

TITAAN State-of-the-Art Networking for Military Mobile Environments

Royal Netherlands Army



What is TITAAN?

TITAAN—Theatre Independent Tactical Army and Air Force Network—is a Communications and Information Systems (CIS) infrastructure, designed for the mobile military environment. Based on ruggedized vehicles and boxes, TITAAN delivers services for both data and telephony.

TITAAN was developed for the Dutch Army and Air Force according to the following primary considerations:

- It had to be developed as a product, not as a project. This means that the requirements phase was much shorter than a 'normal' military project.
- It should be possible to incorporate modifications easily.
- In order to make use of state-of-the-art technology, the infrastructure should be based on Commercial-off-the-Shelf (COTS) hardware based on open standards
- The number of supporting staff required to install and operate this infrastructure in the field should be kept as low as possible
- All equipment should be easily transportable: i.e. the amount of equipment should be reduced as much as possible

The smallest entity in the TITAAN model is a Command Post. In a Command Post a self-supporting infrastructure is implemented using a local area network (LAN) based on 100Mbps Ethernet. The servers and clients are connected to the LAN. The network is fully functional without any external connection. Each Command Post is equipped with a management server running a management application. Command Posts are connected with one another using wide area links, e.g. satellite or radio relay.

It should be no surprise that the network (following the principle of using open standards) is based on Internet Protocol (IP) standard. Almost all modern networks are based on this industry standard. Using IP opens up the range of COTS equipment that becomes available for use.

The network itself has been designed in such a way that configuration of equipment in the field or during the preparation phase of an operation is kept to a bare minimum. All network equipment is configured to be 'plug-and-play', so almost no first-line network knowledge is required in the field. When a network connection becomes unavailable, the network itself reconfigures automatically to make use of alternative paths.

TITAAN delivers a set of basic data services:

- File sharing
- Printing
- E-Mail
- Web-based services
- Data replication
- Data availability services

These services are implemented using Intel-based servers running Windows 2000. Servers are located in so-called Server Containers, vehicles that contain all the server equipment. For reasons of reliability, two Server Containers can be configured in an active-standby configuration. If equipment within an active Server Container becomes unavailable, the standby Server Container can take over.

In addition to these basic services, applications including video conferencing, a portal service and the Dutch C2 system, ISIS, have been tested on TITAAN.

TITAAN is an integrated network for all services. Voice communication is implemented with the TITAAN Converged Telephony Service (TCTS), using Voice-over-IP (VoIP), which transports voice telephony over the IP network.

One of the advantages of using one integrated network is that only a single set of cables has to be used instead of a separate infrastructure for voice, data and videoconferencing. Call processing is implemented on a dedicated server, also running on Windows 2000. To be able to guarantee that voice calls are transported with acceptable quality over the IP network, Quality-of-Service (QoS) using priority classes for different types of traffic is implemented.

Management is implemented in a distributed design. Each Command Post has its own management server running a state-of-the-art management application, which dynamically adjusts its map of the network when a change occurs. This management server is able to upload condensed management information regarding its own Command Post to a central management server. The central server is responsible for all WAN connections and provides the information for the second line support staff.

The TITAAN infrastructure was designed to meet military security standards. That was also necessary to acquire the status of NATO High Readiness Forces Headquarters for 1(GE/NL)Corps in Münster, Germany, which uses the TITAAN infrastructure. The TITAAN infrastructure is being used in the HRF(GE/NL) HQ in the International Security Assistance Force operation ISAF in Afghanistan.

Advantages of using TITAAN

In contrast to traditional ICT infrastructures supporting mobile operations, TITAAN uses a single cabling infrastructure for data, telephony and videoconferencing. This capability has the following advantages:

- Fewer components to transport
- Faster implementation
- Fewer people needed to roll-out and manage
- Lower costs



Even more important is the reduction of operating costs: the support staff for voice and IT can be significantly reduced due to the fact that only one system has to be managed (instead of one voice and one data network), the plug-and-play character of the network, the advanced management application and the intuitive working of call-processing management.

In addition, the costs for acquiring a TITAAN infrastructure are relatively low: due to usage of COTS hardware, the high costs for fully specialized products are avoided. Furthermore, design costs are shared with other projects that can implement their services using a TITAAN infrastructure. This was ensured by developing TITAAN under the RNLA C3I architecture.

In addition to all these cost advantages, the TITAAN system delivers a futureproof, state-of-the-art multi-service network that is available today. The use of open standards also ensure that the network is adaptable to meet future needs and developments as well.

Elements in TITAAN

Although the most important parts of TITAAN from a user point of view are the applications and basic services, all the elements of the TITAAN infrastructure are required to be able to offer these services. These basic elements, so called Realisation Building Blocks or RBBs, have been kept to a very few:

- LAN Backbone Box; part of the LAN backbone within a Command Post. In addition to backbone interconnect ports, this box has access ports for connection to LAN Access Boxes and vehicle switches.
- LAN Access Box; has RJ45 access ports for connecting workstations and IP telephones. The box provides inline power for use with the IP telephones
- Routing Box; provides WAN connectivity to the Command Post's Wide Area backbone. Through this box, serial connections, ISDN- and radio relay links can be used to link Command Posts.
- Server Container; part of a Command Post's LAN backbone; contains the TITAAN servers:
 - TITAAN Server, delivering file management, printing, portal server and e-mail services
 - Management and Administration Server, running the Enterprise management applications
 - Call Manager, providing voice call processing functionality within the Command Post and to other Command Posts and gateways

Besides these servers, it also contains a gateway for connecting the VoIP network to a traditional POTS or ISDN network.

- SatCom Adapter Shelter; vehicle needed to link Command Posts through the satellite network. Part of the Command Post's LAN backbone.

Realisation Building Blocks are interconnected by using the 'Plug-and-Play' principle: without any reconfiguration, every RBB can be connected to every other following only a few rules. In this way, a network infrastructure can be easily built without deep networking knowledge. Telephones and workstations are connected to LAN Access Boxes or L2-switches inside staff vehicles, receiving their IP address from the network. Again, no difficult configuration is needed: just connect and the device is ready for use.

Evolutionary Approach

- First phase designed for HRF(GE/NL) HQ
 - Now operational
 - Only 18 months from start (architecture/design) to operation
- Second phase for Dutch Air Mobile Brigade
 - Has to be operational in the middle of 2004
 - Will be based on Phase I
 - Redesign of Active Directory
 - Smaller Server Container
 - Imbedding of new satellite system
 - Improvements from Phase II will be implemented in Phase I
- Third phase for Dutch division and brigades
 - Design identical to Phase II

C2 Support Centre

- Unit of Royal Netherlands Army (RNLA)
- Ambition: European centre of expertise for Command and Control (C2)
- Intentions to form 'Public-Private Partnership' with civilian companies
- Pragmatic approach; device 'Design a little, build a little, test a little and learn a lot!'
- Other 'products': Integrated Staff Information System (ISIS), Battlefield Management System (BMS), Tactical Messaging System (TMS)
- Additional information

Why TITAAN?

- TITAAN: The ultimate infrastructure for the mobile environment?
- Not only military operations, but also NGOs, like the Red Cross, 'Physicians without Borders', etc.
- Not a 'big bang', 100% solution, but evolutionary approach.
- Adaptable for constantly changing needs in a turbulent world.

