

# [MS-RAI]: Remote Assistance Initiation Protocol Specification

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# 1 Introduction

The Remote Assistance Initiation Protocol is a set of **Distributed Component Object Model (DCOM)** interfaces, as specified in [\[MS-DCOM\]](#), for initiating a **Remote Assistance connection** to another computer in a **domain**. The Remote Assistance Initiation Protocol allows an authorized **Expert** to start **Remote Assistance (RA)** on a remote **Novice** computer to retrieve data that is required to make a Remote Assistance connection from the Expert's computer to the Novice's computer.

## 1.1 Glossary

The following terms are defined in [\[MS-GLOS\]](#):

**Binary Large Object (BLOB)**  
**CLSID**  
**Computer Name**  
**Distributed Component Object Model (DCOM)**  
**Domain**  
**Fully Qualified Domain Name (FQDN)**  
**Opnum**  
**Remote Procedure Call (RPC)**  
**Unicode**  
**Universally Unique Identifier (UUID)**  
**Well-Known Endpoint**

The following terms are specific to this document:

**Expert:** The side of a **remote assistance connection** that is able to view the remote screen of the other computer in order to provide help.

**Novice:** The side of a **remote assistance connection** that shares its screen with the other computer in order to receive help.

**RDP:** See **Remote Desktop Protocol**.

**Remote Assistance:** A feature of the operating system that allows screen, keyboard, and mouse sharing so that a computer user can be assisted by a remote helper.

**Remote Assistance Connection:** A communication framework that is established between two computers that facilitates **remote assistance**.

**Remote Desktop Protocol:** A protocol that enables the exchange of client and server settings and the negotiation of common settings to use for the duration of the connection, so that input, graphics, and other data can be exchanged and processed between client and server.

**Terminal Services:** The ability to host multiple, simultaneous client sessions on Windows servers. Remote users establish a session on a computer, log on, and run applications on a server. The server transmits the graphical user interface of the program to the client. The client then returns keyboard and mouse clicks to be processed by the server.

**Virtual Channel:** A static transport used for lossless communication between two computers over a main data connection, in 1600-byte chunks, that is created once a **remote assistance connection** has been established. A **Virtual Channel** allows data and control messages to be exchanged between the two computers. The **Virtual Channel** that is used by the **Remote Assistance** Protocol is described in the [Remote Desktop Protocol: Basic Connectivity and Graphics Remoting Specification](#) ([MS-RDPBCGR]) document.

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

## 1.2 References

### 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. Please check the archive site, <http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624>, as an additional source.

[C706] The Open Group, "DCE 1.1: Remote Procedure Call", C706, August 1997, <http://www.opengroup.org/public/pubs/catalog/c706.htm>

[MS-DCOM] Microsoft Corporation, "[Distributed Component Object Model \(DCOM\) Remote Protocol Specification](#)", March 2007.

[MS-ERREF] Microsoft Corporation, "[Windows Error Codes](#)", January 2007.

[MS-GLOS] Microsoft Corporation, "[Windows Protocols Master Glossary](#)", March 2007.

[MS-OAUT] Microsoft Corporation, "[OLE Automation Protocol Specification](#)", March 2007.

[MS-RA] Microsoft Corporation, "[Remote Assistance Protocol Specification](#)", June 2007.

[MS-RDPBCGR] Microsoft Corporation, "[Remote Desktop Protocol: Basic Connectivity and Graphics Remoting Specification](#)", June 2007.

[MS-RPCE] Microsoft Corporation, "[Remote Procedure Call Protocol Extensions](#)", January 2007.

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

### 1.2.2 Informative References

[MSDN-CRYPTO] Microsoft Corporation, "Cryptography Reference", <http://msdn2.microsoft.com/en-us/library/aa380256.aspx>

## 1.3 Protocol Overview (Synopsis)

The Remote Assistance Initiation Protocol provides a set of DCOM interfaces that enable an Expert to retrieve the Remote Assistance connection-specific data from the remote Novice computer. This Remote Assistance connection-specific data is subsequently used to initiate a Remote Assistance connection as explained in the Remote Assistance Initiation Protocol.

The Expert must have the IP address or **FQDN** of the Novice's computer in order to use this protocol.

The Expert is the DCOM client and the Novice is the DCOM server.

Before the Expert's DCOM call is executed on the Novice computer, DCOM performs a check to verify that the Expert is on the list of authorized Remote Assistance helpers on the Novice computer. [<1>](#)

## 1.4 Relationship to Other Protocols

The Remote Assistance Initiation Protocol relies on the OLE Automation Protocol [\[MS-OAUT\]](#), the Distributed Component Object Model (DCOM) Remote Protocol [\[MS-DCOM\]](#), and on the Microsoft **remote procedure call (RPC)**, as specified in the Remote Procedure Call Protocol Extensions [\[MS-RPCE\]](#).

The Remote Assistance Initiation Protocol is dependent upon the [Remote Desktop Protocol: Basic Connectivity and Graphics Remoting Specification](#) [MS-RDPBCGR] for basic connectivity and graphics remoting, and for support for the virtual-channel extensions.

The Remote Assistance Protocol [MS-RA] is dependent on the Remote Assistance Initiation Protocol.

## 1.5 Prerequisites/Preconditions

This protocol is implemented over DCOM and RPC, and, as a result, has the prerequisites specified in the Distributed Component Object Model (DCOM) Remote Protocol [\[MS-DCOM\]](#) and Remote Procedure Call Protocol Extensions [\[MS-RPCE\]](#) as being common to DCOM and RPC interfaces.

The Remote Assistance Initiation Protocol [MS-RAI] assumes that the Expert has the IP Address or the fully-qualified domain name (FQDN) of the Novice's computer.

## 1.6 Applicability Statement

This protocol is used to perform the following functions:

- Using the Novice IP address or FQDN, the Expert queries the Novice for a list of active **Terminal Services** sessions running on the Novice computer. Additional information about each Terminal Services session - DomainName, UserName, Terminal Services SessionID, and Terminal Services SessionState are also obtained.
- Using the DomainName, UserName, and SessionID of a specific session on the Novice computer, the Expert queries the Novice for a Remote Assistance Connection String. The Novice starts Remote Assistance and returns a Remote Assistance Connection String. The Novice is now waiting for the Expert to make a peer-to-peer connection to its Terminal Services session.
- After a Remote Assistance Connection String is obtained by the Expert, it is used to make a peer-to-peer Remote Assistance connection to the Novice's Terminal Service session on the Novice's computer.

## 1.7 Versioning and Capability Negotiation

This document covers versioning issues in the following areas:

**Supported Transports:** This protocol uses the DCOM [\[MS-DCOM\]](#) technology, which provides capabilities to query for interface versions.

**Protocol Versions:** This protocol is comprised of the following two primary DCOM interfaces, which are version 0.0: [<2>](#)

- IPCHService
- IRASrv

Both these interfaces offer similar functionality through their methods. An RPC client determines if a method is supported by attempting to invoke the method; if the method is not supported, the RPC server returns an "**opnum** out of range" error, as specified in [\[C706\]](#) and [\[MS-RPCE\]](#).

When an Expert attempts to connect using this protocol, it should use only one of these two interfaces.

The Novice computer must implement at least one of these two interfaces, and may implement both interfaces.

The Expert computer negotiates for a given set of server functionality by specifying the **UUID** corresponding to the wanted RPC interface when binding to the Novice.

## 1.8 Vendor-Extensible Fields

This protocol does not define any vendor-extensible fields.

## 1.9 Standards Assignments

No standards assignments have been received for this protocol. All values used in these extensions are in private ranges specified in section [2.1](#).

| Parameter                             | Value                                | Reference                      |
|---------------------------------------|--------------------------------------|--------------------------------|
| RPC Interface UUID for IPCHService    | 833E4200-AFF7-4AC3-AAC2-9F24C1457BCE | <a href="#">IPCHService</a>    |
| RPC Interface UUID for IPCHCollection | 833E4100-AFF7-4AC3-AAC2-9F24C1457BCE | <a href="#">IPCHCollection</a> |
| RPC Interface UUID for ISAFSession    | 833E41AA-AFF7-4AC3-AAC2-9F24C1457BCE | <a href="#">ISAFSession</a>    |
| RPC Interface UUID for IRASrv         | F120A684-B926-447F-9DF4-C966CB785648 | <a href="#">IRASrv</a>         |
| <b>CLSID</b> for PCHService object    | 833E4010-AFF7-4AC3-AAC2-9F24C1457BCE | <a href="#">PCHService</a>     |
| CLSID for RASrv object                | 3C3A70A7-A468-49B9-8ADA-28E11FCCAD5D | <a href="#">RASrv</a>          |



## 2 Messages

The following sections specify how the Remote Assistance Initiation Protocol messages are transported and the common data types.

### 2.1 Transport

DCOM [\[MS-DCOM\]](#) is used as the transport protocol. The Remote Assistance Initiation Protocol [MS-RAI] documented here relies upon DCOM [MS-DCOM] authentication and encryption for all protocol messages.

This protocol MUST use these universally unique identifier (UUID) interfaces, as explained in section [1.9](#):

- (833E4200-AFF7-4AC3-AAC2-9F24C1457BCE)
- (833E4100-AFF7-4AC3-AAC2-9F24C1457BCE)
- (833E41AA-AFF7-4AC3-AAC2-9F24C1457BCE)
- (F120A684-B926-447F-9DF4-C966CB785648)

The following two are the CLSIDs of the objects implementing these interfaces, as explained in section [1.9](#):

- (833E4010-AFF7-4AC3-AAC2-9F24C1457BCE)
- (3C3A70A7-A468-49B9-8ADA-28E11FCCAD5D)

### 2.2 Common Data Types

In addition to RPC base types and definitions specified in [\[C706\]](#) and [\[MS-DTYP\]](#), additional data types are defined below.

