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COMMAND AND CONTROL COMMUNICATIONS (C3) IN NORTHERN OPERATIONS

BY

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United States Army

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A commander must have the means to control his forces. This is a fact that is understood, but is not easily accomplished. In northern operations, command and control communications is often more difficult to install and maintain than in other areas. Operations in vast, sparsely populated areas with extreme climatic and terrain conditions make the development of a command and control communications network a detailed task. This paper presents some of the factors that must be taken into consideration in system planning. A discussion of the capabilities of different types of communications components lead to the conclusion that radio is the most functional means for operations in a northern theater. However, multi-channel radio systems in northern operations must be able to span great distances and operate in extreme conditions. The command and control network should not be limited to doctrinal communications because that limits flexibility in a region that requires flexibility. Examples of the use of commercial communications to extend and provide robustness to the military networks are reviewed to demonstrate the additional capability that they can

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USAWC MILITARY STUDIES PROGRAM PAPER

COMMAND AND CONTROL COMMUNICATIONS (C3) IN NORTHERN OPERATIONS

AN INDIVIDUAL STUDY PROJECT

by

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ABSTRACT

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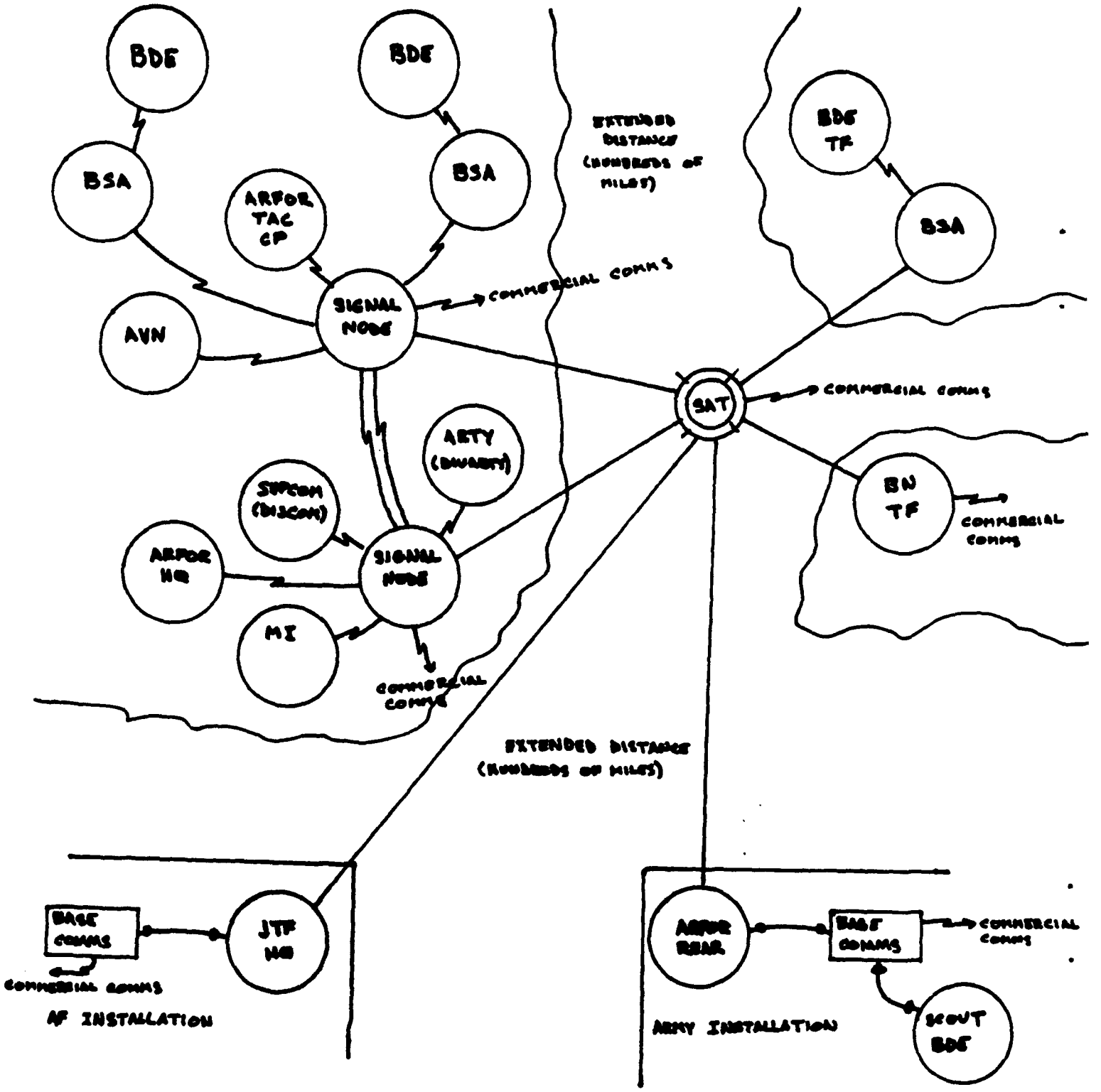

A GENERIC LONG RANGE COMMUNICATIONS NETWORK COMBINING LINE OF SIGHT, SATELLITE, AND COMMERCIAL SYSTEMS LINKING ARMY FORCES IN NORTHERN OPERATIONS

