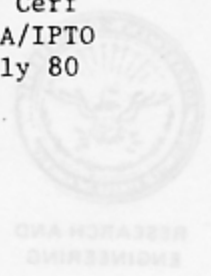


THE UNDER SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301



DoD Protocol Standardization

The attached memoranda from the Principal Deputy Undersecretary of Defense for Research and Engineering and from the Assistant Secretary of Defense (Communications, Command, Control and Intelligence) describe the DoD plans for standardizing internet protocols. The first two are the Internet Protocol and the Transmission Control Protocol.

The DARPA Internet project will continue to provide technical support for the DoD standardization effort, including the test and evaluation of selected proposed standards.

SUBJECT: Host-to-Host Protocols for Data Communications Networks

A number of data communications networks are operating or under development within DoD, without adequate provisions for interoperability. AUTODIN II is expected to become operational during FY 1980, to provide common-user data communications services for DoD computer systems and control systems. Plans for reduction in the number of specialized data networks such as the DMCS Intercomputer Network (DMCS), the SAC Digital Handling System Communications (DHSC) and the SAC Digital Network (SACDN), among others. Local networks such as the Community On-Line Intelligence Network System (COLINS) and certain tactical networks must have effective AUTODIN II interfaces.

AUTODIN II will provide connectivity for a wide range of systems, but the potential for information exchange beyond narrowly defined communities will be limited without appropriate standards for internet, host-to-host, terminal-to-host and other protocols. As the need to exchange information across network boundaries increases, lack of common protocol standards will become a formidable barrier to interoperability. Techniques in which the protocols of one network are translated into the protocols of another will become increasingly unworkable as the number of protocols and networks requiring interconnection increases.

To insure interoperability of future data networks, I am directing the adoption of a set of DoD standard host-to-host protocols based on the Transmission Control and Internet



RESEARCH AND
ENGINEERING

THE UNDER SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301

23 DEC 1978

MEMORANDUM FOR SECRETARY OF THE ARMY
SECRETARY OF THE NAVY
SECRETARY OF THE AIR FORCE
CHAIRMAN, JOINT CHIEFS OF STAFF
DIRECTOR, DEFENSE ADVANCED RESEARCH PROJECTS
AGENCY
DIRECTOR, DEFENSE COMMUNICATIONS AGENCY
DIRECTOR, DEFENSE INTELLIGENCE AGENCY
DIRECTOR, DEFENSE LOGISTICS AGENCY
DIRECTOR, NATIONAL SECURITY AGENCY

SUBJECT: Host-to-Host Protocols for Data Communications
Networks

A number of data communications networks are operating or under development within DoD, without adequate provisions for interoperability. AUTODIN II is expected to become operational during FY 1980, to provide common-user data communications service for DoD computer systems and permit a reduction in the number of specialized data networks. Plans are under way to incorporate within AUTODIN II networks such as the WWMCCS Intercomputer Network (WIN), Intelligence Data Handling System Communications (IDHSC) and the SAC Digital Network (SACDIN), among others. Local networks such as the Community On-Line Intelligence Network System (COINS) and certain tactical networks must have effective AUTODIN II interfaces.

AUTODIN II will provide connectivity for a wide range of systems, but the potential for information exchange beyond narrowly defined communities will be limited without appropriate standards for internet, host-to-host, terminal-to-host and other protocols. As the need to exchange information across network boundaries increases, lack of common protocol standards will become a formidable barrier to interoperability. Techniques in which the protocols of one network are translated into the protocols of another will become increasingly unworkable as the number of protocols and networks requiring interoperation increases.

To insure interoperability of future data networking, I am directing the adoption of a set of DoD standard host-to-host protocols based on the Transmission Control and Internet



Protocols (TCP/IP version 4) developed in the DARPA/DCA internetwork community. DoD requirements for precedence, security, and community of interest controls will be incorporated within the standard protocol set. Use of these protocols will be mandatory for all packet-oriented data networks where there is a potential for host-to-host connectivity across network or subnetwork boundaries. Case-by-case exceptions will be granted only for networks that can be shown to have no future requirements for interoperability. Because the host-to-host protocol being developed for AUTODIN II evolved from an early version of TCP and is unsuitable for internetwork operation, the AUTODIN II TCP will have to be upgraded to the standard protocol set. Recognizing that there may be cost and schedule impacts on the AUTODIN II program, the Defense Communications Agency should perform a cost tradeoff analysis to determine the optimum time for this transition. DCA should provide the results of this analysis by April 1979.

