

[MS-WKST]: Workstation Service Remote Protocol Specification

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1 Introduction

This is a specification of the Workstation Service Remote Protocol (WKSSVC). It is based on the **Remote Procedure Call (RPC)** protocol ([\[C706\]](#) and [\[MS-RPCE\]](#)).

WKSSVC can be used to remotely perform tasks on a computer on a network, including:

- Configuring properties and behavior of a **Server Message Block network redirector** (SMB network redirector).
- Managing **domain** membership and **computer names**.
- Gathering information, such as the number of enabled transport protocols and the number of currently logged-on users.

1.1 Glossary

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

Active Directory
ASCII
browser server
built-in domain
client
computer name
directory service (DS)
distinguished name (DN)
domain
domain controller (DC)
domain controller locator
domain member (member machine)
domain name (3)
Domain Name System (DNS)
domain object
endpoint
fully qualified domain name (FQDN) (2)
Group Policy
handle
Interface Definition Language (IDL)
Internet host name
LDAP
little-endian
machine account
message digest 4 (MD4)
Microsoft Interface Definition Language (MIDL)
named pipe
naming context (NC)
NetBIOS
NetBIOS name
Netlogon (3)
Network Data Representation (NDR)
network redirector
opnum

original equipment manufacturer (OEM) character set
plaintext
primary domain controller (PDC)
pseudo-random number generator (PRNG)
read-only domain controller (RODC)
registry
remote procedure call (RPC)
RPC protocol sequence
RPC transport
salt
schema
security context
security descriptor
security principal (2)
Security Support Provider Interface (SSPI)
server
Server Message Block (SMB)
service principal name (SPN)
SMB connection
SMB session
standard user
Stock Keeping Unit (SKU)
Transmission Control Protocol (TCP)
Unicode
UTF-8
UTF-16
universally unique identifier (UUID)
well-known endpoint

The following terms are specific to this document:

active user: A user that is currently authenticated on a computer.

cleartext: In cryptography, the form of a message (or data) that is transferred or stored without cryptographic protection.

client side: The initiating end of the protocol.

organizational unit (OU): A container within a **domain** that provides a facility to classify and differentiate objects in a directory structure such as **LDAP**.

routable protocol: A communications protocol that allows packets to be forwarded from one network to another.

server side: The receiving end of the protocol.

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as described 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. 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-ADA1] Microsoft Corporation, "[Active Directory Schema Attributes A-L](#)", June 2007.

[MS-ADA2] Microsoft Corporation, "[Active Directory Schema Attributes M](#)", June 2007.

[MS-ADA3] Microsoft Corporation, "[Active Directory Schema Attributes N-Z](#)", June 2007.

[MS-ADSC] Microsoft Corporation, "[Active Directory Schema Classes](#)", June 2007.

[MS-ADSO] Microsoft Corporation, "[Active Directory System Overview](#)", July 2009.

[MS-ADTS] Microsoft Corporation, "[Active Directory Technical Specification](#)", June 2007.

[MS-BRWS] Microsoft Corporation, "[Common Internet File System \(CIFS\) Browser Protocol Specification](#)", July 2007.

[MS-BRWSA] Microsoft Corporation, "[Common Internet File System \(CIFS\) Browser Auxiliary Protocol Specification](#)", September 2007.

[MS-CIFS] Microsoft Corporation, "[Common Internet File System \(CIFS\) Protocol Specification](#)", September 2009.

[MS-DISO] Microsoft Corporation, "[Domain Interactions System Overview](#)", November 2009.

[MS-DTYP] Microsoft Corporation, "[Windows Data Types](#)", January 2007.

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

[MS-LSAT] Microsoft Corporation, "[Local Security Authority \(Translation Methods\) Remote Protocol Specification](#)", June 2007.

[MS-NLMP] Microsoft Corporation, "[NT LAN Manager \(NTLM\) Authentication Protocol Specification](#)", June 2007.

[MS-NRPC] Microsoft Corporation, "[Netlogon Remote Protocol Specification](#)", March 2007.

