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Date
2003-07-09

Dynalab's Demonstration of Network-Based Defense

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Corporate information

Dynalab AB is a systems development company specialised in GIS and positioning. We develop platform-independent systems for positioning, monitoring and managing objects in the world around us.

Our competence covers geographical information systems (GIS), workflow and content management. All the consultants at Dynalab have a university education and several years of experience of technically advanced projects within the IT business.

Our clientele consists mainly of major enterprises and Government authorities. A very important client since a number of years is the Swedish Armed Forces (SwAF), with whom we co-operate in developing an information system for strategic military intelligence, planning and decision. A central part of this system is the management of geographical information, for which we have developed a support service for following up objects related to a geographical reference point.

Dynalab has its own and complete platform of UML-based services and products that cut down development time considerably. By following clearly defined requirements and measurement variables we can deliver a cost-effective product that will streamline the customer's business operation.

NBD Background

In the future, the Swedish Armed Forces must be able to quickly respond to different types of threats and risks. The Swedish Parliament has therefore decided that the Armed Forces are to be developed according to the concept of Network-Based Defense.

The idea of Network-Based Defense entails a new way of working for the Armed Forces. With greater flexibility than before it will be possible to link together different military functions, such as decision-making, information systems and weapon systems, in a single networked organisation.

This Network-Based Defense will provide the basis for an improved understanding of various situations, thus enabling faster decision-making and greater flexibility in combining units and resources to suit whatever task is at hand. Consequently, the Armed Forces will be able to utilise its resources much more effectively than before, putting them to work in the right place at the right time.

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The development of a Network-Based Defense organisation is important, and will continue for a long time. To make the best possible use of future technologies and knowledge - both at home and abroad - the Armed Forces will work together with other Government authorities, civilian contractors and researchers. There is considerable interest abroad in how Sweden is developing its armed forces. Technological systems are only one part of an improved defense. The network concept places special demands on the Armed Forces to change the methods of command and control, warfare, and development. However, it also calls for a review of the command structure and the proficiencies that future soldiers and the Armed Forces staff will need.

Demo description

Dynalab AB wants to show the possibilities with modern technology and COTS and how the common operational picture can be presented in the future. DynNBF demonstrates a realisation of NBD functions in the field.

Scenario

The demo is based on the following scenario:

The world has fallen into a continued recession. Oil prices are skyrocketing. There has been an increased foreign activity in Sweden's neighboring countries, and also numerous violations of the Swedish borders. Sweden is performing a large military exercise on Gotland, where they are testing a number of new weapons systems. This has drawn the attention of several countries, and they are performing intelligence operations through active and passive sensors as well as agents. Our command is responsible for the security in the area near Visby. The use of force is authorised.

Features

The application supports the following functions:

- Positioning of own troops and resources
- Positioning of enemies and other objects
- Common Operational Picture (COP) among the users
- Messaging and orders
- History and logging of messages and orders
- Geographic visualisation of alarms
- Simple, easy-to-use and effective user interface
- Field clients can be installed on rugged, portable computers
- Basic security and encrypted communication

The Application

A setup consists of one command client and one or more field clients. The field client has a connection to the telecommunication system and a GPS-receiver. The user has access to detailed and filtered information relevant to his context, such as position, range and task.

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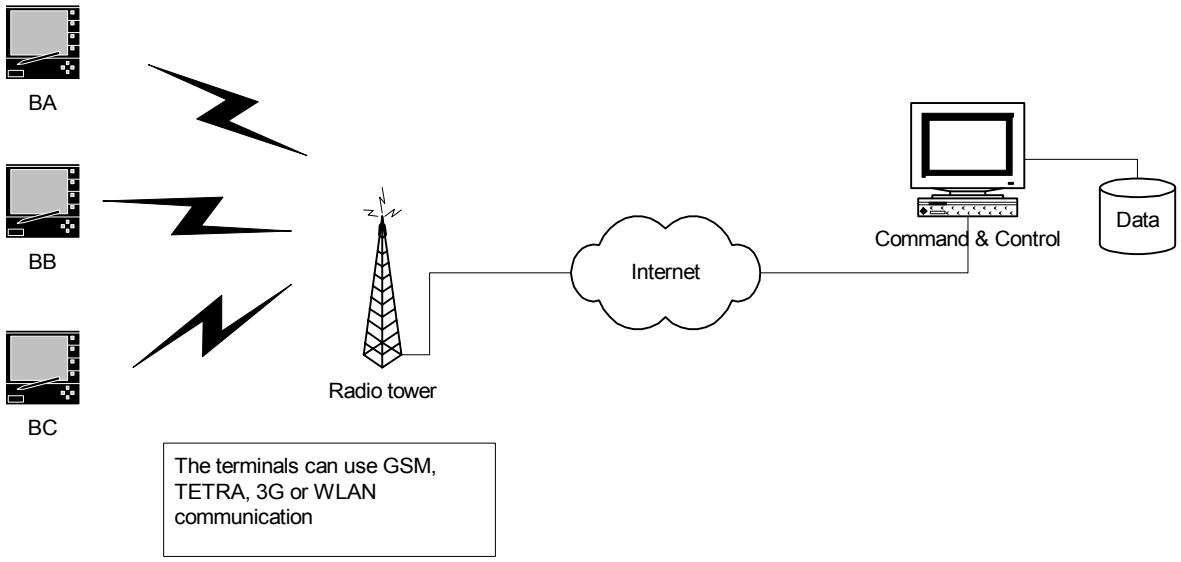

The command client is installed on a regular PC and is used for command and control. The user has a complete overview and access to detailed information about all other users and objects.

