

U.S. DEPARTMENT OF COMMERCE  
Technology Administration  
National Institute of Standards and Technology



**FIPS PUB 164**

**FEDERAL INFORMATION PROCESSING STANDARDS PUBLICATION**  
(Supersedes FIPS PUB 133/Former Federal Standard 1005A)

**2,400 BITS PER SECOND FOUR-WIRE DUPLEX  
AND TWO-WIRE HALF-DUPLEX MODEMS FOR  
DATA COMMUNICATIONS USE ON  
TELEPHONE-TYPE CIRCUITS**

REFERENCE

**CATEGORY: TELECOMMUNICATIONS STANDARD**

**SUBCATEGORY: MODEMS**

1992 APRIL 2

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PUBLICATION TITLE

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CHANGE ITEM(S)

FIPS publications 133, 134-1, 135, and 136 have been withdrawn from the FIPS series and superseded by the FIPS listed below. This change notice should be filed with each withdrawn FIPS.

FIPS PUB 162 - 1,200 Bits Per Second Two-Wire Duplex Modems for Data Communications Use on Telephone-Type Circuits, 1992 April 2 replaces FIPS PUB 136.

FIPS PUB 163 - 2,400 Bits Per Second Two-Wire Duplex Modems for Data Communications Use on Telephone-Type Circuits, 1992 April 2

and

FIPS PUB 164 - 2,400 Bits Per Second Four-Wire Duplex and Two-Wire Half-Duplex Modems for Data Communications Use on Telephone-Type Circuits, 1992 April 2 replaces FIPS PUB 133.

FIPS PUB 165 - 4,800 Bits Per Second Four-Wire Duplex and Two-Wire Half-Duplex Modems for Data Communications Use on Telephone-Type Circuits, 1992 April 2

and

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# FIPS PUB 164

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## 2,400 BITS PER SECOND FOUR-WIRE DUPLEX AND TWO-WIRE HALF-DUPLEX MODEMS FOR DATA COMMUNICATIONS USE ON TELEPHONE-TYPE CIRCUITS

CATEGORY: TELECOMMUNICATIONS STANDARD

SUBCATEGORY: MODEMS

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Computer Systems Laboratory  
National Institute of Standards and Technology  
Gaithersburg, MD 20899

Office of Technology and Standards  
National Communications System  
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## Foreword

The Federal Information Processing Standards Publication Series of the National Institute of Standards and Technology (NIST) is the official publication relating to standards and guidelines adopted and promulgated under the provisions of Section 111(d) of the Federal Property and Administrative Services Act of 1949 as amended by the Computer Security Act of 1987, Public Law 100-235. These mandates have given the Secretary of Commerce and NIST important responsibilities for improving the utilization and management of computer and related telecommunications systems in the Federal Government. The NIST through its Computer Systems Laboratory provides leadership, technical guidance, and coordination of Government efforts in the development of standards and guidelines in these areas.

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James H. Burrows, Director  
Computer Systems  
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## Abstract

Modems are used to modulate digital data into a form that can be transmitted within the voice-band frequencies passed by telephone-type circuits, and to demodulate the information back to digital data at a destination.

The modem described by this standard is based upon International Telegraph and Telephone Consultative Committee (CCITT) Recommendations V.26 (four-wire duplex) and V.26 bis (two-wire half-duplex). This standard and FIPS PUB 163 supersede FIPS PUB 133 (former Federal Standard 1005A) in its entirety.

Key words: analog transmission channels; coding; communications equipment; Federal Information Processing Standard; modulation; telecommunications.

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1992 April 2

Announcing the Standard for

**2,400 BITS PER SECOND FOUR-WIRE DUPLEX AND TWO-WIRE  
HALF-DUPLEX MODEMS FOR DATA COMMUNICATIONS  
USE ON TELEPHONE-TYPE CIRCUITS**

Federal Information Processing Standards Publications (FIPS PUBS) are issued by the National Institute of Standards and Technology (NIST) after approval by the Secretary of Commerce pursuant to Section 111(d) of the Federal Property and Administrative Services Act of 1949 as amended by the Computer Security Act of 1987, Public Law 100-235.

**1. Name of Standard.** 2,400 Bits Per Second Four-Wire Duplex and Two-Wire Half-Duplex Modems for Data Communications Use on Telephone-Type Circuits (FIPS PUB164).

**2. Category.** Telecommunications Standard, Modems.

**3. Explanation.** Modems are used to modulate digital data into a form that can be transmitted within the voice-band frequencies passed by telephone-type circuits, and to demodulate the information back to digital data at a destination.

