NCCoE: Mobile App Single-Sign On

Achieving a secure, reliable, accessible SSO solution for Public Safety & First Responders

PSCR

2017

PUBLIC SAFETY BROADBAND
STAKEHOLDER MEETING

#PSCR2017

Introductions

- Bill Fisher – NIST, National Cybersecurity Center of Excellence
- Mike Korus – Motorola Solutions
- John Bradley – Ping Identity
- Arshad Noor – StrongAuth
- Mark Russell – MITRE Corporation

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

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Challenge

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Project Challenge

- Mobile platforms offer a significant operational advantage to public safety stakeholders by providing access to mission critical information.
- These advantages can be limited if complex authentication requirements hinder PSFR personnel, especially when delay – even seconds – is a matter of containing or exacerbating an emergency situation.

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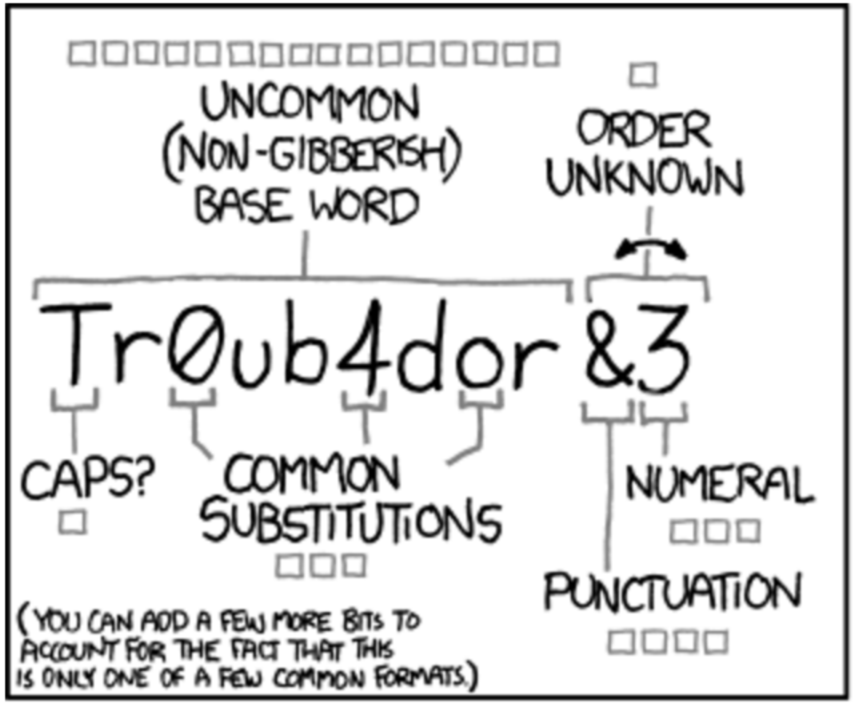
Security Challenge - Passwords

Passwords:

- Complexity - hard to remember
- Hard to type on mobile phone
- Need one for each application
- They are often re-used
- Can be phished


UNCOMMON (NON-GIBBERISH) BASE WORD
ORDER UNKNOWN
Tr0ub4dor &3
CAPS?
COMMON SUBSTITUTIONS
NUMERAL
PUNCTUATION
(YOU CAN ADD A FEW MORE BITS TO ACCOUNT FOR THE FACT THAT THIS IS ONLY ONE OF A FEW COMMON FORMATS.)

