



## American National Standard for Financial Services

# ANSI X9.117–2020

# Mutual Authentication for Secure Remote Access



Developed by  
Accredited Standards Committee X9, Incorporated  
Financial Industry Standards

**Date Approved: January 23, 2020**

American National Standards Institute

American National Standards, Technical Reports and Guides developed through the Accredited Standards Committee X9, Inc., are copyrighted. Copying these documents for personal or commercial use outside X9 membership agreements is prohibited without express written permission of the Accredited Standards Committee X9, Inc. For additional information please contact ASC X9, Inc., 275 West Street, Suite 107, Annapolis, MD 21401.

**This page left intentionally blank**

<b>Contents</b>	<b>Page</b>
<b>Mutual Authentication for Secure Remote Access</b> .....	<b>1</b>
1 <b>Scope</b> .....	<b>1</b>
2 <b>Purpose</b> .....	<b>1</b>
3 <b>Normative References</b> .....	<b>2</b>
4 <b>Terms and definitions</b> .....	<b>4</b>
5 <b>Authentication Framework</b> .....	<b>6</b>
5.1 <b>Introduction</b> .....	<b>6</b>
5.2 <b>Risk Framework</b> .....	<b>6</b>
5.3 <b>Authentication Credential Lifecycle</b> .....	<b>7</b>
5.4 <b>Authentication Methods</b> .....	<b>8</b>
5.4.1 <b>Introduction</b> .....	<b>8</b>
5.4.2 <b>Knowledge Factors</b> .....	<b>9</b>
5.4.3 <b>Possession Factors</b> .....	<b>10</b>
5.4.4 <b>Biometric Factors</b> .....	<b>11</b>
5.5 <b>Multi-factor Authentication (MFA)</b> .....	<b>12</b>
5.6 <b>Mutual Authentication</b> .....	<b>13</b>
5.7 <b>System Authentication</b> .....	<b>14</b>
6 <b>Requirements</b> .....	<b>15</b>
6.1 <b>General Requirements</b> .....	<b>15</b>
6.2 <b>Authentication Requirements</b> .....	<b>16</b>
6.2.1 <b>General Authentication Requirements</b> .....	<b>16</b>
6.2.2 <b>High Risk Level 3 Requirements</b> .....	<b>17</b>
6.2.3 <b>Moderate Risk Level 2 Requirements</b> .....	<b>17</b>
6.2.4 <b>Low Risk Level 1 Requirements</b> .....	<b>17</b>
6.2.5 <b>Minimal Risk Level 0 Requirements</b> .....	<b>17</b>
6.3 <b>Technology Considerations</b> .....	<b>17</b>
6.3.1 <b>Soft Tokens</b> .....	<b>17</b>
6.3.2 <b>Cryptographic Protocol</b> .....	<b>18</b>
6.3.3 <b>Two Factor Authentication</b> .....	<b>18</b>
6.4 <b>Knowledge Factors</b> .....	<b>19</b>
<b>Annex A (Informative) Authentication Control Objectives</b> .....	<b>20</b>
<b>Annex B (Informative) Password Considerations</b> .....	<b>35</b>
<b>Annex C (Informative) Know Your Customer (KYC) Considerations</b> .....	<b>40</b>
<b>Bibliography</b> .....	<b>44</b>

## Tables

<b>Table 1 Authentication Frameworks</b> .....	<b>2</b>
<b>Table 2 Risk Levels Framework</b> .....	<b>6</b>
<b>Table 3 Authentication Factors for Humans versus Applications</b> .....	<b>13</b>
<b>Table 4 Authentication Requirements</b> .....	<b>16</b>
<b>Table 5 Probability of Letters in English Words</b> .....	<b>36</b>

## **Figures**

<b>Figure 1 Authentication Credential Lifecycle.....</b>	<b>7</b>
<b>Figure 2 Entity Authentication.....</b>	<b>16</b>
<b>Figure 3 Recommended Password Hashing.....</b>	<b>38</b>

## Foreword

Approval of an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretation should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of approval.

Published by

Accredited Standards Committee X9, Incorporated  
Financial Industry Standards  
275 West Street, Suite 107  
Annapolis, MD 21401 USA  
X9 Online <http://www.x9.org>

Copyright © 2020 ASC X9, Inc.

All rights reserved.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without prior written permission of the publisher. Published in the United States of America.

## Introduction

Approval of an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer. Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretation should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

Suggestions for the improvement or revision of this Standard are welcome. They should be sent to the X9 Committee Secretariat, Accredited Standards Committee X9, Inc., Financial Industry Standards, 275 West Street, Suite 107 Annapolis, MD 21401 USA.