To address these and future protocol issues and promulgate appropriate standards, I am forming an OSD Protocol Standards Working Group chaired by the Director, Information Systems. I ask each addressee to nominate a representative. Names should be provided by 8 January 1979 to LTC Wilcox (695-3287). The first task of this group will be to finalize details of the standard host-to-host protocol set. Draft specifications for these protocols will be available in January 1979. Final specifications should be distributed by April 1979 following review by the working group and testing by DCA and DARPA. At that time, I expect to promulgate these standards and set dates for their adoption.

The Defense Communications Agency is designated as DoD Executive Agent for computer communications protocols and will manage the implementation and development and evolution of standard host-to-host protocols, as designated by the Protocol Standards Working Group. The DCA will forward to this office within 120 days a management plan for carrying out this role.

Gerald P. Dinneen

Gerald P. Dinneen
Principal Deputy



ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301

COMMUNICATIONS,
COMMAND, CONTROL,
AND INTELLIGENCE

8 APR 1980

MEMORANDUM FOR SECRETARY OF THE ARMY
SECRETARY OF THE NAVY
SECRETARY OF THE AIR FORCE
CHAIRMAN, JOINT CHIEFS OF STAFF
DIRECTOR, DEFENSE ADVANCED RESEARCH PROJECTS AGENCY
DIRECTOR, DEFENSE COMMUNICATIONS AGENCY
DIRECTOR, DEFENSE INTELLIGENCE AGENCY
DIRECTOR, DEFENSE LOGISTICS AGENCY
DIRECTOR, NATIONAL SECURITY AGENCY

SUBJECT: Host-to-Host Data Communications Protocols

The revised Management Plan for Standardization of Host-to-Host Data Communications Protocols (enclosure 1) is approved. The plan has been modified to emphasize DCA's direct responsibilities as Executive Agent.

The DoD Standard Transmission Control Protocol and Internet Protocol Specifications (enclosure 2) are hereby ratified. Use of these protocols is mandatory for all packet-oriented data networks where there is a potential for host-to-host connectivity across network or subnetwork boundaries. In order to facilitate rapid implementation of these protocols on DoD networks, the Defense Communications Agency, as part of its Executive Agent role, will prepare a series of workshop/seminars and implementation support documents to assist the DoD activities in implementing these protocols. The AUTODIN II implementation of these protocol standards will take place as soon after AUTODIN II IOC as possible.

I would like to thank all those who participated in the OSD Protocol Standards Working Group during the past year. That Working Group is hereby disestablished and its responsibilities are transferred to the various DCA panels as defined in the Executive Agent Charter.

Gerald P. Dinnin

Enclosures 2

MANAGEMENT PLAN

For

EXECUTIVE AGENT FOR STANDARDIZATION OF HOST-TO-HOST DATA COMMUNICATIONS PROTOCOLS IN THE DOD

1. Reference. USDRE Memo, Host-to-Host Protocols for Data Communications Networks, 23 Dec 78.

2. Introduction. This paper constitutes the Executive Agent Management Plan for Standardization of Data Communications Protocols in the DoD. This Plan identifies the major functions, the organization and responsibilities of the Director, Defense Communications Agency as the Executive Agent and the responsibilities of the Military Departments and DoD Agencies for supporting the Executive Agent.

3. Authority. The authority for establishing the Director, Defense Communications Agency (DCA) as the Executive Agent for Standardization of Host-to-Host Data Communications Protocols in the DoD is contained in the reference. A more permanent authority will be provided by a DoD Directive which will be drafted by DCA for the signature of the Principal Deputy Under Secretary of Defense, Research and Engineering, upon approval of this Plan.

4. Background. Protocols are the rules of performance for data communications networks; and these rules pervade all levels of performance, from electrical interfaces to the interactions among user processes within host computers. Hence, the standardization of protocols is of interest and concern to a number of organizational elements, including operators, program managers, systems engineers, standards groups and users. Judicious management of protocol standards can do much to enhance the value of DoD data communications services. Conversely, lax management of standards on the one hand, or overly zealous insistence on unnecessary conformity on the other, can cause user dissatisfaction and spawn proposals for special-purpose networks.