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CHART 2: GENERAL PURPOSE RADIO-TELETYPE NETWORK

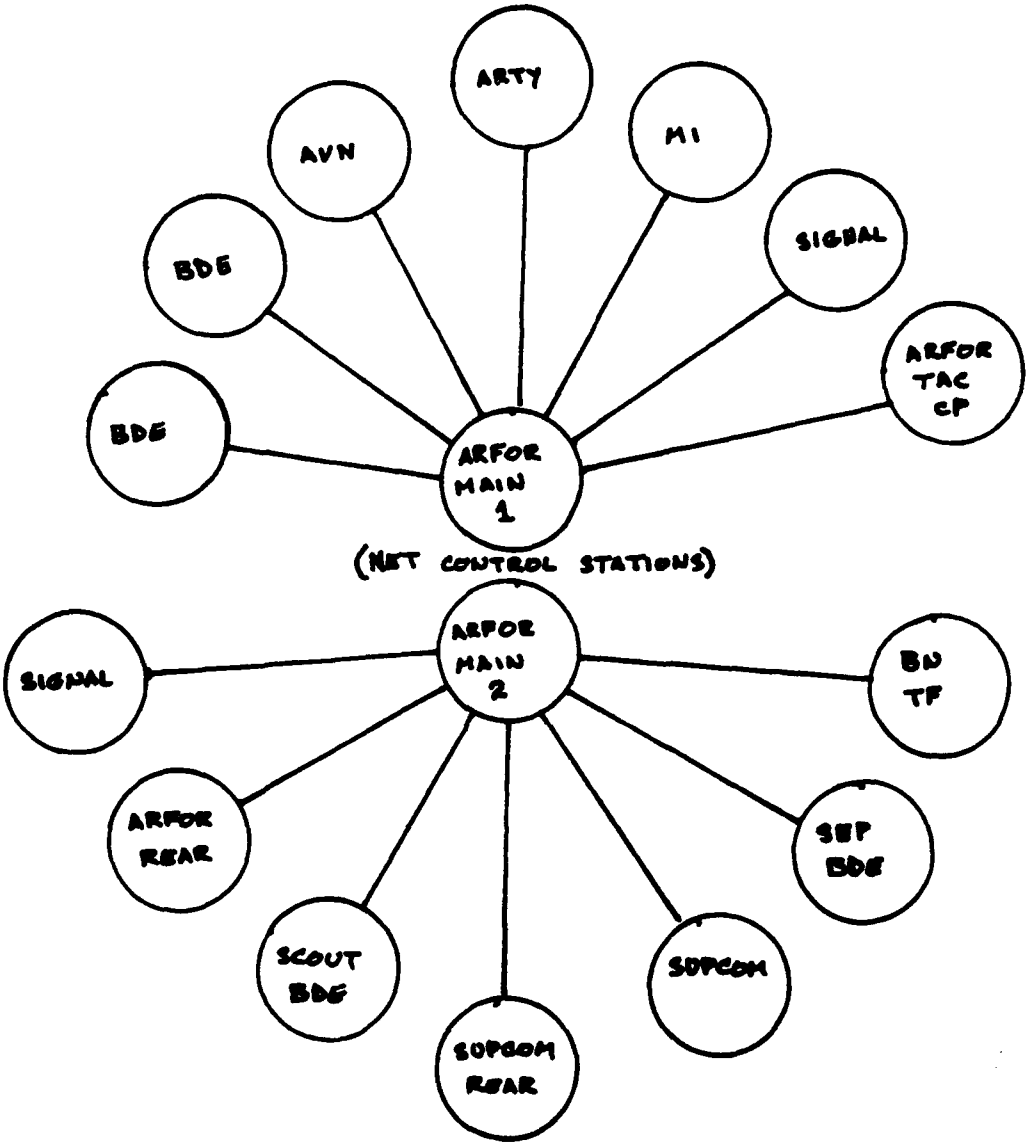

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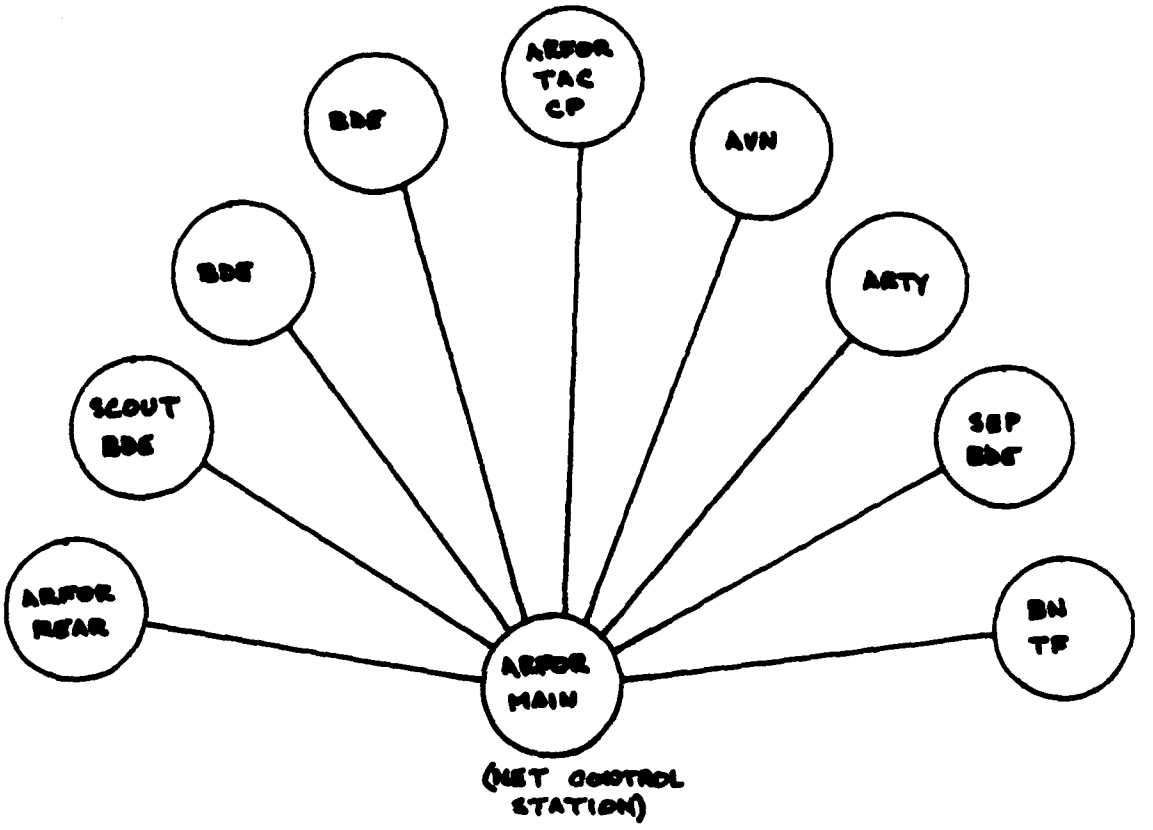
CHART 3: TACSAT NET