This Standard was processed and approved for submittal to ANSI by the Accredited Standards Committee on Financial Services, X9. Committee approval of the Standard does not necessarily imply that all the committee members voted for its approval.

**CAUTION NOTICE:** This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of approval.

At the time this standard was approved, the **X9** committee had the following members:

Roy C. DeCicco, X9 Chairman  
 Corby Dear, X9 Vice Chairman  
 Steve Stevens, X9 Executive Director  
 Janet Busch, Program Manager

<b>Organization Represented</b>	<b>Representative</b>
ACI Worldwide .....	Doug Grote
Amazon.....	Igor Kleyman
American Bankers Association.....	Diane Poole
Bank of America .....	Daniel Welch
BDO .....	Tim Crawford
Bloomberg LP .....	Corby Dear
Communications Security Establishment .....	David Smith
Conexus, Inc.....	Gray Taylor
CUSIP Global Services.....	Gerard Faulkner
Delap LLP .....	Andrea Beatty
Deluxe Corporation.....	Andy Vo
Diebold Nixdorf .....	Bruce Chapa
Digicert.....	Dean Coclin
Dover Fueling Solutions .....	Henry Fieglein
Federal Reserve Bank .....	Ainsley Hargest
First Data Corporation .....	Lisa Curry
FIS .....	Stephen Gibson-Saxty
Fiserv .....	Dan Otten
FIX Protocol Ltd - FPL .....	James Northey
Futurex.....	Ryan Smith
Gilbarco .....	Bruce Welch
Harland Clarke.....	Jonathan Lee
Hyosung TNS Inc.....	Joe Militello
IBM Corporation.....	Todd Arnold
Ingenico .....	Steven Bowles
ISITC.....	Lisa Iagatta
ITS, Inc. (SHAZAM Networks).....	Manish Nathwani
J.P. Morgan Chase .....	Roy DeCicco
MagTek, Inc.....	Mimi Hart
MasterCard Europe Sprl.....	Mark Kamers
Microsoft .....	Howard Bush
NACHA The Electronic Payments Association .....	George Throckmorton
National Security Agency .....	Mike Boyle
NCR Corporation .....	Kevin Spengler
Office of Financial Research, U.S. Treasury Department .....	Thomas Brown Jr.
PCI Security Standards Council .....	Troy Leach
PricewaterhouseCoopers LLP.....	Michael Versace
PriVerify Corp .....	Adam Glynn
RouteOne .....	Chris Irving
SWIFT/Pan Americas .....	Karin DeRidder
Symcor Inc.....	Debbi Fitzpatrick
TECSEC Incorporated.....	Ed Scheidt
The Clearing House.....	Sharon Jablon
U.S. Bank.....	Michelle Wright

**ANSI X9.117-2020**

U.S. Commodity Futures Trading Commission (CFTC) .....	Robert Stowsky
University Bank .....	Stephen Ranzini
USDA Food and Nutrition Service .....	Lisa Gifaldi
VeriFone, Inc.....	Dave Faoro
Viewpointe .....	Richard Luchak
VISA.....	Adam Clark
Wells Fargo Bank.....	Mark Schaffer

At the time this standard was approved, the X9F Data and Information Security subcommittee had the following members:

Dave Faoro, X9F Chairman  
 Stephen Case, Vice-Chairman

<b>Organization Represented</b>	<b>Representative</b>
ACI Worldwide .....	Doug Grote
ACI Worldwide .....	Dan Kinney
ACI Worldwide .....	Lisa McKee
ACI Worldwide .....	Julie Samson
American Bankers Association .....	Tom Judd
American Express Company .....	Gail Chapman
American Express Company .....	Farid Hatefi
American Express Company .....	John Timar
American Express Company .....	Kevin Welsh
Bank of America.....	Amanda Adams
Bank of America.....	Peter Capraro
Bank of America.....	Andi Coleman
Bank of America.....	Joel Kazin
Bank of America.....	Terry McKinney
Bank of America.....	Matt Sharp
Bank of America.....	Michael Smith
Bank of America.....	Daniel Welch
BBVA Compass .....	Omar Jarrar
BDO .....	Tim Crawford
BDO .....	Jeffrey Ward
BlackBerry Limited .....	Daniel Brown
Bloomberg LP .....	Erik Anderson
Bloomberg LP .....	Corby Dear
Capital One .....	Johnny Lee
comforte AG .....	Thomas Gloerfeld
comforte AG .....	Henning Horst
Communications Security Establishment .....	Jonathan Hammell
Communications Security Establishment .....	David Smith
Conexxus, Inc. ....	David Ezell
Conexxus, Inc. ....	Alan Thiemann
CUSIP Global Services.....	Scott Preiss
Delap LLP .....	Andrea Beatty
Delap LLP .....	Diane Bishop
Delap LLP .....	David Buchanan
Deluxe Corporation .....	Margiore Romay
Deluxe Corporation .....	Andy Vo
Diebold Nixdorf .....	Christoph Bruecher



