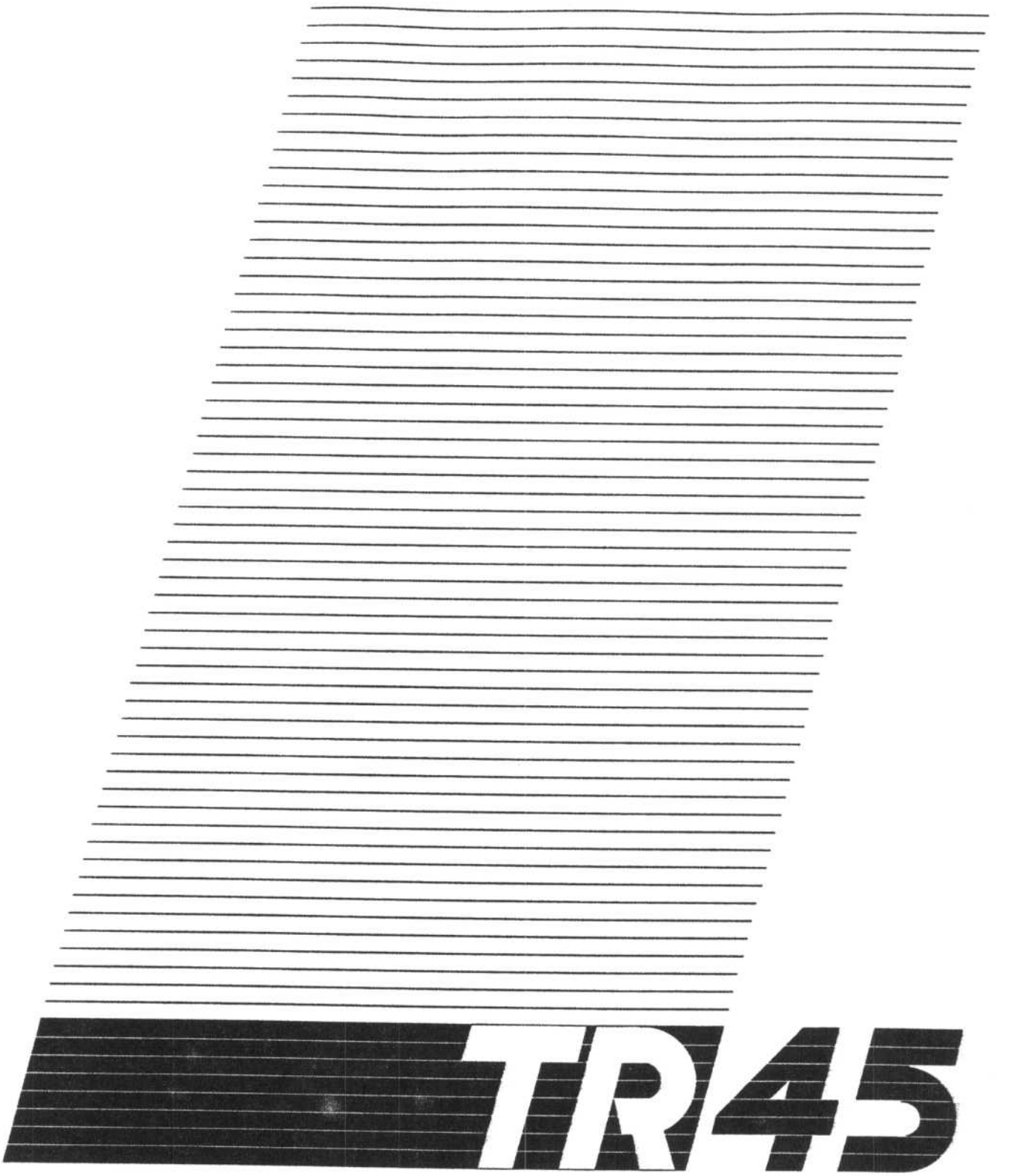

Appendix-A to TIA/EIA 627

December 23, 1996

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Document History

Revision	Date	Remarks
0		Frozen for PN-3379 Ballot
	Feb 2, 1996	headers modified to reflect ANSI TIA/EIA 627
	Nov 29, 1996	Editorial: running footer corrected. TIA address corrected in notice page.
	Dec 10, 1996	Further editorial - removed date on reference to Common Cryptographic Algorithm document.
	Dec 23, 1996	Further editorial - added final s to Common Cryptographic Algorithms

Table of Contents

1. Introduction

This document contains requirements for message encryption and voice privacy for cellular systems described in TIA/EIA 627, "800MHz Cellular System, TDMA Radio Interface, Dual-Mode Mobile Station - Base Station Compatibility Standard." Related documents are the latest revisions of:

"Common Cryptographic Algorithms", TIA

"Interface to Common Cryptographic Algorithms", TIA

Note: The notation §nn is used to indicate a referenced section of TIA/EIA 627.

