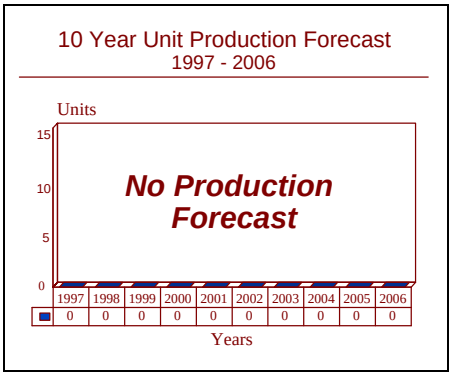
NICS (NATO Integrated Communications System) - Archived - 3/98

Outlook

- Plans for future NICS upgrades will likely be passed over in favor of more efficient and more encompassing C^{3}I programs
- Political developments limit future upgrades



Orientation

Description. Switched user voice/teletype/data system providing survivable, secure strategic communications.

Sponsor

NACISA (NATO Communications and Information Systems Agency)

NJCEC (NATO Joint Communications and Electronics Committee)

Contractors

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The Pilot Secure Voice Program (PSVP) was a joint development in the hands of AEG-Telefunken, Siemens Electrovox and Page-Europa. The Initial Voice Switched Network (IVSN) was developed by ITT-Defense Technology. Litton C3I Systems was responsible for TARE and Ford Aerospace & Communications responsible for SATCOM.

Licensee. No production licenses have been granted.

Status. In service.

Total Produced. NICS is a single integrated system.

Application. A strategic and operational communications system designed to coordinate NATO activities.

Price Range. Due to the nature of the NICS system a unit cost estimate is neither possible nor meaningful.

Technical Data

Design Features

NICS I. The origin of NICS is found in the ACENET program which was revised, expanded and submitted as the NICS project in 1970 and subsequently approved by the Atlantic Council in 1971. Financial and technical constraints ensured that NICS would be implemented in two stages, with Stage I incorporating the previous ACE HIGH and SATCOM efforts into an integrated communications system that could stand on its own until the completion of the second phase in a then estimated 1995 time frame. NICS I, which was originally scheduled for completion by 1983, included five programs as follows:

TARE. The Telegraph Automatic Relay Equipment (TARE) project, similar to the US AUTODIN system, consists of 18 store-and-forward message switches. These employ paired computers at each station with a communications processor acting as a line concentrator and a message processor.

Both units are interfaced separately to the same input so that messages can be transferred or retrieved if one of the computers fails. A mass-storage subsystem is also provided which stores the messages and records each transaction. The first TARE unit was installed at SACLANT HQ at Norfolk, VA, during 1979. The remaining units were built at the rate of approximately five per year. The main contractor for the TARE effort was Litton.

IVSN. The Initial Voice Switched Network (IVSN), a program similar to the US AUTOVON, provides 24 access switches built by ITT-North Electric. It serves both direct NICS subscribers (DNS) and indirect NICS subscribers (INS) who access NICS through a PABX. Each of the switches can be brought up to a capacity of 4,096 terminations to handle local and trunk connections. The following features are included: (1) precedence and preemption, (2) camp-on-busy, (3) conferencing (progressive and preplanned), (4) closed networks, (5) abbreviated dialing, and (6) hotline and off-hook service. The schedule called for the first group of five switches to be installed in 1979; the second and third groups, each consisting of five switches, in 1980, and the remainder in 1981.

PSVP. The Pilot Secure Voice Program (PSVP) was initially intended to be an interim measure designed to satisfy minimum communications security requirements until a more comprehensive system was developed. Based on current reduced requirements and the status of the program, however, the PSVP system is now regarded as a permanent part of the network. This program incorporates manual switchboards together with 400 Siemens Elcrovox scramblers which carry a unit cost price tag of approximately US$80,000. Twenty-four-wire switchboards built by Page-Europa of Italy have been provided along with control units to pool the 1,600 nominated users. Ultimately the dedicated manual switchboards will be abandoned and the voice coders integrated directly into the ISVN. In addition to Siemens and Page-Europa, AEG-Telefunken has been a major contractor on this effort.

