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STATEMENT OF

LIEUTENANT GENERAL WILLIAM E. ODOM

DIRECTOR, NSA/CHIEF, CSS

FOR THE

SENATE SELECT COMMITTEE ON INTELLIGENCE

9 OCTOBER 1985

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I. INTRODUCTION

Mr. Chairman and distinguished members of this Committee, I welcome the opportunity to submit this statement for the record offering NSA's views on SIGINT capabilities which will be required by the year 1995 and how we are planning to achieve them.

I would like to begin with a brief discussion of our philosophy of planning. Historically, long range planning has been a major component of NSA management. The nature of our work requires that we always stay ahead of our adversaries, or potential adversaries, and this has always caused us to place emphasis on planning. Our planning has evolved over the last several decades in response to three major stimuli. First and most important is the threat or target stimulus. We continually review our planning to ensure we will be able to respond not only to targets of enduring interest, but also to emerging targets and issues which will grow in importance in the future. Secondly, there is the technical stimulus. NSA continually reviews new and forecasted communication technology. We are always aware that new technologies can threaten our ability to produce intelligence. As a result of these technological threats, NSA management seeks to implement new programs that will maintain and enhance our ability to collect and evaluate new signals.

Finally, NSA management regularly strives for more efficient and productive methods of operations, and this then, becomes the third major stimulus for change within the SIGINT System.

The need for planning has never been greater. The threat to our security is expanding. While the Soviet Union remains our single most important target, new targets such as international terrorism and narcotics will demand greater emphasis in our future posture. We also must place emphasis on improving our support to military commanders in peace, crisis, and war. In this regard we are in the process of describing a SIGINT "architecture" for each major combat region of the world. In these architectures special care is being taken to truly understand the friendly warfighting concepts and missions (e.g. deep attack, close air support) and to articulate the threat so the relationship of our capability-to-threat-to information need is clear and traceable.

Perhaps the greatest need for planning, however, is in the technical area. The explosion of technology in communications will have a dramatic effect on all targets in the future. This critical forecast was recognized by the Director of Central Intelligence in 1983 and led to a comprehensive community study called the "Future SIGINT Capabilities Study" (FSCS) with which you are already familiar. NSA management made a major commitment in manpower and time to help produce this study which describes the technical challenges SIGINT will face in the next 10-15

years, and the capabilities we will have to achieve if we are to continue to produce high quality intelligence. We regard the FSCS as a major document in our planning strategy and much of what follows in this statement is drawn from its findings and recommendations. We routinely try to plan out to 15 years and much of my statement focuses, like the FSCS, on the year 2000.

I will now discuss what we believe will be the major intelligence issues through 1995 and beyond against which our planning is directed; the technical challenges to the SIGINT System that are threatening our ability to respond to these issues; and how we plan to deal with these challenges. I will also report on our planning for a survivable SIGINT system, and briefly touch on our future plans in the communications and computer security areas.

II. INTELLIGENCE ISSUES THROUGH THE 1990s

To understand the principal threats with which U.S. intelligence in general and the U.S. SIGINT system in particular must deal for the remainder of this century, it is necessary to review the emergence and dynamics of the post World War II international security order and the United States' central role in it. Our country faces two principal challenges today and through the 1990s. The first is a strategic -- primarily military -- challenge. The second is a series of geopolitical challenges. Both are caused

in whole, or in part, by the growth of Soviet power, but this primacy of the East-West axis in our security problems should not be understood to mean that the North-South and the West-West axes do not also pose threats to international stability and U.S. interests.

For the first three decades after World War II, our security commitments and intelligence responsibilities were based on two strategic zones, Western Europe and East Asia. In the late 1940s the U.S. met the Soviet challenge in Europe with a security alliance and a massive economic recovery program. The result has been the longest period of peace in Europe in recent centuries. In 1950 the U.S. was challenged militarily in Korea. It responded militarily, developed a system of security agreements, and supplied large economic recovery resources. The result has been an equally long period of peace in Northeast Asia. 25X1

By the late 1970s, at least four developments had occurred which created a qualitative change in the structure of East-West competition:

- The Soviet military buildup reached a level and a comprehensiveness unparalled in peace time arms buildups, altering significantly the correlation of military forces in the world.