2. Message Encryption

The following is a description of the messages that are enciphered. For each message, the enciphered fields are designated. The messages are grouped by channel designation.

Message encryption is enabled/disabled by the field Message Encryption Mode, see §2.7.1.3.3.

2.1 Analog Voice Channels

2.1.1 Forward Analog Voice Channel

2.1.1.1 Alert With Info (See §3.7.2.1.)

The Alert with INFO message is encrypted. Word 1 of the Mobile Station Control Message contains the order and order qualifier fields that identify this message as **ALERT WITH INFO.** No field in Word 1 is encrypted. No field in Word 2 - First Alert With Info Word is encrypted.

The subsequent words contain a character representation. Each character transmitted is represented in IA5 form in a field of 8 bits. Each word contains up to three characters. The 24 bits that comprise the three characters in each FVC word are treated by CMEA as a single message.

No other fields in the *Alert With Information Message* are encrypted.

2.1.1.2 Flash With Info (See §3.7.2.1.)

The Flash with INFO message is encrypted. Word 1 of the Mobile Station Control Message contains the order and order qualifier field that identify this message as **FLASH WITH INFO**. No field in Word 1 is encrypted. No field in Word 2 - Flash With Info Word is encrypted.

The subsequent words contain a character representation. Each character transmitted is represented in IA5 form in a field of 8 bits. Each word contains up to three characters. The 24 bits that comprise the three characters in each FVC word are treated by CMEA as a single message.

No other fields in the *Flash With Information Message* are encrypted.

2.1.2 Reverse Analog Voice Channel

2.1.2.1 Called Address Message (See §2.7.2.1 and §4.1.3.1.)

The 32 bits in Word 1 - First Word of the **Called Address Message** which comprise digits 1-8 are encrypted. These 32 bits are treated by CMEA as a new single message. No additional fields in Word 1 are encrypted.

The 32 bits in each Word 2 (and Word 3 and 4 when sent for 32-Digit Dialing) of the **Called Address Message** which comprise further dialed digits are encrypted. These 32 bits are treated by CMEA as a new single message.

No other fields in the *Called Address Message* are encrypted.

2.2 Digital Traffic Channels

When encryption is disabled, all fields of all signaling messages sent by the mobile station and base station are unencrypted.

Encryption shall apply only to the part of the message body specified below. The message CRC shall never be encrypted.

2.2.1 Forward Traffic Channel

When encryption is enabled, the encryptable fields of the following Forward Traffic Channel messages, as listed below, shall be encrypted. All other Forward Traffic Channel messages shall be unencrypted.

2.2.1.1 Alert With Info (See §3.7.3.1.3.2.1)

The FACCH message contains up to n characters each represented as 8 bits in the IA5 format. These are enciphered prior to convolutional coding. The CRC is computed on the resultant 48 bits. For the first slot of a multi-slot message (Continuation Flag = 0) all fields except the Message Type (40 bits total) are encrypted by CMEA. For the subsequent slots of a multi-slot message (Continuation Flag =1) all fields are encrypted (total of 48 bits) by CMEA.

3. Voice Privacy

A Voice Privacy Mask (VPM) comprising two different 260-bit binary data values is generated. One is XORed with the bits in the Forward Digital Traffic Channel and the other is XORed with the bits in the Reverse Digital Traffic Channel to provide so-called "voice privacy." The VPM used for BS to MS transmission is the Forward VPM; that for MS to BS transmission is the Reverse VPM (see "Common Cryptographic Algorithms", TIA)

The VPM shall not to be changed during a call. If VPM is not available at the time of an initial traffic channel designation upon entering the Conversation task, (typically due to calculation delay in its generation) then a VPM of all zeros is to be used until the operational VPM has been completely generated.

Enciphering shall take place after error correction coding and before interleaving. In particular, note that user voice is enciphered while still represented as bits rather than quaternary symbols. Similarly, deciphering occurs after deinterleaving.