Source: https://xkcd.com/936/

Solution

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Core of the Build

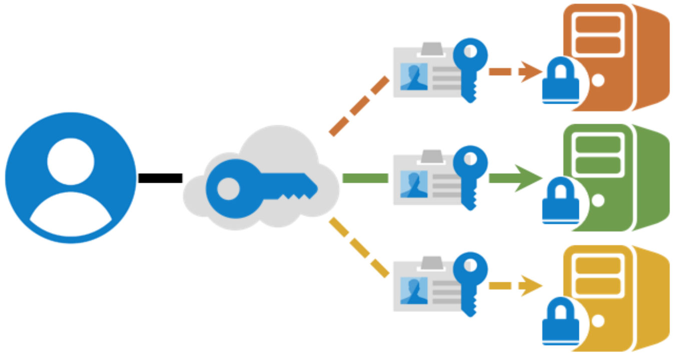
Multifactor Authentication to Mobile Resources

- Biometrics, external hardware authenticators and other authentication options

p@$$w0rd +

Single Sign-on to Mobile Resources

- Authenticate once with mobile native app or web apps
- Leverage initial MFA when accessing multiple applications



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Benefits of an NCCoE Reference Design

NCCoE Benefits – Industry Collaboration

NCCoE brings in Industry experts to design and build the reference design:

SAMSUNG OpenID IETF Google RSA

Mobile SSO Technology Vendor Build Team:

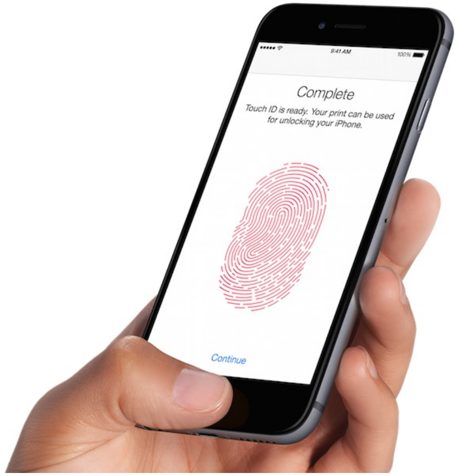
Nok Nok LABS yubico Ping Identity MOTOROLA SOLUTIONS STRONGAUTH® Securing the Core

NCCoE Benefits – Standards Based

NCCoE solutions implement standards and best practices:

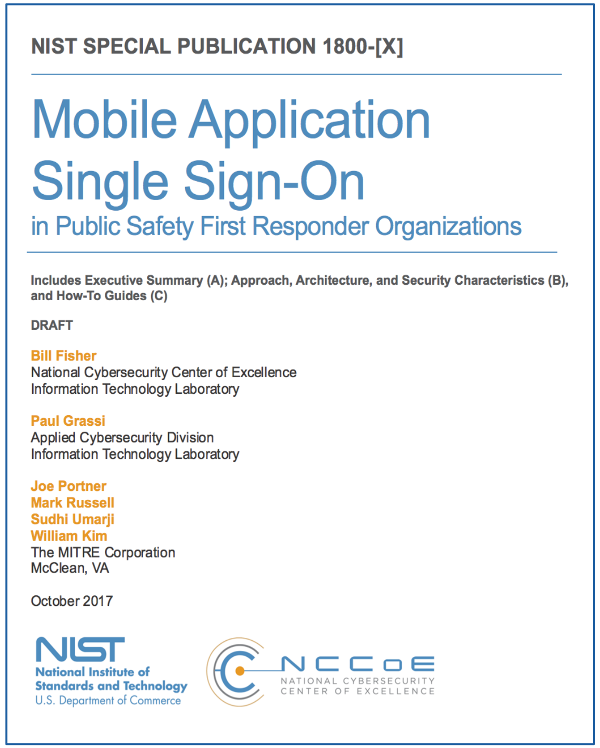
OpenID OAUTH 2 IETF NFC fido alliance AppAuth

Using modern commercially available technology:


9:41 AM
100%
Complete
Touch ID is ready. Your print can be used for unlocking your iPhone.
Continue

NCCoE Benefits – Practical Guidance

- Project will result in a freely available NIST Cybersecurity Practice Guide (SP 1800-x) including:



NIST SPECIAL PUBLICATION 1800-[X]

Mobile Application Single Sign-On
in Public Safety First Responder Organizations

Includes Executive Summary (A); Approach, Architecture, and Security Characteristics (B), and How-To Guides (C)