Diebold Nixdorf .....	Andrea Carozzi
Diebold Nixdorf .....	Bruce Chapa
Diebold Nixdorf .....	Michael Ott
Diebold Nixdorf .....	David Phister
Digicert.....	Tim Hollebeek
Digicert.....	Steve Medin
Discover Financial Services .....	Cheryl Mish
Discover Financial Services .....	Diana Pauliks
Discover Financial Services .....	Jordan Schaefer
Discover Financial Services .....	Jorge Vargas
Dover Fueling Solutions .....	Henry Fieglein
Federal Reserve Bank .....	Patrick Adler
Federal Reserve Bank .....	Guy Berg
Federal Reserve Bank .....	Marianne Crowe
Federal Reserve Bank .....	Amanda Dorphy
Federal Reserve Bank .....	Ken Han
Federal Reserve Bank .....	Ainsley Hargest
Federal Reserve Bank .....	Daniel Maynard
Federal Reserve Bank .....	Susan Pandey
Federal Reserve Bank .....	Patti Ritter
First Data Corporation .....	Lisa Curry
First Data Corporation .....	Vinayak Kagalkar
First National Bank of Omaha .....	Robert Lamagna-Reiter
First National Bank of Omaha .....	Sherry Rewolinski
First National Bank of Omaha .....	Kristi White
FIS .....	Saman Amighi
FIS .....	John Soares
FIS .....	Sunny Wear
Fiserv .....	Bud Beattie
Fiserv .....	Dan Otten
Futurex.....	Ryan Smith
Futurex.....	Tim Weston
GEOBRIDGE Corporation .....	Jason Way
Gilbarco .....	Scott Turner
Gilbarco .....	Bruce Welch
Harland Clarke.....	Joseph Filer
Hyosung TNS Inc.....	Joe Militello
Hyosung TNS Inc.....	JaeWhan Shin
IBM Corporation.....	Todd Arnold
IBM Corporation.....	Richard Kisley
Ingenico .....	Steven Bowles
Ingenico .....	Wayne Burgess
Ingenico .....	Nabil Hamzi
Ingenico .....	Steve McKibben
Intralinks .....	Dominic Brown
Intralinks .....	William Klingenberg
Intralinks .....	Dario Lirio
ISARA Corporation .....	Mike Brown
ISARA Corporation .....	Philip Lafrance
ISARA Corporation .....	Alexander Truskovsky
ITS, Inc. (SHAZAM Networks).....	Manish Nathwani
J.P. Morgan Chase .....	Kathleen Krupa
J.P. Morgan Chase .....	Jackie Pagán

