

# [MS-OXPHISH]: Phishing Warning Protocol

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## Revision Summary

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# 1 Introduction

The Phishing Warning Protocol enables clients to identify and mark e-mail messages that are designed to trick recipients into divulging sensitive information (such as passwords and other personal information) to a source that is not trustworthy.

Sections 1.5, 1.8, 1.9, 2, and 3 of this specification are normative. All other sections and examples in this specification are informative.

## 1.1 Glossary

This document uses the following terms:

**handle:** Any token that can be used to identify and access an object such as a device, file, or a window.

**Message object:** A set of properties that represents an email message, appointment, contact, or other type of personal-information-management object. In addition to its own properties, a Message object contains recipient properties that represent the addressees to which it is addressed, and an attachments table that represents any files and other Message objects that are attached to it.

**named property:** A property that is identified by both a GUID and either a string name or a 32-bit identifier.

**phishing:** The luring of sensitive information, such as passwords or other personal information, from a recipient by masquerading as someone who is trustworthy and has a real need for such information.

**phishing message:** An email message that is designed to trick a recipient into divulging sensitive information, such as passwords or other personal information, to a non-trustworthy source.

**property ID:** A 16-bit numeric identifier of a specific attribute. A property ID does not include any property type information.

**remote operation (ROP):** An operation that is invoked against a server. Each ROP represents an action, such as delete, send, or query. A ROP is contained in a ROP buffer for transmission over the wire.

**MAY, SHOULD, MUST, SHOULD NOT, MUST NOT:** These terms (in all caps) are used as defined in [\[RFC2119\]](#). All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

## 1.2 References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the [Errata](#).

### 1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact [dochelp@microsoft.com](mailto:dochelp@microsoft.com). We will assist you in finding the relevant information.

[MS-OXCADATA] Microsoft Corporation, "[Data Structures](#)".

[MS-OXCMSG] Microsoft Corporation, "[Message and Attachment Object Protocol](#)".

[MS-OXCROPS] Microsoft Corporation, "[Remote Operations \(ROP\) List and Encoding Protocol](#)".

[MS-OXCSPAM] Microsoft Corporation, "[Spam Confidence Level Protocol](#)".

[MS-OXPROPS] Microsoft Corporation, "[Exchange Server Protocols Master Property List](#)".

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <http://www.rfc-editor.org/rfc/rfc2119.txt>

### 1.2.2 Informative References

[MS-OXCPRPT] Microsoft Corporation, "[Property and Stream Object Protocol](#)".

[MS-OXOMSG] Microsoft Corporation, "[Email Object Protocol](#)".

[MS-OXPROTO] Microsoft Corporation, "[Exchange Server Protocols System Overview](#)".

### 1.3 Overview

This protocol enables the client to identify and mark e-mail messages that are likely to be **phishing messages**. When an e-mail message is delivered to a messaging client, the client examines the properties of the **Message object** to determine the likelihood of it being a phishing message. If the examination determines that the message is likely to be a phishing message, the client modifies a property on the Message object to mark it as suspicious. A messaging client's user interface can use this property value to identify a potential phishing message and display a warning to the end user.

This protocol does not specify the algorithm that determines the likelihood of a message being a phishing message; it only specifies how the Message object is changed to indicate the result of the algorithm.

### 1.4 Relationship to Other Protocols

The Phishing Warning Protocol uses a property on the **Message object** as a means of identifying and marking messages that are likely to be **phishing messages**. Therefore, this protocol relies on the following:

- An understanding of the Message object, as described in [\[MS-OXOMSG\]](#).
- An understanding of getting and setting properties, as described in [\[MS-OXCMSG\]](#).

For conceptual background information and overviews of the relationships and interactions between this and other protocols, see [\[MS-OXPROTO\]](#).

### 1.5 Prerequisites/Preconditions

This protocol assumes that the client has previously logged on to the server and has acquired a **handle** to the **Message object** for which it has to identify or designate **phishing** status.

### 1.6 Applicability Statement

A client can use this protocol to identify or mark messages that are likely to be **phishing message**. This protocol does not specify the algorithm that determines the likelihood of a message to be a phishing message; it only specifies how the **Message object** is changed to indicate the result of such analysis.

## **1.7 Versioning and Capability Negotiation**

None.

## **1.8 Vendor-Extensible Fields**

None.

## **1.9 Standards Assignments**

None.

Preliminary



## 2 Messages

### 2.1 Transport

**Message object** properties are transported between the client and server, as specified in [\[MS-OXCMSG\]](#).

### 2.2 Message Syntax

Before sending requests to the server, the client MUST obtain a **handle** to the **Message object** used in property operations.

