25**

1 Executive summary

Access to communication and information services is crucial for the actors within the field of National Security and Public Safety (NSPS). High performance, in particular regarding security and robustness, as well as segment specific functions are required.

In this White Paper it is described how secure and robust communications and information solutions, adapted for the NSPS segment, can be obtained using commercial technology and existing infrastructure. Application areas include, for instance, emergency dispatch and command centers, agency communication and collaboration, and coast and border surveillance.

The communication and information solutions follow the principles of a service-oriented architecture. The service concept means that the functions of a communication, information or management system are made available as services that can be accessed by any authorized user, mobile or stationary. Which services to be made available does not have to be predetermined but can be adapted according to the needs in the current situation.

Communication services are based on IMS, IP Multimedia Subsystem. Different types of communication services are available, such as telephony, push-to-talk, video, video conferencing, and instant messaging.

The purpose of the information services is to enable any authorized internal user, or trusted external partner, to access relevant information from a diversity of distributed sources, regardless of where they are located. Information services can provide information about a situation to handle as well as about status, location etc. of the own resources. Operation management services are aimed at the process of turning this information into coordinated activities.

Commercial infrastructure technology and public communication networks, e.g. 2G and 3G mobile networks, constitute the basis for the NSPS infrastructure. Networks for communities such as agencies or other organizations, and private networks can also be utilized. The infrastructure contains services and functionality in the security and network management areas that are used to make the solutions qualified for the NSPS segment.

The communication and information solutions are characterized by being secure and robust, allowing interoperability with external users, integration of existing and new systems, evolutionary growth and situation adaptation.

The proposed approach to communications and information services for National Security and Public Safety facilitates improved operational capabilities and efficiency by providing access to much more advanced and timely information, by supporting efficient management of operations and by enabling cooperation and sharing of resources and information.

2 Introduction

The actors within the field of National Security and Public Safety (NSPS) are engaged in a constant strive to protect the society and its citizens against attacks and dangers of various forms. Access to communication and information services is crucial in order to be successful in this. High performance, in particular regarding security and robustness, as well as segment specific functions are required from these services.

Major investments are made in communication and information solutions for NSPS agencies and authorities. Traditionally these investments are made in turn-key systems addressing a specific need. However, there is a rapid development of information and communications technology for the mass-market. There is also an enormous spread of systems and infrastructure, illustrated by examples such as mobile telephony and the Internet. It is natural to pose the question: How can the National Security and Public Safety segment benefit from this development?

Ericsson introduces the concept of Communication and Information Services for National Security and Public Safety. This is to support actors within the NSPS field in their daily work, as well as in major crisis situations, to predict, eliminate, respond to and recover from attacks and dangers.

Three aspects of the concept are particularly important

- **The technology aspect** – In order to exploit the driving forces generated by commercial and industrial applications, solutions should be based on commercially available and widely used technology and sharing of public infrastructure, e.g. 2G and 3G mobile networks.
- **The vertical aspect** – Solutions must be able to meet the specific requirements that are relevant for each “vertical” NSPS area. Some of the required qualities and features call for improvements and extensions of the commercial solutions and services.
- **The horizontal aspect** – A body of services are developed that may be reused in many different NSPS applications. This facilitates that the two above aspects are combined in a cost-efficient way. It also greatly facilitates collaboration between agencies.

The communication and information solutions are expandable, future-proof, secure and robust, and adapted for the NSPS segment. The solutions have a great potential to improve NSPS operational efficiency. This is achieved by providing efficient communication services and access to much more advanced and timely information, by supporting efficient management of

operations and by enabling inter-agency collaboration and sharing of resources and information.

The solutions described in this White Paper are primarily intended for civil agencies within the NSPS segment, but most parts are relevant also for the armed forces.

Finally, here follows the definitions used for National Security and Public Safety.

National Security (and international security) refers to the protection of the society, its values, and the lives and well being of its citizens, against any form of attack. A state or an association of states provides the protection.

Public Safety refers to the protection of the society and its citizens from all types of harm, danger, injury or damage. The protection is provided by emergency services; the police, fire brigade, rescue, health care, and ambulance and organizations for emergency telephone, consumer protection, animal control, various utility inspectors, and others.

2.1 An illustrating example

A fire starts in a tall building. An alarm from fire detectors is immediately observed at a rescue command center. Using information services, the fire brigade and police department access the location of the fire detectors and combine this information with a map service to have the locations displayed on a map. Locations of the fire engines and the police vehicles are also displayed on the same map.

