# 11\_ZoneInfo

**🔑 Overview**

ZoneInfo is an optional security enhancement in Mango that allows you to logically partition cryptographic sessions without exposing any additional metadata. It silently strengthens the cryptographic context without changing the encryption or decryption workflows.

If specified, ZoneInfo is appended to the password **before** cryptographic key (CBox) generation. If omitted, Mango operates traditionally based only on the password.

This design allows seamless domain-specific encryption without altering input formats, headers, or external behavior.

**📜 How ZoneInfo Works**

* **Password + ZoneInfo** (if provided) are combined before generating the CBox.
* The ZoneInfo is **never** stored, transmitted, or exposed in the encrypted data.
* Different ZoneInfo values produce different CBoxes, even if the underlying password is identical.
* If ZoneInfo is null, Mango defaults to password-only behavior.

ZoneInfo strengthens session uniqueness without adding any observable footprint for attackers.rs

| **Factor** | **Without ZoneInfo** | **With ZoneInfo** |
| --- | --- | --- |
| Password only | ✅ Standard security | ✅ Password + ZoneInfo combined |
| Cryptographic separation by domain | ❌ No | ✅ Yes |
| Metadata exposure | ✅ None | ✅ None |
| Complexity for attacker | Lower | Higher (must guess both password and zone) |

ZoneInfo increases effective entropy and resilience against brute-force and domain-collision attacks without leaking hints.

**💡 Usage Example**

var options = new CryptoLibOptions(

zoneInfo: "XYZ Corp. Marketing"

);

var crypto = new CryptoLib("my password", options);

byte[] encrypted = crypto.Encrypt(sequence, rounds, input);

byte[] decrypted = crypto.Decrypt(encrypted);

If ZoneInfo is omitted, Mango reverts to normal password-only behavior:

var crypto = new CryptoLib("my password");

**🛡️ Security Guarantees**

* **No Metadata Leak:** ZoneInfo never appears in the encrypted output.
* **Session Isolation:** Different zones produce different CBoxes, ensuring separation.
* **Zero Friction:** No API disruptions. ZoneInfo is purely optional.
* **Unlimited Length:** Unlike AES key length restrictions, Mango accepts arbitrarily long passwords + ZoneInfo combinations.

**👉 Best Practices**

* Choose meaningful but **non-public** ZoneInfo values.
* Treat ZoneInfo similarly to a secondary password: **keep it secret**.
* Namespace thoughtfully (e.g., "Corp-ProjectA", "Corp-ProjectB").
* If interoperability across devices is needed, ensure consistent ZoneInfo use.

**🌟 Final Note**

ZoneInfo elegantly strengthens Mango without clutter, overhead, or leaks. It represents Mango's philosophy perfectly: **adaptive, resilient, stealthy encryption — without added friction.**