There are two version-specific forms of the Remote Assistance Connection String, appended with 1 and 2 to differentiate them.

#### 2.2.1 Remote Assistance Connection String 1

The Remote Assistance Connection String 1 contains the **Remote Desktop Protocol** parameters to establish a Remote Assistance connection. The Remote Assistance Connection String 1 is a comma-delimited string comprising the following pieces of data. [<3>](#)

```
<ProtocolVersion>,<protocolType>,<machineAddressList>,<assistantAccountPwd>,  
<RASessionID>,<RASessionName>,<RASessionPwd>,<protocolSpecificParms>
```

The elements are defined as follows:

**ProtocolVersion:** Identifies the protocol version. The value MUST be 65,538.

**protocolType:** Identifies the protocol type. The value MUST be 1.

**machineAddressList:** Identifies network address of server machine. It is a semicolon-delimited list of IPAddress(or **computer name**):PortID string pairs. The IPAddress is of type IPV4.

**assistantAccountPwd:** Password for Remote Assistance Account Name. This MUST be set to "\*".

**RASessionID:** Remote Assistance session unique identifier.

**RASessionName:** Remote Assistance session name. This MUST be set to "\*".

**RASessionPwd:** Remote Assistance session password. This MUST be set to "\*".

**protocolSpecificParms:** Parameters specific to a Remote Desktop Protocol.

The following is an example of Remote Assistance Connection String 1:

```
65538,1,172.31.243.138:3389;MIKE_HOME:3389,*,Uj7RpOlU80SibpRw
RZ9+z1vbh7nIgVn89X1AiKp15Vc=,*,*,RcfwecK8dpcT1fjZ6iQ5M0+q7iU=
```

The values for the Remote Assistance Connection String 1 entities in the example above are:

```
ProtocolVersion = 65538
protocolType = 1
machineAddressList = 172.31.243.138:3389;MIKE_HOME:3389
assistantAccountPwd = *
RASessionID = Uj7RpOlU80SibpRwRZ9+z1vbh7nIgVn89X1AiKp15Vc=
RASessionName = *
RASessionPwd = *
protocolSpecificParms = RcfwecK8dpcT1fjZ6iQ5M0+q7iU=
```

## 2.2.2 Remote Assistance Connection String 2

The second type of the Remote Assistance Connection String packet is in XML format.[<4>](#) The details of this are as follows:

```
<E>
  <A KH="Protocol-specific Parameter" ID="Authorization String Identifier" />
  <C>
    <T ID="Transport ID" SID="Session ID">
      <L P="Port" N="Server Name" />
    </T>
  </C>
</E>
```

The Remote Assistance Connection String 2 starts with the root Node <E>. This root Node contains the following child nodes:

1. The Auth String Node <A> has the following attributes:

| Value | Meaning  |
|-------|--|
| KH    | Parameters specific to a Remote Desktop Protocol |
| ID    | Authstring identifier                            |

2. The Connector Node <C> has child nodes that give information on the underlying Transport used. This Transport Node <T> has the following attributes:

| Value | Meaning              |
|-------|----------------------|
| ID    | Transport Identifier |
| SID   | Session Identifier   |

3. The Transport Node has Listener child Nodes that give information about the Server IP and port. This Listener node <L> has the following attributes:

| Value | Meaning  |
|-------|--|
| P     | Port: The dynamic port on which the Remote Assistance Connection could happen. |
| N     | Server Name: The name/IP address of the server, that is, the Novice Computer.  |

The following is an example of Remote Assistance Connection String 2:

```
<E>
  <A KH="YiKwWUY8Ioq5NB3wAQHSbs5kwrM=" ID="8rYm30RBW8/4dAWoUsWbFCF5jno/7jr5t
NpHQc2goLbw4uuBBJvLsU02YYLlBMg5"/>
  <C>
    <T ID="1" SID="1440550163">
      <L P="49749" N="2001:4898:1a:5:79e2:3356:9b22:3470"/>
      <L P="49751" N="172.31.250.64"/>
    </T>
  </C>
</E>
```

In the preceding example:

1. The Auth String Node <A> has the attribute KH="YiKwWUY8Ioq5NB3wAQHSbs5kwrM=" and attribute ID = "8rYm30RBW8/4dAWoUsWbFCF5jno/7jr5tNpHQc2goLbw4uuBBJvLsU02YYLIBMg5".
2. The Connector Node <C> has one Transport child Node <T> with the following attributes:

ID = "1"

Session ID - SID = "1440550163"

3. The Transport Node has two Listener child Nodes <L> with the following server and port information attributes:

Port - P = "49749"

Server Name - N = "2001:4898:1a:5:79e2:3356:9b22:3470", and

Port - P = "49751"

Server Name - N = "172.31.250.64".

### 2.2.3 SessionStateEnum

The **SessionStateEnum** enumeration defines the states of a Terminal Services session.

```
typedef enum
{
```

```
pchActive = 0,  
pchConnected = 1,  
pchConnectQuery = 2,  
pchShadow = 3,  
pchDisconnected = 4,  
pchIdle = 5,  
pchListen = 6,  
pchReset = 7,  
pchDown = 8,  
pchInit = 9,  
pchStateInvalid = 10  
} SessionStateEnum;
```

**pchActive:** The user is logged on and active.

**pchConnected:** The server is connected to the client.

**pchConnectQuery:** The server is in the process of connecting to the client.

**pchShadow:** The session is shadowing another session.

**pchDisconnected:** The client has disconnected from the session.

**pchIdle:** The session is waiting for a client to connect.

**pchListen:** The session is listening for a request for a new connection. No user is logged on to a listener session. A listener session cannot be reset, shadowed, or changed to a regular client session.

**pchReset:** The session is being reset.

**pchDown:** The session is down due to an error.

**pchInit:** The session is initializing.

**pchStateInvalid:** The session is in an unknown state.

## 3 Protocol Details

The following sections specify details of the Remote Assistance Initiation Protocol, including abstract data models, timers, and message processing rules.

### 3.1 Remote Assistance Server Details for IPCHService

The Remote Assistance server provides methods that allow a client to:

- Get the collection of the Terminal Services sessions on the remote Novice computer.
- Get a Remote Assistance Connection String for a specific Terminal Server session.

The following sections specify server details of the IPCHService interface of the Remote Assistance Initiation Protocol, including abstract data models, timers, and message processing rules.

#### 3.1.1 Abstract Data Model

No abstract data model is used.

#### 3.1.2 Timers

No protocol timers are required other than those internal ones used in remote procedure call (RPC) to implement resiliency to network outages, as specified in [\[MS-RPCE\]](#).

#### 3.1.3 Initialization

The server MUST listen on the **well-known endpoint** defined for this RPC interface. For more information, see section [2.1](#).

#### 3.1.4 Message Processing Events and Sequencing Rules

##### 3.1.4.1 IPCHService

The **IPCHService** interface is implemented by the Novice to allow the Expert to request a Remote Assistance Connection String. [<5>](#)

The UUID for this interface is: "833E4200-AFF7-4AC3-AAC2-9F24C1457BCE".

Opnums 3 and 4 are not used across the network. These opnums are reserved and MUST NOT be reused by non-Microsoft implementations. [<6>](#)

Methods in RPC Opnum Order

| Method                   | Description |
|--------------------------|-------------|
| Opnum7NotUsedByProtocol  | Opnum: 7    |
| Opnum8NotUsedByProtocol  | Opnum: 8    |
| Opnum9NotUsedByProtocol  | Opnum: 9    |
| Opnum10NotUsedByProtocol | Opnum: 10   |

| Method                                | Description   |
|---------------------------------------|---|
| Opnum11NotUsedByProtocol              | Opnum: 11   |
| Opnum12NotUsedByProtocol              | Opnum: 12   |
| Opnum13NotUsedByProtocol              | Opnum: 13   |
| Opnum14NotUsedByProtocol              | Opnum: 14   |
| Opnum15NotUsedByProtocol              | Opnum: 15   |
| Opnum16NotUsedByProtocol              | Opnum: 16   |
| Opnum17NotUsedByProtocol              | Opnum: 17   |
| Opnum18NotUsedByProtocol              | Opnum: 18   |
| <a href="#">RemoteConnectionParms</a> | Gets the Remote Assistance connection parameters for a specified UserName, DomainName, and SessionID triple.<br>Opnum: 19   |
| <a href="#">RemoteUserSessionInfo</a> | Returns the collection of the Terminal Services sessions on the remote Novice computer. All the Terminal Services session information is returned as a standard IPCHCollection interface. The members of this collection are objects of type ISAFSession. ISAFSession includes the DomainName, UserName, SessionID and User SessionState for each session.<br>Opnum: 20 |
| Opnum21NotUsedByProtocol              | Opnum: 21   |

Opnums 0, 1, and 2 are reserved for the **IUnknown\_QueryInterface**, **AddRef**, and **Release** methods used by the standard COM IUnknown interface, as specified in [\[MS-DCOM\]](#). Opnums 5 and 6 are reserved for the **GetIDsOfNames** and **Invoke** methods in the IDispatch interface, as specified in [\[MS-OAUT\]](#). Opnums 7 through 18 and opnum 21 are not used by this protocol.