Fire fighters inside the building on fire are trying to locate people remaining inside. The fire fighter has positioning equipment, a video camera and a sensor to detect living objects and temperature detectors in the helmet. The data from these sensors are linked to personnel in a fire brigade command vehicle in the vicinity of the building. In the vehicle, data is displayed together with drawings of the building, the exact location of personnel in the building as well as other data. The fire fighter gets all relevant information, instructions and guidance by speech via the helmet headset.

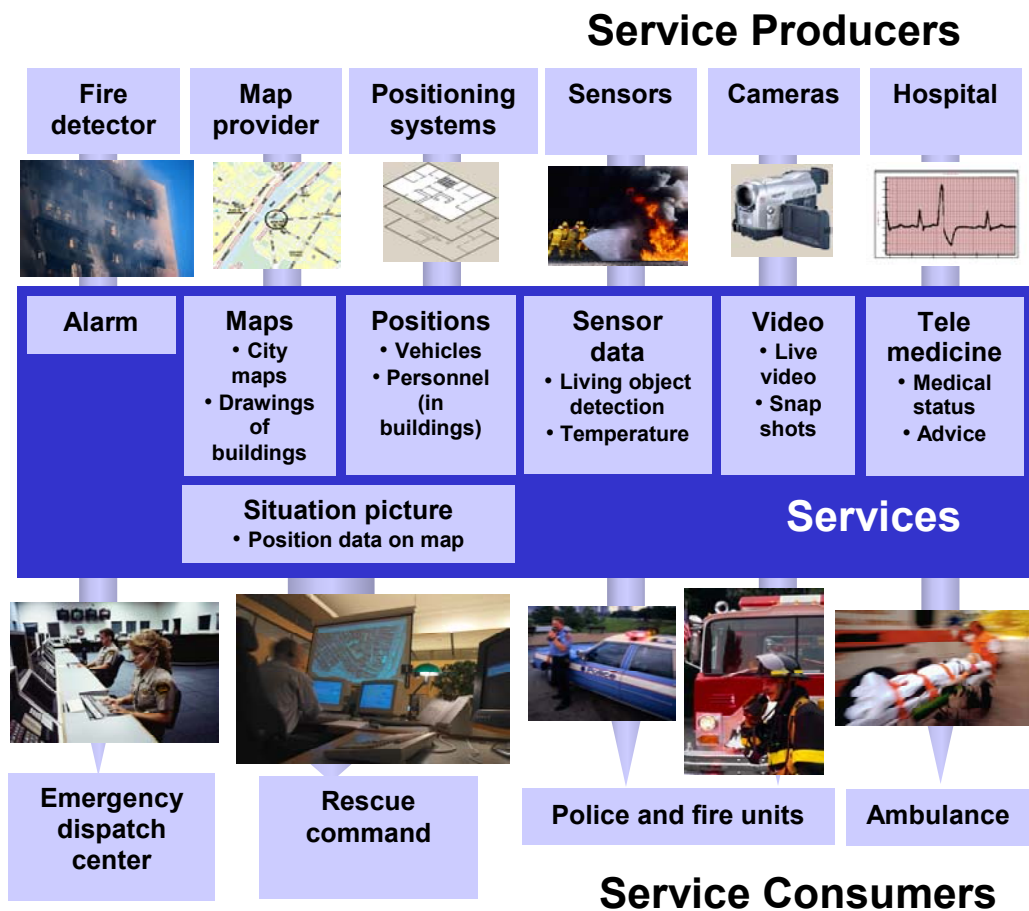


Figure 1. Examples of NSPS services and their producers and consumers. Access to services can be established at the moment the need occurs.

As ambulance personnel takes care of wounded people they use telemedicine services, for example medical advice from a hospital. Hospitals get information about the number of injured people and types of injuries in order to prepare for best possible care at the hospital.

This example illustrates how shared information services provide useful information to different actors, facilitate efficient command and resource use and facilitate cooperation between agencies and organizations. In this way operational capabilities such as fire fighting and rescue of life are made more efficient. Efficiency is improved both in terms of achieved results and in terms of costs for the operation.

3 Communication and information services

3.1 Architecture

NSPS communication and information solutions are based on a Service Oriented Architecture (SOA). The service concept means that the functions of a communication, information or operation management system is made available as services that can be accessed by authorized users, mobile or stationary. The overall architecture is depicted in Figure 2.