Common Operational Picture

All clients can see the positions of the other users and also the positions of detected objects. Users can also add information to the map or the Common Operational Picture (COP). Other information such as surveillance ranges, weapons ranges and weather, can also be added to the picture. Messages can be sent to one user or broadcasted to all users.

Extensions

The application is component-based and can be extended with new functions such as:

- Navigation and route planning
- Off-line operation
- Communication optimising for low bandwidth solutions
- Tracking

See civilian example below.

The workflow

The command client gets an alarm from a sensor, and a new object is displayed in the COP. The data from the sensor is available by clicking on the object. The commander can then dispatch some of his available units to find out more about the object. Note that this can be personnel as well as other sensors. The new information is added to the COP and is immediately available to the other users.

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Civilian application – Vattenfall AB

The purpose of this project was to provide the Swedish energy company Vattenfall with knowledge and experience regarding data applications on a TETRA mobile radio system. The application made it possible to get field access to digital maps, presentation of position/location, and to use various types of digital forms. The project goal was to demonstrate an application for mobile access to digital maps, positioning and digital forms that utilise TETRA as a communication channel.

Scenario

The main purpose of the application is to support field technicians.

The technician, Lars, connects his PDA to his PC as he glances through today's headlines on the intranet. The team that Lars is part of consists of a total of 20 service engineers. Their main task is to carry out condition control and to take measures against upcoming errors in one of Vattenfall's electricity networks. Since a couple of years, the Vattenfall group uses the mobile radio system TETRA as a common communication platform.

In the PDA Lars has access to detailed information about the network area, such as maps and documentation, as well as gauge data from power installations. A list of activities, which is continuously updated, gives him information about what tasks there are to be done and their priority. The list of activities makes it possible to stay updated about your colleagues' work, which means that everyone in the team all the time knows what is going on. Through a GPS receiver Lars gets information about his own and his fellow-workers' positions. Personnel at the office can also register the position, which is a safety factor when working alone.

Lars goes through the routine for downloading data from the company's central GIS server to the PDA. The reason for downloading a large part of the information locally is the limited bandwidth of the TETRA network. In addition, it is possible to work locally if something should happen with the communication link.

On his way out to the service car, Lars connects the PDA to the TETRA terminal and gets a dialogue box that confirms that he is online. He turns on the positioning function and sees the little twinkling car icon numbered 20, which shows his position. On the PDA display there is also a number of other car icons to be seen, indicating that his colleges are already out in the field. Before driving out from the parking lot, Lars makes a run-through of the current list of activities. It does not show any critical commissions, which means this morning should be spent making a delivery control.

Having reached their destination, Lars opens the PDA and clicks on delivery control. He chooses the current delivery by clicking the icon on the map. Then he goes through the container and quickly states that everything seems to be in order. The delivery can thus be approved without any remarks, and after a couple of clicks on the display this can be sent as a message to the office and the other members of the team.

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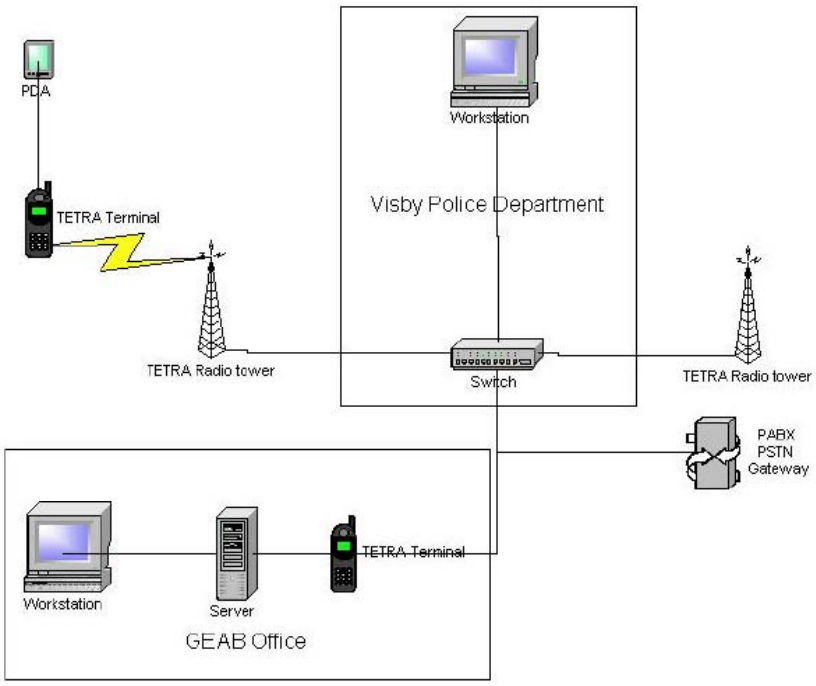
Architecture



Application features

The features are similar to those in the military demo:

- Positioning of own resources
- Geographic visualisation of alarms
- Shared picture among the users (COP)
- Messaging and task assignment
- History and logging of messages and orders
- Streamlined GUI
- Rugged field clients
- Encrypted data and communication

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Technical Information

Both the military demo and the Vattenfall application were developed using Windows 2000, Visual Studio 6.0, ESRI MapObjects 2.1 and GeoPres 2.1 (MapObjects extension).
The field clients store geographic data as ESRI shape files. The command client uses shape files and SDE data.

Summary

Dynalab has shown how COTS software can be used to quickly build efficient and easily adjustable applications based on the ideas of the Network-Based Defense. The principles can be applied to military as well as civilian applications.