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IEEE Standard for Biometric Open Protocol

Sponsor

Standards Development Board
of the
IEEE Communications Society

and the

Technical Committee on RFID
of the
IEEE Technical Activities Board

Approved 3 September 2015

IEEE-SA Standards Board

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Abstract: Identity assertion, role gathering, multilevel access control, assurance, and auditing are provided by the Biometric Open Protocol Standard (BOPS). The BOPS implementation includes software running on a client device (smartphone or mobile device), a trusted BOPS server, and an intrusion detection system. The BOPS implementation allows pluggable components to replace existing components' functionality, accepting integration into current operating environments in a short period of time. The BOPS implementation provides continuous protection to the resources and assurance of the placement and viability of adjudication and other key features. Accountability is the mechanism that proves a service-level guarantee of security. The BOPS implementation allows the systems to meet security needs by using the application programming interface. The BOPS implementation need not know whether the underlying system is a relational database management system or a search engine. The BOPS implementation functionality offers a "point-and-cut" mechanism to add the appropriate security to the production systems as well as to the systems in development. The architecture is language neutral, allowing Representational State Transfer (REST), JavaScript Object Notation (JSON), and Secure Sockets Layer (SSL) or Transport Layer Security to provide the communication interface. The architecture is built on the servlet specification, open SSLs, Java, JSON, REST, and an open persistent store. All tools adhere to open standards, allowing maximum interoperability.

Keywords: admin console, application, BOPS admin, BOPS cluster, BOPS server, BOPS IDS, client device IDS, Jena Rules, IDS cluster, IEEE 2410™, liveness, original site admin, site admin, trusted adjudicated data, user, user device

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Introduction

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Convenience drives consumers toward the biometrics-based access management solutions, say studies from Ericsson, PayPal, IBM®, and Microsoft®.

According to the Ericsson study "Your body is the new password," 52% of smartphone users want to use their fingerprints instead of a password, a further 61% want to use fingerprints to unlock their phones, and 48% want to use eye recognition.

The study conducted by PayPal says that consumers approve biometrics for access management. In terms of readiness to switch from traditional password protection to the new technology, 53% of the surveyed population would be comfortable replacing passwords with fingerprints, and 45% would choose a "retinal scan," which is presumably an iris scan (the misplaced terminology points to the lack of consumer education).

IBM Fellow and Speech Chief Technology Officer David Nahamoo states that, over the next five years, your unique biological identity and biometric data—facial definitions, iris scans, voice files, even your DNA—will become the key to safeguarding your personal identity and information and will replace the current user-ID-and-password system.

A Microsoft Research-funded study titled "The Quest to Replace Passwords: A Framework for Comparative Evaluation of Web Authentication Schemes," concluded that the vast password-replacement transition should conform to the following criteria: nothing to carry, efficient to use, and easy recovery from a loss. The Microsoft study goes as far as concluding that such criteria could be achieved mostly through the biometric schemes.

Biometric technologies provide consumers with a long-awaited convenience to securely enter cyberspace on the front end. The Biometric Open Protocol Standard (BOPS), developed by Hoyos Labs, protects digital assets and digital identities on the backend.

BOPS is a biometrics-agnostic standard that opens an application programming interface for registered developers. Entering as a game-changer, BOPS communication architecture enables two-way Secure Sockets Layer or Transport Layer Security connection over the encryption mechanism to the server, which employs an intrusion detection system (IDS). The IDS is an external system responsible for blacklisting devices that are violating the replay portion of this specification.

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1. Overview

1.1 Scope

The Biometric Open Protocol Standard (BOPS) provides identity assertion, role gathering, multilevel access control, assurance, and auditing. The BOPS implementation includes software running on a client device (e.g., smartphone or mobile device), a trusted BOPS Server, and an intrusion detection system (IDS). The BOPS implementation allows pluggable components to replace existing components' functionality, accepting integration into the current operating environments in a short period of time. The BOPS implementation adheres to the principle of continuous protection in adjudicating access to resources. Accountability is the mechanism that proves a service-level guarantee of security. The BOPS implementation allows the systems to meet security needs by using the application programming interface (API). The BOPS implementation need not know whether the underlying system is a relational database management system (RDBMS) or a search engine. The BOPS implementation functionality offers a "point-and-cut" mechanism to add the appropriate security to the production systems as well as to the systems in development.

1.2 Purpose

This standard provides a biometric-agnostic, multilevel security protocol.

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1.3 Intended audience

The intended audience of this document includes security evaluators, system underwriters, developers, and systems engineers. The BOPS is subject to changes and updates.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

The Trusted Computer System Evaluation Criteria (Mitre 1984).

ISO 8601, Data elements and interchange formats—information interchange—representation of dates and times.[1]

3. Definitions, acronyms, and abbreviations

3.1 Definitions

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary Online* should be consulted for terms not defined in this clause.[2]

account: A user account that was validated (against an external system or by an email validation mechanism). It can have associated one or multiple mobile devices. The enrollment process ends by creating a client certificate for the device that shall be used for subsequent calls to authenticate against the HoyosID platform.

Bell-LaPadula: The multilevel model that was proposed by Bell and LaPadula for enforcing access control in government and military applications. A subject can only access objects at certain levels determined by their security level.

JUnit: A testing framework for Java programming language.

RESTful: Refers to Representational State Transfer (REST), which is a software architecture style.

SHA1: Secure hash algorithm one, which was designed by the U.S. National Security Agency (NSA).

3.2 Acronyms and abbreviations

admin	administrator
AOP	aspect oriented programming

[1]ISO publications are available from the ISO Central Secretariat (http://www.iso.org/). ISO publications are also available in the United States from the American National Standards Institute (http://www.ansi.org/).
[2]*IEEE Standards Dictionary Online* subscription is available at:
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API	application programming interface
app	a mobile client application
BOPS	biometric open protocol standard
CPU	central processing unit
CSRF	cross-site request forgery
ID	identifier
IDS	intrusion detection system
IP	internet protocol
JSON	JavaScript object notation
LDAP	lightweight directory access protocol
MAC	mandatory access control
NSA	National Security Agency (U.S.)
QR code	quick response code
RDBMS	relational database management system
REST	representational state transfer
SSL	secure socket layer
TCSEC	trusted computer system evaluation criteria
TLS	transport layer security
URL	uniform resource identifier
XNTP	extended network time protocol

4. Conformance

The BOPS comprises the rules governing secure communication between a variety of client devices and the trusted server. This standard is based on the tested computer-based implementation of the Trusted Computer System Evaluation Criteria (TCSEC).

BOPS conforms to the TCSEC, which is the U. S. Department of Defense standard that sets basic requirements for assessing the effectiveness of computer security controls built into a computer system. TCSEC was created by the National Computer Security Center, an arm of the National Security Agency (NSA) and is also frequently referred as “Orange Book, section B1.” BOPS also conforms to the Director of the Central Intelligence Directive 6/3 protection level 3, level 4, and level 5 (PL3, PL4, and PL5), and to the standards of the Multiple Independent Levels of Security/Safety (MILS) architecture.

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