#### 3.1.4.1.1 RemoteConnectionParms (Opnum 19)

The **RemoteConnectionParms** method gets the Remote Assistance connection parameters for a specific UserName, DomainName, and SessionID triple.

```
[id(DISPID_PCH_SVC_REMOTECONNECTIONPARMS)]
HRESULT RemoteConnectionParms(
    [in] BSTR bstrUserName,
    [in] BSTR bstrDomainName,
    [in] long lSessionID,
    [in] BSTR bstrUserHelpBlob,
    [out, retval] BSTR* pbstrConnectionString
```

);

**bstrUserName:** The UserName part of the DomainName\UserName string corresponding to the Terminal Services session for which the client is requesting a Remote Assistance Connection String.

**bstrDomainName:** The domain name part of the DomainName\UserName string corresponding to the Terminal Services session for which the client is requesting a Remote Assistance Connection String.

**lSessionID:** Identifier of the Terminal Services session for which the client is requesting a Remote Assistance Connection String.

**bstrUserHelpBlob:** A semicolon-delimited string that contains the domain and user names of the Expert requesting a Remote Assistance ticket. The format of the string is as follows:

```
<Length of the string>;  
<"UNSOLICITED=1"> (Note: no semicolon)  
<Length of the DomainName\UserName string>;  
<ID=DomainName\UserName> (Note: characters 'ID=' count toward string length)
```

For example:

```
"13;UNSOLICITED=118;ID=EXDOMAIN\EXUSER"
```

**pbstrConnectionString:** Pointer to a Remote Assistance Connection String for the requested session.

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. 0 or positive values indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the following method implementation:

| Return value/code                             | Description   |
|---|---|
| 0x00000000<br>S_OK                            | The call was successful.  |
| 0x80070005<br>E_ACCESSDENIED                  | General access denied error. <a href="#">&lt;7&gt;</a>  |
| 0x8007000E<br>E_OUTOFMEMORY                   | Out of memory.  |
| 0x800704EC<br>ERROR_ACCESS_DISABLED_BY_POLICY | Windows cannot open this program because it has been prevented from doing so by a software restriction policy. For more information, open Event Viewer or contact the system administrator. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

### 3.1.4.1.2 RemoteUserSessionInfo (Opnum 20)

The **RemoteUserSessionInfo** method returns the collection of the Terminal Services sessions on the remote Novice machine. All the Terminal Services session information is returned as a standard **IPCHCollection** interface. The members of this collection are objects of type **ISAFSession**. **ISAFSession** includes the **DomainName**, **SessionID**, **SessionState**, and **UserName** for each session.

```
[id(DISPID_PCH_SVC_REMOTEUSERSESSIONINFO)]  
HRESULT RemoteUserSessionInfo(  
    [out, retval] IPCHCollection** pVal  
);
```

**pVal:** Pointer to an [IPCHCollection](#) interface containing Terminal Services sessions information on the server.

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. 0 or positive values indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the following method implementation.

| Return value/code                             | Description   |
|---|---|
| 0x00000000<br>S_OK                            | The call was successful.  |
| 0x80070005<br>E_ACCESSDENIED                  | General access denied error. <a href="#">&lt;8&gt;</a>  |
| 0x8007000E<br>E_OUTOFMEMORY                   | Out of memory.  |
| 0x800704EC<br>ERROR_ACCESS_DISABLED_BY_POLICY | Windows cannot open this program because it has been prevented from doing so by a software restriction policy. For more information, open Event Viewer or contact the system administrator. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

#### 3.1.4.1.2.1 IPCHCollection

The **IPCHCollection** interface provides methods to enumerate the elements of a collection.

The UUID for this interface is: "833E4100-AFF7-4AC3-AAC2-9F24C1457BCE"

Opnums 3 and 4 are not used across the network. These opnums are reserved and MUST NOT be reused by non-Microsoft implementations. [<9>](#)

Methods in RPC Opnum Order

| Method                   | Description                       |
|--------------------------|-----------------------------------|
| <a href="#">_NewEnum</a> | Creates a copy of the collection. |



| Method                | Description   |
|-----------------------|---|
|                       | Opnum: 7  |
| <a href="#">Item</a>  | Retrieves an element.<br>Opnum: 8                               |
| <a href="#">Count</a> | Retrieves the number of elements in the collection.<br>Opnum: 9 |

Opnums 0, 1, and 2 are reserved for the **IUnknown\_QueryInterface**, **AddRef**, and **Release** methods used by the standard COM IUnknown interface, as specified in [\[MS-DCOM\]](#). Opnums 5 and 6 are reserved for the **GetIDsOfNames** and **Invoke** methods in the IDispatch interface, as specified in [\[MS-OAUT\]](#).

#### 3.1.4.1.2.1.1 \_NewEnum (Opnum 7)

The **\_NewEnum** method creates a copy of the collection.

```
[propget, id(DISPID_NEWENUM)] HRESULT _NewEnum(
    [out, retval] IUnknown** pVal
);
```

**pVal:** Pointer to a pointer to the **IUnknown** interface of a new copy of the collection.

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. 0 or positive values indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the method implementation.

| Return value/code           | Description  |
|-----------------------------|--|
| 0x00000000<br>S_OK          | The call was successful.                           |
| 0x80004003<br>E_POINTER     | The method failed due to an invalid pointer.       |
| 0x8007000E<br>E_OUTOFMEMORY | The method was unable to allocate required memory. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

#### 3.1.4.1.2.1.2 Item (Opnum 8)

The **Item** method retrieves an element.

```
[propget, id(DISPID_VALUE)] HRESULT Item(
    [in] long vIndex,
    [out, retval] VARIANT* ppEntry
```

);

**vIndex:** One-indexed number of the element to retrieve.

**ppEntry:** Pointer to the element at *vIndex*, of type [VARIANT](#) as defined in [\[MS-OAUT\]](#).

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. Zero or positive values indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the method implementation.

| Return value/code           | Description  |
|-----------------------------|--|
| 0x00000000<br>S_OK          | The call was successful.                           |
| 0x80004003<br>E_POINTER     | The method failed due to an invalid pointer.       |
| 0x8007000E<br>E_OUTOFMEMORY | The method was unable to allocate required memory. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

#### 3.1.4.1.2.1.3 Count (Opnum 9)

The **Count** method retrieves the number of elements in the collection.

```
[propget, id(DISPID_PCH_COL_COUNT)]  
HRESULT Count(  
    [out, retval] long* pVal  
);
```

**pVal:** Pointer to the number of elements in the collection.

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. Zero or positive values indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the method implementation.

| Return value/code           | Description  |
|-----------------------------|--|
| 0x00000000<br>S_OK          | The call was successful.                           |
| 0x80004003<br>E_POINTER     | The method failed due to an invalid pointer.       |
| 0x8007000E<br>E_OUTOFMEMORY | The method was unable to allocate required memory. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

#### 3.1.4.1.2.2 ISAFSession

The **ISAFSession** interface is implemented by servers to describe sessions.

The UUID for this interface is:

"833E41AA-AFF7-4AC3-AAC2-9F24C1457BCE".

Opnums 3 and 4 are not used across the network. These opnums are reserved and **MUST NOT** be reused by non-Microsoft implementations. [<10>](#)

Methods in RPC Opnum Order

| Method                             | Description  |
|------------------------------------|--|
| <a href="#">SessionID (Get)</a>    | Retrieves the identifier number of the session.<br>Opnum: 7  |
| <a href="#">SessionID (Set)</a>    | Sets the identifier number of the session.<br>Opnum: 8       |
| <a href="#">SessionState (Get)</a> | Retrieves the state of the session.<br>Opnum: 9              |
| <a href="#">SessionState (Set)</a> | Sets the state of the session.<br>Opnum: 10                  |
| <a href="#">DomainName (Get)</a>   | Retrieves the domain name for the session user.<br>Opnum: 11 |
| <a href="#">DomainName (Set)</a>   | Sets the domain name for the session user.<br>Opnum: 12      |
| <a href="#">UserName (Get)</a>     | Retrieves the user name for the session.<br>Opnum: 13        |
| <a href="#">UserName (Set)</a>     | Sets the user name for the session.<br>Opnum: 14             |

Opnums 0, 1, and 2 are reserved for the **IUnknown\_QueryInterface**, **AddRef**, and **Release** methods used by the standard COM IUnknown interface, as specified in [\[MS-DCOM\]](#). Opnums 5 and 6 are reserved for the **GetIDsOfNames** and **Invoke** methods in the IDispatch interface, as specified in [\[MS-OAUT\]](#).