DRAFT

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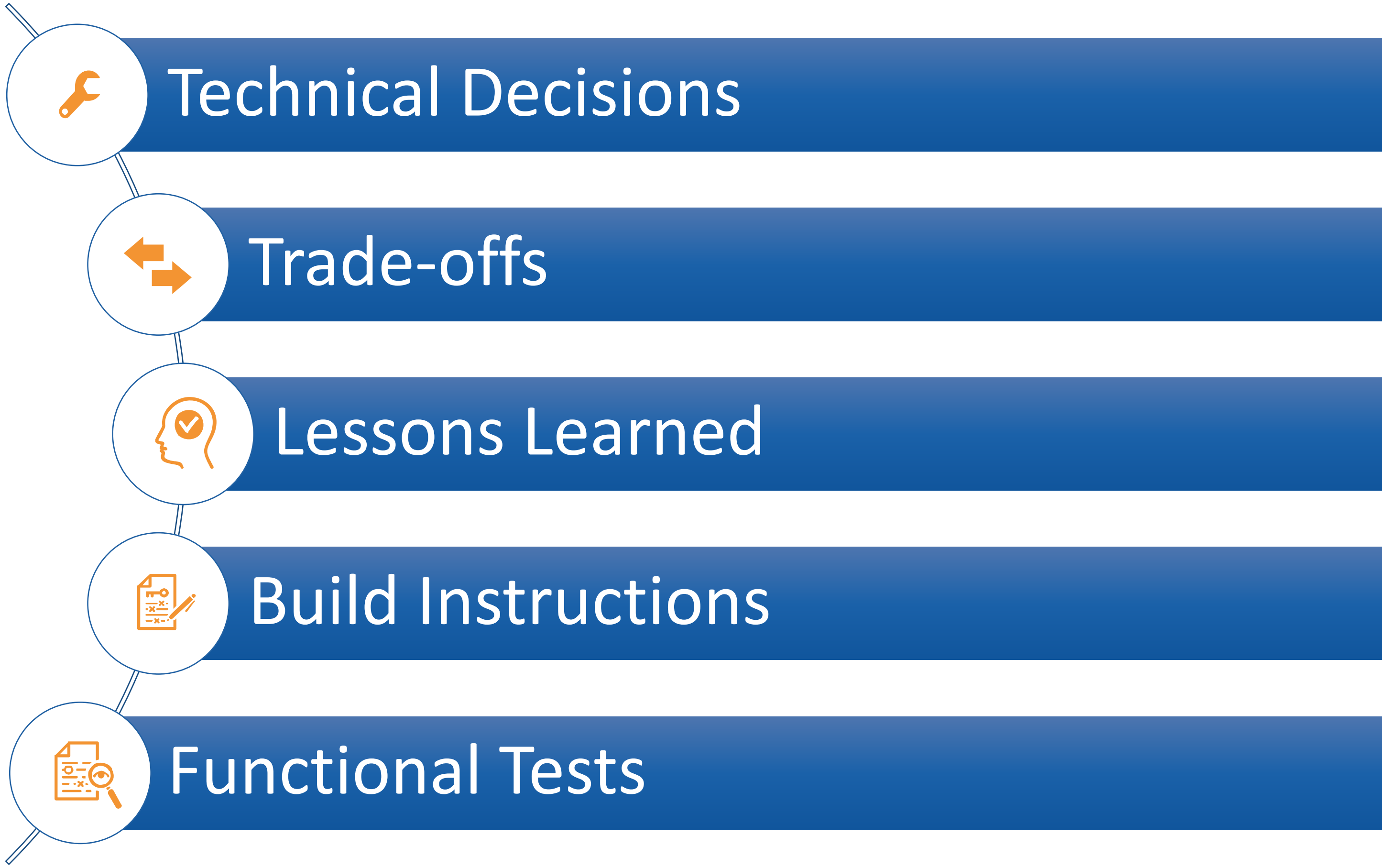

