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Why You Only Need FIDO2

A Modern Authentication Whitepaper

Executive Summary

Traditional authentication stacks are broken. Passwords, SMS codes, and email one-time passwords introduce unnecessary risk, cost, and friction—while failing to stop modern attacks.

FIDO2 (including passkeys and hardware authenticators such as YubiKeys) represents a fundamental shift in authentication security. When implemented correctly, FIDO2 alone provides stronger protection than legacy multi-factor authentication (MFA) systems, while dramatically improving user experience.

This paper explains **why FIDO2 is sufficient as a primary authentication mechanism**, what threats it already eliminates, and where organizations should focus their security efforts instead of adding redundant login challenges.

The Problem with Legacy Authentication

Most authentication systems evolved incrementally:

- Passwords → breached and reused
- Password + SMS → vulnerable to SIM swap and phishing
- Password + email OTP → inbox compromise = account compromise
- CAPTCHA + MFA → usability tax without meaningful gains

Despite these layers, breaches still occur—not because attackers defeat MFA, but because **authentication is no longer the weakest link**.

What FIDO2 Solves Completely

FIDO2 eliminates entire categories of attacks by design.

Phishing Resistance

FIDO2 credentials are cryptographically bound to the website's origin.
A fake website cannot reuse or relay authentication challenges.

No Shared Secrets

There are:

- No passwords to leak
- No hashes to crack
- No secrets stored on the server

Each authentication uses a unique public/private key pair.

Hardware-Backed Security

With authenticators such as YubiKeys or platform secure enclaves:

- Private keys never leave the device
- Malware cannot extract credentials
- Attacks require physical possession

Replay and Man-in-the-Middle Protection

Each login uses a one-time cryptographic challenge over TLS.
Captured traffic is useless.

Result:
FIDO2 prevents the vast majority of real-world account takeover attacks.

Why Adding "More Factors" Often Reduces Security

Adding extra login challenges after FIDO2 is usually counterproductive.

Common Mistakes

- Email OTP after passkey login
- SMS verification as a “backup”
- Knowledge-based questions
- Mandatory CAPTCHA for authenticated users

Why This Backfires

- Recovery paths become the weakest link
- Users are trained to approve prompts blindly
- Attackers target the least secure factor
- UX degradation leads to unsafe workarounds

Security systems fail at their weakest component—not their strongest.

Where Security Actually Fails (And What to Fix Instead)

Authentication is only one layer. Real breaches typically come from:

1. Session Hijacking

Mitigate with:

- Secure, HttpOnly, SameSite cookies
- Session rotation
- Idle timeouts
- Re-authentication for sensitive actions

2. Account Recovery Abuse

Recovery must be harder than login:

- Require multiple registered passkeys
- Support authenticator revocation
- Use delayed recovery with alerts
- Avoid email-only resets

3. Authorization Errors

Ensure:

- Strict server-side access control
- Object ownership checks
- Role separation (user vs admin)

4. XSS and Injection Attacks

Prevent session theft with:

- Strong Content Security Policy
- Output encoding
- No inline scripts

Use Case: Cyqur Vault and Binarii Cloud

Secure Corporate Secret Storage by Design

Cyqur Vault is a corporate-grade secrets management platform designed to protect high-value confidential data such as credentials, encryption keys, legal documents, and proprietary intellectual property.

At its core, Cyqur Vault combines **FIDO2-based authentication** with **Binarii Cloud secure data storage**, creating a security model that removes entire classes of attack rather than attempting to detect them after the fact.

Binarii Cloud: Replicated Circular Fragmentation

Binarii Cloud stores data using **replicated circular fragmentation**, a storage architecture where:

- Data is split into multiple fragments
- Fragments are distributed across independent storage locations
- No single fragment contains meaningful information
- Replication ensures availability without reconstructing full datasets

This design means:

- A storage breach does not expose usable data
- Data reconstruction is cryptographically controlled
- Insider threats and infrastructure compromise are mitigated by default

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Why FIDO2 Is Critical in This Model

In Cyqur Vault, authentication is not just about logging in—it directly controls **data reassembly and access authorization**.

Key properties:

- Cyqur Vault **holds and enforces access credentials**
- Access to secrets requires successful FIDO2 authentication
- No passwords or shared secrets exist anywhere in the system

- Credentials are bound to specific authenticators and users

This makes FIDO2 the *logical and cryptographic gatekeeper* for corporate secrets.

Instant Access Revocation Through Key Control

Traditional systems struggle with revocation:

- Passwords are copied
- Tokens persist
- Credentials linger in caches and backups

Cyqur Vault takes a different approach.

Because access is tied to FIDO2 credentials:

- **Revoking a key immediately revokes access**
- Lost devices can be disabled instantly
- Departing employees lose access without rotating shared secrets
- No data re-encryption or mass credential reset is required

Control of keys equals control of access.

Security Advantages for Corporates

By combining FIDO2 with Binarii Cloud, Cyqur Vault delivers:

- Zero-phishing authentication
- No password breach risk
- No shared secrets

- Cryptographically enforced access control
- Immediate revocation without downtime
- Strong protection against insider threats

Most importantly, **security scales with simplicity**, not complexity.

When Additional Challenges *Do* Make Sense

Rather than permanent extra factors, Cyqur Vault applies **contextual step-up authentication** only when risk increases:

- New device or environment
- Administrative or vault-wide actions
- Credential or policy changes

Step-up remains FIDO2-native:

- Re-assert passkey
- Require hardware-backed authenticators
- Require a second registered key

Conclusion

FIDO2 is not “passwordless MFA.”
It is **a replacement for passwords and most legacy MFA altogether**.

Cyqur Vault demonstrates how FIDO2 can be elevated from a login mechanism to a **core security primitive**, directly controlling access to fragmented, distributed corporate secrets stored in Binarii Cloud.

When authentication, authorization, and data access are cryptographically unified:

- Attack surfaces shrink
- Recovery paths remain secure
- Revocation becomes instant and reliable

The future of security is fewer secrets, fewer layers, and stronger guarantees.