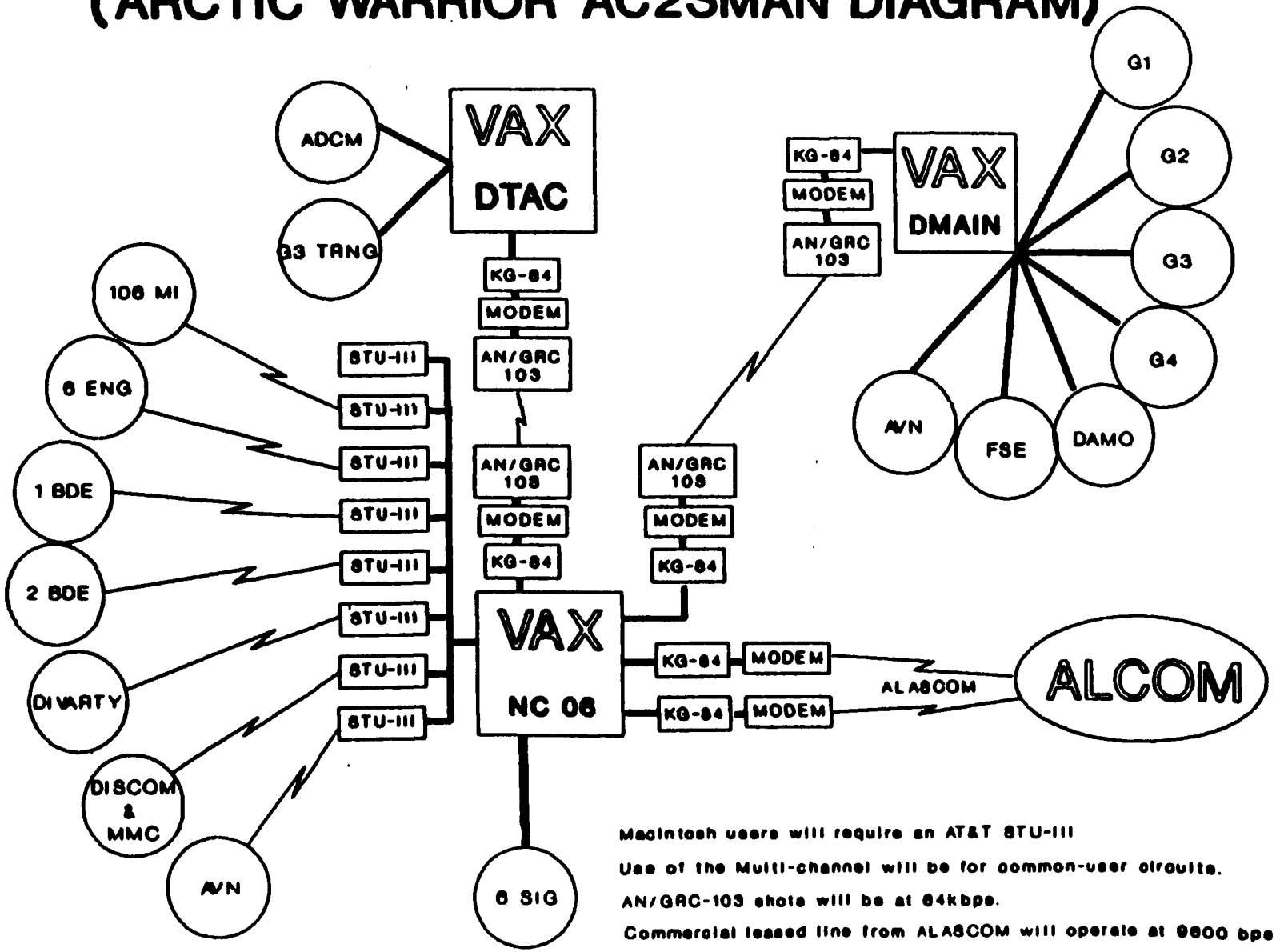


AN EXAMPLE OF A TACSAT NET SET UP TO LINK MAJOR SUBORDINATE HQS.

SLE Fo

AUTOMATED CMD + CONT SYS.

(ARCTIC WARRIOR AC2SMAN DIAGRAM)



Macintosh users will require an AT&T STU-III

Use of the Multi-channel will be for common-user circuits.