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

[MS-SMB] Microsoft Corporation, "[Server Message Block \(SMB\) Protocol Specification](#)", July 2007.

[MS-SMB2] Microsoft Corporation, "[Server Message Block \(SMB\) Version 2 Protocol Specification](#)", July 2007.

[MS-SPNG] Microsoft Corporation, "[Simple and Protected GSS-API Negotiation Mechanism \(SPNEGO\) Extension](#)", January 2007.

[NIS] Sun Microsystems, Inc., "System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)", <http://docs.sun.com/app/docs/doc/816-4556>

If you have any trouble finding [NIS], please check [here](#).

[RFC1001] Network Working Group, "Protocol Standard for a NetBIOS Service on a TCP/UDP Transport: Concepts and Methods", STD 19, RFC 1001, March 1987, <http://www.ietf.org/rfc/rfc1001.txt>

[RFC1035] Mockapetris, P., "Domain Names - Implementation and Specification", STD 13, RFC 1035, November 1987, <http://www.ietf.org/rfc/rfc1035.txt>

[RFC1321] Rivest, R., "The MD5 Message-Digest Algorithm", RFC 1321, April 1992, <http://www.ietf.org/rfc/rfc1321.txt>

[RFC1777] Yeong, W., Howes, T., and Kille, S., "Lightweight Directory Access Protocol", RFC 1777, March 1995, <http://www.ietf.org/rfc/rfc1777.txt>

[RFC1964] Linn, J., "The Kerberos Version 5 GSS-API Mechanism", RFC 1964, June 1996, <http://www.ietf.org/rfc/rfc1964.txt>

[RFC2251] Wahl, M., Howes, T., and Kille, S., "Lightweight Directory Access Protocol (v3)", RFC 2251, December 1997, <http://www.ietf.org/rfc/rfc2251.txt>

[RFC2252] Wahl, M., Coulbeck, A., Howes, T., and Kille, S., "Lightweight Directory Access Protocol (v3): Attribute Syntax Definitions", RFC 2252, December 1997, <http://www.ietf.org/rfc/rfc2252.txt>

[RFC2253] Wahl, M., Kille, S., and Howe, T., "Lightweight Directory Access Protocol (v3): UTF-8 String Representation of Distinguished Names", RFC 2253, December 1997, <http://www.ietf.org/rfc/rfc2253.txt>

[SCHNEIER] Schneier, B., "Applied Cryptography, Second Edition", John Wiley and Sons, 1996, ISBN: 0471117099.

If you have any trouble finding [SCHNEIER], please check [here](#).

[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

[FIPS140] National Institute of Standards and Technology, "Federal Information Processing Standards Publication 140-2: Security Requirements for Cryptographic Modules", December 2002, <http://csrc.nist.gov/publications/fips/fips140-2/fips1402.pdf>

[IEEE802.1X] Institute of Electrical and Electronics Engineers, "IEEE Standard for Local and Metropolitan Area Networks - Port-Based Network Access Control", December 2004, <http://ieeexplore.ieee.org/iel5/9828/30983/01438730.pdf>

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

[PIPE] Microsoft Corporation, "Named Pipes", <http://msdn.microsoft.com/en-us/library/aa365590.aspx>

[WININTERNALS] Russinovich, M., and Solomon, D., "Microsoft Windows Internals, Fourth Edition", Microsoft Press, 2005, ISBN: 0735619174.

If you have any trouble finding [WININTERNALS], please check [here](#).

1.3 Overview

The Workstation Service Remote Protocol is designed for remotely querying and configuring certain aspects of an SMB network redirector on a remote computer. For example, an implementer can use this protocol to query the computer name or major and minor version numbers of the operating system running on a remote computer.

An implementer can also use the protocol to configure the behavior of an SMB network redirector. For example, an implementer can use this protocol to configure the following:

- The number of seconds the SMB network redirector maintains an inactive **SMB connection** to a remote computer's resource before closing it.
- The number of simultaneous network commands that can be sent to the SMB network redirector.
- The number of seconds the SMB network redirector waits before disconnecting an inactive **SMB session**.

