Multi-Factor Authentication

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College of Engineering

- Use multiple elements/factors to prove identity

- Factors of authentication
  - What entity knows (*e.g.* password, private key)
  - What entity has (*e.g.* badge, smart card)
  - What entity is (*e.g.* fingerprints, retinal characteristics)
  - What entity does (e.g., voice pattern, handwriting, typing rhythm)
  - Where entity is (*e.g.* in front of a particular terminal)

- Example: Chip & PIN credit card transaction
  - Need to 'have' Chip and 'know' PIN

- Provides additional protection as compromising one-factor is not sufficient
  - Ex: Guessing a password is not sufficient
  - Ex: Stealing an ATM card is not sufficient

- Factors used must be commensurate with the value of asset
  - Ex: Using SMS as a second factor was proven to be insufficient for protecting multi-millionaire and billionaire accounts. Adversaries bribed telco employees and cloned SIM cards.

- Two-Factor Authentication is becoming the norm
  - Almost everyone has a connected device that can be leveraged

Two Factor Authentication (TFA)

- Use two factors, e.g., password + ?
  - Mobile Phone – SMS
  - Software OTPs
  - Email account
  - OTP Hardware dongles

Two Factor Authentication

PayPal™

Search

Enter Security Code

12172441925

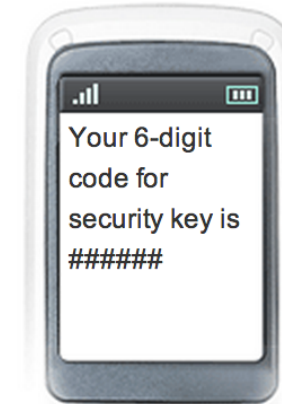Secure Log In 🔒

Confirm your phone number and 6-digit code.

Your mobile number: 12178988368

Send SMS

Please wait a moment for the SMS to arrive. The code you receive is valid for one minute from when you receive it. Didn't get the code?

6-digit code:

Submit

I don't have my security key with me

Your 6-digit code for security key is ######

Two Factor Authentication

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Google

2-step verification

Enter the verification code generated by your mobile application.

Enter code:

[   ] **Verify**

☐ Don't ask for codes again on this computer ?

Don't have your phone?
Cancel

Two Factor Authentication?

Bank of America   Sign In

Enter your Passcode

If your SiteKey is correct, enter your Passcode to sign in. If this isn't your SiteKey, do not enter your Passcode.

SiteKey lets you know you're at a Bank of America site and not a fraudulent one.

Your SiteKey

Holy Grail

Passcode

[   ]

Sign in

Summary

- Multi-factor authentication provides better protection than traditional single-factor authentication

- Two-factor authentication (TFA) is becoming the norm

- SMS, Software OTP are commonly used 2nd factors