THE JOINT CHIEFS OF STAFF
WASHINGTON, D.C. 20301

JCSM-68-82
8 April 1982

MEMORANDUM FOR THE SECRETARY OF DEFENSE

Subject: WWMCCS Intercomputer Network Mid-Range Improvement Plan

1. Based on Assistant Secretary of Defense (Communications, Command, Control, and Intelligence) direction,* a major upgrading of the WWMCCS Intercomputer Network (WIN) is underway.

2. The plan in the Appendix for the mid-range improvements to WIN is forwarded for your information. It supersedes the WIN Implementation Plan** and the WIN/AUTODIN II Support Plan.***

3. The objective of the WIN Mid-Range Improvement Plan is to identify the recently modified requirements for enhancements to WIN, the funding and milestones required to attain the modifications, transition strategies for the orderly migration from the current architecture to architectures of the future, and follow-on technical documents required in each specific improvement area.

4. The WIN Mid-Range Improvement Plan addresses the next 5 years and will be reviewed and updated annually.

For the Joint Chiefs of Staff:

James E. Dalton

JAMES E. DALTON
Lieutenant General, USAF
Director, Joint Staff

Attachment

References:

* Memorandum by the Assistant Secretary of Defense (Communications, Command, Control, and Intelligence), 29 December 1980, "WIN Reliability"

** JCSM-7-78, 16 January 1978, "WWMCCS Intercomputer Network Implementation Plan"

*** JCSM-69-79, 13 March 1979, "WWMCCS Intercomputer Network/AUTODIN II Support Plan"

APPENDIX

WWMCCS INTERCOMPUTER NETWORK MID-RANGE IMPROVEMENT PLAN

1. Purpose. To provide a comprehensive mid-range (through FY 1985) improvement plan that identifies the requirements and goals for the further development and enhancement of the WWMCCS Intercomputer Network (WIN) with the objectives of: (a) improving WIN reliability and efficiency; (b) providing new and enhanced capabilities for the operational users; (c) supporting the transition of WIN to the DOD Data Network and the WWMCCS Information System (WIS) environment; and (d) facilitating interoperability with other internetted communities at appropriate levels of security. The purpose of this document is to identify in a single planning document software development and enhancement; ongoing and planned activities for future hardware acquisition and communications improvements; operational test, experimentation, and evaluations; and transition strategies for the orderly migration from the current architecture to architectures of the future. Detailed technical and implementation plans (such as technical analysis/cost estimates (TA/CEs), subsystem project plans (S/PPs), management engineering plans (MEPs)) in specific areas will subsequently be developed by DCA. These technical plans will provide the recommended engineering solutions to satisfying the operational requirements (ORs) expressed in this plan. Yearly review and updating of this plan as appropriate will be performed during the second quarter of each fiscal year.

2. Relationship With Other Plans

a. Operational Requirement for WWMCCS Internetting (see Reference 7a). In July 1977, the Joint Chiefs of Staff approved and validated an OR for a WIN. The network was

to consist of a number of WWMCCS computers and remote terminal users. Specifically, WIN was to provide:

(1) Increased operational responsiveness through real-time, simultaneous participation of the Joint Chiefs of Staff, Services, commands, and agencies in operations planning and crisis management.

(2) Easier, more rapid means of accessing and exchanging computer-based information and data.

(3) More reliable receipt of data transmissions.

(4) Secure, rapid, interactive means of written coordination via teleconferencing.

The OR stated that WIN would support the National Military Command System (NMCS), Service headquarters, unified commands, selected component commands, the transportation operating agencies (TOAs), and selected DOD agencies. Further, the OR stated a requirement for interfacing with intelligence, logistics, tactical command and control, and environmental support systems. This WIN Mid-Range Improvement Plan identifies the ongoing and planned actions for changes in the WIN architecture that will significantly improve network utilization and operation in providing the functionality stated in the OR.

b. WIN Implementation Plan (see Reference 7b). The WIN Implementation Plan identifies the requirement for: (1) a two-phased expansion of the WIN from 6 to 20 WWMCCS host sites between 1978 and 1980; (2) transition of WIN from a dedicated communications subsystem employing Defense Advanced Research Project Agency Network packet-switching technology to the common-user AUTODIN II communication system beginning in 1980; and (3) specified WIN subnetwork funding, including Interface Message Processor (IMP) hardware

and software maintenance and network monitoring to be managed in the Communications Services Industrial Fund (CSIF). A subsequent decision (see Reference 7g) by OSD resulted in a 3- to 5-year delay in the WIN transition to AUTODIN II. Therefore, this WIN Mid-Range Improvement Plan identifies the requirements for WIN enhancements prior to and including the transition to AUTODIN II, when applicable. The WIN Implementation Plan will be rescinded when the WIN Mid-Range Improvement Plan is published.

c. WIN/AUTODIN II Transition Plan (see Reference 7e). The WIN/AUTODIN II Transition Plan addressed the replacement of the dedicated WIN communications subsystem with the facilities of AUTODIN II. The plan described a strategy of transition; identified the network configuration; identified the responsibilities of the Services, the Joint Chiefs of Staff, and the DCA; provided schedules and costs of conversion; and described the required capabilities of the WWMCCS Network Front End (WNFE). The WIN/AUTODIN II Transition Plan will be rescinded when the WIN Mid-Range Improvement Plan is published.