The modem described by this standard is based upon International Telegraph and Telephone Consultative Committee (CCITT) Recommendations V.26 (four-wire duplex) and V.26 bis (two-wire half-duplex). This standard and FIPS PUB 163 supersede FIPS PUB 133 (former Federal Standard 1005A) in its entirety.

**4. Approving Authority.** Secretary of Commerce.

**5. Maintenance Agency.** National Communications System, Office of Technology and Standards.

**6. Related Documents.** Federal Information Resources Management Regulations subpart 201-20.303, Standards, and subpart 201-39.1002, Federal Standards.

**7. Objectives.** This standard is intended to facilitate interoperability between telecommunication facilities and systems of the Federal Government.

**8. Applicability.** This standard shall be used by all Federal departments and agencies when procuring new equipment and services that utilize 2,400 bit/s four-wire duplex and/or two-wire half-duplex modems for data communications use on telephone-type circuits. However, it is not mandatory for use when expanding or replacing equipment in already existing networks of modems.

**9. Specifications.** The specifications are CCITT Recommendation V.26, 2,400 Bits Per Second Modem Standardized for Use on 4-Wire Leased Telephone-Type Circuits, and V. 26 bis, 2400/1200 Bits Per Second Modem Standardized for Use in the General Switched Telephone Network.

Requirements are as follows:

- a. Section 2 of CCITT Recommendation V.26 is adopted with the following exception:
  - 1) Modulation Alternative B shall be utilized.
- b. Section 3 of CCITT Recommendation V.26 is adopted.
- c. Section 4 of CCITT Recommendation V.26 is adopted.
- d. Use of Sections 5 through 9 of CCITT Recommendation V.26 is optional.
- e. Section 2 of CCITT Recommendation V.26 bis is adopted.

- f. Section 3 of CCITT Recommendation V.26 bis is adopted.
- g. Section 4 of CCITT Recommendation V.26 bis is adopted with the following exception:
  - 1) The modulation rate is not limited to 75 baud.
- h. Use of Sections 5 through 10 of CCITT Recommendation V.26 bis is optional.

**9.1 Source of Documents.** Copies of CCITT Series V Recommendations, Data Communication Over the Telephone Network, are available from the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161. When ordering, specify PB89-144208.

**10. Qualifications.** This standard is based upon CCITT Recommendation V.26 and V.26 bis, that have undergone extensive international review and have been widely implemented by manufacturers. However, this standard will be reviewed at 5-year intervals to ensure that the needs of Government users are adequately addressed.

**11. Patents.** Modems implementing this standard may be covered by U.S. and foreign patents.

**12. Implementation.** The use of this standard by Federal departments and agencies is compulsory and binding for the acquisition of new equipment and services, effective September 15, 1992, except as noted in Section 8.

**13. Waivers.** Under certain exceptional circumstances, the heads of Federal departments and agencies may approve waivers to Federal Information Processing Standards (FIPS). The head of such an agency may redelegate such authority only to a senior official designated pursuant to Section 3506 (b) of Title 44, U.S. Code. Waivers shall be granted only when:

- a. Compliance with a standard would adversely affect the accomplishment of the mission of an operator of a Federal computer system or related telecommunications system, or
- b. Cause a major adverse financial impact on the operator which is not offset by Governmentwide savings.

Agency heads may act upon a written waiver request containing the information detailed above. Agency heads may also act without a written waiver request when they determine that conditions for meeting the standard cannot be met. Agency heads may approve waivers only by a written decision which explains the basis on which the agency head made the required finding(s). A copy of each such decision, with procurement sensitive or classified portions clearly identified, shall be sent to: National Institute of Standards and Technology; Attn: FIPS Waiver Decisions, Technology Building, Room B154, Gaithersburg, MD 20899.

In addition, notice of each waiver granted and each delegation of authority to approve waivers shall be sent promptly to the Committee on Government Operations of the House of Representatives and the Committee on Governmental Affairs of the Senate and shall be published promptly in the *Federal Register*.

When the determination on a waiver applies to the procurement of equipment and/or services, a notice of the waiver determination must be published in the *Commerce Business Daily* as a part of the notice of solicitation for offers of an acquisition or, if the waiver determination is made after the notice is published, by amendment to such notice.

A copy of the waiver, any supporting documents, the document approving the waiver and any supporting and accompanying documents, with such deletions as the agency is authorized and decides to make under 5 U.S.C. Sec. 552 (b), shall be part of the procurement documentation and retained by the agency.

**14. Where to Obtain Copies.** Copies of this publication are for sale by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161. When ordering, refer to Federal Information Processing Standards Publication 164 (FIPSPUB164), and the title. When microfiche is desired, this should be specified. Payment may be made by check, money order, purchase order, credit card, or deposit account.





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