CIP-67. The Central Improvement Program (CIP-67) is a pre-NICS project under which Siemens was to provide microwave line of sight (LOS) capabilities for the large numbers of subscribers in the Central Region. Both static and transportable analog units were to be provided, with these to be integrated into the rest of the NICS network.

SIP. The Subsystem Integration Project provides the ancillary facilities at each station, such as patch panels, instrumentation, etc., to ensure that proper interfaces were provided for the equipment mentioned above to permit

them to efficiently communicate with each other. A total of 33 major sites and approximately 270 secondary installations were/are affected.

Original SIP planning was based on expectations that a significant percentage of the DCS communications trunking networks in Europe (US-owned and PTT-leased) would be converted to digital technology. Although Germany was expected to have only 15 percent of its commercial plant converted to digital technology, this was considered to be more than adequate to satisfy US digital-leased requirements and most likely sufficient to support NICS. Germany took a more conservative view on digitalization because it is believed that it considered the move to digital systems to be a threat to prematurely amortize relatively new telephone plants. The more rapidly than expected diminishing costs of digital systems, however, served to weaken this position.

In addition to the relatively straight forward definition of the analog/digital interface, the SIP digitization initiative most select the type of digital modulation to be used. NICS studies were reported to favor the Delta modulation method in order to minimize interface difficulties with military systems, conserve the frequency spectrum, and ease encryption. Existing European PTT systems, however, typically use the pulse code modulation as their modulation technique.

As originally formulated, the long range SIP plan was to replace the entire ACE HIGH network. It is now clear, however, that in the current environment, and until the future role NATO is more fully resolved, whatever improvements are made to the existing NICS I architecture will be developed and integrated on a limited project-by-project basis.

Until the opportunity for full digitization is realized, a program for the limited refurbishment of analog equipment is in place to ensure that the existing system will continue to operate.

The main elements of the planned digital replacement of the complete ACE HIGH system are reported to include: digital multiplex structure, digital radio (troposcatter modem and radio frequency equipment), timing and distribution system, analog-to-digital and digital-to-analog conversion equipment, crypto equipment, sub-multiplex equipment, transmission status, and control facilities. A limited industrial survey conducted by NICSMA indicates that all major components are expected to be off-the-shelf commercial technology in the time-frame for the ACE HIGH replacement procurement.

Operational Characteristics. NICS is an integrated communications system linking all NATO headquarters, major NATO commands, and civil wartime agencies. This includes full interoperability with the US Defense Communications System (DCS). NICS is a revised and expanded version of the earlier ACENET concept and is based on a meshed grid-type common user network for voice, telegraph and data traffic.

Existing NATO equipment and systems such as HF microwave links, satellite systems, and civil/military communications networks may be used where possible. New links and facilities will be incorporated to replace obsolete equipment and improve performance. When completed as originally conceived, NICS will be a highly sophisticated, circuit-switched system with ground-based and spaceborne segments, operational automatic message switching centers, nodes, and gateways.

Variants/Upgrades

Three other major communications programs currently are being undertaken by NATO outside the NICS framework. The Status, Control and Reporting System (SCARS) is a SHAPE network designed to control the status and release of nuclear weapons. The Computer Assisted Message Processing System (CAMPS) will automatically translate messages into the proper format for transmission and provide an automated interface between NICS and military computers. The ACE HF Improvement Program will upgrade the present ACE- WIDE system currently available to SACEUR.

Program Review

Background. The first step toward creating an alliance-wide strategic communications system was taken in the early 1960s with the creation of the ACE HIGH network, a high capacity, troposcatter microwave voice and telegraph system. The network is composed of 49 over-the-horizon (OTH) links and an equal number of microwave line-of-sight (LOS) tail links and inter-connections. Forty-two of the OTH links were built in the early 1960s and operate in the 670-960 MHz band, while six of the seven stations built in 1967-1968 operate in the G-band (4.4-5.0 Ghz).

