

**5 June 2003**

**MIL-STD-2045-44500  
COORDINATION DRAFT**

**This Change Notice is being presented as  
a draft document for review purposes**

**NOTICE OF  
CHANGE**

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SENSITIVE**

**MIL-STD-2045-44500  
DRAFT NOTICE 3  
[DATE]**

**DEPARTMENT OF DEFENSE INTERFACE STANDARD  
TACTICAL COMMUNICATIONS PROTOCOL 2 (TACO2)  
FOR THE NATIONAL IMAGERY TRANSMISSION FORMAT STANDARD**

TO: ALL HOLDERS OF MIL-STD-2045-44500:

1. THE FOLLOWING PAGES OF MIL-STD-2045-44500 HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
COVER		Cover	27 June 1996
ii		ii	27 June 1996
1		1	27 June 1996
2		Reprinted without change	
3		3	27 June 1996
4		4	27 June 1996
5		5	27 June 1996
6		6	27 June 1996
81		Reprinted without change	
82		82	29 July 1994
DD1426		DD1426	27 June 1996

2. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

3. Holders of MIL-STD-2045-44500 will verify that page changes and additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the military standard is completely revised or canceled.

Custodians:		Preparing Activity:
Army:	AC	CI
Navy:	OM	
Air Force:	02	(Project DCPS-0092)
MISC:	NC	

AMSC N/A

AREA DCPS

**NOT MEASUREMENT  
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**DRAFT**

**MIL-STD-2045-44500  
18 June 1993**

# **DEPARTMENT OF DEFENSE INTERFACE STANDARD**

## **TACTICAL COMMUNICATIONS PROTOCOL 2 (TACO2) FOR THE NATIONAL IMAGERY TRANSMISSION FORMAT STANDARD**



**AMSC N/A**

**AREA DCPS**

**DRAFT - Supersedes cover of MIL-STD-2045-44500, Notice 2**

## FOREWORD

1. This standard is approved for use by all Departments and Agencies of the Department of Defense (DOD).

2. The National Imagery Transmission Format Standard (NITFS) is the standard for formatting digital imagery and imagery-related products and exchanging them among members of the Intelligence Community (IC) as defined by Executive Order 12333, DOD, and other departments and agencies of the United States Government as governed by Memoranda of Agreement (MOA) with those departments and agencies.

3. The National Imagery Transmission Format Standard Technical Board (NTB) developed this standard based upon currently available technical information.

4. The DOD and members of the IC are committed to interoperability of systems used for formatting, transmitting, receiving, and processing imagery and imagery-related information. This standard describes the TActical COmmunication protocol 2 (TACO2) requirements and establishes its application within the NITFS.

5. As a result of a Defense Information Systems Agency (DISA) action, standards for all military data communication protocols will be published in a MIL-STD-2045 series of documents. A MIL-STD-2045 document series has been established within the Data Communications Protocol Standards (DCPS) standardization area.

a. MIL-STD-2045-10000 series. MIL-STD-2045-10000 to MIL-STD-2045-19999 inclusive, will be used to describe DOD's implementation of commercial, international, national, federal, and military standards within the functional profile concept, in order to provide required network services. U.S. Government Opeystems Interconnection Profile (GOSIP) will be the basis for developing the 10000 series with DOD enhancements and unique military standards.

b. MIL-STD-2045-20000 series. MIL-STD-2045-20000 to MIL-STD-2045-29999 inclusive, will be used to describe DOD enhancements and extensions to existing commercial, international, national, or federal standards.

c. MIL-STD-2045-30000 series. MIL-STD-2045-30000 to MIL-STD-2045-39999 inclusive, will be used to describe DOD unique protocols and services that are not supported by commercial, international, national, or federal standards.

d. MIL-STD-2045-40000 series. MIL-STD-2045-40000 to MIL-STD-2045-49999 inclusive, will be used to document interim standards. Interim standards are documents DOD needs until these standards are described in either GOSIP or MIL-STD-2045-20000 or 30000 series standards.

6. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to National Imagery and Mapping Agency (NIMA), ATTN: ETAS (MS P-24), 12100 Sunset Hills Road Reston, VA 22190 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

## 1. SCOPE

1.1 Scope. This document establishes the requirements for the Tactical Communications protocol 2 (TACO2), part of the National Imagery Transmission Format Standard (NITFS). National Imagery Transmission Format (NITF) is a standard format for transmitting digital imagery and imagery-related products among members of the Intelligence Community (IC), and TACO2 is a protocol suite that may be used for that transmission. It includes requirements for Forward Error Correction (FEC), which is necessary to ensure interoperability and to promote commonality among subsystems that comply with NITFS.