#### 2.2.1 Phishing Warning Protocol Properties

The following property is specific to the Phishing Warning Protocol.

##### 2.2.1.1 PidNamePhishingStamp

Type: **PtypInteger32** ([\[MS-OXCDATA\]](#) section 2.11.1)

The **PidNamePhishingStamp** property ([\[MS-OXPROPS\]](#) section 2.470) indicates whether a message is likely to be a phishing message.

The value of this **named property** is a 32-bit field. The structure is specified as follows.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
STAMP																												E	X		

**STAMP (28 bits):** This field is obtained from the fifth value of the **PidTagAdditionalRenEntryIds** property ([\[MS-OXPROPS\]](#) section 2.509).

**E - ENABLED (1 bit):** If the value of this field is 1, the user has enabled functionality (such as hyperlinks, reply, and attachments) within the message. The default value for this field is zero (0), which indicates that the user has not enabled functionality.

**X (3 bits):** Unused. These bits SHOULD be set to zero (0) by the client and ignored by the server.

## 3 Protocol Details

### 3.1 Client Details

The role of the client is to determine whether a message is a **phishing message** and to update the **PidNamePhishingStamp** property (section [2.2.1.1](#)), as specified in section [3.1.5](#), to indicate the results of such analysis. The client then checks the value of the **PidNamePhishingStamp** property when the message is opened and conveys a warning to the end user for any message that is likely to be a phishing message.

#### 3.1.1 Abstract Data Model

None.

#### 3.1.2 Timers

None.

#### 3.1.3 Initialization

Before matching the **PidNamePhishingStamp** property (section [2.2.1.1](#)) on the message, as specified in section [3.1.4.2](#), the existence of the fifth value of **PidTagAdditionalRenEntryIds** ([\[MS-OXPROPS\]](#) section 2.509) MUST be ensured. If it is not present, the value MUST be created, as specified in [\[MS-OXCSPAM\]](#) section 3.2.4.1.2.

#### 3.1.4 Higher-Layer Triggered Events

##### 3.1.4.1 Client Receives a New Message

When the client receives a new message, the client determines whether the message is likely to be a **phishing message**. When the message is delivered, if the client determines that the message is likely to be a phishing message, the client sets the **PidNamePhishingStamp** property (section [2.2.1.1](#)) on the **Message object**, as specified in section [3.1.5](#).

##### 3.1.4.2 End User Opens a Message

When an end user opens a message, the client tries to retrieve the value of the **PidNamePhishingStamp** property (section [2.2.1.1](#)). If the property is present, its **STAMP** field, as specified in section [2.2.1.1](#), is compared against the fifth value of the multivalued property **PidTagAdditionalRenEntryIds** ([\[MS-OXPROPS\]](#) section 2.509). If this comparison does not result in a match, the **PidNamePhishingStamp** property SHOULD be ignored. If the comparison results in a match, the client considers the message to be a **phishing message**. If the value of the **ENABLED** field, as specified in section [2.2.1.1](#), in the **PidNamePhishingStamp** property is 1, the user has enabled the functionality and the client SHOULD display the message as a normal message. If the value of the **ENABLED** field in the **PidNamePhishingStamp** property is zero (0), the client SHOULD disable the functionality of the message. The functionality that the client disables (according to the value of the **ENABLED** field in the **PidNamePhishingStamp** property) is implementation-dependent.

The user has the option to enable all functionality within a message by interacting with the user interface. If the user enables functionality within a message, the value of the **ENABLED** field of the **PidNamePhishingStamp** property on that message is set to 1.

The functionality is also enabled when the **PidTagJunkPhishingEnableLinks** property ([\[MS-OXPROPS\]](#) section 2.760) is set to TRUE.

### 3.1.5 Message Processing Events and Sequencing Rules

The client SHOULD set the **PidNamePhishingStamp** property (section [2.2.1.1](#)) if the client determines that the message is likely to be a **phishing message**, as specified in section [3.1.4.2](#).

Once the client determines that a message is a phishing message, it uses the **RopGetPropertyIDsFromNames remote operation (ROP)** ([\[MS-OXCROPS\]](#) section 2.2.8.1) to map the **PidNamePhishingStamp named property** to a **property ID**. The client then updates the value of the **PidNamePhishingStamp** property (section 2.2.1.1) to indicate that the message is likely to be a phishing message. The client SHOULD use the value of this property to warn the user when a message is likely to be a phishing message.