- A diffusion of economic power had occurred, in no small part due to the success of U.S. economic recovery programs

for Europe and East Asia, which changed the relationship between possession of economic power and the bearing of military obligations. In the 1950s, the U.S. carried all the West's military responsibilities, but it also possessed the lion's share of the economic wealth. In the 1980s, it carries even larger military obligations while possessing a proportionately smaller share of the Western World's economic wealth. Our alliance relations today reflect, politically, the tensions created by such economic change.

- The Persian Gulf - Southwest Asian oil producing region has taken on a new strategic significance in light of Western vital interests in access to the area's oil production. This is critically true for Western Europe and Japan, but also significant for the U.S. economy.

- US/PRC normalization of relations marked the end of a slow process in the break up of the Sino-Soviet bloc and a major realignment of power on the East-West axis. For the first time since the early part of the 20th century, the U.S. enjoys good relations with both China and Japan, a condition that considerably reduces our military requirements to meet security obligations in East Asia.

While other factors may also be added to this list, these four are sufficient to demonstrate that we are in a new era of East-West competition involving changed relationships with our

allies and expanded resources, particularly military resources, in the hands of our adversaries.

The U.S. commitment to Southwest Asia to repel an external military invasion commits us to yet a third strategic zone on the periphery of the Eurasian land mass. Thus the international security order, previously based on two strategic zones, now rests on three interrelated strategic zones, and promises to continue to do so for the rest of the century. The "interrelated" nature of these three zones is also new, and it derives from the vital reliance by Europe and East Asia on Mid-East oil. The first and second zones are more related to the third than to each other. To meet our security commitment in the first two zones, we must retain access to the third zone. Soviet hegemony over Southwest Asia would give Moscow enormous leverage vis-a-vis our NATO allies and Japan, and it could easily lead to the neutralization of our security alliances in Europe and Asia.

The growth of Soviet power has also brought qualitative changes to the nature of U.S.-Soviet competition in the third world. One can identify another three lesser strategic zones where U.S.-Soviet bilateral competition overlays volatile and dynamic domestic forces of change. They are Southeast Asia, Africa, and Latin America. The center of gravity for competition in these regions has shifted from Southeast Asia in the 1960s and 1970s, to Africa, dating at least from Soviet-Cuban intervention

in Angola in 1975, to Latin America in the 1980s following the collapse of the Somoza regime in Nicaragua. The increasingly interdependent international economic order and the indigenous forces of political upheaval would challenge U.S. security interests even if the Soviets were not involved in these regions. The growing Soviet capabilities for power projection, however, allow Moscow to exacerbate regional problems and to make the task of U.S. policy more difficult, dangerously difficult in some cases.

Looking ahead toward the end of the century, we can expect to see some shifts in the character of the threat to U.S. interests in all of these lesser zones. Latin America is likely to prove troublesome at best and volatile at worst for the remainder of the century with the intensity of insurgencies shifting into the South American continent and possibly North to Mexico. Southeast Asia, quiescent for about a decade, is likely to come back into the limelight with developments in the Philippines. In Africa, the danger of a black-white polarization becoming congruent with a Soviet-Western polarization is precisely what Moscow seeks to create and will have some success in achieving. The likehood of regional wars involving U.S. vital interests is greatest in Central America, next in some parts of Southeast Asia, and to a lesser degree in sub-Saharan Africa.

Of the three interrelated strategic zones -- Europe, Southwest Asia, and East Asia -- Southwest Asia is the most dangerous, the

most likely to involve U.S. military commitments, and the region where U.S. and Soviet forces could most easily confront one another in a local conflict. In East Asia, the greatest uncertainties for the future are found on the Korean Peninsula where the large North Korean armed forces could easily initiate a conflict. The trends in Europe look less likely to lead us into war and more likely to lead us into changing political climates, complicated diplomatic relations, and economic competition under the shadow of an increasingly adverse NATO-Warsaw Pact military balance. At the same time, political change in East Europe can easily lead to Soviet military actions against its allies or Yugoslavia, creating the danger of spreading the conflict beyond either Soviet or U.S. control. Such developments also create opportunities for Western strategy to reduce Soviet influence in East Europe.