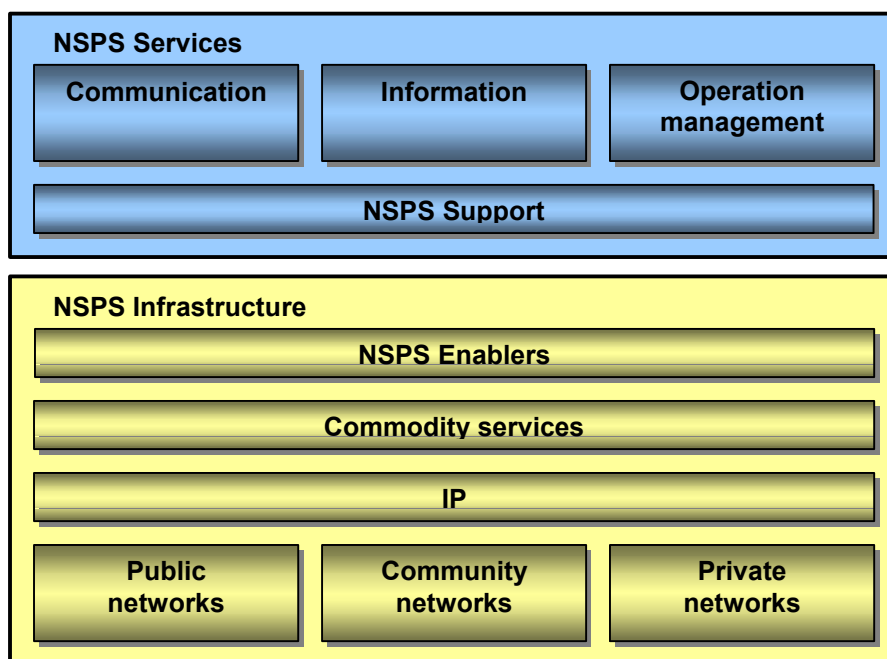


Figure 2. Overall architecture of NSPS communication and information solutions.

NSPS Services includes communication, information and operation management services. This is segment specific services, often with features that are not normally supported by solutions for other segments. The NSPS Support layer contains basic application services that can be used directly or as building blocks in more advanced NSPS services.

NSPS Infrastructure encapsulates commercial infrastructure technology and public communication networks, typically GSM and 3G networks. Community networks operated by agencies or other organizations, as well as various private networks can also be used.

The NSPS Enablers layer contains functionality and support services that are used to give the NSPS services the required characteristics and features. The commodity services layer is providing basic functionality for communication

and information services; these do not have to be re-developed specifically for NSPS applications. The IP layer ensures that connectivity can be accomplished in a unified manner using different types of networks.

Neither the infrastructure nor the technical systems producing services need to be new systems, even though new systems may of course also be included. Services and information residing in existing and new systems are integrated and aggregated. Thereby services and information with a higher value are created.

The communication and information solutions are based on an open architecture using open standards. This allows any compatible or encapsulated legacy systems as well as new systems to be connected. The open standards also allow different system and service developers to be engaged.

Another very important principle is that of situation adaptation. The objective is to use the resources, including human individuals, technical systems and information, that are best suited in a given situation. In the case of resource conflicts, intelligent priorities should be set. To enable this, the services to be accessed by different users, and the combination of technical systems behind the services, do not have to be predetermined but can be adapted according to the needs at each time. The system combinations can be predefined, or can be defined and connected in "run time".

The communication and information "system" is not to be regarded as a single system, but rather a distributed system of systems that is producing application services, utilizing the NSPS infrastructure.

Security, robustness and interoperability are among the most important aspects governing the architectural solutions.

Services and service producing systems as well as terminals and other resources can easily be added or removed, also in real time, without affecting the operation of other services.

The communication and information solutions are completely scalable; services and capabilities can be further developed and the range of services and systems can be extended over time in an evolutionary fashion.

3.2 Services

3.2.1 Communication services

National security and public safety has always been a segment of sophisticated consumers of communications services, especially various voice services. Reliable communication is crucial for NSPS actors. Communication solutions keep the personnel in touch with each other and with the operations management. They can also provide access to data when and where it is needed the most.

Recent technology evolutions open up new avenues for communications. In addition to voice services other types of communication can now be seamlessly integrated into a communication session.

The main vehicle for this is IMS, IP Multimedia Subsystem. IMS is a global standard, first specified by the Third Generation Partnership (3GPP/3GPP2) and now embraced by other international standards bodies. IMS has been defined to enable content and feature rich services and the use of different types of networks.