The system at present carries approximately 570 voice, 260 telegraph, and 60 data circuits. ACE HIGH terminals are spread through the alliance's territory, running from

northern Norway to eastern Turkey, including the Shetland Islands, northern and southern Italy, Malta, Crete, and Cyprus, as well as the major field commands and national capitals.

The second step toward establishing a modern communications system undertaken during the 1960s was the NATO SATCOM program, a comprehensive effort including both the satellites and ground stations. While these programs advanced NATO's communications capabilities considerably, it was recognized late in the 1960s that only a thoroughly comprehensive effort would provide the type of communications needed in a fast-moving modern warfare engagement.

Additionally, it was also recognized that most of the installed ACE HIGH equipment employed early 1960s-era technology which was rapidly becoming obsolete, with spare parts correspondingly becoming increasingly more expensive and difficult to obtain. The result of this concern was the formulation and initiation of the NATO Integrated Communications System, i.e. NICS, program.

In 1969 the communications division of the SHAPE Technical Center presented to the NATO command a proposal for a common-user meshed grid network for Allied Command Europe (the ACENET network). The first ground stations for linking the SATCOM communications satellite with NICS became operational in early 1983 but delays were experienced in other elements of the NICS I program.

A major problem concerned the TARE units which were the responsibility of Litton Industries in the USA. First equipment was scheduled to be installed in 1979, but the company was unable to meet NATO specifications. This resulted in the technical specifications being lowered to handle less traffic and also in delays in installation. Problems were also experienced with the IVSN manufactured by ITT-North. The first of these units was scheduled for installation in 1979 but, due to problems in the software design, specifications were also reduced and first elements of the system became operational in 1983. ITT agreed to accept a reduced price for the system and pay damages for failing to meet the contract.

Substantial cost overruns, timetable slippages, widespread dissatisfaction with the performance of US- based contractors involved in the program and the inability to reach some agreement with respect to a common architecture led the NJCEC and NICSMA to abandon the NICS II project. In its place, the agencies planned to develop, procure and integrate new equipment for the network on a project-by-project basis. Participation of American firms in these efforts was said to be in doubt due to their failures during the NICS I effort. NICS Phase I was finally completed in late 1985 and 17 of the 20 TARE systems were operational by the end of 1987.

The total collapse of the Warsaw Pact during 1990 and 1991 has led to a fundamental rethinking of NATO's role and the function of its strategic communications network in the new environment. During April 1991 plans for a NATO Rapid Reaction Force (RRF) were finalized. Effectively, NATO was being restructured around a new Corps-sized RRF, a much-reduced main defensive force and augmentation units. Implicit within the new plans was a substantially reduced US contribution.

These NATO strategic developments were paralleled by changes within the European Economic Community (EEC). One of the proposals put forward during negotiations on the Treaty for Economic and Political Union was for the formation of common foreign and defense policies which included the development of a European-only intervention force. This development was strongly opposed by the UK, which wished to maintain strong defense and political links with the USA and whose substantial worldwide commitments made tight foreign policy links with Europe undesirable. France, contrastingly, was ardently in favor of a common European foreign policy and defense agreement. This debate continues.

Further disruptions to the implementation of the original NICS concept are being caused by the prospective inclusion of Central and Eastern European countries within the NATO alliance. The exact status of such countries is the subject of intense debate and it is probable that a new category of membership will be introduced to provide for them.

During 1993, its was suggested that this would take the form of "associate" status in which these countries, particularly the Central European states of Hungary, Poland, Slovakia and the Czech Republic would be party to NATO planning but not fully integrated within the military network. The Eastern European states (Bulgaria, Romania, Belarus and Ukraine) would be rated as "Observers" and would be informed of NATO actions but not be made party to the decision-making processes. This debate also continues.

Funding

NICS has been funded as a NATO joint venture. Guidelines were established in 1984 by the NATO Joint Communications and Electronics Committee on what percentage of NICS spending should ideally be spent within

each country, based generally on each nation's proportionate share of infrastructure funding. The proportions are (percent): United States 38.0, Germany 12.5, United Kingdom 8.8, Canada 4.6, Italy 4.5, Belgium 3.2, Netherlands 2.9, Denmark 2.1, Norway 1.7, Turkey 0.75, Greece 0.46, Portugal 0.21, Luxembourg 0.12, and uncommitted 20.0. Funding has been running at a level of approximately US$100 million/year since 1980.