The value of the **PidNamePhishingStamp** property is calculated as follows:

- A query for the fifth value in the **PidTagAdditionalRenEntryIds** property ([\[MS-OXPROPS\]](#) section 2.509) is performed. Let the queried value be called `QueriedValue_FromEntryID`.
- The mask (0x0FFFFFFF) is then applied to `QueriedValue_FromEntryID`. That is, the bitwise operation (0x0FFFFFFF AND `QueriedValue_FromEntryID`) is performed to produce the **STAMP** field (section 2.2.1.1) of the **PidNamePhishingStamp** property.
- If the user has not enabled functionality on the message, the value of the **ENABLED** field (section 2.2.1.1) is zero (0) and the final property value is the same as the value of the **STAMP** field. If the user determines that the message is not a phishing message and indicates as such by interaction with the user interface, the final **PidNamePhishingStamp** property value with **ENABLED** field 1 is produced by applying the bitwise operation (**STAMP** OR 0x10000000).

If the user enables the functionality of the phishing message, the **PidNamePhishingStamp** property value is changed and the client uses the **RopSetProperties** ROP ([\[MS-OXCROPS\]](#) section 2.2.8.6) to transmit the new value to the server. The client then uses the **RopSaveChangesMessage** ROP ([\[MS-OXCROPS\]](#) section 2.2.6.3) to commit the property to the server.

### 3.1.6 Timer Events

None.

### 3.1.7 Other Local Events

None.

## 4 Protocol Examples

### 4.1 Setting the PidNamePhishingStamp Property

When the client receives a new message, the client determines whether the message is likely to be a **phishing message**. If the client determines that the message is likely to be a phishing message, the client sets the **PidNamePhishingStamp** property (section [2.2.1.1](#)) on the message, as described in section [3.1.5](#), on message delivery. The client calculates the **PidNamePhishingStamp** property value as described in the following example:

If the fifth value queried from the **PidTagAdditionalRenEntryIds** property ([\[MS-OXPROPS\]](#) section 2.509) is 0xAE241D99, the client begins calculating the **PidNamePhishingStamp** property by setting the **STAMP** field, as specified in section 2.2.1.1, as follows:  $(0xAE241D99 \text{ AND } 0x0FFFFFFF) = 0x0E241D99$ .

The value of the **ENABLED** field, as specified in section 2.2.1.1, of the **PidNamePhishingStamp** property can be either zero (0), if the user has not enabled the functionality of the message, or 1, if the user has enabled the functionality of the message. If the value of the **ENABLED** field is zero (0), the final value of the **PidNamePhishingStamp** property is 0x0E241D99. If the value of the **ENABLED** field is 1, the final **PidNamePhishingStamp** property value is the result of the bitwise operation  $(0x0E241D99 \text{ OR } 0x10000000) = 0x1E241D99$ .

### 4.2 Evaluating the PidNamePhishingStamp Property

For purposes of the examples in this section, let the fifth value queried from the **PidTagAdditionalRenEntryIds** property ([\[MS-OXPROPS\]](#) section 2.509) be called PhishingTagValue.

#### 4.2.1 No PidNamePhishingStamp Property

Examples:evaluating the PidNamePhishingStamp property" If the **PidNamePhishingStamp** property (section [2.2.1.1](#)) is absent from a message, the client will treat the message as a message that is not a **phishing message**.

#### 4.2.2 PidNamePhishingStamp Property Mismatch

If the **PidNamePhishingStamp** property (section [2.2.1.1](#)) is present, the client will compare its **STAMP** field, as specified in section 2.2.1.1, with the least significant 28 bits of the PhishingTagValue value. If the **PidNamePhishingStamp** property value is 0x0EAE2103 and the PhishingTagValue value is 0xAE241D99, the comparison does not result in a match. Therefore, the client ignores the **PidNamePhishingStamp** property, resulting in enabled message functionality and no added **phishing**-related user interface elements.

#### 4.2.3 PidTagJunkPhishingEnableLinks Property Set to True

If the **PidTagJunkPhishingEnableLinks** property ([\[MS-OXPROPS\]](#) section 2.760) is present and is set to TRUE, the client will ignore the **PidNamePhishingStamp** property ([\[MS-OXPROPS\]](#) section 2.470) and will treat the message as a message that is not a **phishing message**.

#### 4.2.4 Phishing Message Functionality Not Enabled By the User

If the **PidNamePhishingStamp** property ([\[MS-OXPROPS\]](#) section 2.470) is present, the client will compare its **STAMP** field, as specified in section [2.2.1.1](#), with the least significant 28 bits of the PhishingTagValue value. If the **PidNamePhishingStamp** property value is 0x0E241D99, and the PhishingTagValue value is 0xAE241D99, the comparison results in a match, indicating that the

message is likely to be a **phishing message**. If the value of the **ENABLED** field, as specified in section 2.2.1.1, of the **PidNamePhishingStamp** property (section 2.2.1.1) is zero (0), the user has not enabled functionality within the message. Therefore, the client will disable functionality within the message, display a warning to the user, and add **phishing**-related user interface elements that allow the user to enable message functionality.