The major factor of continuity from the pre-1980s to the present and foreseeable future is the centrality of the U.S.-Soviet competition to the international security order. The major factor of change is likely to be the reemergence of the German and Japanese questions for Europe and East Asia, questions that caused World War II and which have been kept on ice for the past four decades.

In light of these present and project trends, what are the implications for SIGINT? First, and most obvious, the Soviet target is expanding, becoming more sophisticated in a qualitative sense, and more extensive in its geographic and quantatative dimensions -- more and larger forces in East Asia and Southwest

Asia, a growing blue water navy and much greater power projection capabilities to the three non-contiguous third world zones of East-West competition. Second, support of our economic and diplomatic requirements will necessitate more SIGINT collected from new communication technologies in all the non-Soviet bloc states. Southwest Asia, in particular, is a changing intelligence target because of the difficulty in gaining access, the disparate languages involved, and the rapidly developing communication capabilities in the region.

In the third world strategic zones, we will have to continue the expansion of intelligence support in [redacted] 25X1

In Southeast Asia, we are already facing growing intelligence requirements, probably much faster than we can meet them. For example, [redacted] is rapidly becoming a critical intelligence target. Only somehwat less demanding will be the growing requirements for collection over broad distances, [redacted] 25X1 25X1 25X1

In brief, the policy-making demands for intelligence promise to grow dramatically in the decades ahead. They will be larger, against tougher targets in many cases, particularly the USSR, and against many new targets, economic and diplomatic, as well as military.

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III. THE TECHNICAL CHALLENGE

As can be seen from the foregoing, our national intelligence information needs in the future will be more diverse, greater in quantity and quality, and against more difficult targets. In addition, the need to satisfy effectively military tactical requirements will increase in importance. Our major concern is that our ability to satisfy all these requirements becomes progressively more difficult.

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The FSCS described in great detail the technologies and related trends which threaten to neutralize our present SIGINT systems. Some of the more important are summarized in the following paragaphs. As you know, the FSCS concluded that failure to deal effectively with these technologies will indeed cause a rapid decline in what our SIGINT system can collect and process into useable intelligence.

A. Movement From Analog To Digital Communications

The most significant technical challenge faced by the SIGINT system is the movement from analog signaling technology to the more modern digital signaling systems. Digital communications offer users increased efficiency and reliability over analog and

are coming into use on both terrestial and satellite systems. The real challenge from modern digital communications systems lies in the multitude of signaling formats. The increased ease of encryption of digital signals also concerns us. Of the various signaling modes that use digital transmission,

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B. High Data Rates

Digital communications facilitates the advent of high-speed, high-capacity signaling. The new communications systems we see today are part of a hierarchy that now transmit data at 1.5 million bits per second (megabit) and is expected to show speeds in excess of 800 million bits per second as the technology improves.

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The principal adverse effect of these high data rates on the SIGINT System is caused by the increased bandwidth and throughput. Our current SIGINT equipment simply does not have the capacity to collect either the current or projected use of these new equipment systems.

C. Increased Volume of Communications

As new and more modern digital communications systems are introduced and made operational, they generally are in addition to, rather than as a replacement for, existing communications systems.

Thus, the proliferation of systems continues! This condition is exacerbated by the expanded use of microwave links containing increased numbers of channels and complicated formats. The problem of collection, recording, forwarding, processing, and most particularly that of selectivity, will become most complex.

D. New Signaling Technology

The two most significant new signaling techniques coming into use today are spread-spectrum and short duration or "burst" transmission. Spread spectrum is a digital signaling technique developed for its high reliability. Both have excellent anti-jam and low-probability-of-intercept characteristics. The use of spread spectrum is rapidly increasing in satellite communications, and burst transmissions are being used in a variety of radio frequency spectra. Both present a difficult detection and

collection problem.