d. WIN Phases I and II Management Engineering Plans (see References 7d and 7f). The WIN MEPs for Phases I and II provided detailed guidance on how implementation of the WIN expansion required by Reference 7b would occur. Both Phases I and II have been completed, and the MEPs will be rescinded when the WIN Mid-Range Improvement Plan is published.

e. WIN Reconfiguration Plan (see Reference 7k). The WIN Reconfiguration Plan, approved by the Joint Chiefs of Staff in February 1981, provides for the reconfiguration of the WIN dedicated communications subsystem to improve

the reliability and survivability of the network. Actions in the reconfiguration plan and its associated documentation are not affected by this WIN Mid-Range Improvement Plan, but will be addressed for completeness and to display concurrent project milestones.

f. Assistant Secretary of Defense (Communications, Command, Control, and Intelligence) Guidance on WIN Reliability (see Reference 7i). On 29 December 1980, in a memorandum to the Director, DCA, ASD(C3I) directed that a major upgrade of the WIN be initiated to include: (1) replacement of the current IMP hardware and software, and (2) fielding of the WNFE system as rapidly as possible. This WIN Mid-Range Improvement Plan addresses the hardware acquisition and software development requirements pertinent to this guidance.

g. WWMCCS Information System Modernization Plan (see Reference 7j). On 19 January 1981, in a report prepared for the Committee on Armed Services, US House of Representatives, with the assistance of the WWMCC System Engineer, ASD(C3I)) provided a plan for modernization of the WWMCCS Information System (WIS). The plan calls for continued planning and requirement definition in FY 1982; source selection activities through FY 1986; and phased acquisition, test, and installation of new hardware and software between FY 1985 and FY 1990. The proposed selected architecture will provide a distributed processing system at each site, interconnected by a local network, with sites interconnected by a long-haul network. The first phase of the modernization plan, extending through FY 1985, is an upgrade of the existing system including installation of network front ends; improvements in IMPs, WIN monitoring capabilities, cryptographic synchronization; and redundancy

of circuits and switches. This WIN Mid-Range Improvement Plan addresses the WIN portion of the Phase I WIS Modernization Plan.

3. Background

a. The OR for the WIN (see Reference 7a) was approved by the Joint Chiefs of Staff in 1977 following a series of operational experiments with the 6-node Prototype WIN (PWIN). At the time the OR was approved, the Joint Chiefs of Staff decided that, pending development of the WNFE and use of the AUTODIN II communications system, the most cost-effective approach to satisfy the short-term requirements for a communications subsystem would be to expand the PWIN. This was based on the assumption that WNFE development and AUTODIN II interim operational capability would be completed in FY 1980.

b. Approval of the OR by OSD established the requirement for the development of a WIN implementation plan. This implementation plan was approved by the Joint Chiefs of Staff in January 1978 (see Reference 7b). Approving of the plan in March 1978 (see Reference 7c), OSD stressed the requirement for transition to the AUTODIN II System and established a cutoff of 30 December 1979 for improvements and enhancements to WIN. Because of the short-term life expectancy of the WIN as a dedicated network, cost was used as the primary consideration for the design of the communications subsystem at that time, and little concern was given to redundancy or survivability.

c. On 31 December 1979, an OSD decision (see Reference 7g) to make the WNFE a DOD standard and to procure it competitively resulted in a 3- to 5-year delay in the WIN transition to AUTODIN II. This decision also lifted the moratorium

that had previously been imposed until December 1982 and permitted improvements to the WIN dedicated communications subsystem. This resulted in the Joint Chiefs of Staff approving (see Reference 7k) the WIN Reconfiguration Plan, which addresses four major deficiencies in the dedicated communications subsystem: (1) lack of subsystem survivability due to insufficient path diversity, (2) excessive host-to-IMP loading, (3) lack of subsystem continuity outside the Washington metropolitan area, and (4) decreased IMP efficiency and reliability due to automatic cryptographic synchronization being performed by the IMP. The requirements expressed and validated relative to WIN reconfiguration are complementary to the requirements identified in this WIN Mid-Range Improvement Plan.

d. On 29 December 1980, OSD directed a major upgrade of the WIN to include:

(1) Replacement of the current IMP hardware and software as quickly as possible.

(2) Establishment of a state-of-the-art Network Operations Center (NOC) capability, based upon current Defense Advanced Research Project Agency Network Control Center capabilities in conjunction with the general network upgrade.

(3) Fielding of a WNFE as rapidly as possible.

These same actions are included in the Phase I WIS Modernization Plan (see Reference 7j) and, along with the appropriate software development, test, and evaluation activities, are addressed in this WIN Mid-Range Improvement Plan.

e. During the period June 1980 to March 1981, the Joint Chiefs of Staff conducted three major worldwide command post exercises: POSITIVE LEAP 80, PROUD SPIRIT 80, and POLL STATION 81. All three exercises involved a high degree

of utilization and dependence upon WIN capabilities to successfully coordinate planning activities and to transfer essential data among command centers. These exercises demonstrated that, while significant progress has been made in improving the reliability of WIN since June 1980, further significant gains in reliability and responsiveness are required.