- Technical Decisions
- Trade-offs
- Lessons Learned
- Build Instructions
- Functional Tests

Value to PSFR Community

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Value to PSFR Personnel

Efficiency

Save time and efficiency by reducing the need to authenticate to multiple mobile applications individually

Simplicity

Allowing a user to manage less username/password credentials

Flexibility

Multiple options for multifactor authentication

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Value to PSFR Organizations

Modern

Solution takes advantage of the latest commercially available mobile technology and best practices

Interoperable

Technology uses standard protocols and flows to improve interoperability

Security

Architecture designed with security characteristics as core requirement (more on this later)

Cost Savings

Reduction in costs - NCCoE delivers requirements, architecture and a reference implementation

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Solving Mobile App Single Sign-On Using Standards

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Internet Engineering Task Force - BCP

IETF BCP – “OAuth 2.0 for Native Apps”

- Implements standards such as OAuth (RFC6749) and Proof Code for Key Exchange (PCKE - RFC7636)
- User's password and other credentials are never exposed to the SaaS provider or mobile app
- Apps get an OAuth Token with limited scope of authorization - apps only get access to back-end systems they should be accessing
- IdP policy controls which user attributes are shared with the SaaS provider
- PKCE prevents malicious apps on the device from intercepting the authorization code and using it to get access tokens
- Agnostic to the Authenticator (OIDC, SAML, etc…)

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AppAuth Software Development Kit

Benefits of AppAuth

- Implementation of the “OAuth 2.0 for Native Apps” BCP
- Developed by OpenID Foundation
- Free and open source
  - Code maintained by Google for both iOS and Android
- Securely implements standards
- Developers can “Drag and Drop” into a mobile app

AppAuth

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Standards-Based Multifactor Authentication

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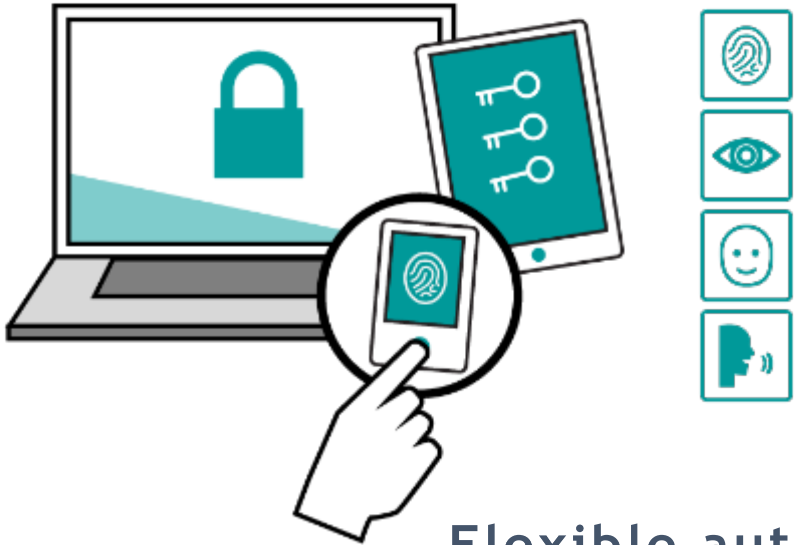
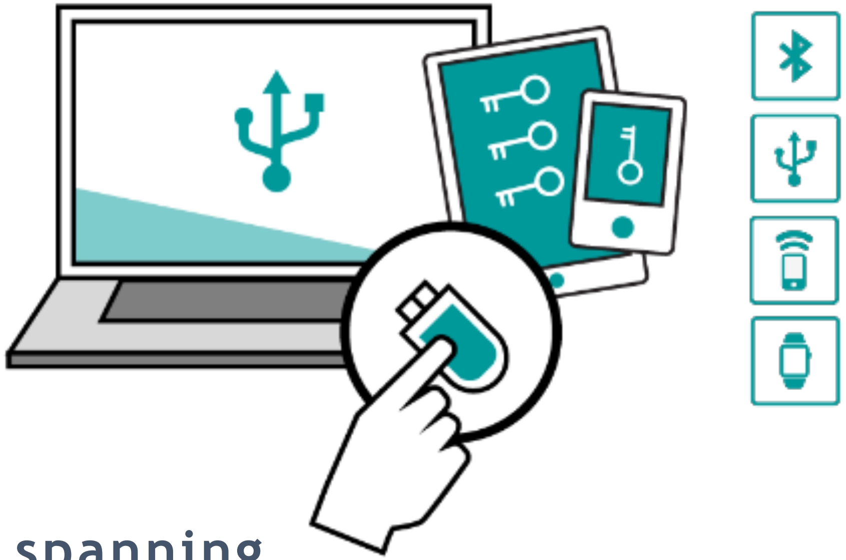
Introduction to Fast Identity Online (FIDO)