1.2 Content. This standard establishes the requirements to be met by systems complying with NITFS when using the TACO2 protocol, and defines the protocols and formats that make up TACO2. All aspects of TACO2 that affect functional interoperability are specified herein. In addition, guidance is provided for those aspects of TACO2 operation that are not strictly related to interoperability but may affect technical performance or resistance to error.

1.3 Applicability. This standard is applicable to the IC and the Department of Defense (DOD). Its primary application is for Secondary Imagery Dissemination Systems (SIDS) in accordance with the memorandum by the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence ASD(C3I), Subject: National Imagery Transmission Format Standard (NITFS), 12 August 1991. This directive shall be implemented in accordance with guidelines in NIMA N0105.

1.4 Protocol tailoring. TACO2 is designed as a single protocol stack that provides for message transfer over a wide variety of tactical communication circuits. It is particularly appropriate for use over circuits where other protocol suites operate poorly or not at all, but also is designed to perform well over any communications circuit. It can transfer any form of data, since it does not use any internal component of an NITFS message. It can be configured to operate over circuits not anticipated at initial installation; therefore, a conforming TACO2 implementation must implement all capabilities specified herein, except as specifically noted. The possible ranges of various parameters may be limited for specific applications; mandatory ranges are specified in this document. Additional information on NITFS compliance is available in NIMA N0105.

1.5 FEC tailoring. As a minimum, only those features or functions specified herein, necessary to ensure interoperability among systems, shall be implemented in an equipment item. While every effort has been made to include all the features necessary, certain aspects depend on system application and must be tailored by the specification writer. These aspects include:

- a. User choice of appropriate FEC selection.
- b. Automatic switching of FEC code based on the conditions of the tactical line.
- c. Inhibiting external or internal FEC codes.
- d. Using an external FEC code if it is desired.



## 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, and 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in section 3, 4, and 5 of this stanedard, whether or not they are listed.

### 2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplements thereto, cited in the solicitation.

#### STANDARDS

##### FEDERAL

FED-STD-1037B - Telecommunications: Glossary of Telecommunication Terms.

##### MILITARY

MIL-STD-188-114A - Electrical Characteristics of Digital Interface Circuits.

MIL-STD-2500 - National Imagery Transmission Format for the National Imagery Transmission Format Standard (NITFS).

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

NATIONAL IMAGERY AND MAPPING AGENCY PUBLICATIONS

- NIMA N0105 - National Imagery Transmission Format Standard (NITFS) Standards Compliance and Interoperability Test and Evaluation Program Plan

(Copies of NIMA documents can be obtained from the web at <http://www.ismc.nima.mil/ntb/baseline/toc.html> or National Imagery and Mapping Agency, ATTN: ETAS (MS P-24), 12310 Sunrise Valley Drive, Reston, VA 20191-3449

2.3 Non-Government publications The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation.

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

- ISO 3309 - High-Level Data Link Control Procedures - Frame Structure, International Organization for Standardization, Switzerland.
- ISO 7498 - Open systems interconnection - basic reference model International Organization for Standardization, Switzerland.
- ISO 8825 - Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1), International Organization for Standardization, Switzerland.
- ISO 9171 - Recorded/Unrecorded Characteristics of 130 mm Optical Disk Cartridges.

(Application for copies of ISO standards should be addressed to the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- ANSI X3.4-198 - American National Standard Code for Interchange (ASCII), 1986.

(Application for copies of ANSI X3.4-1986 should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018-3308.)

INTERNET RFCs

- RFC 791 - Internet Protocol, Postel, J.B., 1981.
- RFC 792 - Internet Control Message Protocol, Postel, J.B., 1981.
- RFC 919 - Broadcasting Internet datagrams, Mogul, J.C., 1984.
- RFC 922 - Broadcasting Internet datagrams in the presence of subnets, Mogul, J.C., 1984.
- RFC 950 - Internet standard subnetting procedure, Mogul, J.C.; Postel, J.B., 1985.
- RFC 998 - NETBLT: A bulk data transfer protocol, Clark, D.D.; Lambert, M.L.; Zhang, L., 1987.
- RFC 1055 - Nonstandard for transmission of IP datagrams over serial lines: SLIP, Romkey, J.L., 1988.
- RFC 1108 - Security Options for the Internet Protocol, Kent, S., 1991.
- RFC 1112 - Host extensions for IP multicasting, Deering, S.E., 1989.