4. Description of Requirement. As the WIN configuration has expanded to include Pacific, European, and CONUS commands, the C2 operational user has increasingly turned to WIN as a primary means of information exchange. This operational dependence upon WIN is expected to increase in direct proportion to the reliability and ease of use of the system. In order to meet the needs of the future, a project plan is essential in order to anticipate, budget, coordinate, and monitor the complex and interrelated activities required to manage the overall effort.

a. The objectives to be addressed by this WIN Mid-Range Improvement Plan and their priorities are as follows:

(1) Priority 1--Reliability and Availability Improvements. Activities that will result in measurable reliability and availability improvements are the primary goal of the WIN Mid-Range Improvement Plan. Utilization of new or enhanced hardware, software, or communications equipment will be required to achieve this objective. Based on JCS-developed performance criteria, a resource measurement system must be established, with related technical objectives that address reliability and availability measurement capabilities that accurately reflect the performance of WIN from the operational user's (i.e., end-to-end) perspective.

(2) Priority 2--Responsiveness and Timeliness Improvements. Responsiveness and timeliness of the

data transfer capability is second in importance only to improvements in overall system reliability. As is the case for reliability and availability improvements where appropriate, new or enhanced hardware, software, or communications equipment will be utilized.

(3) Priority 3--User Capabilities and Operational Supplements to Current WIN Capabilities. Increased utilization of, and dependence upon, current WIN capabilities have pointed out the need for the development, maintenance, and enhancement of tools and techniques for the exchange of operational data when essential WIN components are not available (e.g., when a host computer is dedicated to SIOP or major command processing). Such supplemental capabilities are critical to the timely and accurate exchange of data and information in crisis situations. Additionally, as users request new and enhanced functional capabilities within WIN, appropriate modifications and development activities must be initiated to satisfy their validated requirements.

(4) Priority 4--WIN/WIS and WIN/DOD Data Network Transition. The transition from the present WWMCCS ADP environment to WIS and the DOD Data Network environments are planned modifications to the ADP support for C2 functions. An integral part of the WIS may be distributed processing supported by internetting technology; thus, close coordination with WIS planners, timely development of new and modified interfaces, and appropriate planning for the WIN/WIS/DOD Data Network transitions are critical to the success of this major enhancement to WWMCCS ADP.

(5) Priority 5--Interoperability. WIN provides the potential for WWMCCS to interface to other networking systems such as intelligence, logistics, tactical command and control, and environmental. The OR for WIN identifies a general requirement for WWMCCS to interface with other systems, although detailed requirements for WWMCCS to exchange data and information with other systems have not been formally identified or validated; future enhancements to WIN will consider support of any future interoperability requirements with minimum cost and schedule impact assessment.

b. Technical requirements supporting the objectives and priorities identified in subparagraph 4a above are as follows:

(1) Enhancements to the Current Architecture. These will be funded by DCA (see Table 5). A Technical Support Requirements (TSR) document, with associated priorities, will be submitted by the Command and Control Technical Center (CCTC) for final OJCS review prior to input to the DCA POM, as provided for in Annex B, Volume I, JCS Pub 19. Changes to the TSR will be submitted as revisions are made to the POM.

(a) Host Software Development and Maintenance. Activities in this area are primarily concerned with addressing priority 1, 2, and 3 objectives; specifically, existing (i.e., used operationally by the WWMCCS community) software will be maintained to the highest obtainable level of readiness. Problems associated with the WIN host software or other software components (e.g., General Comprehensive Operating System (GCOS), General Remote Terminal System, Remote Network Processor (RNP)) that adversely affect WIN reliability and availability will be addressed by DCA as a priority requirement, with all appropriate resources being committed to the resolution of the problem(s).

Near-term enhancements are made to the current WIN software components in response to validated System Development Notifications (SDNs) addressing reliability, responsiveness, timeliness, and functional improvements. These enhancements are essential to the operational user. Protocol resiliency, software stability, reduced core and processor requirements, more efficient exchange of information and data between processes in the source host as well as with processes in a remote host, compatibility with new GCOS releases, support of dual-homing, improved recovery mechanisms and improved event recording for problem identification and isolation, and performance reporting are technical improvements necessary to support the operational user. Funds for implementation of these validated SDNs are shown in Table 5. As various aspects of these enhancements are developed by DCA, they will be operationally deployed as rapidly as possible without sacrificing product quality. Since WIN is a critical component in JCS command post exercises, new releases of WIN/WWMCCS ADP Standard System Software will be scheduled for release to the field at least 60 days prior to the start of an exercise (e.g., in early to mid-summer between the spring and fall JCS-sponsored exercises). Emergency corrections and enhancements will be distributed at other times during the calendar year as circumstances warrant. Detailed technical plans for host software in the form of a (1) WWMCCS ADP Standard System Software Product Calendar and (2) Software Development Plan for WIN will be provided by DCA to the WIN Director within 90 days of approval by the Joint Chiefs of Staff of this WIN Mid-Range Improvement Plan, with semiannual updates.

being provided thereafter. Activities in this area will be implemented as incremental enhancements during FY 1982 through FY 1985, with costs estimated to be $2 million per fiscal year, DCA funded. Summary costs and schedule estimates are included in Tables 5 and 1, respectively.