AN/GRC-103 shots will be at 64kbps.

Commercial leased line from ALASCOM will operate at 9600 bps

CHART 4

SOURCE:
APPENDIX 7 (USARAK AC2SMAN (FTX)) TO ANNEX K (COMMUNICATIONS)
TO USARMY 6ID(L) EXERCISE DIRECTIVE FOR JRX ARCTIC WARRIOR 91

COMMAND AND CONTROL COMMUNICATIONS IN NORTHERN OPERATIONS

INTRODUCTION

> Many military people think of only a few places when considering northern operations, and that only a few 'specialists' that work in these regions should know and understand cold weather operating conditions. This is a dangerous assumption...![1]
>
> -Major General Samuel E. Ebbesen,
> Commanding General,
> 6th Infantry Division (Light)
> and Army Forces Alaska (USARAK)
> Ft. Wainwright, Alaska.

We must be careful in our writings and training not to be misled by a label and thus limit the study of northern operations and its support to places like Alaska and Korea. Our Army must be flexible enough and have developed the skills to deal with sudden changes in the weather in such places. Almost half of North America and two-thirds of Eurasia are classified as either arctic or subarctic. The term northern operations covers operations throughout these areas, as well as other land masses that have snow, high elevations or mountains such as found in Europe, the Middle East, and the Southern Hemisphere.[2] Northern operations and training must be built into our doctrine, not necessarily as a separate part, but as a way of going about our normal business.

Many of the particular techniques that allow operations in northern climates enhance operations in other areas as well. Army Field Manual 90-3, Desert Operations talks extensively about actions that many would consider as

"northern operations." The British Falklands Campaign would be described by many as "northern operations." Airland Battle Doctrine is particularly suited for those with northern operations experience because of the wide ranging operational areas and the opportunities for independent aggressive action by commanders. Commanders well versed in northern operations fit well into environments calling for creative and intuitive thought. Just as soldiers were suddenly deployed from Europe and other places of different environments to liberate Kuwait, our soldiers must also be capable of operating in a northern climate with only minimal warning. Our new strategy calls for a smaller more flexible force. This force must be able to fight and win in any environment or region of the world.

The purpose of this paper is to present the considerations that go into planning command and control communications (C3) for northern operations. A second objective is to prove that if commanders and soldiers take these factors into their planning and employment, communications in this environment can be just as effective as any other. Knowledge of the environment is essential for success in military operations. In northern operations, there are special factors that will enhance the ability to operate successfully if they are known and included in the planning process.

GENERAL REQUIREMENTS

In planning a command and control communications system to support the theater of operations, the first factor to be considered must be the needs of the commander.

> Having the best personnel, equipment, and plans are meaningless if you cannot talk to anyone or have a functioning system for command and control. Building a communications infrastructure...was one of the most significant challenges faced by our forces.... Available satellites, leased land lines and tactical equipment had to be woven into a sophisticated network to meet the communications needs of a dynamic and rapidly changing combat situation.[3]

Although Lieutenant General Horner's comment applied to Operation Desert Shield/Desert Storm, it would apply any time and place military forces are used. A commander must always have the means to control and communicate with his forces.

In a cold-weather environment, commanders want and need the same level of communications as a commander in a more temperate one--that is, the capability for effective command and control of his subordinate elements to include maneuver, fire support, air defense, intelligence, and service support.[4] The difference is not in what the commander needs, but is in studying the factors of METT-T from a different perspective. These include: the commander's Mission; the Enemy forces and their capabilities; the Terrain; the friendly Troops available and their capabilities; and the Time available. Every factor of METT-T takes on a different perspective in northern operations. Both enemy and friendly forces capabilities are

affected. Sometimes it takes four times as much time to get things done. The terrain can be mountainous, muskeg, or something else which impacts on capability and mobility.

It is essential that communications planners know and understand the special requirements and constraints imposed by northern regions so the commander can get the necessary command and control communications support to perform his mission. For example, special care must be taken to ensure that personnel are not exposed to the elements for long periods of time. Communications equipment often requires extraordinary preparation to guarantee operation in frigid climates. There are planning and deployment criteria that are unique when working in an exceptionally cold environment that must be taken into account. As one expert has said, "The key point is that there is no real change in communications requirements. What is changed is how the communications support mission is accomplished."[5]

PLANNING CONSIDERATIONS

OPERATIONAL FACTORS

There are two major environmental factors that must be considered in northern operations: (1) Arctic and sub-arctic areas of operations tend to be sparsely populated and involve vast distances to be patrolled/covered. (2) Climatic/terrain conditions reduce mobility below normal expectations. These factors, especially when considered

together, create an environment that requires special attention to detail. This environment also provides opportunities for enterprising commanders with good command and control communications networks. In fact, excellent command and control communications can be a combat multiplier in northern operations.

Extended areas of responsibility, reduction in troop density, and battle area isolation, plus difficulties in command and control, require the use of mission type orders that give maximum latitude to subordinate commanders. Northern operations require that tactical commanders have every opportunity to exploit local situations and take the initiative when the opportunity is presented.[6]

Military operations in northern latitudes may be characterized by the employment of independent task forces, spread/scattered over great distances from each other. When these factors combine with the extreme cold and deep snow that hamper mobility, task forces will become isolated and operations will cease unless these forces are able to communicate with higher and adjacent units to arrange for support and supply. The lack of major land lines of communications, the necessity of relying upon air lines of communications, and the great dispersion between forces means that primary reliance must be placed on radio as a means of communication.[7]

A real-world example of this is the Alaskan Command (ALCOM), which is a sub-unified command of the Pacific

Command (PACOM). The ALCOM has the regional responsibility for northern latitudes of the Pacific Theater, excluding Korea. The ALCOM has an air, a ground, and a sea component--each, with forces currently assigned. Although all components regularly train and exercise together, each also has the capability and the authority to operate independently as the local situation develops. Because of the vast areas involved, the relative isolation of individual elements, and rapidity of response often required--independent action is encouraged within the scope of the commander's intent.