Passwordless Experience



Second Factor Experience



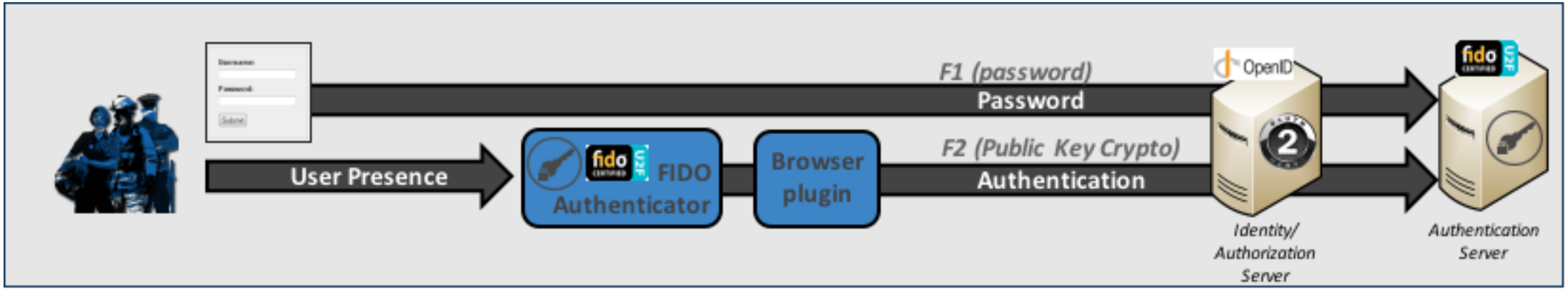
Flexible authentication spanning any number of service providers

*slide taken from FIDO Presentation to NCCoE 5/31/2017

MFA using External Authenticator via FIDO U2F

FIDO U2F – External Authentication over NFC

- U2F token used in addition to primary authenticator (e.g., password)
- "FIDO protocols mandate a “proof of user presence” (e.g., by pushing a button, verifying your biometric data, etc.) ”
- IdP may support the protocol directly (natively or using a plug-in)
- Authenticator attestation sent at time of registration & authentication – IdP can decide whether or not the authenticator is acceptable