Within DCA, the Deputy Directors for Systems Engineering, Command and Control Systems, Command and Control Technical Support, Plans and Programs, and Operations and Readiness have clear and vital interests in this important area, and their full and active participation is essential to the success of the Executive Agent's protocol standardization efforts. Moreover, it is important to have the participation of user representatives from the Services, Defense Agencies OJCS and JINTACCS to ensure responsiveness of the Executive Agent to user operational requirements. Likewise, the participation of the National Communications System is essential so that the Executive Agent can benefit from NCS federal and international standards experience. The participation of non-DoD government organizations who are concerned with protocol standardization, such as the Intelligence Community Staff and the National Bureau of Standards, is useful and will therefore be invited.

5. Functions of the Executive Agent. The Director, DCA, as Executive Agent, will manage the development, implementation and evolution of standard host-to-host and higher level data communications protocols. Specifically, the Executive Agent will perform the following functions:

- a. Provide a forum for discussion with Services and Defense Agencies on requirements for new standards.
- b. Based on identified requirements, cause new proposals for standardization or for enhancements and modifications to existing standards to be specified.
- c. Prepare, distribute and maintain documentation of the standards and their specifications.
- d. Maintain configuration control of the standards and their specifications.
- e. Evaluate and approve or disapprove proposed standards and specifications for use by the DoD.
- f. Evaluate and approve or disapprove requests for waivers received from the Services and Defense Agencies.
- g. Test proposed standards and specifications.
- h. Coordinate a DoD RDTE effort to develop new protocols and identify items having standardization potential.
- i. Provide a forum for exchange of technical information on host-to-host and higher level data communications protocols.
- j. Monitor federal, national and international standards developments to ensure that DoD requirements have appropriate influence in standardization forums.
- k. Ensure that DoD standards are developed with due consideration of emerging federal, national and international standards as appropriate.

6. Organization. DCA will use resources from its headquarters directorates and field offices to carry out the functions of the Executive Agent delineated in paragraph 5 above. The principal responsibilities will be assumed by the Systems Engineering Directorate (DCA Code 1000) for technical functions, and by the Operations and Readiness Directorate (DCA Code 500) for configuration control functions. To provide for the full participation of the Military Departments, Defense Agencies and other DoD components, two panels, a Protocol Configuration Control Board (PCCB) and a Protocol Standards Technical Panel (PSTP), will be established to advise and assist DCA in performing the Executive Agent functions. A Protocol Standards Steering Group (PSSG), also comprised of representatives of representatives of all interested DoD components, will provide overall direction to the effort and will advise the Director, DCA, on policy matters.

The relationship among the several organizational elements assigned functions in support of the Executive Agent are portrayed in Figure 1, and their responsibilities and membership are defined as follows:

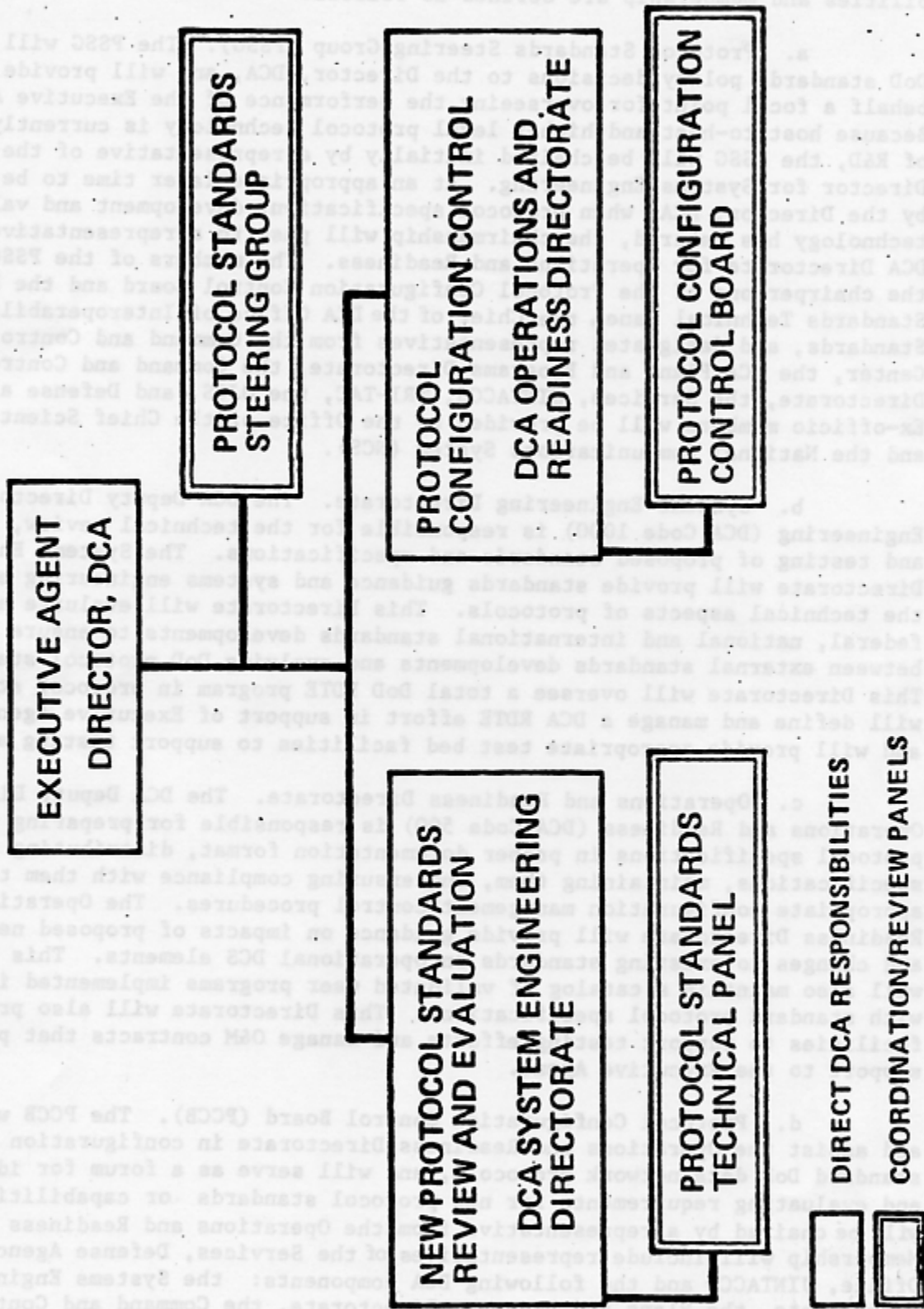
a. Protocol Standards Steering Group (PSSG). The PSSG will recommend DoD standards policy decisions to the Director, DCA, and will provide on his behalf a focal point for overseeing the performance of the Executive Agent functions. Because host-to-host and higher level protocol technology is currently a subject of R&D, the PSSG will be chaired initially by a representative of the DCA Deputy Director for Systems Engineering. At an appropriate later time to be designated by the Director, DCA, when protocol specification, development and validation technology has matured, the chairmanship will pass to a representative of the DCA Directorate for Operations and Readiness. The members of the PSSG will be the chairpersons of the Protocol Configuration Control Board and the Protocol Standards Technical Panel, the Chief of the DCA Office of Interoperability and Standards, and designated representatives from the Command and Control Technical Center, the DCA Plans and Programs Directorate, the Command and Control Systems Directorate, the Services, JINTACCS, TRI-TAC, the OJCS, and Defense agencies. Ex-officio members will be provided by the Office of the Chief Scientist, DCA, and the National Communications System (NCS).

b. Systems Engineering Directorate. The DCA Deputy Director for Systems Engineering (DCA Code 1000) is responsible for the technical review, evaluation and testing of proposed standards and specifications. The Systems Engineering Directorate will provide standards guidance and systems engineering expertise on the technical aspects of protocols. This Directorate will evaluate and monitor federal, national and international standards developments to ensure compatibility between external standards developments and evolving DoD protocol standards. This Directorate will oversee a total DoD RDTE program in protocol standardization, will define and manage a DCA RDTE effort in support of Executive Agent functions, and will provide appropriate test bed facilities to support testing activities.

c. Operations and Readiness Directorate. The DCA Deputy Director for Operations and Readiness (DCA Code 500) is responsible for preparing standard protocol specifications in proper documentation format, distributing these specifications, maintaining them, and ensuring compliance with them through appropriate configuration management control procedures. The Operations and Readiness Directorate will provide guidance on impacts of proposed new standards and changes to existing standards on operational DCS elements. This Directorate will also maintain a catalog of validated user programs implemented in accordance with standard protocol specifications. This Directorate will also provide network facilities to support testing efforts and manage O&M contracts that provide support to the Executive Agent.

