How to extract the plaintext without knowing the secret key while following NIST or ISO/IEC recommendations for modes of operations of block ciphers

RAMP SESSION

FSE08

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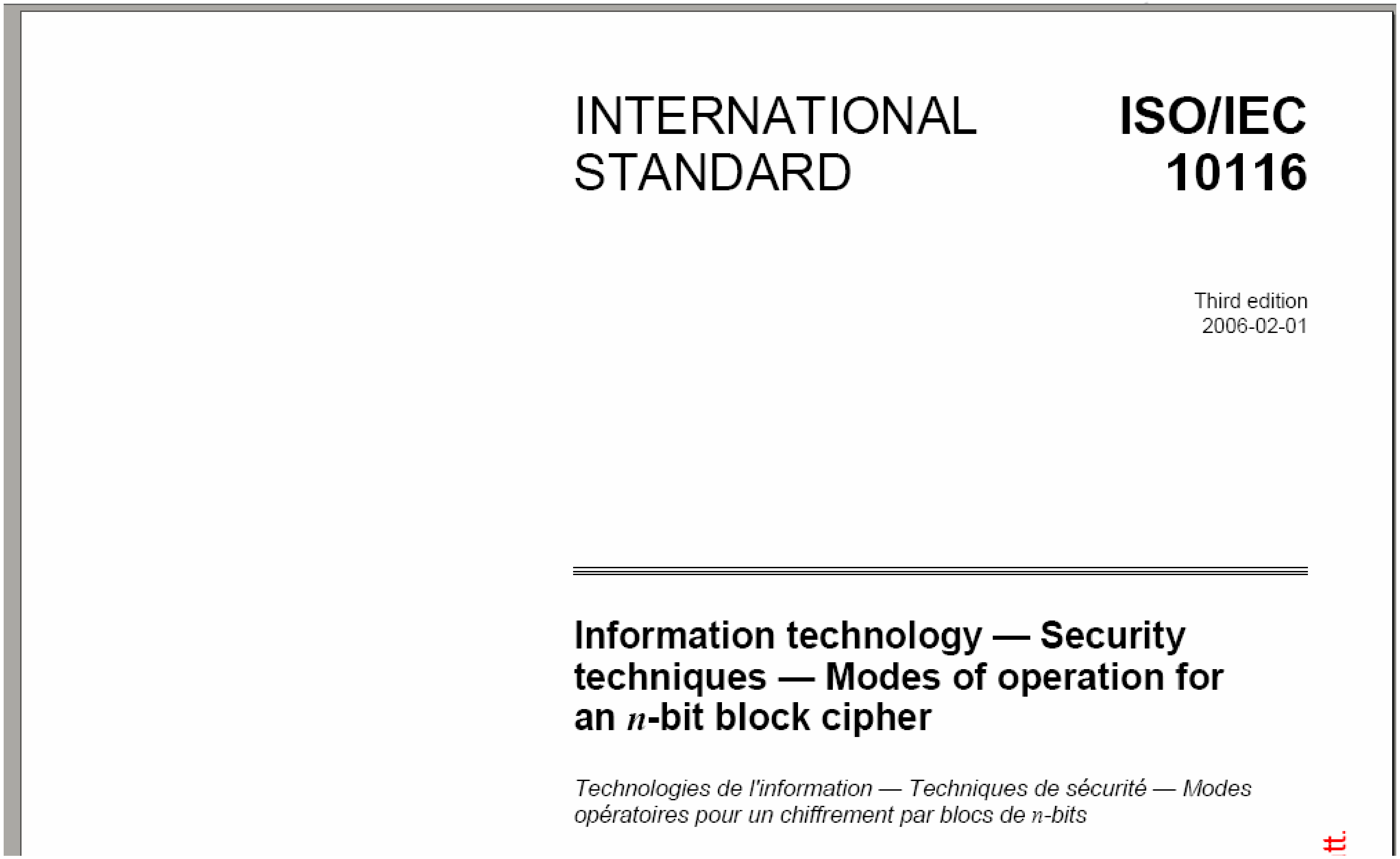
The key separation principle for different modes of operation of the block ciphers is a cryptographic folklore wisdom that states:

One should always use distinct keys for distinct algorithms and distinct modes of operation.