(b) Communications Subsystem Hardware and Software Upgrade. To support operational user connectivity, a priority 1 objective is to significantly improve the reliability and availability of the WIN dedicated communications subsystem prior to the transition to a DOD Data Network, replacing existing hardware and software used for the communications switches. The replacement hardware and software, to be acquired by DCA, will be capable of interfacing to the current host computer (AN/FYQ-65(V)). The initial communications switch replacement will be made on a one-for-one basis during FY 1982. A coordinated MEP will be provided by DCA to the OJCS WIN Director in May 1982. In addition to the engineering requirements for a one-for-one replacement, engineering and cost data for the installation of additional communication switches at every WIN host site will be provided by DCA for Service and Defense agency coordination in May 1982. Subject to the availability of funds, DCA will fund for the required site preparation and installation costs for the additional switches in FY 1982. Lacking DCA funding, additional switches will not be installed. Redundant switches and dual-homing of host computers will be evaluated as reliability and availability enhancements. Implementation is proposed for FY 1983, subject to funding availability. The estimated total cost for the

communications subsystem hardware and software upgrade is $2.2 million, DCA funded (see Table 3). Continuing maintenance costs for the hardware and software are estimated to be $500,000 per year (see Table 2), CSIF funded. While current plans do not require Service funding of either the replacement hardware or software, it will be the Service/site responsibility to insure adequate funding and resources for any required facility modifications for the one-for-one IMP replacement and reimbursement to the CSIF for outyear maintenance support of that hardware and software. Specific requirements for transitioning from the current communications switches to their replacements are identified in subparagraph 4b(3). Cost and schedule summaries for the communications subsystem upgrade are provided in Tables 3 and 1, respectively. Also required as an integral part of the subsystem upgrade is the establishment of a state-of-the-art NOC network monitoring capability. Modifications addressing hardware and software acquisition, installation and cutover to the new equipment will be provided by DCA in 2d quarter FY 1982.

(c) WWMCCS ADP System Test Facility. A testbed is required in support of all priority objectives in order to adequately test and evaluate technical and operational enhancements planned for the current WIN architecture. Such a "testbed" was expanded in FY 1981 to provide for the testing of WIN components (both host and communications switches) in a multihost and multinode configuration, utilizing live and simulated terrestrial and satellite communications facilities. The test facility is capable of testing a wide variety of host configuration and communications switch connections, to include appropriate encryption devices,

cryptographic ancillary units, and other equipment. The test facility must be continuously upgraded to reflect changes in the WIN architecture in order to insure adequate and accurate evaluations of proposed enhancements and quality products for release to the community. Development and utilization of a variety of testing capabilities such as synthetic workload generators, terminal simulated operational data files, and use of operational network applications programs in the test facility are essential to insuring adequate and accurate evaluation of proposed enhancements and quality products for release to the community. Improved modeling and simulation capabilities are also needed to complement the testbed and reduce requirements for dedicated testbed hardware time; to provide simulation of larger networks than the testbed can emulate; and to permit analysis of new and modified components that are not yet available in testable hardware and software. The test facility will also be capable of supporting evaluation activities relative to future engineering and architectural changes including WIS. The test facility is funded by DCA.

(d) WIN Reconfiguration Plan. The WIN Reconfiguration Plan (see Reference 7k) was approved by the Joint Chiefs of Staff in February 1981. The plan addresses priority 1 objectives by providing for the reconfiguration of the dedicated communications subsystem to improve the reliability and survivability of the network. Although approved by separate action, the reconfiguration plan is referenced here due to its significance and relationship to other WIN improvement activities. The implementation activities identified

in the WIN Reconfiguration Plan will be completed by late FY 1982.

(e) Training. Classroom instruction and on-the-job training is required for the operational users, computer operations staff, network controllers, and communications technicians who support and utilize WIN. The training curriculum must not only address the functional capabilities of WIN and how to use them but must also include instruction in diagnosing and correcting abnormal conditions. Use of mobile training teams, computer-directed training programs, instruction manuals, and multihost training exercises of an operational nature are essential to insure adequate levels of training for all WIN users and support personnel.

(f) Network Control, Management, and Performance Measurement. As WIN capabilities have become more critical to WWMCCS operations and as network-related workloads have increased, the shortcomings of current hardware, software, and procedures for control and management of WIN have become more apparent. In order to support priority 1 objectives, improvements are essential in the real-time and near-real-time monitoring of the status and performance of the network (including network-related site components) and in the information available to technical and operational users and managers concerning network and site capacity and performance to provide the basis for current management action and future planning. The development activities supporting improved network control and management capabilities have been identified and provided to the OJCS via the NOC Development and Support Plan (see Reference 7h). Cost summaries

for the NOC Development and Support Plan are provided in Table 5. Enhancements to provide additional information required by network and site technical and operational managers for current action and future planning will be integrated with those specified above as they are identified.

(2) FY 1982 Through FY 1985 Architectural Modifications. Significant improvement in WIN performance cannot be achieved without major upgrades and architectural changes (i.e., WNFE). This section describes the requirements for the incorporation of the WNFE as the network interface between the host computers (AN/FYQ-65(V)) and the designated long-haul communications subsystem. The WNFE addresses priority 1, 3, 4, and 5 objectives.

(a) WNFE Development and Acquisition. The WNFE is a terminal handling communications processor that interfaces a WWMCCS computer to the communications subsystem facility supporting WIN; i.e., the WIN dedicated communications subsystem or DOD Data Network. The WNFE must be capable of providing essential network service to designated operational users (i.e., terminal access) in the absence of the host. Each host computer (AN/FYQ-65(V)) will require a WNFE capable of the following:

1. Function as a data communications front end processor capable of interfacing a WWMCCS AN/FYQ-65(V) computer system to the packet-switched communications subsystem.