d. Protocol Configuration Control Board (PCCB). The PCCB will advise and assist the Operations and Readiness Directorate in configuration control of standard DoD data network protocols, and will serve as a forum for identifying and evaluating requirements for new protocol standards or capabilities. The PCCB will be chaired by a representative from the Operations and Readiness Directorate. Membership will include representatives of the Services, Defense Agencies, TRI-TAC Office, JINTACCS and the following DCA components: the Systems Engineering Directorate, the Plans and Programs Directorate, the Command and Control Systems Directorate and the Command and Control Technical Center.

EXECUTIVE AGENT FOR STANDARDIZATION OF HOST-TO-HOST DATA COMMUNICATIONS PROTOCOLS



Figure

e. Protocol Standards Technical Panel (PSTP). The PSTP will assist the DCA Systems Engineering Directorate in accomplishing the technical functions of the Executive Agent. The panel will be chaired by a representative of the Systems Engineering Directorate. Membership will consist of representatives from the DCA Office of Interoperability and Standards, the Operations and Readiness Directorate, the Plans and Programs Directorate, the Command and Control Systems Directorate, the Command and Control Technical Center, and technical experts selected by the Services, JINTACCS, TRI-TAC and Defense Agencies. Ex-officio members will be provided by the Office of the Chief Scientist and the National Communications System (NCS), and will be invited from the Intelligence Community (IC) Staff and from the National Bureau of Standards (NBS).

f. DCA Interoperability and Standards Office. The functions of the DCA Interoperability and Standards Office stem from the DCA charter, DoD Directive 5105.19, which directs DCA to develop standards for the DCS. The functions are further elaborated in a 23 January 1969 OASD memorandum which assigns DCA the responsibility for development of long-haul communications standards for the DoD, and in DoD Directives 4120.3 and 4120.3M which prescribe policies and procedures for the Defense Standardization and Specification Program (DSSP). In accordance with these responsibilities, the DCA Office of Interoperability and Standards, Code R110, will have the responsibility for reviewing proposed protocol standards for DoD long-haul communications. These processes will be accomplished in accordance with the procedures established under the Defense Standardization and Specification Program (DSSP) and will be based upon a clear delineation of valid requirements. This office will closely monitor and evaluate the development of federal and nongovernment standards in order to adopt such standards where appropriate and to minimize the differences between such standards and DoD standards to the greatest possible extent.

g. Air Force Directorate of Computer Resources. A 17 December 1965 OASD memorandum assigned USAF the responsibility for developing computer standards for the Department of Defense. In accordance with these responsibilities, the Air Force Directorate of Computer Resources (AF/ACDX) will have the responsibility for coordinating with the Department of Defense computer standards community those draft data communications standards developed under this plan which dictate an interface with computer equipment. This coordination will be accomplished in accordance with the provisions of the Memorandum of Understanding between HQ USAF/ACDX, the DCA (Code R110), and the US Army (Communications, Research and Development Command), of 5 April 1974.

7. Required Resources. The DCA, as the Executive Agent, will apply available facility resources to support the above functions but will require additional dollars and personnel resources.

a. Facilities.

(1) Test bed facilities required to support the above functions are available within the Hybrid Simulation Facility (HSF) at the Defense Communications Engineering Center — e.g., the Experimental Data Network (EDN). Enhancements which may be required to support the functions of the Executive Agent will be handled under normal HSF upgrade procedures.

(2) Network facilities required to support the above functions are available within ARPANET.

b. Dollars.

(1) RDTE funds required to support the above RDTE functions can be made available within the DCS RDTE appropriation. Some augmentation of funds in the out years may be necessary.

(2) O&M funds which will be required for facilities and contractor support will be identified and justified under normal budgetary procedures.

c. Personnel.

(1) Personnel needed to staff the Steering Group, the PSTP and the PCCB will be made available from the DCA, the Services and other Defense Agencies on a part-time basis.

(2) Additional personnel which will be required to perform the detailed management and technical support within the DCA Systems Engineering and Operations and Readiness Directorates remain to be identified.