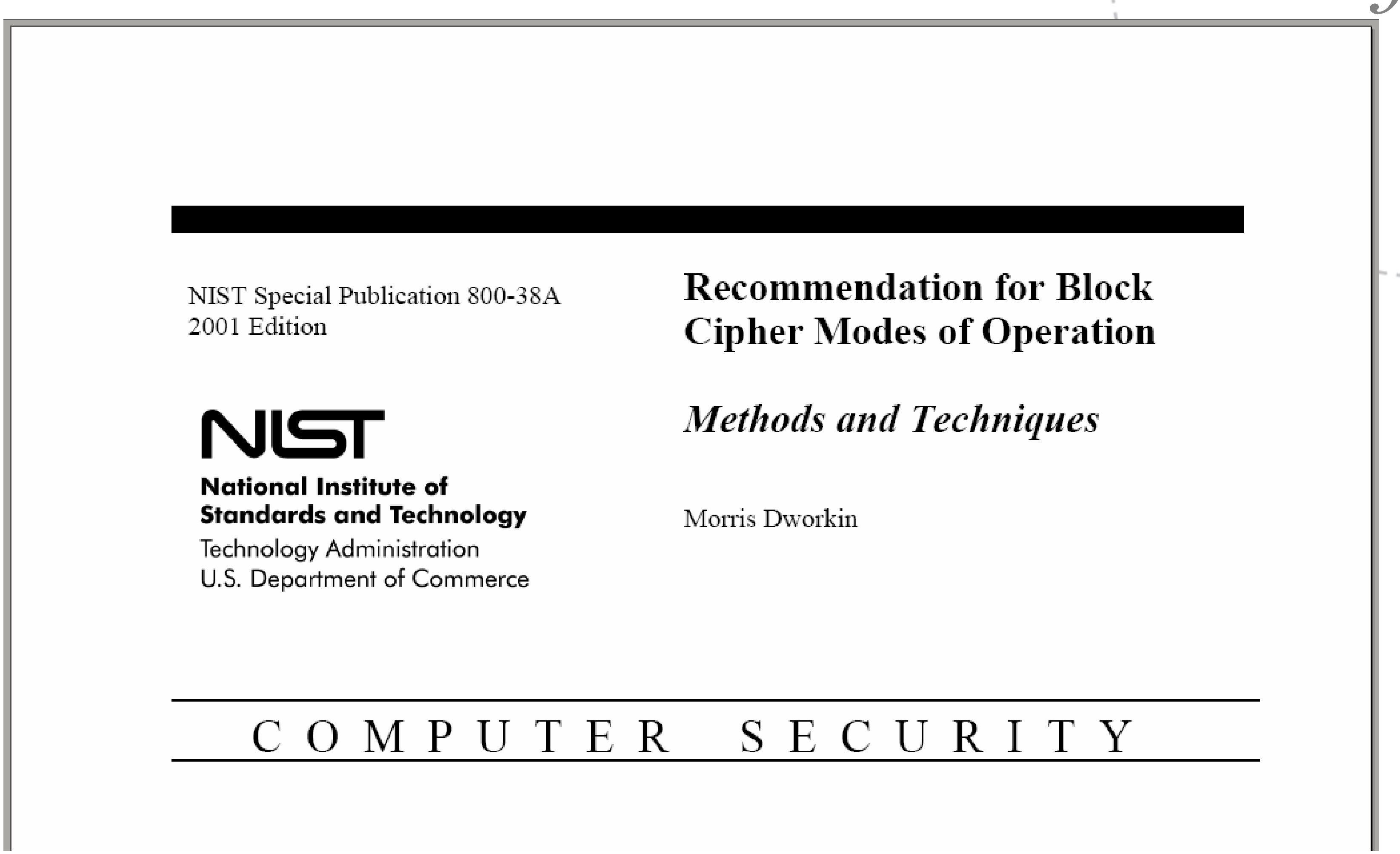
INTERNATIONAL STANDARD

ISO/IEC 10116

Third edition
2006-02-01

Information technology — Security techniques — Modes of operation for an n-bit block cipher

Technologies de l'information — Techniques de sécurité — Modes opératoires pour un chiffrement par blocs de n-bits



NIST Special Publication 800-38A
2001 Edition

Recommendation for Block Cipher Modes of Operation

Methods and Techniques

Morris Dworkin

National Institute of Standards and Technology
Technology Administration
U.S. Department of Commerce

COMPUTER SECURITY

- NIST Special Publication 800-21 2005, *“Guideline for Implementing Cryptography In the Federal Government”* and NIST Special Publication 800-57 2007, “Recommendation for Key Management Part 1: General (Revised)”
- *“Keys used for one purpose shall not be used for other purposes.”*
- *“In general, a single key should be used for only one purpose (e.g., encryption, authentication, key wrapping, random number generation, or digital signatures)”.*
- *“Some uses of keys interfere with each other”, but the interference is explained only by interchangeable use of one key for key transport and digital signatures.*

- In ISO/IEC 10116 standard there is just a brief mentioning that: *"How keys and starting variables are managed and distributed is outside the scope of this International Standard".*
- However!!!!
- **All examples that explain different modes of operation use a same encryption key??!?!**

```
• vi OnceUponATimeInTheWest.txt
• dd if=/dev/zero of=zero.txt bs=4096 count=1024
• openssl enc -aes-128-cbc -in zero.txt -out zero.bin -K
  01234567890123456789012345678901 -iv
  0123456789abcdef0123456789abcdef – nopad
• openssl enc -aes-128-ofb -in OnceUponATimeInTheWest.txt –out
  EncryptedDoc.bin -K 01234567890123456789012345678901 -iv
  0123456789abcdef0123456789abcdef  -nopad
• vi EncryptedDoc.bin
• ./XORFiles zero.bin EncryptedDoc.bin Extracted.txt
• vi Extracted.txt
```