2. Provide designated operational users independent terminal access to remote network hosts and the local host for at least 30 terminals (e.g., a mixture of teletypes, VIPs, and graphics).

3. Provide the ability to access local host files and programs via the local WNFE; all standard H6000 retrievals should be accomplished (e.g., data management system forms mode retrievals), without modification to standard user terminal actions and application programs.

4. Provide an access path to remote network hosts for any terminal connected to the DN355 (or Honeywell Information Systems contract equivalent) of the AN/FYQ-65(V).

5. Provide security access controls for both local independent terminals and remote network users at least as stringent as those provided in the current WWMCCS standard software. These access controls will be compatible with GCOS.

6. Reduce the host processing and memory requirements by 50 percent for network support by offloading network associated processing and memory requirements from the host.

7. Support WWMCCS standard remote line printers.

8. Permit the terminal user to continue use of the WIN telecommunications network command language.

9. Provide accounting for network events that employ local resources. This accounting capability should provide an audit trail back to both the individual initiator of the action and forward to the manager of the resource employed.

10. Have a throughput of at least 64 kilobits per second (kbps) sufficient to support a total end-to-end system throughput of 10000 LL (1 LL = 1920 6-bit characters) in a 30-minute period.

11. Have a combined reliability for both hardware and software of at least 0.99.

12. Each WNFE is to be capable of simultaneously supporting two 50/56 kbps communication subsystem access lines to separate communication switches (dual homing).

13. Provide performance information automatically to the NOC.

14. Be capable of interfacing up to four host systems to a communications subsystem node with maximum throughput limited only by the WNFE capability.

15. Possess an efficient communications processor operating system capable of providing maximum bandwidth and throughput for WNFE.

16. Support WWMCCS ADP RNP use of the communications subsystem.

17. Support retrievals to the local host without any added delay over comparable retrieval systems initiated through the DN-355.

A technical evaluation, including costs of available hardware and software capable of satisfying the WNFE functional and performance requirements identified above, will be provided by DCA to the OJCS WIN Director. A coordinated MEP addressing hardware acquisition, software development and enhancement, site requirements, and schedules will be provided by DCA to the OJCS WIN Director 90 days after hardware selection. Software to satisfy all requirements listed above will be provided by DCA in phased releases identified in the MEP. Schedule and cost summaries are provided in Tables 1 and 4, respectively. The strategy for transition from the current WIN architecture to a WNFE architecture is identified in subparagraph 4b(3).

(b) WWMCCS Network Front End Compatible Host Software Development. Host software that is compatible with the WNFE architecture is essential and will be developed by DCA in parallel with WNFE development. Application program interfaces to the intercomputer networking services provided in current WIN architecture must be maintained to avoid unnecessary and unwarranted impacts on the operational network application programs. Application program interfaces that provide new and improved network services will be documented and distributed to the community on a priority basis prior to WNFE fielding to facilitate timely modification of application programs to take advantage of those services.

(c) Communications Operating System for the Network Front End. The Communications Operating System for the Network Front End (COS/NFE) is an effort to design, specify, and verify a COS for the WNFE that addresses WWMCCS multilevel security requirements. The COS/NFE is functionally identical to the WNFE described in subparagraph 4b(2)(a). The COS/NFE will be developed and funded by DCA during FY 1982 through FY 1984, with potential operational deployment in early FY 1985. A TA/CE for the COS/NFE will be provided to the OJCS WIN Director 1 year prior to fielding. An MEP will be provided 90 days following approval by the OJCS of the COS/NFE implementation. Estimated cost to develop and deploy the COS/NFE is $2 million; maintenance costs were included in subparagraph 4b(2)(a) above.

(3) WIN Transitions. The preceding sections have identified requirements and planned actions for

a WIN communications switch upgrade and WNFE. The purpose of this section is to specify the operational constraints to be satisfied during the various transition periods.

(a) Generic Requirements. Regardless of the specific engineering or technical change being made to the WIN architecture, certain generic, or common, requirements apply. These are:

1. The "operational architecture" to be modified and enhanced must remain in a full operational status throughout the transition period. Periods of scheduled outages to install new hardware and software; to perform local installation checkout; to participate in planned multihost testing; and to provide training in the use and operation of new architectural components will be required. During such periods, however, resumption of the "operational architecture" will be possible within 1 hour, from user request for restoral to system availability to the user.

2. Transition planning documents will be distributed a minimum of 120 days prior to initiating implementation of any architectural changes. Transition planning will include representatives of the WIN Director; DCA; Service headquarters; and, when appropriate, WIN Site Coordinators and other support personnel from affected sites. Transition planning documents will be prepared in close coordination with DOD Data Network and WIS planners, as appropriate; will provide technical details, such as schedules, service and site costs, and organizational

responsibilities; and will be coordinated with OJCS, the Services, and DCA.

3. Services and WWMCCS sites will fund those costs, as detailed and coordinated in future technical documents for any required facilities' modifications (e.g., additional electrical power, air conditioning, computer room expansion) at a particular site. The sites will provide the physical space and environmental support required that is applicable for approved architectural changes.