##### 3.1.4.1.2.2.1 DomainName (Get) (Opnum 11)

The **DomainName (Get)** method retrieves the domain name for the session user.

```
[propget, id(DISPID_SAF_SESS__DOMAINNAME)]
HRESULT DomainName(
    [out, retval] BSTR* pVal
```

);

**pVal:** Pointer to the domain name for the session user.

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. 0 or positive values indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the method implementation.

| Return value/code       | Description                                  |
|-------------------------|--|
| 0x00000000<br>S_OK      | The call was successful.                     |
| 0x80004003<br>E_POINTER | The method failed due to an invalid pointer. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

#### 3.1.4.1.2.2.2 DomainName (Set) (Opnum 12)

The **DomainName (Set)** method sets the domain name for the session user.

```
[propput, id(DISPID_SAF_SESS__DOMAINNAME)]  
HRESULT DomainName(  
    [in] BSTR pVal  
);
```

**pVal:** Domain name to assign for the session user.

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. 0 or positive values indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the method implementation.

| Return value/code  | Description              |
|--------------------|--------------------------|
| 0x00000000<br>S_OK | The call was successful. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

#### 3.1.4.1.2.2.3 SessionID (Get) (Opnum 7)

The **SessionID (Get)** method retrieves the identifier number of the session.

```
[propget, id(DISPID_SAF_SESS__SESSIONID)]
    HRESULT SessionId(
        [out, retval] DWORD* pVal
    );
```

**pVal:** Pointer to the identifier number of the session.

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. 0 or positive values indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the method implementation.

| Return value/code          | Description                        |
|----------------------------|------------------------------------|
| 0x00000000<br>S_OK         | The call was successful.           |
| 0x80000003<br>E_INVALIDARG | One or more arguments are invalid. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

#### 3.1.4.1.2.2.4 SessionID (Set) (Opnum 8)

The **SessionID (Set)** method sets the identifier number of the session.

```
[propput, id(DISPID_SAF_SESS__SESSIONID)]
    HRESULT SessionId(
        [in ] DWORD pVal
    );
```

**pVal:** Identifier number of the session to assign.

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. 0 or positive values indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the method implementation.

| Return value/code  | Description              |
|--------------------|--------------------------|
| 0x00000000<br>S_OK | The call was successful. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

### 3.1.4.1.2.2.5 SessionState (Get) (Opnum 9)

The **SessionState (Get)** method retrieves the state of the session.

```
[propget, id(DISPID_SAF_SESS__SESSIONSTATE)]  
HRESULT SessionState(  
    [out, retval] int* pVal  
);
```

**pVal:** Pointer to an integer that represents the state of the session. The integer MUST be one of the values of [SessionStateEnum](#), as specified in section [2.2.3](#).

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. 0 or positive values indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the method implementation.

| Return value/code          | Description                        |
|----------------------------|------------------------------------|
| 0x00000000<br>S_OK         | The call was successful.           |
| 0x80000003<br>E_INVALIDARG | One or more arguments are invalid. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

### 3.1.4.1.2.2.6 SessionState (Set) (Opnum 10)

The **SessionState (Set)** method sets the state of the session.

```
[propput, id(DISPID_SAF_SESS__SESSIONSTATE)]  
HRESULT SessionState(  
    [in] int pVal  
);
```

**pVal:** An integer that represents the state of the session. The integer MUST be one of the values of the [SessionStateEnum](#) enumeration, as specified in section [2.2.3](#).

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. 0 or positive values indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the method implementation.

| Return value/code  | Description              |
|--------------------|--------------------------|
| 0x00000000<br>S_OK | The call was successful. |

| Return value/code          | Description                        |
|----------------------------|------------------------------------|
| 0x80000003<br>E_INVALIDARG | One or more arguments are invalid. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

### 3.1.4.1.2.2.7 UserName (Get) (Opnum 13)

The **UserName (Get)** method retrieves the user name for the session.

```
[propget, id(DISPID_SAF_SESS__USERNAME)]
HRESULT UserName(
    [out, retval] BSTR* pVal
);
```

**pVal:** Pointer to the user name for the session.

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. 0 or positive values indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the method implementation.

| Return value/code       | Description                                  |
|-------------------------|--|
| 0x00000000<br>S_OK      | The call was successful.                     |
| 0x80004003<br>E_POINTER | The method failed due to an invalid pointer. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

### 3.1.4.1.2.2.8 UserName (Set) (Opnum 14)

The **UserName (Set)** method sets the user name for the session.

```
[propput, id(DISPID_SAF_SESS__USERNAME)]
HRESULT UserName(
    [in] BSTR pVal
);
```

**pVal:** User name to assign for the session.

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. 0 or positive values

indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the method implementation.

| Return value/code  | Description              |
|--------------------|--------------------------|
| 0x00000000<br>S_OK | The call was successful. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

### 3.1.5 Timer Events

No timer events are required beyond the events maintained in the underlying RPC transport (see section [2.1](#)).

### 3.1.6 Other Local Events

No additional local events are used beyond the events maintained in the underlying RPC transport (see section [2.1](#)).

## 3.2 Remote Assistance Client Details for IPCHService

The following sections specify client details of the Remote Assistance Initiation Protocol, including abstract data models, timers, and message processing rules.

### 3.2.1 Abstract Data Model

The Expert MUST specify the IP address or FQDN of the Novice's computer to use this protocol.

Using the specified IP Address or FQDN of the Novice computer, the Expert connects to the Novice computer and invokes the [RemoteUserSessionInfo](#) method of IPCHService on the remote Novice computer and gets back a collection containing the DomainName, UserName, SessionID and SessionState of the Terminal Services sessions from the Novice Computer.

The Expert selects the Terminal Services session where Remote Assistance is to be offered and by specifying the Terminal Services Session's DomainName, UserName and SessionID, invokes the [RemoteConnectionParms](#) method of IPCHService on the remote Novice computer to obtain the Remote Assistance Connection String.

### 3.2.2 Timers

No protocol timers are required other than those internal ones used in RPC to implement resiliency to network outages, as specified in [\[MS-RPCE\]](#).

### 3.2.3 Initialization

The client creates an RPC association (or binding) to the server RPC before an RPC method is called. The client MAY create a separate association for each method invocation, or it MAY reuse an association for multiple invocations.



### 3.2.4 Message Processing Events and Sequencing Rules

The following list shows the sequence of steps involved in a Remote Assistance Connection String request:

1. Create an instance of PCHService on the remote server and request its IPCHService interface pointer.
2. Invoke the [RemoteUserSessionInfo](#) method of the IPCHService interface to retrieve an ISAFSession interface pointers' collection of type IPCHCollection.
3. Enumerate the ISAFSession interfaces of the server by repeatedly calling the Item method of the IPCHCollection interface.
4. From the collected ISAFSession interface values, choose a session and specify its SessionID and corresponding DomainName and UserName in a call to the [RemoteConnectionParms](#) method of the IPCHService interface. This call returns the Remote Assistance Connection String for the specified session. Sessions with no DomainName or UserName MUST be ignored.
5. This Remote Assistance Connection String is valid to begin the Remote Assistance Connection.

### 3.2.5 Timer Events

No protocol timer events are required on the client other than the events maintained in the underlying RPC transport.

### 3.2.6 Other Local Events

No additional local events are used on the client other than the events maintained in the underlying RPC transport.

## 3.3 Remote Assistance Server Details for IRASrv

The Remote Assistance Server provides methods to allow a client to:

- Get the collection of the Terminal Services sessions on the remote Novice computer.
- Get a Remote Assistance Connection String for a specified user session on the remote Novice computer.

The following sections specify server details of the Remote Assistance Initiation Protocol, including abstract data models, timers, and initialization.

### 3.3.1 Abstract Data Model

No abstract data model is used.

### 3.3.2 Timers

No protocol timers are required other than those internal ones used in RPC to implement resiliency to network outages, as specified in [\[MS-RPCE\]](#).

### 3.3.3 Initialization

The server MUST listen on the well-known endpoint defined for this RPC interface. For more information, see section [2.1](#).

### 3.3.4 Message Processing Events and Sequencing Rules

#### 3.3.4.1 IRASrv

The **IRASrv** interface is implemented by the Novice computer to allow the Expert computer to request a Remote Assistance Connection String. [<11>](#)

The UUID for this interface is: "F120A684-B926-447F-9DF4-C966CB785648".

Opnums 3 and 4 are not used across the network. These opnums are reserved and MUST NOT be reused by non-Microsoft implementations. [<12>](#)

Methods in RPC Opnum Order

| Method                            | Description  |
|-----------------------------------|--|
| <a href="#">GetNoviceUserInfo</a> | Retrieves the Remote Assistance Connection string information for a specified Terminal Services session.<br>Opnum: 7   |
| <a href="#">GetSessionInfo</a>    | Returns the collection of the Terminal Services sessions on the remote Novice computer. This method also returns the number of Terminal Services sessions running on the Novice computer. All the Terminal Services session information is returned as a SAFEARRAY. The elements of this SAFEARRAY are strings with information about the DomainName, UserName and SessionID for each Terminal Services session.<br>Opnum: 8 |

Opnums 0, 1, and 2 are reserved for the **IUnknown\_QueryInterface**, **AddRef**, and **Release** methods used by the standard COM IUnknown interface, as specified in [\[MS-DCOM\]](#). Opnums 5 and 6 are reserved for the **GetIDsOfNames**, and **Invoke** methods in the IDispatch interface, as specified in [\[MS-OAUT\]](#).

##### 3.3.4.1.1 GetNoviceUserInfo (Opnum 7)

The **GetNoviceUserInfo** method is received by the server in an RPC\_REQUEST packet. The method is received in the Terminal Services session as specified by the Client. In response, the server returns the [Remote Assistance Connection String 2](#) for the specified Terminal Services session.

```
[id(1), helpstring("method GetNoviceUserInfo")]
HRESULT GetNoviceUserInfo(
    [in, out] LPWSTR* szName
);
```

**szName:** Pointer to a null-terminated **Unicode** string that contains the Remote Assistance Connection String 2 for the specified Terminal Services session.