(Internet RFCs can be accessed at Universal Resource Locator (URL) [www.faqs.org/rfcs/index.html](http://www.faqs.org/rfcs/index.html).)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.



6.5 Effectivity summary. Some of the capabilities specified in this document are not required as of the issue date of the document. All such capabilities are marked with effectivity numbers, for example, (Effectivity 1). Each effectivity number will be replaced by a specific date in subsequent releases of this document.

6.5.1 Effectivity 1 - FEC I and Bit Error Ratio Test (BERT).

- a. 4.1.6 FEC. Forward Error Correction (FEC) is a mandatory component of the TACO2 protocol stack whose use in a particular circuit is user selectable (Effectivity 1).

6.5.2 Effectivity 2 - FEC II.

- a. APPENDIX C FEC-II CODE. (The contents of this section are (Effectivity 2) pending further implementation and testing of the proposed FEC code.)
- b. 5.4.2.2.3 FEC-II. FEC-II is applied to a SLIP and/or HDLC encapsulated datalink as described in appendix C (Effectivity 2).

6.5.3 Effectivity 3 - Header abbreviation and client-controlled flow.

- a. 4.1.5 Header Abbreviation sublayer. TACO2 provides a mechanism for header abbreviation across point-to-point links. Use of the header abbreviation sublayer is optional: its inclusion in any compliant implementation of TACO2 shall be mandatory (Effectivity 3).
- b. 5.2.3.5 Client-controlled flow. (Effectivity 3)
- c. 5.4.1 Header Abbreviation sublayer. TACO2 provides a mechanism for header abbreviation across point-to-point links. Use of the header abbreviation sublayer is optional: its inclusion in any compliant implementation of TACO2 shall be mandatory (Effectivity 3).

6.5.4 Effectivity 4 - Pull vs. push.

- a. 5.1 NITFS reliable transfer server for TACO2 (TACO2 NRTS). The TACO2 NRTS described here assumes an active sender and a passive receiver ("push" operation); as of the effectivity date (Effectivity 4) the TACO2 NRTS shall also support an active receiver and passive sender ("pull" operation).
- b. 5.2.9.2.5 Direction. (Effectivity 4) Until the effectivity date, operation of TACO2 is defined only for "M" set to 1; that is, TACO2 allows only active sending and passive receiving. Following that date, operation with "M" set to 0 is also permissible.

6.5.5 Effectivity 5 - Multicast.

- a. 5.3.1.1 IP augmentations. ... TACO2 supports a limited form of multicasting by allowing simplex receivers to "listen in" on simplex, half-duplex, or full-duplex transmissions; (Effectivity 5: later versions of TACO2 may support acknowledged multicast).

6.5.6 Effectivity 6 - Medium Access Control layer.

- a. 5.4 Data link layer. The Data Link layer in TACO2 is divided into three sublayers: Header Abbreviation, FEC, and Framing. (Effectivity 6: a Medium Access Control Layer, just below the Framing Sublayer, is under consideration.)

6.5.7 Effectivity 8 - Defense Information Systems Network (DISN).

- a. Effectivity 8 no longer applies.

6.7 Subject term (key word) listing.

Error detection  
Forward error correction (FEC)  
Frames  
HDLC  
ICMP  
IP  
Message Transfer Facility  
NETBLT  
Packets  
Secondary Imagery Dissemination Systems  
SIDS  
SLIP

**STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL**

INSTRUCTIONS

1. The preparing activity must complete blocks 1,2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

<b>I RECOMMEND A CHANGE:</b>	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	<b>MIL-STD-2045-44500</b>	<b>930618</b>

3. DOCUMENT TITLE  
**TACTICAL COMMUNICATIONS PROTOCOL 2 (TACO2) FOR THE NITFS**

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME <i>(Last, First, Middle Initial)</i>	b. ORGANIZATION	
c. ADDRESS <i>(Include Zip Code)</i>	d. TELEPHONE <i>(Include Area Code)</i>	7. DATE SUBMITTED <i>(YYMMDD)</i>
	(1) Commercial  (2) AUTOVON <i>(If applicable)</i>	

8. PREPARING ACTIVITY  
**NATIONAL IMAGERY AND MAPPING AGENCY**

a. NAME <b>ETAS (MS P-24)</b>	b. TELEPHONE <i>(Include Area Code)</i> (1) Commercial <b>(703) 375-2997</b> (2) AUTOVON
c. ADDRESS <i>(Include Zip Code)</i> <b>12100 Sunset Hills Road Reston, VA 22190</b>	<b>IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:</b> Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340          AUTOVON 289-2340