4. The WIN Director, in collaboration with OJCS/J-3, will control the removal of a site or group of sites for transition testing. Transition testing will be under the control of the DCA-designated Test Director, with all test periods coordinated with the WIN Director and affected sites. The DCA Operations Center/NOC will assist in the planning, coordination, and execution of all transition test periods.

5. The criteria of Volume IV of JCS Pub 19 will be used as the performance baseline for all WIN improvement efforts.

(b) Communications Subsystem Upgrade. Unique requirements specific to the replacement of the existing communications switches are:

1. The new communications switches must be compatible with the existing host and communications circuits and cryptographic equipment, since special redundant circuits and encryption devices will not be available.

2. Site engineering for the installation of replacement communications switches will evaluate possible future installation of a collocated redundant switch and dual-homing of hosts.

3. For DCA, engineering will also include upgrading of the network operations monitoring and traffic accounting capability.

(c) WWMCCS Network Front End. Due to the differences between host-to-host and terminal access protocols that exist in the current WIN and those to be implemented in the WNFE architecture, the entire WIN must be simultaneously cut over to the new protocols. Thus, it will be necessary to establish a parallel host interface for approximately a 3-month period. During this transition period, the current WIN protocols will remain the primary means of providing intercomputer networking service to the C2 environment. The current WIN protocols and architecture will remain intact at all times except when individual sites or groups of sites are removed for WNFE installation, testing, and evaluation. Additional unique requirements pertaining to the WNFE architecture, which will also be addressed in a transition plan, include:

1. Since special redundant circuits/encryption devices will not be available to support the transition period, the WNFE must be compatible with the existing hosts and communications subsystem.

2. Acquisition and installation of hardware, circuits, and encryption devices for terminals connected to the WNFE will be the responsibility of the Service or site.

3. Engineering for the installation of the WNFE will include communications facilities to support dual-homing of local, as well as geographically separate, host and communications switches.

(d) WIN/DOD Data Network Transition. The WIN dedicated communications subsystem will be replaced by the DOD Data Network when the following prerequisites can be met:

1. The system performance of the DOD Data Network will be capable of operational support to the WWMCCS ADP system at least to the level provided by WIN, and will have been accredited to a security level of at least TOP SECRET.

2. An operational NFE will be capable of providing an operational interface between the packet switches of the DOD Data Network and the WWMCCS computers.

3. DOD Data Network packet switching nodes (PSN) will be operational in at least five CONUS locations, two European locations, and two Pacific locations prior to the transition of WIN to the DOD Data Network.

4. Each WIN host computer will be dual-homed to two DOD Data Network PSNs.

Detailed transition and engineering plans will be developed when the DOD Data Network transition date becomes final. The current planning date for transition is 4th quarter FY 1984.

(e) WIN/WIS Transition. At the present time, insufficient details regarding the WIS architecture are available to permit identification of specific WIN transition requirements. Engineering plans will be developed to address technical transition issues and strategies as the WIS architecture is finalized.

5. Schedules and Resource Estimates. Schedules and resource estimates for the WIN Mid-Range Improvement Plan are presented in Tables 1 through 5.

6. Responsibilities

a. The Joint Chiefs of Staff will be responsible for the periodic review and approval of the WIN Mid-Range Improvement Plan for operational responsiveness and promulgation.

b. The OJCS WIN Director will:

(1) Take necessary action, in collaboration with the Director for Operations (J-3), to insure that the impact of architectural changes and upgradings in WIN on operational activities is minimized.

(2) Conduct periodic in-process reviews with the Services and DCA to review the status of this WIN Mid-Range Improvement Plan.

(3) Consistent with WIN configuration management responsibilities specified in Annex L to Volume I of JCS Pub 19, coordinate technical evaluation recommendations (within the scope of funding identified in this plan) prior to further project implementation.

(4) Provide final coordination on all S/PPs, MEPs, and transition plans prior to publication.

c. DCA will:

(1) Be responsible for the implementation and maintenance of the WIN Mid-Range Improvement Plan.

(2) Provide planning, engineering, and other technical management support, direction, and control of the activities required to carry out the WIN Mid-Range Improvement Plan.

(3) Develop technical evaluations that address the technical alternatives to achieve the requirements specified in the WIN Mid-Range Improvement Plan. Technical evaluation recommendations will be coordinated

with the WIN Director prior to further project implementation.

(4) Develop coordinated S/PPs, MEPs, and transition plans, as appropriate.

(5) Prepare appropriate test and evaluation plans for the communications subsystem upgrading, near-term architectural modification, and DOD Data Network/WIS transition.

(6) Monitor all aspects of the DOD Data Network, WIS, and other programs and activities that relate to WIN (e.g., command information subsystems, graphics, multilevel ADP security).

(7) Interface on a routine basis with the Single Service Training Manager (Air Training Command) to develop, coordinate, and monitor enhancements to the WIN Training Program in anticipation of improvements and upgradings of WIN functional capabilities and architectural configurations.

(8) Acquire, install, and maintain the hardware and software for the communications subsystem upgrading.

(9) Provide funding support as identified in approved S/PPs and MEPs.

d. The Services will:

(1) Coordinate/concur in S/PPs, MEPs, and other technical transition documents developed by DCA in support of the WIN Mid-Range Improvement Plan.

(2) Collaborate with DCA in the preparation of individual MEPs required by the WIN Mid-Range Improvement Plan.