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. Zero or positive values indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the method implementation.

| Return value/code               | Description  |
|---------------------------------|--|
| 0x00000000<br>S_OK              | The call was successful.   |
| 0x80004003<br>E_POINTER         | The method failed due to an invalid pointer for szName.                  |
| 0x8007000E<br>E_OUTOFMEMORY     | Out of memory.   |
| 0x80070052<br>ERROR_CANNOT_MAKE | An instance of Remote Assistance is already running on Novice's machine. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

### 3.3.4.1.2 GetSessionInfo (Opnum 8)

The **GetSessionInfo** method is received by the server in an RPC\_REQUEST packet. In response, the server returns the Terminal Services session information for the various sessions on the computer. The Terminal Services session information is returned as a SAFEARRAY of BSTRs. Each BSTR contains the DomainName, UserName and SessionID in the format DomainName\UserName:SessionID.

This method also returns the count of the total number of sessions.

This method does not return Idle and Disconnected Terminal Services sessions. Any null values returned in the SAFEARRAY should be ignored.

```
[id(2), helpstring("method GetSessionInfo")]
HRESULT GetSessionInfo(
    [in, out] SAFEARRAY(BSTR)* UserNames,
    [in, out] INT* Count
);
```

**UserNames:** Pointer to a [SAFEARRAY](#), as specified in [\[MS-OAUT\]](#), of BSTRs containing the Terminal Services session information. Each BSTR element in the array contains the DomainName, UserName and SessionID in the format DomainName\UserName:SessionID. This is returned to the Expert.

**Count:** Pointer to an INT that returns the number of Terminal Services sessions on the Novice.

**Return Values:** A signed 32-bit value indicating return status. If the method returns a negative value, the method has failed. If the 12-bit facility code (bits 16–27) is set to 0x007, the value contains a Win32 error code (defined in [\[MS-ERREF\]](#)) in the lower 16 bits. Zero or positive values indicate success, with the lower 16 bits in positive non-zero values containing warnings or flags defined in the method implementation.

| Return value/code  | Description              |
|--------------------|--------------------------|
| 0x00000000<br>S_OK | The call was successful. |

| Return value/code           | Description  |
|-----------------------------|--|
| 0x80004003<br>E_POINTER     | The method failed due to an invalid pointer.       |
| 0x8007000E<br>E_OUTOFMEMORY | The method was unable to allocate required memory. |

Exceptions Thrown:

No exceptions are thrown beyond those thrown by the underlying RPC protocol [\[MS-RPCE\]](#).

### 3.3.5 Timer Events

No protocol timer events are required on the client other than the events maintained in the underlying RPC transport.

### 3.3.6 Other Local Events

No additional local events are used other than the events maintained in the underlying RPC transport.

## 3.4 Remote Assistance Client Details for IRASrv

The following sections specify client details of the Remote Assistance Initiation Protocol, including abstract data models, timers, and message processing rules.

### 3.4.1 Abstract Data Model

The Expert computer MUST specify the IP address or FQDN of the Novice's computer to use this protocol.

Using the specified IP Address or FQDN of the Novice computer, the Expert computer connects to the Novice computer and invokes the [GetSessionInfo](#) method of IRASrv on the remote Novice computer. **GetSessionInfo** returns a SAFEARRAY of BSTRs containing the DomainName, UserName and SessionID of the Terminal Services sessions from the Novice computer.

The Expert computer selects the Terminal Services session where Remote Assistance is to be offered and invokes the [GetNoviceUserInfo](#) method of the IRASrv interface running on the remote Novice computer. The GetNoviceUserInfo method returns the Remote Assistance Connection String for the Terminal Services session where it is being invoked.

### 3.4.2 Timers

No protocol timers are required other than those internal ones used in RPC to implement resiliency to network outages, as specified in [\[MS-RPCE\]](#).

### 3.4.3 Initialization

The client creates an RPC association (or binding) to the server RPC before an RPC method is called. The client MAY create a separate association for each method invocation, or it MAY reuse an association for multiple invocations.

### 3.4.4 Message Processing Events and Sequencing Rules

The following list shows the sequence of steps involved in a Remote Assistance Connection String request:

1. Create an instance of RASrv object on the remote server and request its IRASrv interface pointer.
2. Invoke the [GetSessionInfo](#) method of the IRASrv interface to retrieve the Terminal Services session information as a SAFEARRAY of BSTRs and the count of the number of sessions.
3. From the collected Terminal Services session entries, choose a session and use the corresponding SessionID to invoke the [GetNoviceUserInfo](#) method of IRASrv in the specified session. This call returns the Remote Assistance Connection String for the specified session.
4. This Remote Assistance Connection String is valid to begin the Remote Assistance Connection from the Expert computer to the Novice computer.

### 3.4.5 Timer Events

No protocol timer events are required on the client other than the events maintained in the underlying RPC transport.

### 3.4.6 Other Local Events

No additional local events are used on the client other than the events maintained in the underlying RPC transport.

## 4 Protocol Examples

The following example demonstrates the client and server for [IPCHService](#) interface, using the [RemoteUserSessionInfo](#) and [RemoteConnectionParms](#) methods.

1. The client (Expert) calls the **RemoteUserSessionInfo** method on the server.
2. The server (Novice) returns with code 0x00000000; and with the [IPCHCollection](#) interface pointer.
3. The client gets the count of the Terminal Services sessions in the collection by calling the [Count](#) method on the **IPCHCollection** interface.
4. The client indexes the collection from 1 through count using the [Item](#) method, and for each item in the collection retrieves the [ISAFSession](#) interface pointer.
5. From the **ISAFSession** interface the client gets:
  1. The DomainName using the [DomainName\(Get\)](#) method.
  2. The UserName using the [UserName\(Get\)](#) method.
  3. The SessionID using the [SessionID\(Get\)](#) method.
6. The Client selects a DomainName, UserName, and SessionID.
7. The client formats the UserBlob, for example:  
"13;UNSOLICITED=119;ID=TESTDOMAIN\Admin".
8. The Client calls the **RemoteConnectionParms** method using the UserName, DomainName, SessionID, and UserBlob.
9. The server returns with code 0x00000000, and with the Remote Assistance Connection String.

## 5 Security

The following sections specify security considerations.

### 5.1 Security Considerations for Implementers

This protocol relies on the security features provided by DCOM [\[MS-DCOM\]](#). Implementers SHOULD review the security considerations listed in [\[MS-RPCE\]](#) section 5.1, as these are also valid for DCOM and DCOM-based protocols. [<13>](#)

### 5.2 Index of Security Parameters

There are no security parameters for this protocol.

## 6 Appendix A: Remote Assistance Invitation File Format

The purpose of the Remote Assistance Initiation Protocol is to obtain the Remote Assistance Connection String using DCOM. However, the implementer is free to use alternative approaches to obtain the connection string. One such alternative approach implemented in Windows is to transmit the Remote Assistance Invitation File over e-mail as an XML file. [<14>](#)

The Expert computer parses the Remote Assistance Invitation File to extract the Remote Assistance Connection String and other information.

There are two version-specific types of the Remote Assistance Invitation File.

Following is a sample Remote Assistance Invitation File of the first type: [<15>](#)

```
<?xml version="1.0" encoding="Unicode" ?>
  <UPLOADINFO TYPE="Escalated">
    <UPLOADDATA
      USERNAME="jeff"
      RCTICKET="65538,1,192.168.1.65:3389;jeff xp:3389,*,ot9B5Ut8n6FmiIOr2Aa9l
      5WwuLcMdtNl5AoXFiA4wLg=,*,*,5nKH3X0Ikre0jjL9SaRlfN10p9o="
      RCTICKETENCRYPTED="1"
      DtStart="1160080069"
      DtLength="60"
      PassStub="o2*5GdBARK JBB"
      L="0" />
    </UPLOADDATA>
  </UPLOADINFO>
```

The file contains the following pieces of information:

| Value      | Meaning   |       |         |          |  |          |  |         |   |          |  |          |   |   |  |
|------------|---|-------|---------|----------|--|----------|--|---------|---|----------|--|----------|---|---|--|
| UPLOADINFO | The UPLOADINFO TYPE MUST be "Escalated".  |       |         |          |  |          |  |         |   |          |  |          |   |   |  |
| UPLOADDATA | <div>The UPLOADDATA contains the following information:</div> <table><tr><th>Value</th><th>Meaning</th></tr><tr><td>USERNAME</td><td>The name of the Remote Assistance Novice computer.</td></tr><tr><td>RCTICKET</td><td>The Remote Assistance Connection String.</td></tr><tr><td>DtStart</td><td>The time when the Remote Assistance Connection String was created. This time is the number of seconds elapsed since UTC 1/1/70.</td></tr><tr><td>DtLength</td><td>The duration for which the Remote Assistance Connection String is valid. This is expressed in minutes. If the Expert computer cannot connect to the Novice computer successfully within this time, the Novice computer shuts down.</td></tr><tr><td>PassStub</td><td>The encrypted Novice computer's password string. When the Remote Assistance Connection String is sent as a file over e-mail, to provide additional security, a password is used. <a href="#">&lt;16&gt;</a></td></tr><tr><td>L</td><td>Indicates whether the Novice computer is connected via a modem.<br/>L = 1 means MODEM is used, 0 means high-speed connectivity is used.</td></tr></table> | Value | Meaning | USERNAME | The name of the Remote Assistance Novice computer. | RCTICKET | The Remote Assistance Connection String. | DtStart | The time when the Remote Assistance Connection String was created. This time is the number of seconds elapsed since UTC 1/1/70. | DtLength | The duration for which the Remote Assistance Connection String is valid. This is expressed in minutes. If the Expert computer cannot connect to the Novice computer successfully within this time, the Novice computer shuts down. | PassStub | The encrypted Novice computer's password string. When the Remote Assistance Connection String is sent as a file over e-mail, to provide additional security, a password is used. <a href="#">&lt;16&gt;</a> | L | Indicates whether the Novice computer is connected via a modem.<br>L = 1 means MODEM is used, 0 means high-speed connectivity is used. |
| Value      | Meaning   |       |         |          |  |          |  |         |   |          |  |          |   |   |  |
| USERNAME   | The name of the Remote Assistance Novice computer.  |       |         |          |  |          |  |         |   |          |  |          |   |   |  |
| RCTICKET   | The Remote Assistance Connection String.  |       |         |          |  |          |  |         |   |          |  |          |   |   |  |
| DtStart    | The time when the Remote Assistance Connection String was created. This time is the number of seconds elapsed since UTC 1/1/70.   |       |         |          |  |          |  |         |   |          |  |          |   |   |  |
| DtLength   | The duration for which the Remote Assistance Connection String is valid. This is expressed in minutes. If the Expert computer cannot connect to the Novice computer successfully within this time, the Novice computer shuts down.  |       |         |          |  |          |  |         |   |          |  |          |   |   |  |
| PassStub   | The encrypted Novice computer's password string. When the Remote Assistance Connection String is sent as a file over e-mail, to provide additional security, a password is used. <a href="#">&lt;16&gt;</a>   |       |         |          |  |          |  |         |   |          |  |          |   |   |  |
| L          | Indicates whether the Novice computer is connected via a modem.<br>L = 1 means MODEM is used, 0 means high-speed connectivity is used.  |       |         |          |  |          |  |         |   |          |  |          |   |   |  |