Recent Contracts

No contractual information has been made publicly available.

Timetable

	1969	ACENET presented to NATO
Mar	1970	NICS design study began
		First NATO satellite launched
	1971	NICS concept approved by Atlantic Council
	1975	ACE HIGH digitalization tests began
Dec	1975	Committee on Equipment Interoperability formed
	1976	TARE contracts awarded
Nov		US/NICSMA working group established
Dec		CIP-67 contract awarded
	1979	First TARE unit installed
		NICS I funding completed
	1980	ISVN system completed
April		Approval of NICS II architecture
Jan	1981	Freq Plan/System Configuration for modified ACE HIGH
		Completion of TARE installations
Sep		System/subsystem performance for mod ACE HIGH I
June	1982	Release of IFBs for modernized ACE HIGH
Dec		Modernized ACE HIGH contract award
	1984	IVSN operational
	1985	NICS I IOC
Jan	1986	NACISA formed from NICSMA
		TARE full acceptance
Jan	1987	TVSN-IVSN integration
Jan	1988	NACISA takeover as management authority
	1991	NATO Rapid Reaction Force proposed

Worldwide Distribution

NICS is specific to **NATO** and deployed within the NATO area.

Forecast Rationale

Completion of the NICS I project has brought NATO communication to a relatively high level of efficiency. However, the continued evolution of the NATO and Eastern/Central European political arenas have caused further efforts to upgrade NICS to be temporarily shelved. NICS II has been canceled due to the lack of an acceptable plan for the development and implementation of a common architecture for the system. It is perceived by some that the overall NICS program is rapidly becoming less essential within the rapidly expanding environment of NATO C3I and CCIS systems.

The organized structure of NACISA has been oriented toward the planning, development, procurement, and configuration of integrated C3I systems for deployment by NATO as a whole ⌖ systems that would venture beyond

the scope of NICS. While NICS would be an element of these new systems, its demands are now subordinated to those of C3I as a whole. It is now realized that communications and command, control and information (C2I) systems must be planned and integrated from the earliest stages with full allowance made for mutually influencing factors. The logical consequence of this is the NATO Communications Information System (NATO-CIS) concept.

A key point in determining the future of the program remains the ultimate resolution of the political union debate inside the EEC. The US and the UK are fighting hard to preserve NATO as a central element in Western military planning. The trend within other factions of the European Union lean towards establishing the EEC as that framework, implicitly reducing the role NATO.

If NATO is to become the framework for an international intervention force capable of responding to rapidly evolving crises such as the Iraqi invasion of Kuwait, then the development of a *much enhanced* version of NICS will be essential. This augmented system would have to be capable of handling the heavy communications traffic experienced in the early stages of coordinating such intervention and, later, in the operational control of the intervention forces.

However, if NATO's future role is to be reduced by a decision to organize such activities within an EEC foreign policy/defense framework, existing NICS facilities may be judged adequate to support a reduced mandate for an extended period. Consequentially, this would eliminate the need for further work on NICS.

This debate, which has continued since 1992 without resolution, is indicative of the political environment surrounding the NICS program. Combined with other complex issues such as the inclusion of additional countries into the alliance, it is becoming clear that the NICS technology will be effectively obsolete by the time NATO arrives at any meaningful decision. Although NATO C3I programs will continue to develop and expand, it is probable that any subsequently developed communication program will be so intrinsically different from the original NICS structure that it could not be considered an extension of the program.

NICS I expenditures and related efforts were originally scheduled to continue at the rate of approximately US$100 million per year through 1995. Serious concerns as to the future role of NATO in modern Europe have caused most significant NATO infrastructure projects to be reassessed. Future NICS improvements and upgrades are likely candidates to become a casualty of this process.

Ten-Year Outlook

No production is forecast.

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