A primary joint communications thrust in the ALCOM theater has been the development of an automated command and control communications network that can incorporate the special operating requirements of a command with an extended theater in a harsh environment. This communications network is able to provide and disseminate intelligence information, present current status and locations of forces, maintain logistics detail, and update personnel accountability. It can also pass operations orders, frags, and air tasking orders.[8]

This command and control communications network provides the glue that holds this command together. What makes the ALCOM system unique from others throughout the military is the vast array of differing pieces and supporting technologies that had to be brought together to engineer a network that meets the needs of the commander in this

environment.[9]

ENVIRONMENTAL FACTORS

When most planners consider northern operations, the primary factor considered is the possibility of extreme cold. In northern areas of operations, the temperature can drop to the range -20 to -80 degree Fahrenheit and can stay there for weeks.

Although extreme cold is the factor most likely to deter operations, it can be overcome. In World War II, it was fairly common for weather to reach these levels during German/Russian operations in the winters of 1942-44. The Soviets overcame these temperatures to rout the Germans. In early 1989, in a major U.S./Canadian joint exercise, temperatures stayed below -40 degrees Fahrenheit for 28 consecutive days. Over 20,000 US troops successfully participated in this exercise which covered Alaska, Canada, and the Bering Sea. The joint forces were prepared for extreme cold in the 1989, and weather did not stop this exercise.

The proper use and care of equipment will overcome most difficulties, but proper preparation is essential. Communications equipment to be used for cold weather operations requires regular maintenance. There also needs to be exacting pre-operational planning. Cold weather increases the installation and tear down times of communications systems by a factor of about four.[10]

Perhaps the most important factor in extreme cold weather operations is the attitude of the troops. Lieutenant General Harold T. Fields, former commander of the 6th Infantry Division proved over and over that well trained troops can be mentally prepared for extreme hardships. "Well trained and confident troops with good leadership will perform well in extreme cold weather."[11]

Sudden changes in weather must also be considered to include extreme temperature swings, snow storms, strong winds, and dense fog or ice fog (a condition unique to northern climates). Such sudden changes must be anticipated and every advantage taken of favorable conditions, even of short duration. The commander who can accurately predict the sudden changes in the weather will gain an advantage over his opponent.[12] This advantage can be exploited with a proactive command and control communications network.

The communications planner must also be very sensitive to weather changes for at least three reasons. First, these changes can abruptly reduce or increase the mobility of communications support vans and vehicles. Second, weather changes cause internal sweating or condensation in communications equipment, which will then require drying out. Finally, changes in atmospheric conditions caused by weather affect the reliability of command and control communications networks.

Road networks in northern operations are often limited. This fact severely limits where headquarters and signal

centers can be located and places a very real constraint on the combat commander's deployment and support of his forces. Most major communications equipment is road-bound or must be airlifted into isolated locations.

Because road networks are limited, the enemy is generally aware of where they are. This creates another problem. If the opponent knows that your headquarters and signal sites are generally confined to areas that are only reached by a very limited road network, his ability to find and disrupt them greatly increases. Exceptional care must be exercised in the placement, concealment, and signal masking of these locations.

A final factor that must be considered is atmospheric conditions. In northern regions they can be extraordinary. For example, an atmospheric disturbance caused by a sun spot is much more likely to have an impact on communications in areas far from the equator. Some can be predicted and some cannot.

COMMANDER'S PERSONALITY

All of the previous conditions put constraints on communications system planning that allow a lesser margin of error than in more temperate environments. It is also essential that the communications planners understand the commander's operational intent and any operational quirks he might have. Northern conditions do not permit quick recovery and repositioning of equipment if the commander's

intent was misread. The distances--sometimes hundreds of miles--and limited equipment involved do not allow for total redundancy or easy rerouting.

For example, if the commander likes to be in the forward areas, the communications planners must know this and take it into account, because he must have the means to receive information and to control his forces from forward locations. Or, if he is generally at his main headquarters, the command and control means must be available there to rapidly influence the current situation.

If the commander often pushes decision-making authority onto subordinate commanders or encourages independent action, the command and control system must be prepared to support this contingency. In this event, some flexibility in the command and control system is required. For independent action, subordinate commanders must not only have the ability to control the forces that are normally assigned to them, but must also be able to coordinate routinely with any force or element that might be attached to them for given missions.

With the limited communications means available and the conditions found in northern operations, it is imperative that the communications planners understand how the commander operates. There is less luxury of being able to modify an already-deployed network to meet changed demands because the communications planners did not anticipate nor understand a commander's intent.

PLANNING THE SYSTEM

GENERAL

Planning starts with knowing what the commander wants to do. Meeting the commander's needs will always be the most important consideration. Operating in northern climates does not change this fact.

There is no single communications support plan that will match every every campaign plan: Missions are going to be different; conditions are going to be different. Some key planning factors that must be considered were covered in the previous section. They, plus a few known communicatiors tenets, lead to a summary of basic guidelines for planning a command and control communications system to support northern operations:

(1) Independent task forces are likely to be employed.

(2) There are limited land lines of communications.

(3) Forces can be greatly dispersed by hundreds of miles.