Following is a sample Remote Assistance Invitation File<17> of the second type:

```
<?xml version="1.0" encoding="Unicode" ?>
<UPLOADINFO TYPE="Escalated">
  <UPLOADDATA
    USERNAME="jeff"
    LHTICKET="3CD9C8A0DB0628410E91EC277CAEB705E5422CE1DA55E0C118155A8BA465C3E81552DC
B85D03F6A7F2F930C44C1D097239DB8B47339A01D4392F4F05985106757148AEA4C6832BA2AC7C46
0B958BD4F47966DBBC76E72F6F47FEE1AC50844D654D2D86A760854286F9DAA3823F0346D41063C7
6378535688017C2D00D263AC187F6BE26FDB854B01E1BC8E4328F54163DB2E901D3805E0D6CF2593
7A2D43C959F51809124DA2E70807A737323968644CB8BC56ECD43AAA40B3B2BA7021198D98AA4D
5B9818095053C0104A52743343489AD1E12AC0CB7001E56910718B9A8155A60AFF3CC26D2B163629
46C32F7F9C22AE844D731740301FBF5951FCF765E052D793F526603AA6B7F86C0697BD02FEF32A8F
4031E30AD55F9752FCA3DB60F8A12466D256F29B22131C1D8ED43E9ACA2BBD172C27D1FD284F825E
E4E65F2D201E042C1C4DEE6C06522A3F015036F7603AAF16D8A6CB595E22CA80572C91F9E163028C
AA4A3E7EA0152045BDAAE8C1221283FF2E23CC53D34870348D6D9CBD5B93411D4F9BB8180062D6B
573CF2D428FDB1CA7142885F6B2A966A149E19F5D00E22E18A3802612521C126455B675F4D7E12C3
6B861C19A2795CE87ED592CCCB735A081E428CC50BC23B460794B53601221FFCCCB458090DEB9B59
19C942A6FD6937F49F9951A9CD416E8E356A6293443EC11798DE204CC67B652C5B62491E37455098
764EE6727AB8272827411A712C62012026C71BC408D09F6B5FEEB85BF9DE434A5A2BB6F514C4BD06
4D643F0A0EEAE46CCACA4994A6E7CEC42B70EC020DD2CB42058DC919EBE2CBCBE34575F4A40D47D1
EEA092653FC6723B2EC2E88231E46E98598218AA305810360CA972C935B5BCB73769197FD78B835C
3A63A7D603E6CB51F6E84B377D731FEF38C6A9FE68640B58506486C76C33B7F53176E7A52D753DD2
EAE34FB2812663D94B5F6BEF6C878BCD7D41F1983A5B87F1F797D4D7504F9C83A9FE661EBBD57FB
3A01CF82D2E7FF01AE38F70EB8FA8A77B2A4DAB5BDA0E0B458A8FC51F3A354AB9F104DD7B91144D5
E8589F319CDB5ABD4A2B5DBB4B9C43E74309DE5C30102E7165507C5B2A5E613E30F784A0540E206C
38965F1869EE53BD0CC8056B324C242F4DFD5D70EB55082F5A9F5513164D1097536037AB6964DBF4
D3425CBC5F2564B8DBC13889782BFE2C3DB391992781A80B187F6DAE15D643C85BAB3E12B535FEB0
E0BF79FF58"
    RCTICKET="65538,1,172.31.244.101:55646,*,BnrZvG4FglMwHBhZgo7SkJEqD90DrPYPNxtC/lv
UcczDCZJacjm0w80gKyzCHTTC,*,*,VasNb+Ymg1mvJ/AJWSh56qq7pk4="
    RCTICKETENCRYPTED="1"
    DtStart="1160080069"
    DtLength="60"
    PassStub= "fg^2IkiL*z3j4U"
    L="0" />
  </UPLOADDATA>
</UPLOADINFO>
```

The file contains the following pieces of information:

| Value      | Meaning  |       |         |          |   |          |  |          |   |         |   |          |  |
|------------|--|-------|---------|----------|---|----------|--|----------|---|---------|---|----------|--|
| UPLOADINFO | The UPLOADINFO TYPE MUST be "Escalated".   |       |         |          |   |          |  |          |   |         |   |          |  |
| UPLOADDATA | <p>The UPLOADDATA contains the following information:</p> <table> <tr> <th>Value</th><th>Meaning</th></tr> <tr> <td>USERNAME</td><td>The name of the Remote Assistance Novice.</td></tr> <tr> <td>LHTICKET</td><td>The encrypted <a href="#">Remote Assistance Connection String 2</a> where each byte is converted to two HEX numbers&lt;18&gt;.</td></tr> <tr> <td>RCTICKET</td><td>The version-specific&lt;19&gt; Remote Assistance Connection String.</td></tr> <tr> <td>DtStart</td><td>The time when the Remote Assistance Connection String was created. This time is the number of seconds elapsed since UTC 1/1/70.</td></tr> <tr> <td>DtLength</td><td>The duration for which the Remote Assistance Connection String is valid. This is expressed in minutes. If the Expert computer cannot</td></tr> </table> | Value | Meaning | USERNAME | The name of the Remote Assistance Novice. | LHTICKET | The encrypted <a href="#">Remote Assistance Connection String 2</a> where each byte is converted to two HEX numbers<18>. | RCTICKET | The version-specific<19> Remote Assistance Connection String. | DtStart | The time when the Remote Assistance Connection String was created. This time is the number of seconds elapsed since UTC 1/1/70. | DtLength | The duration for which the Remote Assistance Connection String is valid. This is expressed in minutes. If the Expert computer cannot |
| Value      | Meaning  |       |         |          |   |          |  |          |   |         |   |          |  |
| USERNAME   | The name of the Remote Assistance Novice.  |       |         |          |   |          |  |          |   |         |   |          |  |
| LHTICKET   | The encrypted <a href="#">Remote Assistance Connection String 2</a> where each byte is converted to two HEX numbers<18>.   |       |         |          |   |          |  |          |   |         |   |          |  |
| RCTICKET   | The version-specific<19> Remote Assistance Connection String.  |       |         |          |   |          |  |          |   |         |   |          |  |
| DtStart    | The time when the Remote Assistance Connection String was created. This time is the number of seconds elapsed since UTC 1/1/70.  |       |         |          |   |          |  |          |   |         |   |          |  |
| DtLength   | The duration for which the Remote Assistance Connection String is valid. This is expressed in minutes. If the Expert computer cannot   |       |         |          |   |          |  |          |   |         |   |          |  |

| Value | Meaning  |  |
|-------|----------|--|
|       |          | connect to the Novice computer successfully within this time, the Novice computer shuts down.  |
|       | PassStub | The encrypted Novice's computer password string. When the Remote Assistance Connection String is sent as a file over e-mail, to provide additional security, a password is used. |
|       | L        | Indicates whether the Novice computer is connected via a modem.<br>L = 1 means MODEM is used, 0 means high-speed connectivity is used.   |

## 7 Appendix B: Full IDL

For ease of implementation, the full IDL is provided below.