The protocol is also designed to enumerate all the users currently logged on to a remote computer, and to enumerate the transport protocols currently enabled for use by the SMB network redirector on a remote computer. When enumerating currently logged-on users or transport protocols, the protocol does not guarantee that all logged-on users or transport protocols will be enumerated. The protocol also does not guarantee that the enumerated users or transport protocols will not be duplicated.

The protocol can also be used to manage domain membership and the computer names of a computer on a network. For example, this protocol can be used to configure the following:

- The primary name of a computer
- Alternate names of a computer
- The domain membership of a computer

This is an RPC-based protocol. This protocol contains no protocol-specific state that is stored across protocol messages and only operates on state accessible through other protocols and local services. Some methods manipulate the **server** state and the state at a **domain controller** during message processing. This state is not part of this protocol but is exposed by other protocols.

This is a simple request-response protocol. For every method that the server receives, it executes the method and returns a completion. The **client** simply returns the completion status to the caller. Each method call is independent of any previous method call.

1.4 Relationship to Other Protocols

The Workstation Service Remote Protocol is dependent on the RPC and SMB protocols for its transport. This protocol uses RPC [\[MS-RPCE\]](#) over **named pipes**, as specified in section [2.1](#). Named pipes in turn use SMB [\[MS-SMB\].<1><2>](#). The **server side** of the protocol invokes domain interaction tasks, as specified in [\[MS-DISO\]](#).

The client-side protocol relationships are illustrated in the following diagram:

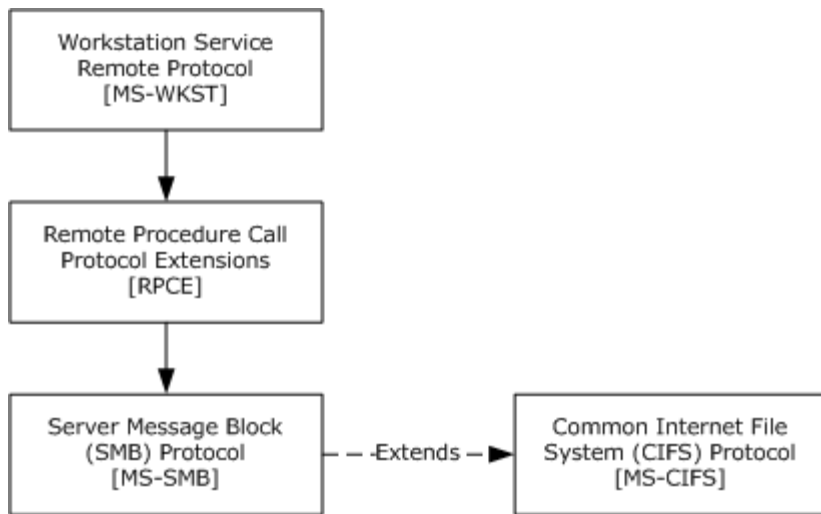


Figure 1: Client-side protocol relationships among the Workstation Service Remote Protocol, Remote Procedure Call Protocol Extensions [MS-RPCE], and Server Message Block (SMB) Protocol [MS-SMB], and Common Internet File System (CIFS) Protocol Specification [MS-CIFS]

The server-side protocol relationships are illustrated in the following diagram:

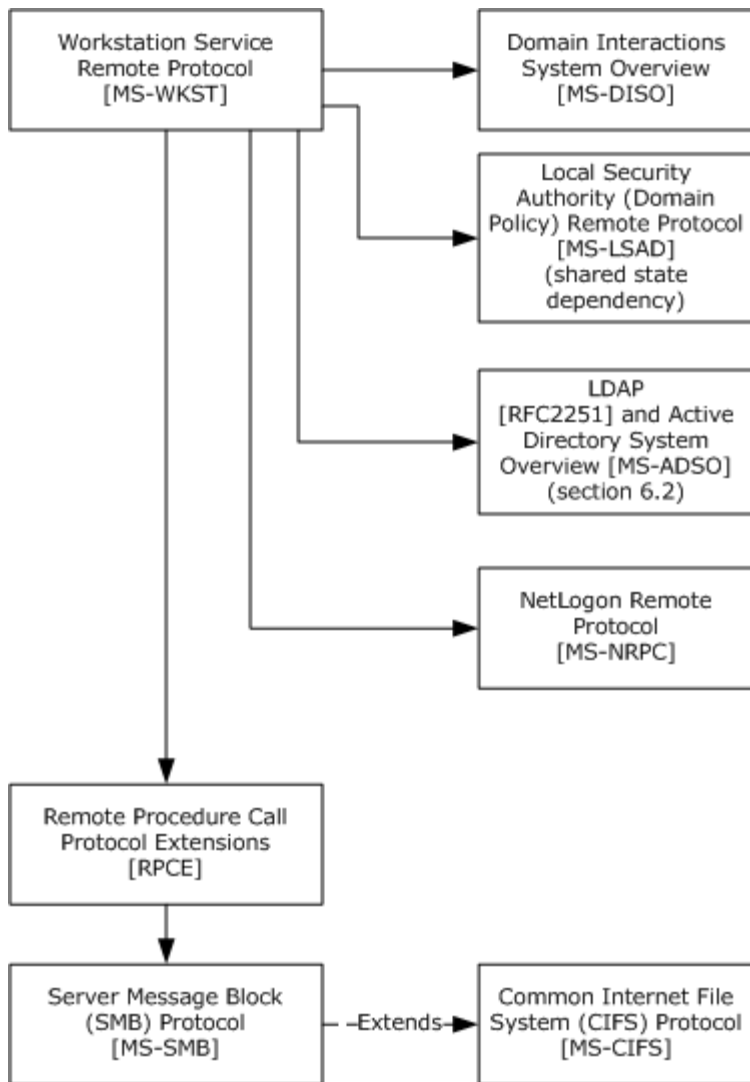


Figure 2: Server-side relationships among the Workstation Service Remote Protocol

The server-side dependency on the [\[MS-LSAD\]](#) protocol in Figure 2 is a shared-state dependency resulting from [\[MS-WKST\]](#) depending on **Access Check Algorithm Pseudocode** ([\[MS-DTYP\]](#) [\(section 2.5.3.2\)](#)), which in turn depends on state in [\[MS-LSAD\]](#).

The server-side protocol invokes the following tasks defined in [\[MS-DISO\]](#):

- Joining a domain using a predefined account ([\[MS-DISO\]](#) section 6)
- Joining a domain by creating an account via SAMR ([\[MS-DISO\]](#) section 7)
- Joining a domain by creating an account via **LDAP** ([\[MS-DISO\]](#) section 8)
- Removing a **domain member** ([\[MS-DISO\]](#) section 9)

The server-side protocol depends on LDAP [\[RFC2251\]](#) and [\[MS-ADSO\]](#) section 6.2 for querying and updating objects in **Active Directory**.

The server-side protocol also depends on ADM elements defined in [MS-DISO] as specified in section [3.2.1.5](#).

The server-side protocol depends on [\[MS-NRPC\]](#) for DC-location functionality (see the **DsrGetDcNameEx2** method).

No other protocol depends on the Workstation Service Remote Protocol.

1.5 Prerequisites/Preconditions

The Workstation Service Remote Protocol is an RPC interface and, as a result, has the prerequisites [\[MS-RPCE\]](#) common to RPC interfaces.

It is assumed that a Workstation Service Remote Protocol client has obtained the name of a remote computer that supports the Workstation Service Remote Protocol before this protocol is called.

The client is expected to know the names of the transport protocols that can be enabled for use by the SMB network redirector on a remote computer.

1.6 Applicability Statement

This protocol is only appropriate for querying and configuring an SMB network redirector on a remote computer or enumerating the currently logged-on users on a remote computer.

This protocol is not appropriate for enumeration of large numbers of logged-on users or transport protocols, because it provides no guarantees that those enumerations are consistent.

1.7 Versioning and Capability Negotiation

There are no versioning issues for this protocol.