IMS allows for creation of any type of communication session, including combinations of different media, enabling a wide range of services. Examples of IMS based communication services are (this is in no way a complete list):

- **Telephony** – allowing personnel to call any other person on the planet.
- **Push to talk** – allowing personnel to continue to use a radio style communication pattern.
- **Video** – allowing personnel to film at an incident scene to, for example, document a situation directly into a case file.
- **Video conferencing** – allowing personnel to, for example, have on-line meetings. External participants, such as collaboration partners or various kinds of experts can be invited into the conference, with or without video capabilities.
- **Instant messaging** – allowing for quick and non-intrusive message exchanges.

IMS also enables combinations of services. For example, it is possible to enhance an ongoing voice call by adding images or a video session to that call enabling parallel image/video and voice communication for the duration needed.

All IMS based communication services share a number of qualities.

When a session is to be established an invitation can be addressed towards a single user as well as a group of users. Groups can be “system” wide definitions such as “My Department” or “Fire Station 4”. Groups can also be dynamically created at, for example, the scene of a car-accident. Personnel may then address all people at the scene with a single, for example, push-to-talk message.

If so desired, sessions established may exhibit high levels of security.

In emergency situations prompt session establishment is an important aspect. For this reason latency in the session setup needs to be quick enough. IMS is built around SIP (Session Initiation Protocol). A SIP session setup usually requires the exchange of only a few messages, thus ensuring a quick session establishment time.

When a session is established it must be assured that the perceived quality meets operational needs. This is achieved through various monitoring and queuing functions. Monitoring involves the use of feedback loops in order to regulate the bit stream. Strict priority queuing allows delay-sensitive data such as voice to be sent first, ahead of packets in other queues, giving delay-sensitive data preferential treatment over other traffic.

Furthermore, due to the distributed IMS architecture there is no single point of failure. If a piece of equipment is damaged, others continue to operate and joint communications are not interrupted.

IMS erases borders between disparate communications systems. IMS creates a layer of access independent middleware. Personnel can communicate across multiple agencies even if separate types of networks are used. In other words, the reach of IMS based communication services knows no borders.

Thus, IMS supports the creation of any real-time conversational style session. Non-real time sessions, such as information browsing, register lookups, incident reports and so forth, are also supported. These types of tasks represent the normal day-to-day operations of all personnel. Introducing optimized solutions for these tasks will make operations easier on the field as well as in the office.

IMS puts no restrictions on the user interfaces. This is, perhaps, one of the more important facets of IMS. Terminals may be created that preserves a well-known user interface, or new and enhanced user interfaces can be created to support personnel in different types situations. The latter is an important aspect; a generic system and user interface may be too complex and difficult to use, jeopardizing the ability to do a job. To find the most efficient solutions, it is important that users are part of the development already at an early stage, and can test user interfaces before they are launched.

For more detailed information on IMS see reference list.

3.2.2 Information services

Information is always critical for the success of a mission. To be useful, information must be timely and presented in a way that does not interfere with other activities. Most importantly, it must be possible to select the most relevant information, so that it does not represent mere information, but can be refined into useful knowledge and understanding.

Often there is very specific information that is critical in a certain situation, e.g. the location or content of a specific object, the properties of a substance or identity of a person.

Another important type of information is that giving a general knowledge and understanding about the current mission, its intent, activities and conditions, often referred to as situational awareness. This can promote self-synchronization and effective collaboration.

Information supply and management is headed straight towards the heart of operational strategy and effectiveness. There are also strong implications regarding coordination between agencies and organizations:

- Realizing that information is the tool with which you run your business and collaborate with partners, it becomes clear that building a new vertical solution for each need is inefficient and adds unnecessary complexity.
- Fulfilling information needs of internal actors as well as external partners can be simplified by adopting a common information management strategy.

Technology to produce, process, store, and transport information has developed enormously during the last decades. Advanced information, possibly originating from several distributed sources, can be processed and distributed to users, regardless if they are at a fixed locations or mobile.

It has also become feasible, and affordable, to make almost any type of information commonly accessible instead of exclusively fed to a specific consumer for a specific purpose.

These ways of using information can be effectively implemented by making information available as services that can be accessed from mobile or stationary terminals. The purpose of the information services is to enable any authorized internal user, or trusted external partner, to access relevant information from a diversity of sources, regardless of where they are located.

The governing principle for the information services is that as much information as possible should be made accessible for many different purposes, and, when it is found to be favorable, be used also for purposes and in contexts that were not anticipated from the beginning.