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E. Growth In FIS Denial Techniques

Foreign Instrumentation Signals (FIS) are associated with the command, control, and instrumentation of special space and airborne systems. These systems include ballistic missiles, re-entry vehicles, aerodynamic vehicles, cruise missiles, remotely-piloted vehicles, and satellite systems.

The Soviet Union is determined to deny the U.S. SIGINT System the content of these intelligence-laden instrumentation signals. Soviet communications designers are applying new technology to encrypt these signals and to make them more difficult to collect. By 1990, we expect the use of digital technology and spread spectrum to be extensive in transmission of instrumentation signals. We also expect the

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F. Growth in use and Sophistication of Encryption

One of the most serious SIGINT problems inherent in the growth in digital communications is the relative ease of digital encipherment. This, together with general awareness of government,

financial and industrial organizations of the need to secure their communications has given rise to increased use of enciphered communications. We expect the use of both indigenous and commercial cipher systems to spread rapidly throughout the Third World as they attempt to protect their valued voice, facsimile and printer transmissions.

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G. Proliferation of Western Technology

Western equipment and technology have played a crucial role in the advancement of Soviet electronic production capabilities. The Soviets can be expected to continue their attempts to acquire a broad range of western technologies, and they are known to have established profitable working relationships with private companies in West Germany, France, Italy and Japan. These relationships have provided the Soviets access to many advanced technologies now being used by the West. The third world countries are valuable conduits either directly or indirectly, for advanced technologies from the West.

H. Increased use of Communications Satellites

Throughout the world, there are now approximately 50 active communications satellites. That figure will jump to at

least 70 by 1986. Most of the signals transmitted through these satellites will be high speed digital, and encrypted. Further complicating the problem will be the introduction of highly directional beaming, a technique that will deny collection opportunities to many current collection sites.

Worldwide use of communications satellites is expected to expand at the rate of 15% per annum through the year 2000. By 1986, new satellites will employ fixed or re-arrangeable multi-beam switching techniques. Later in the 1990s, new satellites will feature synchronous scan beam and on-board processing and routing.

These and other advancements are expected to improve the worldwide satellite capability so that by the year 2000, an estimated 600 gigabits will be transmitted every second.

IV. THE RESPONSE - THE SIGINT SYSTEM IN THE 1990s

To meet the technical challenges of the 1990s, the SIGINT system must be capable of dealing with changing technology and responsive to intelligence requirements. It will use new equipments designed with standardization and modularity in mind. It will stress system flexibility and accessability while placing data processing and reporting as far toward the collection end of the system as is practical. It must, in all cases, provide intelligence to the user during peace, crisis and war, in time to meet his needs and to every extent practical must be immune

to single point failure. The Soviet target will remain paramount while the effort applied against China and the Third World will approach that against the USSR.

Our cryptanalytic strength will be increased and computers will play an ever increasing role including so-called "super computers" not yet on the drawing board. Using such computers, an intensive effort will continue on both the Soviet and Third World targets. Automation will help winnow the large amounts of data available to the future system even as processing and reporting efforts are pushed toward the front end (i.e., the collector) to ease the load on the system.

[redacted] Search will play an increasingly important role against the Soviet target where technological advances are hidden. This contrasts with the Third World where competing technologies are well advertised. Remoted collection will be more commonplace. Both [redacted] The communications, analytic and reporting systems will be multilayered, flexible and accessible.

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To plan the USSS needed to meet the challenge, we have looked across the SIGINT disciplines from two viewpoints; that is, from a systems viewpoint for collection assets and from a cross-systems viewpoint for the other disciplines. The resulting USSS projected structure is described below.

A. Collections Systems Posture

1. Conventional Systems

Conventional systems represent the bulk of our present and future SIGINT collection assets. They include U.S., Second and Third Party fixed sites as well as ground, sea and air-mobile assets. Also included are collection assets targeted against foreign domestic and international satellite communications; those charged with the geolocation of high frequency and line-of-sight communications; radar emissions and foreign instrumentation signaling; and finally, those which will detect and exploit new signals as target technology evolves.