**ANSI X9.117-2020**

J.P. Morgan Chase .....	Darryl Scott
Level 10.....	Allan Elder
MagTek, Inc. ....	Jeff Duncan
MagTek, Inc. ....	Mimi Hart
MasterCard Europe Sprl .....	Mark Kamers
MasterCard Europe Sprl .....	Larry Newell
MasterCard Europe Sprl .....	Michael Ward
Micro Focus .....	Luther Martin
Micro Focus .....	Phil Smith III
Microsoft.....	Howard Bush
National Institute of Standards and Technology (NIST) .....	Elaine Barker
National Institute of Standards and Technology (NIST) .....	Lily Chen
National Security Agency.....	Mike Boyle
National Security Agency.....	Nick Gajcowski
National Security Agency.....	Paul Timmel
NCR Corporation .....	Charlie Harrow
NCR Corporation .....	Bradford Loewy
P97 Networks, Inc.....	Steve Moses
PCI Security Standards Council .....	Leon Fell
PCI Security Standards Council .....	Troy Leach
PCI Security Standards Council .....	Ralph Poore
PriVerify Corp.....	Adam Glynn
SafeNet Infotech Pvt. Ltd.....	Amit Sinha
SafeNet Infotech Pvt. Ltd.....	Devesh Tewari
TECSEC Incorporated .....	Ed Scheidt
TECSEC Incorporated .....	Dr. Wai Tsang
TECSEC Incorporated .....	Jay Wack
Thales UK Limited.....	Larry Hines
Thales UK Limited.....	James Torjussen
The Clearing House .....	Mark Fitlin
The Clearing House .....	Sharon Jablon
The Clearing House .....	Hirak Patel
The Clearing House .....	Miguel Sanchez
The Phoenix Group.....	Ron Davis
The Phoenix Group.....	Candice Hoft
U.S. Bank .....	Stephen Case
University Bank .....	Stephen Ranzini
University Bank .....	Michael Talley
Utimaco Inc. ....	Susan Langford
VeriFone, Inc.....	John Barrowman
VeriFone, Inc.....	Dave Faoro
VeriFone, Inc.....	Saxon Noh
VeriFone, Inc.....	Joachim Vance
Viewpointe .....	Richard Luchak
VISA .....	Ben Choong
VISA .....	Adam Clark
VISA .....	Eric Le Saint
VISA .....	Kim Wagner
Wells Fargo Bank.....	Jason Buck
Wells Fargo Bank.....	David Cooper
Wells Fargo Bank.....	William Felts, IV
Wells Fargo Bank.....	Calvin Heng
Wells Fargo Bank.....	Rameshchandra Ketharaju

Wells Fargo Bank .....	Antoinette McCarthy
Wells Fargo Bank .....	Kelly O'Donnell
Wells Fargo Bank .....	Mark Schaffer
Wells Fargo Bank .....	Jeff Stapleton
Wells Fargo Bank .....	Tony Suarez
White and Williams LLP .....	Richard Borden
White and Williams LLP .....	Sandra Lambert
White and Williams LLP .....	Joshua Mooney
White and Williams LLP .....	Michael Olsan

Under ASC X9, Inc. procedures, a working group may be established to address specific segments of work under the ASC X9 Committee or one of its subcommittees. A working group exists only to develop standard(s) or guideline(s) in a specific area and is then disbanded. The individual experts are listed with their affiliated organizations. However, this does not imply that the organization has approved the content of the standard or guideline.

X9F4 Cybersecurity and Cryptographic Solutions working group had the following members

Jeff Stapleton X9F4 Chairman  
 Sandra Lambert X9F4 Vice-Chairman  
 Jeff Stapleton – Work Group Editor

<b>Organization Represented</b>	<b>Representative</b>
ACI Worldwide .....	Lisa McKee
Amazon .....	John Britton
Amazon .....	Igor Kleyman
Amazon .....	Rahul Prabhakar
American Express Company .....	Gail Chapman
Bank of America .....	Amanda Adams
Bank of America .....	Peter Capraro
Bank of America .....	Andi Coleman
Bank of America .....	Joel Kazin
Bank of America .....	Terry McKinney
Bank of America .....	David Mortman
Bank of America .....	Matt Sharp
Bank of America .....	Daniel Welch
BBVA Compass .....	Omar Jarrar
BDO .....	Tim Crawford
BlackBerry Limited .....	Daniel Brown
Bloomberg LP .....	Erik Anderson
Capital One .....	Johnny Lee
comforte AG .....	Henning Horst
Conexus, Inc. ....	David Ezell
Conexus, Inc. ....	Alan Thiemann
Conexus, Inc. ....	Linda Toth
Delap LLP .....	Andrea Beatty
Delap LLP .....	Spencer Giles
Diebold Nixdorf .....	Christoph Bruecher
Diebold Nixdorf .....	Rick Brunt
Diebold Nixdorf .....	Andrea Carozzi
Diebold Nixdorf .....	Bruce Chapa