Since the information is available as services, it is technically possible to allow any user to access the information, but the information services also contain functionality for the information owner to control which individuals, organizations, roles or technical systems that are allowed to access the information; the information is strongly protected against any other use.

Situation adaptation is used to select information producing sources and combine their output into information services that as much as possible fulfills the needs of the users in any particular situation.

Examples of information services are:

- **Situation pictures** – showing e.g. locations and properties of personnel, vehicles or other objects on a map or drawing of a building.
- **Sensor information** – from cameras, chemical or biological sensors, radars etc.
- **Information from databases**
- **Maps and drawings of buildings**
- **Weather information**

3.2.3 Operation management services

As described above, information services can provide information about a situation to handle as well as about status, location etc. of the own resources. Operation management services are aimed at the process of turning this information into coordinated activities.

The operation management services employ the service and situation adaptation concepts in the same manner as the information services.

Management in different stages is supported; analysis, operations planning, operations control, training and debriefing.

The management of everyday situations and major crisis situations is usually based on the same operational principles. This means that well known methods, processes and tools also can be used in more rare and extreme scenarios. There should be support for highly optimized operations under regular and anticipated conditions and support for more delegated decision-making and self-coordination in case of unpredicted or larger crisis situations. In the latter case, a common awareness of the overall situation is the basis for coordination and efficiency.

Functional areas that create these capabilities include:

- **Collaboration support** – facilitates dialogue and chains of interaction in the process of making decisions and performing activities, physically distributed and independent of locations.
- **Planning support** – helps to understand, design and describe assignments. Can for instance include a routing service, that, through usage of various information, calculates the most efficient route to an incident scene.
- **Decision support** – buys time for decision makers by providing suggestions and input to possible ways of action, and assessments of the likely outcome of different alternatives.
- **Command support** – enables definition and distribution of assignments and dissemination of directives, information and tools.
- **Resource planning** – these services allow efficient management of various resources such as people, vehicles, locations and so forth.
- **Business Process Management (BPM)** – measures and monitors the efficiency of operational activities.
- **Alarm** – automatic and manual alerting of relevant response authorities.
- **Public warnings** – and other types of interaction with the public.

Decision makers as well as those who are assigned to accomplish the work use the above services. Both categories should be equipped with terminals appropriate for collaboration, receiving information and other use of advanced services.

3.2.4 NSPS Support services

NSPS Support contains basic services that are useful in many different NSPS applications, either directly or as building blocks for aggregated services. The NSPS Support layer forms a catalyst surface, providing an environment that allows application services to be developed and operate efficiently together.

In order to facilitate horizontal integration and interoperability, the NSPS Support layer provides common basic services for many different types of applications and users.

Furthermore, interoperability requires the establishment and maintenance of common agreements with respect to standards, definitions and methods. For example in the following areas:

- **Information schemas and models** – e.g. establishing rules on how information is described and in what way different information relates to other information.
- **Information management** – e.g. establishing rules on who has the right to create, read, update and delete information.
- **Business process modeling** – e.g. establishing rules on how information is used in various contexts and processes.

The basic services include:

- **Basic communication and information services** – allowing for each agency to use their own identities and addressing plan, including personal identities within groups.
- **Instant messaging** – supporting many forms of media including text, picture, voice and video.
- **Messaging** – deferred messaging services including e-mail, voice mail, telefax, SMS and MMS.
- **Positioning** – information pertaining to an objects location, be it a person, vehicle, or building.
- **Register lookup** – allowing for easy cross-reference lookups to immediately verify personal ID number, vehicle registration number, crime records etc.
- **Information mining** – gives the ability to constantly sift through a continuous flow of information received from different kinds sources, for instance sensors such as cameras, infrared devices, radars as well as news reports, weather reports, events calendars and so forth. Based on agency defined algorithms certain threats may then be discovered that call for various actions.
- **Network resource management** – allows to efficiently managing various network resources taking priority considerations into account.
- **Geographical information** – support for handling any type of geographical information, be it traditional maps, weather maps, sea charts or building drawings.
- **Transport routing service support** – building blocks for transport routing services, i.e. finding the most efficient transport route.
- **Resource management support** – building blocks for resource management services.

- **Metering services** – allows for metering of all services rendered. This information may in its turn be used for billing and settlements between various agencies.

3.3 Infrastructure

3.3.1 NSPS Enablers

The purpose of the NSPS Enablers layer is to provide services and functions that can be used to give the NSPS communication and information services the required characteristics and basic features regarding

- Service configuration
- Situation adaptation
- Security mechanisms
- Service and infrastructure management

The layers below the NSPS Enablers in the infrastructure contain technology and solutions that are not specific for the NSPS area. The NSPS Enablers layer essentially contains services and functionality that are used to make the communication and information services qualified for the NSPS segment.