(4) Weather conditions will be a factor.

(5) Operations will be joint in nature.

(6) Special consideration must be given to care of equipment and personnel.

(7) Use of non-military communications can greatly improve overall capability.

(8) Communications links supporting the supply and maintenance elements are critical in this environment.

(9) Multiple means of communications must be established

between elements.

MULTI-CHANNEL RADIO

The primary building block of a command and control network in northern operations should be multi-channel radio. Multi-channel radio can provide many types of communications to a commander--voice telephone, data, FAX, teletype, local and extended area networks, and maneuver control systems. Multi-channel radio provides bulk encrypted communications paths, cleared for SECRET or higher classification, if reguired. It can also overcome many terrain and weather constraints. Radio systems can be installed quickly as compared to wire systems.

The disadvantages of radio systems include ease of detection by enemy electronic countermeasures and the impact of atmospheric conditions, which are exceptionally severe in the northern environment. However, both of these detractors can be partially neutralized by competent frequency management and signal-masking.

LINE-OF-SIGHT MULTI-CHANNEL RADIO

Line-of-sight (LOS) very-high-frequency (VHF) radio has the flexibility and relative ease of installation to provide the medium-range links. In this environment, LOS radio can connect locations 30 to 40 miles apart; and relays can multiply that by three, if required. LOS radio relays can also be used to get into hard-to-reach locations in mountainous terrain. Relays can also be placed and

resupplied by helocopter. Following basic doctrine, LOS radio--normally the AN/TRC-145 radio terminal, AN/TRC-113 radio relay, or mobile subscriber equipment, when fielded--will be used to connect major subordinate headquarters and higher headquarters within the same vicinity.

Generally, the nodal concept is the best for connecting these headquarters. With the limited road networks in this environment, it is best to disperse sites as much as possible and to minimize the signal signature at headquarters locations. The use of signal nodes and radio relays assist in confusing the electronic picture that the enemy sees when attempting to locate command and control headquarters.

EXTENDED-RANGE MULTI-CHANNEL RADIO

Satellite and tropospheric multi-channel radio can be used to provide the extended range needed to link joint or major headquarters and to reach distant separate task forces. These extended range radios can also be used to provide the links between the forward support bases and the rear or garrison locations where major maintenance and supply facilities are located. The range for troposheric systems is between 90 and 250 miles. Satellite systems can extend systems over thousands of miles.

These systems have the same advantages as other radio; however, they have some distinct disadvantages that must be

overcome. Tropospheric radio is extremely sensitive to atmospheric conditions and requires exceptionally well-trained operators to install and maintain the system. There are three problems with satellite radios: First, the availability of terminals is very limited. Only the highest priority operations get multi-channel satellite. Second, the northern areas are on the fringe of most satellite footprints and often special arrangements must be made to use satellites in this region. These include the use of high gain antennas that magnify the receive signal and repositioning of satellites so the ground stations are deeper within the footprint. Third, the availability of channels on individual satellites is also limited. Even if you have satellite terminals, you must have a priority to get satellite use-time.[13]

COMMERCIAL COMMUNICATIONS SUPPORT

> Communications planners should use every means available to integrate commercial capabilities into miltary networks to achieve the ability to communicate over extended distance.[14]
>
> -Lieutenant General Harold T. Fields,
> Former Commander,
> 6th Infantry Division (Light)
> and Army Forces Alaska (USARAK)

In northern operations the use of commercial communications is a real boon. Anywhere that there is a community, there are commercial communications; in most places where there is something of tactical or strategic significance, commercial communications are available.

Military communications planners in the less-populated northern regions should make a real effort to establish regular personal and contractual relationships with the commercial communications companies.

For prices that are often less expensive than the cost of additional military systems, these companies can provide many options that complement and enhance the available military command and control networks. First, they can provide a redundancy or alternative paths for basic military networks. Second, they can add to the robustness of the overall system that can create more communications paths and greater connectivity. Third, they can provide the backbone communications links to relatively-forward node locations that allow scarce military systems to extend further into the combat areas. They can be a substitute when satellite or tropospheric communications are unavailable. Fourth, the commercial companies can design communications packages on demand to meet temporary or long-term requirements.[15]

The legal and technical limitations that have in some cases hindered the use of commercial systems have been largely overcome. The willingness of military personnel to accept off-the-shelf equipment that meets the military requirements with only slight modification coupled with vendor willingness to conform to the constraints of military contract procedures have produced a middle ground that provides opportunities for flexible communications planners.

An example is the relationship between the Army

component command of the Alaskan Command and ALASCOM, a commercial long lines communications company on the Northwest Pacific rim. The Army and the Air Force regularly contract with ALASCOM for the use commercial circuits into communities all over Alaska and the Aleutian Islands. These circuits are conditioned by ALASCOM to meet military needs and provide connections between isolated communities that military forces use to extend to units in the outlands or combat areas.

As a separate long-term project, the Army has worked with ALASCOM to develop special satellite communications shelters with equipment that meets Army specifications for communications and transportability. These shelters meets the Army's need for flexible long-range communications in northern operations. They overcome the problems of satellite use-time and foot prints that were discussed earlier when military satellite equipment is used, because the solutions were negotiated into the lease contracts.

Also by contractual agreement, military operators have been trained on this equipment, so the cost of civilian operators is saved and provides even more flexibility. Because they have military operators, these terminals can be placed almost anywhere in the combat area with very few limitations.

PUTTING IT TOGETHER

Chart 1 demonstrates a communications network laid out

to support an Army Component Command in a northern region with extended subordinate elements. Included in this chart is a combination of line-of-sight, satellite, and commerical systems used in combination to link command and control locations. The nodal concept is used.