The traditional [redacted] fixed sites will remain in about the same numbers as today. They will, however, be improved and upgraded to extend their role; i.e., higher frequencies, automated Morse code intercept capabilities, more extensive and next generation use of remoting technology and new ELINT and foreign instrumentation signals (FIS) tasks. 25X1

The ground work for conventional overt site improvements lies in the bauded, conventional, and high frequency [redacted] 25X1 collection systems upgrades currently nearing completion. These systems will be modernized as new technologies are mastered and new systems added to provide SIGINT on missile and space targets. ELINT collectors will be upgraded primarily by higher frequency

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3. Overhead Systems

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As mentioned, one area of existing major agreement is the need to [redacted] 25X1

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[redacted] The proposed baseline architecture, 25X1

subject to validation, will be for a minimum, [redacted] 25X1

[redacted] at all times) program to replace [redacted] The baseline concept of operations requires [redacted] capability, with common downlinking [redacted] mission ground station. The relay concept provides operational flexibility, reduces our dependence on [redacted] mission ground stations, and could lead to further economies in our processing and reporting posture. 25X1

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The Community continues to study similar options for the [redacted] An intensive study effort is underway and should lead to recommendations for some level of consolidation among these collectors. 25X1 25X1

At the same time that we are working toward future systems architecture, efforts to make best use of existing and already-funded programs have shown considerable progress. Here, I am specifically referring to the use of [redacted] 25X1

[redacted] can be, and are 25X1

being made for relatively low investment of our scarce cryptologic dollars. In August 1985, the [redacted] program became operational using a [redacted] satellite which is being [redacted] with 25X1

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[redacted] as the ground station location. This provides, for the first time, a [redacted] system which will be used against targets in [redacted] In September of this year, we began an extended survey of the [redacted] 25X1 25X1 25X1 25X1 25X1 25X1

4. Clandestine Systems

This category comprises a set of collection systems which are at once highly specialized and very sensitive. Although already important in the current SIGINT effort, that importance will rise in the future as the foreign governments and certain international groups (such as terrorists and narcotics traffickers) apply denial techniques to prevent SIGINT access to their communications.

B. SIGINT Communications

The current communications system can not keep pace with the growth of the SIGINT system. The SIGINT architecture

calls for a producer/user network involving up to 500 elements by the end of the century. A ten-minute restoration time is specified for critical network components. Data rates in the 50-100 megabits/second range for major sites and processing centers will be required during higher levels of stress. Additionally, collection and processing centers will be served by at least two independent paths.

Within the system, the transmission path is the weakest future link. Projected circuit availability, particularly for wideband service, is not sufficient to meet the projected load. Department of Defense communications carriers such as the Defense Satellite Communications System will continue to be the primary [redacted] Combinations of other satellite systems, Second Party assets and domestic commercial service will have to support the remaining requirements. The final solution will require considerable further study and is underway as a specific FSCS follow-on effort. 25X1

To service users the future communications system will rely on packet-switched technology such as [redacted] and the Defense Data Network for automatic routing and high speed service. Tailored system access will support a wide range of user conditions while maintaining system security. In the area of physical equipment, communications system security technology is expanding sufficiently to achieve protection at 25X1

the necessary higher data rates. Encryption technology will extend into the one to ten gigabit range by the year 2000 and multiplexer technology will be capable of handling several independent transmission paths.

Although the future system design aligns itself well with that proposed for reporting and dissemination, the bridge to tactical users remains uncertain. The communications architecture cannot be completed until interoperability planning matures.

C. SIGINT Processing

We have developed a concept for SIGINT processing from which the future system will be designed. The character of the future environment makes it unwise to continue and increase centralization of SIGINT processing. Instead, a decentralized, distributed system will be better suited to meet the dynamic demands ranging from peace through crisis to war. Processing will move toward the point of collection to the degree possible. The User Interface System is our proposed scheme to achieving greater decentralization.