Situation adaptation and service configuration involve functionality for the user to define which services should be running and accessible and to establish connectivity between the system elements involved in producing the services. Implementation of this functionality is to a large extent based on commercially available middleware.

Supporting services and functionality required for the employed security mechanisms are found in the NSPS Enablers layer and are used by the NSPS Services.

Different organizations using common or interoperable communication and information services may very well have different overall security policies. The communication and information solutions must therefore be capable of handling several parallel overall security solutions simultaneously.

The technical security solutions are only parts of the overall security solutions that are implementing the security policies. The technical solutions must be coordinated with the parts related to methods, organization, and competence.

In particular, technical solutions are apt to fulfill security objectives such as identification and authentication, authorization and access control, protection

against intrusion and attacks (including detection), maintaining confidentiality, integrity and privacy of information, non-repudiation (signing) and auditing.

The security solutions are based on concepts such as classifying information, maintaining different “isolated” security zones and defining user roles with respect to access and authority.

The technical components for implementing the security solutions include encryption, firewalls, digital signatures and certificates, user smartcards, logging and of course also physical mechanisms such as restriction of admittance.

Service and infrastructure management involves network management, security management and service monitoring and orchestration.

3.3.2 Commodity services

NSPS services and applications will make use of well-known and established infrastructure services. There is no reason to redo these services in the NSPS context.

The communications industry delivers many communications services that can be regarded as commodity services since they are ubiquitous. Consider for instance the following abilities:

- Establish a voice connection
- Send instant messages
- Send e-mail
- Browse various information

There are also numerous IT back-end services that fuels the above and many other services:

- **Directories of user profiles** – creating the foundation for role-based security.
- **Databases** – allowing storage of any type of information in a searchable way.
- **Web servers** – allowing any machine to retrieve any information.
- **Search engines** – create index of available information.

Even though we refer to these services as commodity services we see them evolving constantly. It is now, for example, possible and quite normal to add video as a component to a traditional voice connection.

3.3.3 IP layer

Connectivity for all NSPS services and applications is based on IP (v4 and v6). Making this call is easy based on a number of observations:

- IP was designed to deal with problems where some of the infrastructure is not there.
- The evolution of various access technologies continues. This yields, among many things, higher bandwidth and more robustness.

As result, the long establish vision on that everything will be delivered using a packet-based method is now coming into reality.

It should be noted that it was 30 years ago when ARPANET was commissioned by the US Defense Department for research into networking; it worked then and it works now. In fact, it works even better now. And we foresee a continued evolution that will yield an even better experience.

3.4 Terminals

Common mass-market terminals such as a standard cell phones, PC or PDA can be used as is. There is a constant flow of new and sophisticated terminals on the market. Alternatively, terminals specially designed for an agency or the NSPS segment can be used. Properties such as very high robustness or additional features such as direct mode functionality (communication directly between terminals without using base stations) can be integrated in specially designed terminals. In addition, security features exhibited by terminals are other important aspects of terminal capabilities.

Terminals are, perhaps, one of the more important parts. The reason being that this is where the users experience and interact with services and information. It is essential that different user groups are equipped with terminals appropriate for the use of relevant services.

4 Benefits of the approach

The proposed approach to communication and information services for National Security and Public Safety has several distinct benefits:

- Facilitates improved operational capabilities and efficiency
- Security and robustness
- Interoperability with external users
- Integration of existing systems
- Cost efficiency
- Evolutionary growth
- Situation adaptation
- Everything is anywhere for the use of anyone with the right authority

The improvement of operational efficiency and capabilities is mainly related to:

- **Information** – Advanced information services combined with high-performance communication enables improved information acquisition, processing and distribution, also to mobile units. This leads to better situation awareness and access to key information (of sufficient quality) for different types of actions. The critical piece of information required for an action often exists somewhere – it is all about finding it and getting it where it is needed.
- **Collaboration** – Inter-agency compatible communication and a system for common services and information sharing open up a multitude of new opportunities for collaboration both within and between agencies.
- **Management** – In addition to improved information and collaboration, improved support for decision making and operation management is giving more effective NSPS operations.

Security and robustness is achieved by employing adapted security and robustness functions based on existing commercial public communication and IS/IT technology and solutions.