**ANSI X9.117-2020**

Diebold Nixdorf .....	Scott Harroff
Diebold Nixdorf .....	Anne Konecny
Diebold Nixdorf .....	Michael Nolte
Diebold Nixdorf .....	Michael Ott
Diebold Nixdorf .....	David Phister
Diebold Nixdorf .....	Matthias Runowski
Digicert .....	Tim Hollebeek
Digicert .....	Steve Medin
Discover Financial Services.....	Cheryl Mish
Discover Financial Services.....	Diana Pauliks
Discover Financial Services.....	Lakshmi Ramanathan
Discover Financial Services.....	Jordan Schaefer
Discover Financial Services.....	Jorge Vargas
Dover Fueling Solutions.....	Henry Fieglein
Federal Reserve Bank .....	Patrick Adler
Federal Reserve Bank .....	Guy Berg
Federal Reserve Bank .....	Marianne Crowe
Federal Reserve Bank .....	Pieralberto Deganello
Federal Reserve Bank .....	Amanda Dorphy
Federal Reserve Bank .....	Ken Han
Federal Reserve Bank .....	Ainsley Hargest
Federal Reserve Bank .....	Daniel Littman
Federal Reserve Bank .....	Daniel Maynard
Federal Reserve Bank .....	Paul Nunnally
Federal Reserve Bank .....	Susan Pandy
Federal Reserve Bank .....	Patti Ritter
First Data Corporation.....	Lisa Curry
First Data Corporation.....	Prince Duodu
First Data Corporation.....	Vinayak Kagalkar
First Data Corporation.....	Brian Kean
First Data Corporation.....	Brian Murray
First Data Corporation.....	Allisa Walker
FIS.....	Saman Amighi
FIS.....	Ian Lumsden
FIS.....	Sunny Wear
Fiserv .....	Dan Otten
FIX Protocol Ltd - FPL .....	James Northey
GEOBRIDGE Corporation .....	Donna Gem
GEOBRIDGE Corporation .....	Dean Macinskaskas
GEOBRIDGE Corporation .....	Jason Way
Gilbarco.....	Bruce Welch
IBM Corporation.....	Todd Arnold
IBM Corporation.....	Richard Kisley
Ingenico.....	Steven Bowles
Inmar .....	Poovannan Rathinam
ISARA Corporation .....	Mike Brown
ISARA Corporation .....	Philip Lafrance
ISARA Corporation .....	Alexander Truskovsky
ITS, Inc. (SHAZAM Networks) .....	Janet LaFrence
ITS, Inc. (SHAZAM Networks) .....	Manish Nathwani
J.P. Morgan Chase .....	Roger Cowie
J.P. Morgan Chase .....	Robin Doyle
J.P. Morgan Chase .....	Clinton Jones

J.P. Morgan Chase .....	Jackie Pagán
J.P. Morgan Chase .....	Darryl Scott
K3DES LLC .....	Davi Ottenheimer
Level 10 .....	Allan Elder
MagTek, Inc. ....	Mimi Hart
MasterCard Europe Sprl .....	Simon Dix
MasterCard Europe Sprl .....	Leland Englebardt
MasterCard Europe Sprl .....	Mark Kamers
Member Emeritus .....	Darlene Kargel
Member Emeritus .....	Gene Kathol
Member Emeritus .....	Lawrence LaBella
Member Emeritus .....	John McCleary
Member Emeritus .....	Mike McCormick
Member Emeritus .....	Bill Poletti
Member Emeritus .....	Richard Sweeney
Member Emeritus .....	Mark Tiggas
Microsoft .....	Howard Bush
National Institute of Standards and Technology (NIST) .....	Elaine Barker
National Institute of Standards and Technology (NIST) .....	Lily Chen
National Security Agency .....	Greg Gilbert
National Security Agency .....	Tim Havighurst
National Security Agency .....	Paul Timmel
NCR Corporation .....	Charlie Harrow
NCR Corporation .....	Bradford Loewy
NCR Corporation .....	Brian Wotherspoon
PCI Security Standards Council .....	Leon Fell
PCI Security Standards Council .....	Troy Leach
PCI Security Standards Council .....	John Markh
PCI Security Standards Council .....	Ralph Poore
PCI Security Standards Council .....	Randall Rieth
PCI Security Standards Council .....	Elizabeth Terry
PricewaterhouseCoopers LLP .....	Madison Horn
PricewaterhouseCoopers LLP .....	Michael Versace
PriVerify Corp .....	Adam Glynn
SafeNet Infotech Pvt. Ltd. ....	Amit Sinha
Silicon Valley Law Group .....	Stephen Wu
TECSEC Incorporated .....	Ed Scheidt
TECSEC Incorporated .....	Dr. Wai Tsang
TECSEC Incorporated .....	Jay Wack
Thales UK Limited .....	Colette Broadway
Thales UK Limited .....	Larry Hines
Thales UK Limited .....	James Torjussen
The Clearing House .....	Ken Friedman
The Clearing House .....	Sharon Jablon
The Clearing House .....	Miguel Sanchez
The Phoenix Group .....	Candice Hoft
TokenEx .....	Ulf Mattsson
U.S. Bank .....	Stephen Case
U.S. Bank .....	Steven Fenter
U.S. Bank .....	David Lord
U.S. Bank .....	Darin Pettis
University Bank .....	Stephen Ranzini
University Bank .....	Michael Talley