1.8 Vendor-Extensible Fields

This protocol uses Win32 error codes. These values are taken from the error number space specified in [\[MS-ERREF\]](#). Vendors SHOULD [<3>](#) reuse those values with their indicated meaning. Choosing any other value runs the risk of a collision in the future.

1.9 Standards Assignments

Parameter	Value	Reference
RPC Interface UUID	{6BFFD098-A112-3610-9833-46C3F87E345A}	[C706]
Pipe name	\\PIPE\wkssvc	[MS-SMB]

2 Messages

2.1 Transport

The Workstation Service Remote Protocol MUST use the following **RPC protocol sequence**: RPC over SMB, as specified in [\[MS-RPCE\]](#), section [2.1.1.2](#).

The Workstation Service Remote Protocol MUST use the following **well-known endpoint**. The **endpoint** MUST be the pipe name (for more information, see [\[PIPE\]](#)) for RPC over SMB:

```
\PIPE\wkssvc
```

The client MUST set an impersonation level for the creation of the above pipe to either IDENTIFICATION or IMPERSONATION as specified in section [2.2.2](#).

This is the only protocol that is supported for this endpoint.

This protocol MUST use the UUID as specified in section [1.9](#). The RPC version number is 1.0.

This protocol allows any user to establish a connection to the RPC server. The server uses the underlying RPC protocol to retrieve the identity of the caller that made the method call, as specified in the second bullet of section [3.3.3.4.3](#) of [\[MS-RPCE\]](#). The server SHOULD [<4>](#) use this identity to perform method-specific access checks as specified in section [3.2.4](#).

2.2 Message Syntax

In addition to RPC base types specified in [\[C706\]](#), [\[MS-RPCE\]](#), and [\[MS-DTYP\]](#), the following data types are defined in the **Microsoft Interface Definition Language (MIDL)** specification for this RPC interface.

2.2.1 Constants

2.2.1.1 JOIN_MAX_PASSWORD_LENGTH

Constant/value	Description
JOIN_MAX_PASSWORD_LENGTH 256	The size, in 16-bit characters, of the cleartext password buffer specified in a JOINPR_USER_PASSWORD (section 2.2.5.17) structure.

2.2.1.2 JOIN_OBFUSCATOR_LENGTH

Constant/value	Description
JOIN_OBFUSCATOR_LENGTH 8	The size, in bytes, of the unencrypted salt value in a JOINPR_USER_PASSWORD (section 2.2.5.17) structure.

2.2.1.3 MAX_PREFERRED_LENGTH

Constant/value	Description
MAX_PREFERRED_LENGTH 0xFFFFFFFF	A metavalue used in NetrWkstaUserEnum (section 3.2.4.3) and NetrWkstaTransportEnum (section 3.2.4.4) method parameters to

Constant/value	Description
	indicate that the server MUST allocate the amount of memory required to return all the requested data.

2.2.2 Data Types

2.2.2.1 WKSSVC_IDENTIFY_HANDLE

This type is declared as follows:

```
typedef [handle] wchar_t* WKSSVC_IDENTIFY_HANDLE;
```

A null-terminated **Unicode** string that identifies the remote computer on which to execute the method. The client MUST set the impersonation level to **SECURITY_IDENTIFICATION** ([\[MS-RPCE\]](#) section 2.2.1.1.10) for the RPC connection that refers to this **handle**.

2.2.2.2 WKSSVC_IMPERSONATE_HANDLE

This type is declared as follows:

```
typedef [handle] wchar_t* WKSSVC_IMPERSONATE_HANDLE;
```

A null-terminated Unicode string that identifies the remote computer on which to execute the method. The client MUST set the impersonation level to **SECURITY_IMPERSONATION** ([\[MS-RPCE\]](#) section 2.2.1.1.10) for the RPC connection that refers to this handle.

2.2.2.3 handle_t

A concrete type for an RPC binding handle ([\[C706\]](#) section 4.2.9.7 and [\[MS-DTYP\]](#) section 2.1.3). The client MUST set the impersonation level to **SECURITY_IMPERSONATION** ([\[MS-RPCE\]](#) section 2.2.1.1.10) for the RPC connection that refers to this handle.