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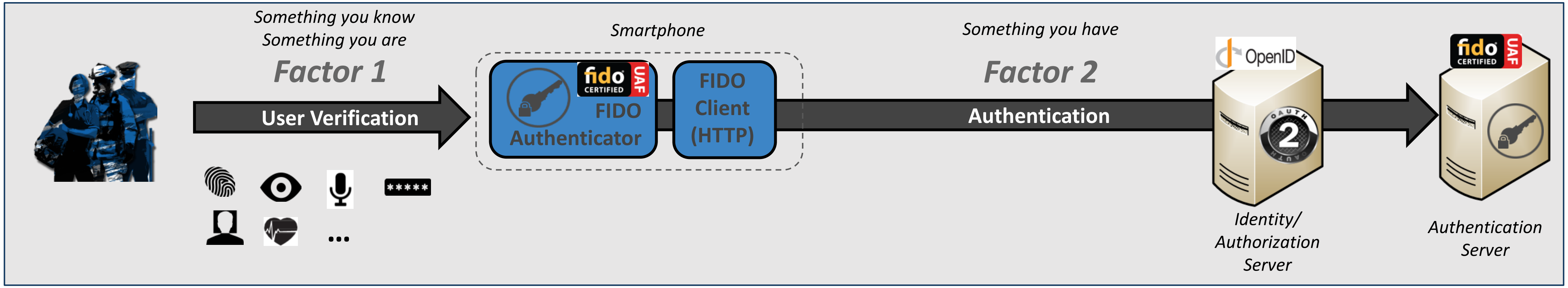
MFA using FIDO Universal Authentication Framework

FIDO UAF is Multifactor Authentication

- Factor 1: User verification (one or more user tests)
- Factor 2: Public Key cryptography challenge/response

FIDO UAF Registration defines how Keys are generated and enrolled

- IdP can send policies during registration identifying authenticator criteria (manufacturer, security characteristics, modalities, etc.)
- Then Device generates keys BUT only registers the PUBLIC key (Private key kept private)
- Username, user verification, key, IdP (relying party) are bound together.



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Benefits of FIDO

- Standards Based
- No Secrets on the Server Side
- Biometric Data (if used) Never Leaves Device
- No Phishing

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*slide taken from FIDO Presentation to NCCoE 5/31/2017

Simple Example

High Level Components

Technologies

Software as a Service (SaaS)

- This approach uses centrally-hosted software that is provided “on demand”, includes apps and back-end servers

OpenID Provider

- Server used to manage user identities and roles, and to share user info with other organizations

Authorization Server

- Server used by SaaS provider to communicate with an OpenID Provider and authorize users

Fast Identity Online (FIDO)

- Work-in-progress: This protocol, and hardware that uses it, allows users to sign on w/ tokens instead of passwords

Actors

Central Public Safety Service Provider (CPSSP)

- Represents a SaaS provider that hosts a back-end for mobile apps used by the PSFR community
- This may or may not be the same entity that writes the mobile client apps

Local Public Safety Department (LPSD)

- Represents a local Police, Fire, EMS, or other public safety or first responder organization that uses the services provided by CPSSP
- This organization manages user accounts and has an OpenID Provider for authentication