This IDL imports the IDL from the OLE Automation Protocol [\[MS-OAUT\]](#), Appendix A, to provide support for the type definitions VARIANT and SAFEARRAY.

```
import "ms-olut.idl";
#define SAFEARRAY(type) SAFEARRAY
#define DISPID_PCH_BASE 0x08010000
#define DISPID_PCH_BASE_COL (DISPID_PCH_BASE + 0x0000)
#define DISPID_PCH_HELPSVC_BASE 0x08000000
#define DISPID_PCH_HELPSVC_BASE_SVC (DISPID_PCH_HELPSVC_BASE + 0x0000)
#define DISPID_PCH_SVC_REMOTECONNECTIONPARMS (DISPID_PCH_HELPSVC_BASE_SVC + 0x0040)
#define DISPID_PCH_SVC_REMOTEUSERSESSIONINFO (DISPID_PCH_HELPSVC_BASE_SVC + 0x0041)
#define DISPID_PCH_COL_COUNT (DISPID_PCH_BASE_COL + 0x0000)

#define DISPID_SAF_BASE 0x08020000
#define DISPID_SAF_BASE_RCD (DISPID_SAF_BASE + 0x0B00)
#define DISPID_SAF_BASE_USER (DISPID_SAF_BASE + 0x0C00)
#define DISPID_SAF_BASE_SESS (DISPID_SAF_BASE + 0x0D00)
#define DISPID_SAF_USER_DOMAINNAME (DISPID_SAF_BASE_USER + 0x0010)
#define DISPID_SAF_USER_USERNAME (DISPID_SAF_BASE_USER + 0x0011)
#define DISPID_SAF_SESS_SESSIONID (DISPID_SAF_BASE_SESS + 0x0010)
#define DISPID_SAF_SESS_SESSIONSTATE (DISPID_SAF_BASE_SESS + 0x0011)
#define DISPID_SAF_SESS_DOMAINNAME (DISPID_SAF_BASE_SESS + 0x0012)
#define DISPID_SAF_SESS_USERNAME (DISPID_SAF_BASE_SESS + 0x0013)

typedef enum
{
    pchActive = 0,
    pchConnected = 1,
    pchConnectQuery = 2,
    pchShadow = 3,
    pchDisconnected = 4,
    pchIdle = 5,
    pchListen = 6,
    pchReset = 7,
    pchDown = 8,
    pchInit = 9,
    pchStateInvalid = 10
} SessionStateEnum;

[
    object,
    uuid(833E4100-AFF7-4AC3-AAC2-9F24C1457BCE),
    dual,
    oleautomation,
    helpstring("IPCHCollection Interface"),
    pointer default(unique)
]

interface IPCHCollection : IDispatch
{
    [propget, id(DISPID_NEWENUM)] HRESULT NewEnum(
        [out, retval] IUnknown* *pVal );
    [propget, id(DISPID_VALUE)] HRESULT Item (
        [in] long vIndex,
        [out, retval] VARIANT *ppEntry );
    [propget, id(DISPID_PCH_COL_COUNT)] HRESULT Count (
        [out, retval] long *pVal );
}
```

```

};

[
    object,
    uuid(833E4200-AFF7-4AC3-AAC2-9F24C1457BCE),
    dual,
    oleautomation,
    helpstring("IPCHService Interface"),
    pointer default(unique)
]

interface IPCHService : IDispatch
{
    HRESULT Opnum7NotUsedByProtocol(void);
    HRESULT Opnum8NotUsedByProtocol(void);
    HRESULT Opnum9NotUsedByProtocol(void);
    HRESULT Opnum10NotUsedByProtocol(void);
    HRESULT Opnum11NotUsedByProtocol(void);
    HRESULT Opnum12NotUsedByProtocol(void);
    HRESULT Opnum13NotUsedByProtocol(void);
    HRESULT Opnum14NotUsedByProtocol(void);
    HRESULT Opnum15NotUsedByProtocol(void);
    HRESULT Opnum16NotUsedByProtocol(void);
    HRESULT Opnum17NotUsedByProtocol(void);
    HRESULT Opnum18NotUsedByProtocol(void);
    [id(DISPID_PCH_SVC__REMOTECONNECTIONPARMS)] HRESULT RemoteConnectionParms(
        [in] BSTR bstrUserName,
        [in] BSTR bstrDomainName,
        [in] long lSessionID,
        [in] BSTR bstrUserHelpBlob,
        [out, retval] BSTR *pbstrConnectionString );
    [id(DISPID_PCH_SVC__REMOTEUSERSESSIONINFO)] HRESULT RemoteUserSessionInfo(
        [out, retval] IPCHCollection* *pVal );
    HRESULT Opnum21NotUsedByProtocol(void);
};

[
    object,
    uuid(833E41AA-AFF7-4AC3-AAC2-9F24C1457BCE),
    dual,
    oleautomation,
    helpstring("ISAFSession Interface"),
    pointer_default(unique)
]

interface ISAFSession : IDispatch
{
    [propget, id(DISPID_SAF_SESS_SESSIONID)] HRESULT SessionID (
        [out, retval] DWORD *pVal );
    [propput, id(DISPID_SAF_SESS__SESSIONID)] HRESULT SessionID (
        [in ] DWORD pVal );
    [propget, id(DISPID_SAF_SESS_SESSIONSTATE)] HRESULT SessionState(
        [out, retval] int *pVal );
    [propput, id(DISPID_SAF_SESS_SESSIONSTATE)] HRESULT SessionState(
        [in ] int pVal );
    [propget, id(DISPID_SAF_SESS__DOMAINNAME)] HRESULT DomainName (
        [out, retval] BSTR *pVal );
    [propput, id(DISPID_SAF_SESS_DOMAINNAME)] HRESULT DomainName (
        [in ] BSTR pVal );
    [propget, id(DISPID_SAF_SESS_USERNAME)] HRESULT UserName (
        [out, retval] BSTR *pVal );
    [propput, id(DISPID_SAF_SESS__USERNAME)] HRESULT UserName (
        [in ] BSTR pVal );
};

```

```

[
    object,
    uuid(F120A684-B926-447F-9DF4-C966CB785648),
    dual,
    nonextensible,
    helpstring("IRASrv Interface"),
    pointer default(unique)
]
interface IRASrv : IDispatch{
    [id(1), helpstring("method GetNoviceUserInfo")] HRESULT GetNoviceUserInfo(
        [in,out] LPWSTR * szName);
    [id(2), helpstring("method GetSessionInfo")] HRESULT GetSessionInfo(
        [in,out] SAFEARRAY(BSTR) * UserNames, [in,out] INT * Count);
};

[
    uuid(833E4010-AFF7-4AC3-AAC2-9F24C1457BCE),
    helpstring("PCHService Class")
]
coclass PCHService
{
    [default] interface IPCHService;
}

[
    uuid(3C3A70A7-A468-49B9-8ADA-28E11FCCAD5D),
    helpstring("RASrv Class")
]
coclass RASrv
{
    [default] interface IRASrv;
};

```

## 8 Appendix C: Windows Behavior

The information in this specification is applicable to the following versions of Windows:

- Windows Server 2003
- Windows XP
- Windows Vista
- Windows Server 2008

Exceptions, if any, are noted below. Unless otherwise specified, any statement of optional behavior in this specification prescribed using the terms SHOULD or SHOULD NOT implies Windows behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that Windows does not follow the prescription.

[<1> Section 1.3:](#) Windows implements Expert authentication using the Offer Remote Assistance Helpers Group. DCOM will only allow members of this group to execute the Remote Assistance Initiation Protocol [MS-RAI] methods.

[<2> Section 1.7:](#)

- Windows Vista and Windows Server 2008 implement IRASrv. A Windows Vista or Windows Server 2008 Novice can only be initiated through IRASrv.
- Windows XP and Windows Server 2003 implement IPCHService. A Windows XP or Windows Server 2003 Novice can only be initiated through IPCHService.
- Windows Vista and Windows Server 2008 Expert first attempt to call IRASrv and if it fails they then attempt to call the IPCHService interface.
- Windows XP and Windows Server 2003 Expert will only attempt to call IPCHService and will not be able to connect to a Windows Vista or Windows Server 2008 Novice.

[<3> Section 2.2.1:](#) This form of the Remote Assistance Connection String is obtained from Remote Assistance running on a Windows XP or Windows Server 2003 Novice.

[<4> Section 2.2.2:](#) This form of the Remote Assistance Connection String is obtained from Remote Assistance running on a Windows Vista or Windows Server 2008 Novice computer.

[<5> Section 3.1.4.1:](#) This interface and its called interfaces, IPCHCollection and ISAFSession, are only called by Windows XP and Windows Server 2003.

[<6> Section 3.1.4.1:](#) Gaps in the opnum numbering sequence apply to Windows as follows.

| Opnum | Description                                   |
|-------|---|
| 3-4   | Only used locally by Windows, never remotely. |

[<7> Section 3.1.4.1.1:](#) Access denied error is returned only for Windows XP SP1 and the initial release of Windows Server 2003 (it is not returned by Windows Server 2003 SP1 or later releases.)

[<8> Section 3.1.4.1.2:](#) Access denied error is returned only for Windows XP SP1 and the initial release of Windows Server 2003 (it is not returned by Windows Server 2003 SP1 or later releases.)

[<9> Section 3.1.4.1.2.1:](#) Gaps in the opnum numbering sequence apply to Windows as follows.

| Opnum | Description                                   |
|-------|---|
| 3-4   | Only used locally by Windows, never remotely. |

[<10> Section 3.1.4.1.2.2:](#) Gaps in the opnum numbering sequence apply to Windows as follows.

| Opnum | Description                                   |
|-------|---|
| 3-4   | Only used locally by Windows, never remotely. |

[<11> Section 3.3.4.1:](#) This interface is only used by Windows Vista and Windows Server 2008.

[<12> Section 3.3.4.1:](#) Gaps in the opnum numbering sequence apply to Windows as follows.

| Opnum | Description                                   |
|-------|---|
| 3-4   | Only used locally by Windows, never remotely. |

[<13> Section 5.1:](#) For DCOM authentication/authorization in Windows Vista and Windows Server 2008, the following are used:

- Authentication Service - RPC\_C\_AUTHN\_WINNT
- Authorization Service - RPC\_C\_AUTHZ\_DEFAULT
- Authentication Level - RPC\_C\_AUTHN\_LEVEL\_PKT\_PRIVACY
- Impersonation Level - RPC\_C\_IMP\_LEVEL\_IMPERSONATE

For DCOM authentication/authorization in Windows XP and Windows Server 2003, all defaults are used.