(3) Provide funding support within the limitations approved in the WIN Mid-Range Improvement Plan and as detailed in subsequent coordinated S/PPs and MEPs.

(4) Support site-unique requirements resulting from this plan.

e. The Air Training Command will:

(1) Provide new and enhanced training programs for operational users, WIN communications support personnel, and computer operations, including mobile training teams, on a routine basis as well as when WIN functional or architectural modifications are anticipated or realized.

(2) Interface on a routine basis with the DCA WIN Project Manager and the WIN Director to maintain cognizance of WIN improvement activities and their implications for WIN training.

7. References

a. JCSM-302-77, 19 July 1977, "WWMCCS Computer Internetting."

b. JCSM-7-78, 16 January 1978, "WWMCCS Intercomputer Network Implementation Plan."

c. Memorandum by the Principal Deputy Under Secretary of Defense for Research and Engineering, 7 March 1978, "WWMCCS Intercomputer Network Implementation Plan."

d. MJCS 223-78, 6 September 1978, "WWMCCS Intercomputer Network Phase I Management Engineering Plan."

e. SM-137-79 and SM-138-79, 13 March 1979, "WWMCCS Intercomputer Network/AUTODIN II Support Plan."

f. MJCS 236-79, 28 September 1979, "WWMCCS Intercomputer Network Phase 2 Management Engineering Plan."

g. Memorandum by the Assistant Secretary of Defense (Communications, Command, Control, and Intelligence), 31 December 1979, "Transition of WWMCCS Intercomputer Network to AUTODIN II."

h. Network Operations Center (NOC) Development and Support Plan, 22 December 1980.

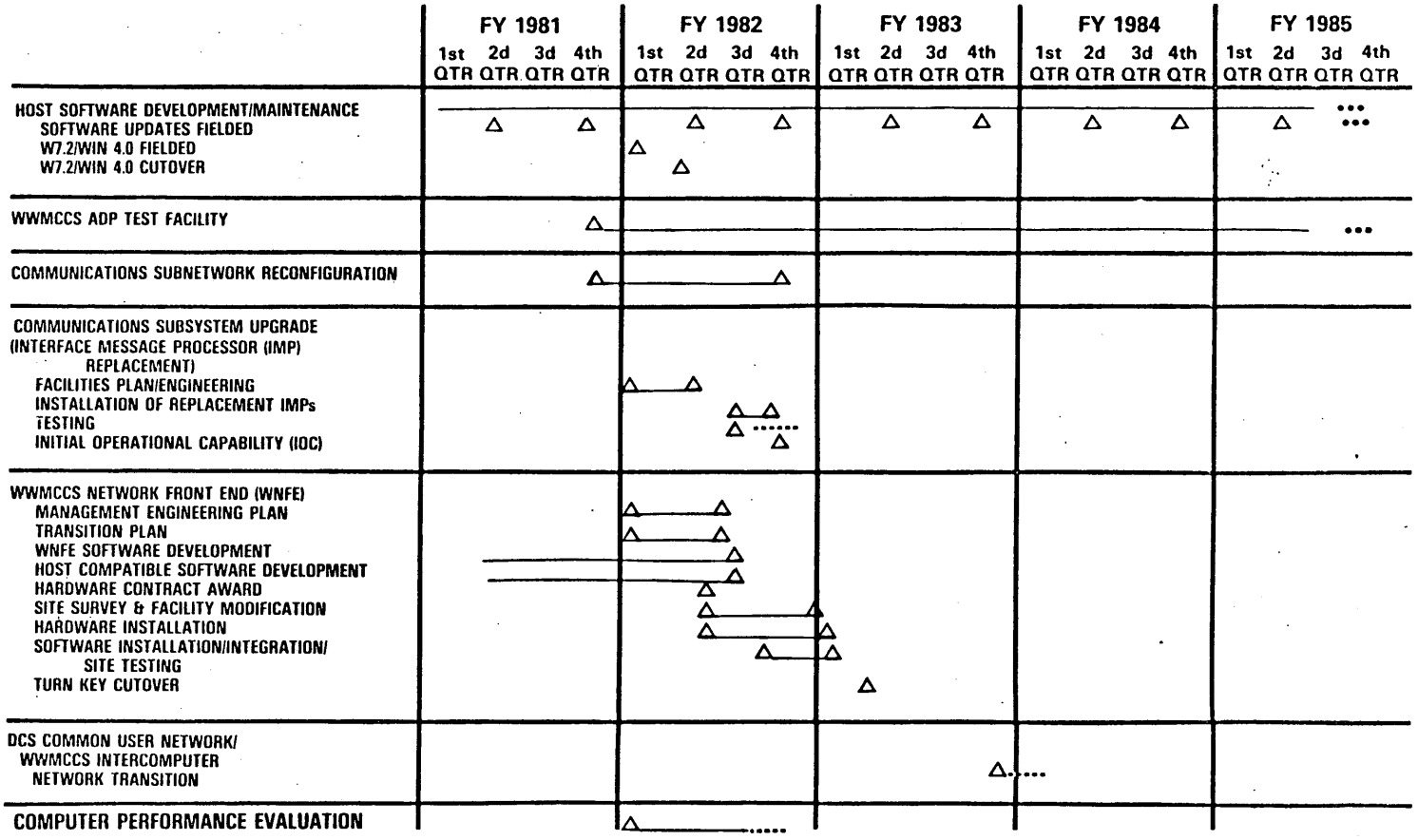
i. Memorandum by the Assistant Secretary of Defense (Communications, Command, Control, and Intelligence), 29 December 1980, "WIN Reliability."

j. WWMCCS Information System (WIS) Modernization Plan, 19 January 1981.

k. JCSM-105-81, 10 February 1981, "WWMCCS Intercomputer Network Reconfiguration Plan."