**ANSI X9.117-2020**

Utimaco Inc.....	Susan Langford
Utimaco Inc.....	Manish Upasani
VeriFone, Inc.....	Dave Faoro
VeriFone, Inc.....	LeAnn Hostetler
VeriFone, Inc.....	Doug Manchester
VeriFone, Inc.....	Saxon Noh
VeriFone, Inc.....	Joachim Vance
VISA.....	Kristina Breen
VISA.....	Ben Choong
VISA.....	Adam Clark
VISA.....	Naga Vinod Duggirala
VISA.....	June Qiu
VISA.....	Marcelo Silva
VISA.....	Hans Van Tilburg
VISA.....	Kim Wagner
Wells Fargo Bank.....	Rao Abhijit
Wells Fargo Bank.....	Sotos Barkas
Wells Fargo Bank.....	William Felts, IV
Wells Fargo Bank.....	Matthew Greenwell
Wells Fargo Bank.....	Sam Grosby
Wells Fargo Bank.....	Jeff Jacoby
Wells Fargo Bank.....	Amanda Judge
Wells Fargo Bank.....	Joseph Kaluzny
Wells Fargo Bank.....	Arun Kamath
Wells Fargo Bank.....	Brian Keltner
Wells Fargo Bank.....	Rameshchandra Ketharaju
Wells Fargo Bank.....	Jan Kohl
Wells Fargo Bank.....	Eric Lengvenis
Wells Fargo Bank.....	Antoinette McCarthy
Wells Fargo Bank.....	Olatunde Ojolola
Wells Fargo Bank.....	Doug Pelton
Wells Fargo Bank.....	Tim Plantand
Wells Fargo Bank.....	Mark Schaffer
Wells Fargo Bank.....	Maria Schuett
Wells Fargo Bank.....	Jeff Stapleton
Wells Fargo Bank.....	Tony Stieber
Wells Fargo Bank.....	Tony Suarez
Wells Fargo Bank.....	Nathan Suri
White and Williams LLP.....	Gwenn Barney
White and Williams LLP.....	Richard Borden
White and Williams LLP.....	Clay Epstein
White and Williams LLP.....	Michael Jervis
White and Williams LLP.....	Sandra Lambert
White and Williams LLP.....	Joshua Mooney
White and Williams LLP.....	Michael Olsan
White and Williams LLP.....	Tania Soris

# Mutual Authentication for Secure Remote Access

## 1 Scope

This standard defines a taxonomy, requirements, operating principles, controls objectives, techniques, and technical approaches to enable financial institutions (FI) and financial services to support secure remote access. Topics considered within the scope of this standard include the following:

- a. Levels of assurance (LoA) for Risk management.
- b. Mutual authentication between two entities, i.e., an end user and a financial services application, performing a financial transaction.
- c. End user multi-factor authentication (MFA) and multi-channel authentication.
- d. Endpoint user interface devices, e.g., browser and other computer applications, mobile device, USB fobs, and RFID
- e. Financial services applications, e.g., Internet / home banking, loan applications, insurance, bill presentment, and bill payment, account to account funds transfer, brokerage
- f. Financial services operated by any financial institution, agent, affiliate or third party service providers (TPSP) that transmit, process, or store financial data.
- g. Authentication assurance value for various authentication mechanisms
- h. Layered security approach – Security approach that requires a criminal to penetrate or overcome a series of security layers before reaching a target, where a layer can refer to different techniques, different points in the technology stack, or at different steps in the business process.

Topics considered out of scope of this standard include the following:

- Identity provisioning and management. Financial institutions are expected to have know-your-customer (KYC) processes and procedures for risk management.
- Federation and user system provisioning.
- Physical security.
- ATM, POS, kiosks, and Bluetooth enabled devices.
- Risk assessment methods

Organizations considering remote access to financial services should perform a business risk assessment and evaluate their needs against the authentication framework provided in this standard to determine their requirements. Organizations implementing remote access methods should evaluate solutions against the requirements provided in this standard to measure compliance. Organizations validating compliance should use the control objectives provided in this standard. Manufacturers or implementers of remote access solutions should provide or enable sufficient functionality to achieve compliance with this standard.

## 2 Purpose

The purpose of this standard is to create an authentication framework that can be adopted by financial institutions, product developers, service providers, merchants, financial services and their customers to achieve a higher level of confidence that they are communicating with the intended party. The overall intent of this standard and