Interoperability is based on the service concept. External systems are connected using bridges enabling their functions to be exhibited according to the service concept and enabling service access. Interoperability is further facilitated through a tactical selection of open and established technologies.

These selections are agnostic to various products and platforms, ensuring long-lived solutions.

Cost efficiency results from:

- Existing information systems and infrastructure are integrated; this creates additional value without the cost for acquisition of new systems.
- Full advantage of the technological development generated by the commercial driving force of mass markets.
- The fact that resources can be allocated and combined with a large degree of freedom facilitates an optimized use of existing resources; with less need to duplicate similar resources.
- The enhanced potential for inter-agency collaboration admits cost saving through sharing of systems, functions and capabilities between agencies.
- The ability to be situation adaptive that allows for great flexibility in both day-to-day operations as well as in various crisis situations.

The NSPS communication and information services allow agencies to operate in a horizontal way. Horizontal integration is a key factor in allowing an organization to reduce its operational costs. Horizontal integration involves people, information, and processes across organizational as well as technological borders.

The communications and information services can be adapted to the needs of different situations. This flexibility is crucial for achieving agencies that can effectively handle both everyday situation and major crisis situations.

Flexibility is achieved on all time scales, from long-term system development to momentary adaptation to an unexpected situation. Long-term flexibility is achieved by the modular architecture, admitting successive addition of new types of existing or new systems and services without changing the existing system.

Medium-term flexibility is achieved by the situation adaptation concept in that new or improved services can be obtained by combining systems and services in new ways, or by successive addition or replacement of systems. This is done as a “run time feature” which makes it very cost efficient since only a small technical development effort is required. To a large extent, agency staff can accomplish this kind of development without involving external technical specialists.

Short-term flexibility, e.g. when an agency is faced with an upcoming situation, is again achieved by the situation adaptation concept by the possibility to adapt services to the needs of the specific operation. The systems behind the

services can be allocated in a way that gives adequate performance and enables efficient cooperation between the different actors that are involved in the specific operation.

The same mechanisms can be used in real-time to adapt to the situation during an operation, to the extent that it is possible and practical from an operational point of view.

5 Application areas and solutions

The communication and information solutions can be applied to a number of different areas, e.g.

- Emergency dispatch and command centers
- Agency collaboration support
- Agency communications
- Coast and border security
- Critical infrastructure protection

Two of the above areas are discussed below.

5.1 Emergency dispatch and command centers

Ericsson's emergency dispatch and command center solution integrates system solutions for telephone and data communications for customers where 24-hour accessibility and reliability are absolutely essential. The solution handles national, regional and district levels and distributes traffic according to pre-configured patterns that can easily be reconfigured depending on national, regional or district requirements.

The emergency dispatch and command center solution enables specialists over a wide area to collaborate, communicate and share information. Alerts and actions can be directed to and shared by specialists in different locations. Interoperability with any kind of communication system is possible.

Today, this solution is usually implemented in national systems. Operators in different regions can cooperate, all having access to all local data of the caller.

The solution includes functions supporting operator work, information management and connectivity:

Operator work-station functions involve

- Call-taking, including intelligent call queue
- Situation pictures with object information presented as text and images
- Maps
- Dispatch

- Time-controlled responses
- Status and position of available resources
- Control of traffic signals and gates
- Planned decision support based on simulated scenarios

Information sharing functions involve

- Integration of information
- Automatic call distribution
- Classification
- Logging
- Statistics

Connectivity functions involve

- Integrated voice and data services
- Integrated wireless and fixed access networks
- Support for land radio systems
- Interworking with Wi-Fi

5.2 Agency collaboration support

The solutions for agency collaboration support allow NSPS agencies to collaborate more effectively, leading to improved operational efficiency.

The solution involves a model for collaboration, referred to as the NSPS grid. This is illustrated in Figure 3. Every agency that is connected to the grid runs and operates a specific set of agency-specific services that fulfills all agency-specific requirements and yields all the functionality of an agency-specific solution.

In addition to this, authorized agencies have access to common services and can access information from other agencies. The external information can be integrated into the agency-specific services. Thus, common services and information sharing gives agencies access to more information and information of higher quality.

The information owner always controls the sharing of information and use of common services.

Technically, common services and information sharing functions are organized as services according to the same principles as any other service described in this White Paper.