The User Interface System is a three-tiered, modular approach to performing the many processing tasks of the 90s. The system begins at its lowest point with the Local Area; that is, interconnected workstations (personal computers) at the

individual analyst level. This local network is, in turn, tied to the Community Networks for broader access and sharing of data. The final tier, the Global Network, consist of the large mainframe computers of the future which will be required to perform tomorrow's complex analytic tasks, particularly in cryptanalysis. Through data-transfer systems such as [redacted] the User Interface System will serve every level of the SIGINT system, including its tactical arm. 25X1

Many questions remain to be answered with regard to the development of this system including concerns for security across a multiple-user network, and the danger of system overload caused by increasing amounts of data. Both can be overcome. The first through a future "trusted" computer system that employs sufficient hardware and software to allow for simultaneous processing of a range of sensitive data while maintaining the integrity of each working level or component. The second, overloading, will require careful analysis of the requirements levied against the system. Distributing processing toward the point of collection will help lessen the burden.

The entire concept will increase the survivability of the total system and will enhance individual and system productivity. It will also allow more detailed and more timely service to the user including the broader aspects of SIGINT system interaction with military commands.

Finally, the move toward greater decentralization will not deny us the capability to assert strong central control where a collection problem requires it and when a military or other operation can better be supported by central management of the USSS. We have bought that capability, and it has served us well in a number of crises and special collection problems. It is now time, however, to restore some of the earlier decentralization but with new technology that gives the entire USSS more flexibility and robustness.

D. Analytic Enhancements

SIGINT analysis now is closely tied to reporting and will be more so in the future. The proposed processing and communications architectures offer tiered and rapid service and are well suited to analytic needs in the 1990s. Automated analytic aids will be developed for use at NSA and at key field sites and to support SIGINT producers on the battlefield. The analyst will be served by large computer driven programs, by data base internetting, through increased use of graphic output, and through advanced programs to correlate disparate data. New approaches to large volume data analysis will be developed to assist our exploitation of targets such as computer-to-computer communications already a reality in the Third World.

E. Reporting Posture

The future system will be vastly more streamlined than today's to provide a semi-automated system. We are planning for

a system which will allow a reporter, whether at NSA or in the field, to generate a single report which the system then will sub-divide and format to provide to users the information they require. We will also seek more specific requirements to enable us to provide better service and to key product distribution to specific needs. Our goal is a highly responsive system with rapid delivery of tailored SIGINT product.

F. Cryptanalytic Strength

Increasing volumes and complexity of worldwide communications, growing COMSEC-consciousness among nearly all Third World nations (particularly noticeable in the Mideast), and constantly-improving cryptographic technology (both techniques and hardware) all contribute to the need for infusion into cryptanalytic organizations of more manpower with advanced technical education in mathematics, computer science, engineering, and language; for the in-house training of such personnel in cryptanalytic applications of their skills; and for continual significant growth in computing power. These same trends also will provide cryptanalysts with additional opportunities for exploitation, provided we have the means to find them among the huge masses of data that will be available. Our present cryptanalytic work force and computer installations already are strained to the limit.

We intend to instensify our recruiting programs for people highly qualified in the skills we critically need, and we will

update our in-house training programs as required. We must and will make major upgrades in our computer capabilities and invest in research to develop exponentially-more-powerful supercomputers and improved software techniques for their efficient use. To that end, NSA actively supports the initiative to develop the Supercomputing Research Center. We also will make maximum possible use of academic and industrial work in cryptology, and will continue efforts to persuade public researchers in the field to refrain from publicizing work that could be damaging to our missions.

G. The Workforce

Finally, the health of the future system depends upon the skill of the workforce. While this is true for all sectors of the SIGINT system, it will be particularly visible at the analyst level. Analysts and reporters, who in many cases will be one and the same, will need to be skilled in a variety of SIGINT disciplines. Over the next ten years our need for highly skilled employees will accelerate. Training to achieve this highly skilled and technical workforce is a formidable task. Also, given the skill levels achieved by these individuals, the projected competition from the private sector will make retention a major issue. The SIGINT System will need sufficient flexibility in personnel policies to cope with the competition.