TABLE 1

WWMCCS INTERCOMPUTER NETWORK OVERALL MILESTONE SUMMARY



NOTE: SCHEDULES SHOWN ABOVE REFLECT PRELIMINARY PLANNING ESTIMATES. FINAL MILESTONES WILL BE BE BASED UPON COORDINATED MEPs.

Table 2

Communications Services Industrial Fund
($ in Thousands)

	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985
Army	299	300	687	562	601
Navy	109	108	819	675	722
Air Force	343	336	1,214	995	1,065
DCA	24	26	264	216	231
DNA	8	8	158	129	138
	783	778	3,142	2,577	2,757

Note: Revenue to Communications Services Industrial Fund, Actual WWMCCS Intercomputer Network Backbone Expense:

FY 1981 (5 months)	- 890
FY 1982	- 2,115
FY 1983	- 2,410

FY 1981 and FY 1982 figures do not exceed budgeted funding and are lower than actual expenditure.

FY 1983 includes compensation for excess expenditure in FY 1981 and FY 1982.

FY 1984 and FY 1985 are planning estimates based on FY 1983 anticipated actual expense plus an annual inflation rate of 7 percent.

FY 1983 through FY 1985 figures include planning estimates of $500K per year for hardware and software maintenance of the Interface Message Processors.

Table 3

Communication Subsystem Upgrade Cost Summary 1/
($ in Thousands)

	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985
O&M (DCA) 2/		360			
RDT&E (DCA)		818 + 1000 3/			
Procurement 4/					

1/ Funding requirements for unique site preparation and engineering are not included.
2/ Interface message processor maintenance costs included under Communications Services Industrial Fund.
3/ Includes Air Force Military Interdepartmental Procurement Request of FY 1982 supplemental funding.
4/ Procurement via DCA RDT&E.

TABLE 4

WWMCCS NETWORK FRONT END COST SUMMARY
($ IN THOUSANDS)

	FY 1981	FY 1982		FY 1983		FY 1984	FY 1985
		REQUIRED	PROGRAMMED	REQUIRED	PROGRAMMED		
RDT&E							
DCA	2108		2445		2100	1100	
		REQUIRED	PROGRAMMED	REQUIRED	PROGRAMMED		
O&M [1]							
ARMY	-	160	-	183	180	183	183
NAVY	-	165	-	191	190	191	191
AIR FORCE	-	275	-	338	80	338	338
DCA	-	630	65	650	200	400	400
DNA	-	29	-	35	35	35	35
TOTAL	-	1259 [3]	65	1397 [3]	685	1147	1147
		REQUIRED	PROGRAMMED	REQUIRED	PROGRAMMED		
PROCUREMENT							
ARMY		1200	496.5	-	1000		
NAVY		1200	496.5	-	1326		
AIR FORCE		2000 [4]	827.5	-	-		
DCA		1200	896.5	-	800		
DNA		200	83.0	-	-		
TOTAL		5800 [3]	2800 [2]	-	3126		

1] FY 1982 AND FY 1983 O&M MAINTENANCE MAY BE LOWER DEPENDING ON MONTH NETWORK FRONT END IS INSTALLED.
2] INCLUDES FY 1982 2400K SUPPLEMENTAL; EXCESS TO BE USED TO SUPPLEMENT SERVICE AND AGENCY SHORTFALLS IN FY 1982 AND FY 1983.
3] SERVICES AND AGENCIES ARE REQUIRED TO PROVIDE ONLY THE FUNDING PROGRAMMED.
4] INCLUDES 200K FOR NETWORK FRONT END TO BE INSTALLED AT AIR TRAINING COMMAND, IF REQUIRED.
NOTE: FUNDING REQUIREMENTS FOR UNIQUE SITE PREPARATION AND ENGINEERING ARE NOT INCLUDED AND NOT PROGRAMMED FOR FY 1982.

Table 5

DCA Current Architecture Enhancements Cost Summary
($ in Thousands)

	FY 1982	FY 1983	FY 1984	FY 1985
O&M 1/2/				
WWMCCS Intercomputer Network (WIN) Software (SW) Development	380	297	250	300
Network Operations Center Enhancements	184	224	306	200
Incident Control	135	160	100	100
Configuration Management	78	10	14	14
Release Integration	156	150	111	111
Onsite Support	45	40	60	60
WIN SW Maintenance	385	359	394	461
Host SW Maintenance	121	92	169	169
Communications SW Maintenance	73	89	163	163
Communications Testbed (Test Facility)	292	174	290	319
Computer Performance Evaluation (CPE)	100	231	388	438
Total	1,949	1,826	2,245	2,335
RDT&E				
Host Software Development	604	1,580	1,037	777

1/ Program Element 32017K.
2/ The functions listed in this table neither connotate nor imply prioritization of effort. Prioritization of efforts will be accomplished in accordance with Annex B, Volume I, JCS Pub 19.