Chart 4 shows how a multi-channel system can carry an automated command and control network using a combination of miltary and commercial assets in a northern environment. This chart diagrams part of a communications system used by ALCOM. There are MacIntosh terminals at subordinate headquarters and staff sections to input and receive information and VAX micro-processers at key locations to hold and process data. This command and control network connects the ALCOM (theater command headquarters) with subordinate headquarters all the way down to the brigade/battalion level. This network provides commanders at all levels with real-time information. General Ebbesen has praised the effectiveness of this system:

> "We have expanded the ALCOM automated command and control system into one of the best that is available today.... It works. I use it as my command and control system.... Everyone talks about the one-third, two-third rule. We are now one-fifth, four-fifth rule because of that system. It allows me to do simultaneous planning. It allows me to speed up the amount of information that can be processed and get it back down to where it can be capitalized for execution."[16]

SINGLE-CHANNEL RADIO

Secondary communications for northern operations is single-channel radio. High frequency (HF) radio has some

real advantages in this region. It can operate over extended distances. HF radio can be used in both the voice and record communications modes. Set up time is quick, and we have equipment that can even operate on the move. Because it uses sky wave propagation, it is not inhibited by prominent terrain features.

However, HF radio has some reliability problems. Frequencies must be changed as often as four times daily to respond to changes in atmospheric conditions. Even with intense frequency management, reliability in northern regions only runs between sixty-five and eighty percent, but the availability times can normally be predicted. Another negative factor is that HF radio can only operate non-secure when used in the voice mode.[17] An example of a HF radio system that can be used in this environment is the radio-telephone network in Chart 2. This type of a network can provide emergency or backup voice and teletype communications throughout a theater.

The preferred choice for single channel radio is tactical satellite (TACSAT). This is a very reliable, easily-installed network, with ranges over thousands of miles. The only problems are the availability of radios--often, fewer than ten in an entire command--and the occasional inability to get satellite-usage time.

These radios are generally tightly controlled. Distribution within the command is managed by the commander or his primary signal officer. In northern operations, this

is one of the assets that signal planners must make sure that the initial issue for an operation is the right one; because once sub-commands are deployed, it is very difficult to move these radios among the distant commands. A generic command and control network with TACSAT is chart 3.

Although FM radio is available and works in this environment, range is limited. FM radio will generally be used only at battalion and brigade levels. It does not have the range to provide command and control communications to the major subordinate headquarters. In unanticipated or fast-developing situations, FM radio with air radio relays can be used temporarily to extend the range.

DEVIATIONS FROM DOCTRINE

In northern operations, it is difficult to always follow command and control doctrine. Signal doctrine calls for communications to be from senior to subordinate; from supporting to supported; from reinforcing to reinforced.[18] In northern operations, this is often not the case. The theater-of-operations communications planner must look at all available communications capabilities, then make decisions on how best to provide adequate support over extended distances in a harsh environment. Army equipment might be needed to link the higher joint headquarters to its components. Supporting units might come into the region without the means to provide extended-range communications. Units new in theater might not have the training to operate

immediately in extreme cold. The planner must take factors like these into consideration. This might mean that some of the doctrinal rules will be broken. Again, the key questions are what does the commander want to do, and how can available assets be used provide a command and control network that best supports his operations?

CONSIDERATIONS FOR SUCCESSFUL OPERATION OF EQUIPMENT

In many areas, the proper operation of equipment is not a major concern at the operational and strategic command levels. In northern operations it is probably the Number Two overriding concern of senior level commanders, as General Ebbesen has emphasized:

> This is an unforgiving environment that allows no flexibility for ill-prepared or poorly maintained equipment. Commanders must acknowledge this in their planning.[19]

For the most severe cold-weather environments, special arctic training is needed. Personnel must know how to install, operate, and maintain communications gear in extreme cold. Breakdowns are commonplace in this environment. Spare parts must be readily available.[20]

Standard types of communications equipment can be used at very low temperatures with satisfactory results if precautions are taken and the equipment is properly winterized. Provision must be made in the operational plan to include the special maintenance requirements necessitated by operations in extreme cold.[21] As a general rule,

signal equipment should be installed and operated in warm shelters. Warm shelter is essential for maintenance personnel. Keeping equipment warm and dry and following winterization instructions will ensure the best possible performance of communications equipment, power generators, and communications support vehicles.[22]

There are five major causes of mechanical malfunctions in communications equipment that must be prepared for in northern operations. The first is contraction. The various types of metal in a subassemmbly contract differently as the temperature fall. Plugs, keys, jacks, valves, shafts, bearings, and dials are subject to malfunctions because of the difference in the rates of contraction at different temperatures.[23]

The second is lack of proper lubrication. Normal lubricants and oils become so viscous at very low temperatures that they may not furnish adequate lubrication between moving parts. Special lubricants and servicing routines are needed to overcome this problem.[24] Sometimes just going to a lighter-weight oil will not be the solution. Contact with maintenance personnel who operate in the local area or consulting local SOPs might assist in getting the proper mix. For example, in extreme cold in Alaska, 30-weight oil becomes viscid, but lighter weights will drain right out of the older five- and ten-kilowatt generators. The command had to develop a special mix by trial and error to use in these generators.