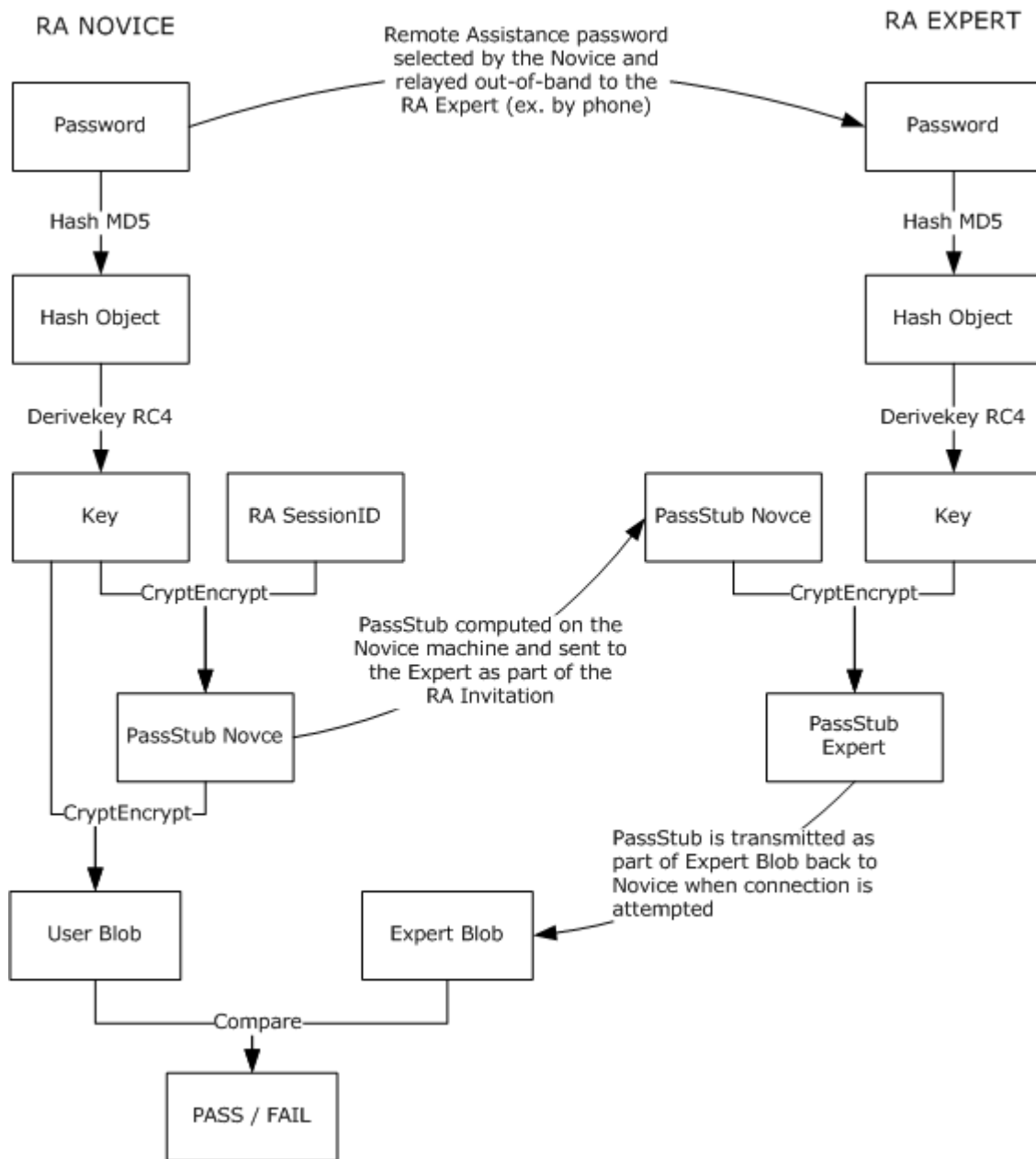
[<14> Section 6:](#) In Windows XP, Windows Server 2003, Windows Vista, and Windows Server 2008 the XML file has the extension MSRCIncident.

[<15> Section 6:](#) This version is specific to Windows XP and Windows Server 2003.

[<16> Section 6:](#) A password MAY be used in Windows XP and Windows Server 2003. For security reasons it is advisable to protect the RA invitation file using a password.

In Windows XP and Windows Server 2003, when a password is used, it is encrypted using PROV\_RSA\_FULL predefined Cryptographic provider with MD5 hashing and CALG\_RC4, the RC4 stream encryption algorithm. More details are in the [Cryptography Reference \[MSDN-CRYPTO\]](#).

Following is the password encryption flow diagram in the case of Windows XP and Windows Server 2003:



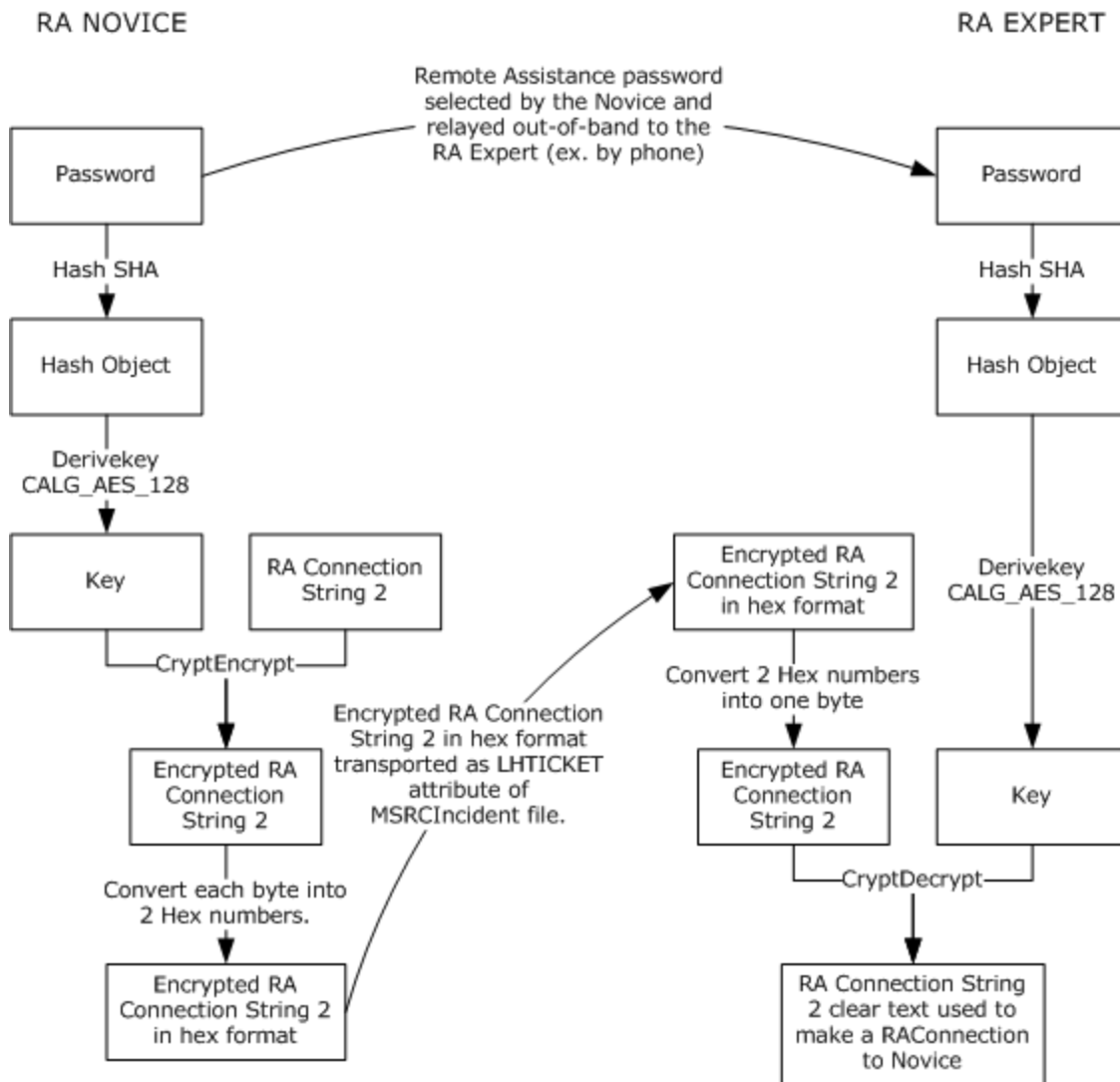
**Figure 1: Windows XP and Windows Server 2003 password encryption flow**

[<17> Section 6:](#) This type is specific to Windows Vista and Windows Server 2008.

[<18> Section 6:](#) In Windows Vista and Windows Server 2008, the password is mandatory and it is encrypted using the MS\_ENH\_RSA\_AES\_PROV predefined Cryptographic provider with CALG\_SHA hashing and the CALG\_AES\_128 encryption algorithm. The cipher mode used SHOULD be CRYPT\_MODE\_CBC and the password used during the encryption process MUST be a Unicode string.

Following is the password encryption flow diagram in the case of Windows Vista and Windows Server 2008:





**Figure 2: Windows Vista and Windows Server 2008 password encryption flow**

[<19> Section 6:](#) This attribute SHOULD be present for Windows XP and Windows Server 2003 compatibility.

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