#### 4.2.5 Phishing Message Functionality Enabled By the User

If the **PidNamePhishingStamp** property ([MS-OXPROPS] section 2.470) is present, the client will compare its **STAMP** field, as specified in section 2.2.1.1, with the least significant 28 bits of the **PhishingTagValue** value. If the **PidNamePhishingStamp** property value is 0x1E241D99 and the **PhishingTagValue** value is 0xAE241D99, the comparison results in a match, which indicates that the message is likely to be a **phishing message**. Because the value of the **ENABLED** field, as specified in section 2.2.1.1, of the **PidNamePhishingStamp** property is 1, the user has enabled functionality within the message. Therefore, the client will treat the message as though it is not a phishing message.

### 4.3 Sample Properties on a Phishing Message

The following is a description of what a client does to stamp the message that has been identified as a **phishing message** and the responses that a server returns. The **ROP** input and responses are summarized in this section; for information about how to set properties by using the **RopSetProperties** ROP ([MS-OXCROPS] section 2.2.8.6), see [MS-OXCPRPT] section 2.2.5.

Because the **PidNamePhishingStamp** property (section 2.2.1.1) is a **named property**, the client asks the server to perform mapping from named properties to **property IDs** by using the **RopGetPropertyIDsFromNames** ROP ([MS-OXCROPS] section 2.2.8.1).

Property name	Property set GUID	Name
<b>PidNamePhishingStamp</b>	{00020329-0000-0000-C000-000000000046}	http://schemas.microsoft.com/outlook/phishingstamp

The server returns the following property IDs in response to the **RopGetPropertyIDsFromNames** ROP.

Property name	Property ID
<b>PidNamePhishingStamp</b>	0x831F

After determining the value of the property, the client uses the **RopSetProperties** ROP to transmit the data to the server.

Property name	Property ID	Property type	Value
<b>PidNamePhishingStamp</b>	0x831F	0x0003(PT_LONG)	0x0A73AE09

If the user enables the functionality of the phishing message, the property value is changed and the client uses the **RopSetProperties** ROP to transmit the new value to the server.

Property name	Property ID	Property type	Value
<b>PidNamePhishingStamp</b>	0x831F	0x0003(PT_LONG)	0x1A73AE09

The client then uses the **RopSaveChangesMessage** ROP ([MS-OXCROPS] section 2.2.6.3) to commit the properties to the server.

## 5 Security

### 5.1 Security Considerations for Implementers

When the message is delivered, the presence of the **PidNamePhishingStamp** property ([\[MS-OXPROPS\]](#) section 2.470) with a successful match of the **STAMP** field, as specified in section [2.2.1.1](#), signals the client that the message has already been evaluated for **phishing** and does not have to be filtered again. Therefore, care has to be taken while setting the **PidNamePhishingStamp** property on the message, and all precautions for evaluation of the fifth value of **PidTagAdditionalRenEntryIds** ([\[MS-OXPROPS\]](#) section 2.509) have to be followed (as described in [\[MS-OXCMSG\]](#)).

### 5.2 Index of Security Parameters

None.

## 6 Appendix A: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include updates to those products.

- Microsoft Exchange Server 2007
- Microsoft Exchange Server 2010
- Microsoft Exchange Server 2013
- Microsoft Exchange Server 2016
- Microsoft Office Outlook 2007
- Microsoft Outlook 2010
- Microsoft Outlook 2013
- Microsoft Outlook 2016
- Microsoft Exchange Server 2019
- Microsoft Outlook 2019
- Microsoft Outlook 2021

Exceptions, if any, are noted in this section. If an update version, service pack or Knowledge Base (KB) number appears with a product name, the behavior changed in that update. The new behavior also applies to subsequent updates unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms "SHOULD" or "SHOULD NOT" implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term "MAY" implies that the product does not follow the prescription.

## 7 Change Tracking

This section identifies changes that were made to this document since the last release. Changes are classified as Major, Minor, or None.

The revision class **Major** means that the technical content in the document was significantly revised. Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements.
- A document revision that captures changes to protocol functionality.

The revision class **Minor** means that the meaning of the technical content was clarified. Minor changes do not affect protocol interoperability or implementation. Examples of minor changes are updates to clarify ambiguity at the sentence, paragraph, or table level.

The revision class **None** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the relevant technical content is identical to the last released version.

The changes made to this document are listed in the following table. For more information, please contact [dochelp@microsoft.com](mailto:dochelp@microsoft.com).

Section	Description	Revision class
<a href="#">6</a> Appendix A: Product Behavior	Updated list of supported products.	major



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