V. SURVIVABILITY

Our definition of survivability is the ability to sustain USSS capabilities through various levels of stress. Survivability is not an absolute; it is attained in degrees and lost in stages. To make SIGINT survivability meaningful, it needs to be both target-and threat-oriented.

Our survivability planning has developed four levels of stress and vulnerability (i.e. threat) upon which we can base the development of target-oriented architectures. Those levels are: LEVEL 1 - facilities accidents/natural disasters, LEVEL 2 - intentional hostile attack, LEVEL 3 - limited nuclear war and, LEVEL 4 - general nuclear war.

In one word, the biggest problem we have to deal with in attempting to survive critical aspects of the USSS is - centralization. For many valid reasons, ranging from billet cuts through technology, we have over the past 20 years centralized a large number of key functions of the USSS. From a survivability perspective, this action has made the system extremely vulnerable to a wide range of threats, created potential communications and processing chokepoints, and resulted in a degradation of field experience and capability.

In building a global survivability architecture we are examining various combinations of dispersal, redundancy, mobility

and hardness. Our planning is directed toward supporting a wide range of users across many scenarios. We must provide for support from the tactical commander's level in limited combat to the President in his three roles (Chief Executive, Head of State, and Commander-in-Chief) in a general nuclear war. Finally, we are providing support to high priority COG survivability efforts.

In light of the above, we have implemented a planning strategy which:

- addresses the entire USSS and a wide range of threats,
- is consistent with customer requirements,
- makes maximum use of existing facilities and programs,
- employs phased implementation and "budget ramp" concepts, and
- will be evolutionary in nature within the confines of a global and nodal architecture.

Phase I of our planning takes advantage of actions currently under way and, for that reason, has a definite Asian/Third World "flavor". Phase II will be oriented almost totally toward the

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addition, this phase will address the general nuclear war scenario,

plan to distribute critical data bases, and develop an inter-connected nodal architecture which makes use of Second Parties.

VI. COMSEC/COMPUSEC

The NSA is also charged with related vital national missions in communications security and automated information systems, or computer security.

The "COMSEC Revolution" is a result of the realization that traditional ways of doing COMSEC business alone could not cope with the expanding threat to our ever increasing system of telecommunications. While not abandoning traditional procedures, we are aggressively pursuing innovative approaches to development, production and acquisition of COMSEC equipment and services.

Our goal is to secure classified information and protect sensitive government information across the board. We are developing new relationships to encourage industry to use private resources for development of secure systems, and to permit direct marketing of COMSEC equipment and services to government organizations and their contractors. NSA provides advice, endorsement and authorization for these efforts, and, as a result, new systems are being developed to provide large quantities of low-cost, dependable equipment throughout government and industry.

We believe these strategies are succeeding and now are turning our efforts to duplicate this success in the computer security

area. Today, the inherent capability of computer systems to protect their data from foreign and criminal threats is very low. To begin to improve this situation, I have directed the National Computing Security Center, as part of the National Security Agency, to foster efforts in government and industry to retrofit current computer systems with minimum credible controls that will detect and prevent unauthorized access, and to pursue a strategy in concert with industry to create computer systems with solid security features designed in from the start. We are only beginning to meet this serious security challenge, but I expect significant progress in the next few years. Our goal is to make security an integral part of all U.S. manufactured computers so that computer-stored information - not only of the U.S. Government but of U.S. industry as well - will be secure from foreign or criminal attack.

VII. THE NEED FOR CONTINUED INVESTMENT

We face great challenges in the future and must achieve significant new capabilities. We must meet and master new target technologies, enhance our cryptanalytic strength, provide enhanced support to the military, respond to expanded needs for security in our communications and computers, and achieve realistic survivability for our system. The technical and financial costs will be high. Even with mission trade-offs, we will need a program of continued major new investment.

Research and development is increasingly costly, and deployment of new technology once established is likewise costly.

We do, however, have the advantage of an exciting and meaningful mission which has always attracted highly skilled and motivated individuals. Given the requisite tools, they can and will achieve the necessary successes.

It is a challenging and exciting future we face with significant implications for our country's security. The next few years will be critical in charting our course to meet that future.

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