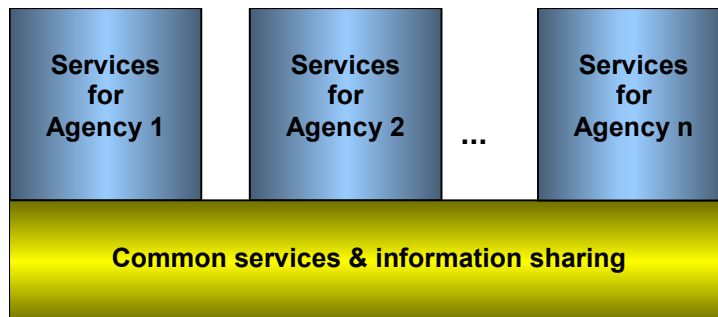


Figure 3. The NSPS grid – a model for agency collaboration support

The NSPS grid introduces a horizontal component into the NSPS segment as illustrated in Figure 3. The grid acts as a catalyst that allows agencies to collaborate and share information and services in a more efficient way.

Shared situation information provides the foundation for shared situation awareness which means that a common understanding within and across the authorities and agencies is established. This enables efficient cooperation, self-synchronization, faster decision cycles and improved decisions. Among other things, shared situation awareness enables a flexible and efficient usage of available assets.

As an example, collaboration and information sharing with respect to the situation in a sea area may be very beneficial to different agencies such as coast guard, the marine within the armed forces, the customs authority, police, rescue agencies, port authorities etc.

Common information services may include information from a number of sources that may already exist within some of the agencies. These include the location and movement of commercial ships, fishing vessels, and unidentified objects, properties such as content of cargo, number of passengers etc. of known objects, strength and direction of wind, speed and direction of current.

In this way the agencies get an instant unified situation picture for a desired region. Given this versatile and detailed knowledge about the situation, all concerned agencies can act and utilize their resources much more efficiently.

For instance, the solution allows a port authority to submit notifications with accurate time of arrivals to the customs authority.

6 Conclusions

In this White Paper a number of solutions are presented regarding communication and information services that enable increased operational efficiency of agencies and authorities within the National Security and Public Safety segment.

The communication and information services are characterized by being secure and robust, admitting integration of existing and new systems, and supporting evolutionary growth and situation adaptation.

Operational efficiency is improved by providing efficient communication services and access to much more advanced and timely information, by supporting efficient management of operations and by enabling inter-agency collaboration and sharing of resources and information.

Everything of this is available anywhere for the use of anyone with the right authority.

Adapted solutions, adhering to the specific needs of each agency or authority are based on number of supporting services providing basic functionality for National Security and Public Safety applications. These can be used directly or be used as building blocks for more sophisticated services.

The use of a common base of supporting services promotes horizontal integration both within and between agencies and significantly lowers the barriers for collaboration. This is also a key factor for achieving cost efficiency.

Cost efficiency is one of the most important benefits of the proposed approach. In addition to improved operational efficiency and horizontal integration, this is achieved in a number of ways; the use of existing communication infrastructure (e.g. 2G and 3G mobile networks) and commercial IS/IT technology and solutions, efficient integration of existing networks and systems, the support for optimized and flexible use of resources, and inter-agency sharing of information and resources.

By introducing the proposed solutions, a journey is commenced where operational efficiency is successively enhanced, and the capabilities to handle everyday as well as extraordinary situations are improved. Technical solutions are successively evolved creating new opportunities and supporting an evolution of the ways that operations are carried out. In this way the National Security and Public Safety segment is given the same, or better, opportunities as other segments to develop its business.

7 Glossary

NSPS: National Security and Public Safety

Horizontal: Refers to the entire NSPS marketplace that crosses agency boundaries. Horizontal services are applicable for all the verticals in the NSPS marketplace in order to, for example increase productivity.

IMS: Internet Protocol Multimedia Subsystem

Service: Functionality produced by a system or system of systems, which is made available to consumers according to a service description. The service description specifies the achieved functionality without referring to any specific implementation or any properties of producing systems.

SOA: Service Oriented Architecture

Vertical: Refers to a particular agency such as police, fire brigade or rescue. Vertical services are unique to a particular task an agency is to perform.

Wi-Fi: Wireless-Fidelity, a logo from the Wi-Fi Alliance that certifies that Ethernet devices comply with the IEEE 802.11 wireless standard.

Grid: A grid is a type of parallel and distributed system that enables the sharing, selection, and aggregation of geographically distributed “autonomous” resources dynamically at runtime depending on their availability, capability, performance, cost, and users' quality-of-service requirements.

8 References

- IMS – IP Multimedia Subsystem. Ericsson White Paper.
http://www.ericsson.com/products/white_papers.shtml