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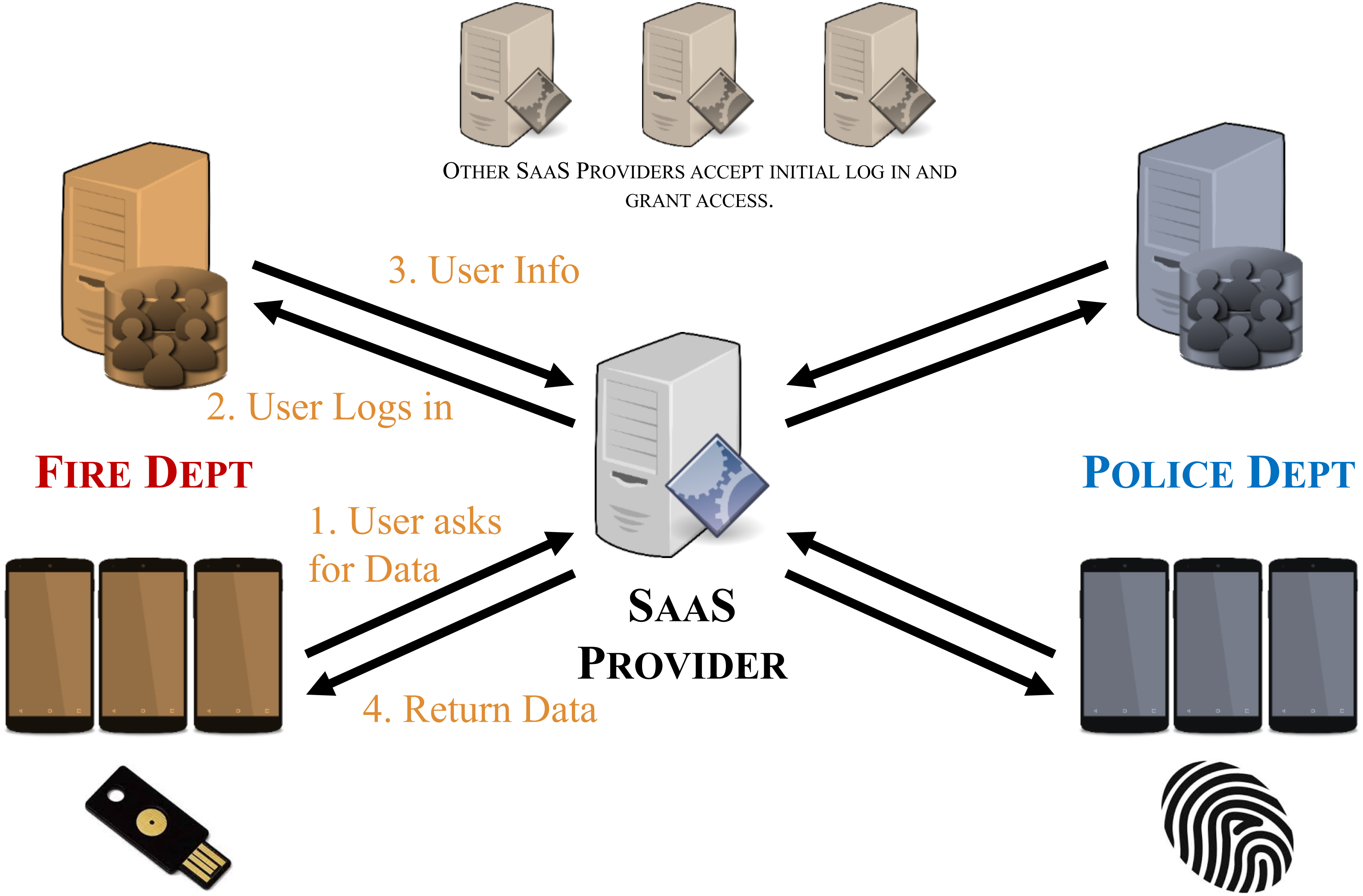
Simple SSO Scenario



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Demonstration

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Questions?

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Project Resources

- Project Description Document:
  - https://nccoe.nist.gov/sites/default/files/library/project-descriptions/psfr-mobile-sso-project-description-final.pdf
  - Document has details architecture and flow diagrams
- Build Team Announcement & Blog:
  - https://nccoe.nist.gov/news/nccoe-and-industry-collaborate-mobile-application-single-sign-project
  - Discusses products used in the build
- PSFR-NCCoE@nist.gov
  - Inquiries go directly to NIST project leads

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Acronym List

API - Application Programming Interface

AS - Authorization Server (term specific to the OAUTH spec)

BCP - Best Current Practice

FIDO - Fast ID Online

FOSS - Free and Open Source

HTTPS - Hyper Text Transfer Protocol Secure

IDP - Identity Provider

IETF - Internet Engineering Task Force

LDAP - Lightweight Directory Access Protocol

NCCoE - National Cybersecurity Center of Excellence

NFC - Near Field Communication

OAUTH - not an acronym, but a rights delegation protocol

OIDC - Open ID Connect

PCKE - Proof Key for Code Exchange

PSFR - Public Safety First Responder

RFC - Request for Comment

RP = Relying Party

SaaS - Software as a Service

SAML - Security Assertion Mark-up Language

SDK - Software Development Kit

SP - Special Publication

SSO - Single Sign On

U2F - Universal Two Factor

UAF - Universal Authentication Framework

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