Moisture condensation caused by operation or localized heating may freeze subassemblies during shutdown periods and render them difficult to operate. This equipment is considered to be in a "cold soaked" state. The best way to bring it back to operation is to heat equipment with a swingfire heater or place in a warm storage area until the equipment comes up to operating temperature.[25]

Rapid changes in temperature and humidity causes "breathing" and "sweating," which can result in malfunctions in most electrical or electronic equipment. To counter this problem, it is best not to shut down communications equipment once it is operating.[26]

The fifth cause and by far the most significant is lack of operator training. Communications equipment is susceptible to failure in the cold weather environment but failure can be minimized by trained personnel.[27]

There is not a lot written on operating communications equipment in northern regions, but two excellent manuals are FC 24-4: Cold Weather Operations for C-E Equipment (draft) and FM 31-70: Basic Cold Weather Manual. These two manuals, with the addition of SOPs of units that are routinely involved in northern operations, such as the 6th Signal Battalion TAC SOP, will do much to provide the micro-perspective to operations under extreme conditions.

My scope has been the macro view. I wanted to illustrate that command and control communications support for northern operations cannot be successfully done unless

the factor of equipment maintenance in a harsh environment is factored in. If not properly maintained and prepared to operate, communications equipment will have a very high failure rate in this environment. The result is unreliable command and control communications at the moment the commander needs them the most!

PERSONNEL CONSIDERATIONS

> "The importance of preparation of communications equipment for northern operations is overshadowed by the importance of preparing soldiers. By far the biggest problem with personnel is mental attitude. Intense training can develop the personal and unit confidence required to overcome negative fears."[28]
>
> -Ebbesen

Most troops have an exaggerated conception of the danger, discomfort, and loneliness of the North. The isolation of the area, the long periods of darkness and light, and the immobilizing affect of the weather can all effect the mental stamina of soldiers. Training should ensure that all soldiers obtain a balanced perspective of northern operations at the earliest possible moment. Indoctrination training, specialized training--including driving and maintenance, communications, equipment repair, and navigation--and leadership training are needed to overcome any fears that soldiers might have.[29]

Correct procedures must be emphasized at all times during training to insure that the basic techniques of northern operations are thoroughly mastered and correctly

applied. Even the very minor errors must be pointed out and the proper corrective action demanded. If soldiers are properly indoctrinated and trained, they will continue to perform the necessary tasks when confronted with the extreme conditions found in the area of northern operations. Troops must be impressed with the fact that their job is still to provide communications for a combat force and not one of survival.[30]

CONCLUSION

Command and control for northern operations require special attention. Once attention is given to the special factors in planning northern operations, and soldiers are trained and prepared for deployment and employment in the northern environment, command and control communications can be as effective in this region as any other. Northern environmental considerations must be taken into the planning process. They must be factored in as a special part of METT-T.

The key question in communications planning and employment remains: Can a communications concept be developed and implemented that supports the needs of the commander?

The answer is yes. Northern environmental concerns can be overcome. Command and control communications can be planned to support northern operations. Soldiers can be

trained to operate for long periods of time in this region, and equipment can operate in extreme cold or radical changes in temperature. The solution is knowing the environment and preparing to operate in it.

ENDNOTES

1. Interview with Major General Samuel E. Ebbesen, Commanding General, 6th Infantry Division (Light), Ft. Wainwright, Alaska. 9 January 1992.

2. U.S. Department of the Army. FM 31-71: Northern Operations, (Washington, DC, 21 June 1971) p. 1-1.

3. Horner, Charles, Lieutenant General, "The Air Campaign", Military Review, (Sep. 1991) p. 23-24.

4. Tactical Communications Systems Employment, (Ft. Sill, Ok., U.S. Army Field Artillery School; C/E Dept: Nov. 90) p.7.

5. Interview with Lieutenant Colonel Robert Fox, Commanding Officer, 6th Signal Battalion, Ft. Richardson, Alaska 10 January 1992.

6. FM 31-71 p. 2-1.

7. Ibid. p. 5-1.

8. Interview with Ebbesen

9. Ibid.

10. Interview with Fox.

11. Briefing by Lieutenant General Harold T. Fields, former Commanding General, 6th Infantry Division (Light), Ft. Richardson, Alaska, February 1988.

12. FM 31-71 p. 2-3.

13. Interview with Major Rex Barfuss, Executive Officer, 6th Signal Battalion, Ft. Richardson, Alaska, 10 January 1992.

14. Fields, Harold T. Lieutenant General, USA,

interviewed by LTC Herbert Dyer, Division Command Lessons Learned, (Carlisle Barracks, Pa: Military History Institute, 1990), p. 18. (Note: MG Fields released the use of his Division Command Lessons Learned to his subordinate commanders and staff in 1990--I was one of those).

15. Interview with Lieutenant Colonel John Deal, Commanding Officer, 1117th Signal Battalion, Ft. Richardson, Alaska, 10 January 1992.

16. Interview with Ebbesen

17. Interview with Barfuss.

18. Tactical Communications Systems Employment, p. 18.

19. Interview with Ebbesen.

20. Tactical Communications Systems Employment. p. 98.

21. Interview with Barfuss.

22. U.S. Army Signal Center, Field Circular 24-4 (draft), Cold Weather Operations For C-E Equipment, (Ft. Gordon, Ga., US Army Signal Center, May 1985) p. 4-1.

23. Ibid.

24. Ibid.

25. U.S. Army 6th Signal Battalion, TAC SOP. (Ft. Richardson, Ak: 10 May 1988) p. H-1-4.

26. FC 24-4. p. 4-2, 4-3.

27. Ibid. p. 4-2.

28. Interview with Ebbesen.

29. FM 31-71. p. 7-1,2,3.

30. Ibid. p. 7-3.

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