2.2.3 Enumerations

2.2.3.1 NETSETUP_JOIN_STATUS

The **NETSETUP_JOIN_STATUS** enumeration contains information about the domain join status of a machine.

```
typedef enum _NETSETUP_JOIN_STATUS
{
    NetSetupUnknownStatus = 0,
    NetSetupUnjoined,
    NetSetupWorkgroupName,
    NetSetupDomainName
} NETSETUP_JOIN_STATUS,
*PNETSETUP_JOIN_STATUS;
```


NetSetupUnknownStatus: Domain join status of the machine is unknown.

NetSetupUnjoined: Machine is not joined to a domain or to a workgroup.

NetSetupWorkgroupName: Machine is joined to a workgroup.

NetSetupDomainName: Machine is joined to a domain.

2.2.3.2 NETSETUP_NAME_TYPE

The **NETSETUP_NAME_TYPE** enumeration specifies the types of validation that can be performed for a computer name, workgroup name, or **domain_name**.

```
typedef enum _NETSETUP_NAME_TYPE
{
    NetSetupUnknown = 0,
    NetSetupMachine,
    NetSetupWorkgroup,
    NetSetupDomain,
    NetSetupNonExistentDomain,
    NetSetupDnsMachine
} NETSETUP_NAME_TYPE,
*PNETSETUP_NAME_TYPE;
```

NetSetupUnknown: Reserved.

NetSetupMachine: Verify that the name is valid as a **NetBIOS** computer name and that it is not in use.

NetSetupWorkgroup: Verify that the name is valid as a workgroup name.

NetSetupDomain: Verify that the name is valid as a NetBIOS domain_name and that a domain with that name exists.

NetSetupNonExistentDomain: Verify that the name is valid as a NetBIOS domain_name and that a domain with that name does not exist.

NetSetupDnsMachine: Verify that the name is valid as a DNS computer name.

2.2.3.3 NET_COMPUTER_NAME_TYPE

The **NET_COMPUTER_NAME_TYPE** enumeration specifies the types of names that can be enumerated for a computer using the [NetrEnumerateComputerNames \(section 3.2.4.17\)](#) method.

```
typedef enum _NET_COMPUTER_NAME_TYPE
{
    NetPrimaryComputerName = 0,
    NetAlternateComputerNames,
    NetAllComputerNames,
    NetComputerNameTypeMax
} NET_COMPUTER_NAME_TYPE,
*PNET_COMPUTER_NAME_TYPE;
```

NetPrimaryComputerName: Query the primary name of a computer.

NetAlternateComputerNames: Query the alternate names of a computer.

NetAllComputerNames: Query all names of a computer.

NetComputerNameTypeMax: Maximum number of name types.

2.2.4 Unions

2.2.4.1 WKSTA_INFO

The **WKSTA_INFO** union contains information about a computer. This union is used by the methods [NetrWkstaGetInfo \(section 3.2.4.1\)](#) and [NetrWkstaSetInfo \(section 3.2.4.2\)](#).

```
typedef
[switch_type(unsigned long)]
union _WKSTA_INFO {
    [case(100)]
        LPWKSTA_INFO_100 WkstaInfo100;
    [case(101)]
        LPWKSTA_INFO_101 WkstaInfo101;
    [case(102)]
        LPWKSTA_INFO_102 WkstaInfo102;
    [case(502)]
        LPWKSTA_INFO_502 WkstaInfo502;
    [case(1013)]
        LPWKSTA_INFO_1013 WkstaInfo1013;
    [case(1018)]
        LPWKSTA_INFO_1018 WkstaInfo1018;
    [case(1046)]
        LPWKSTA_INFO_1046 WkstaInfo1046;
    [default] ;
} WKSTA_INFO,
*PWKSTA_INFO,
*LPWKSTA_INFO;
```

WkstaInfo100: Contains information about a computer environment. For details, see section [2.2.5.1](#).

WkstaInfo101: Contains information about a computer environment. For details, see section [2.2.5.2](#).

WkstaInfo102: Contains information about a computer environment. For details, see section [2.2.5.3](#).

WkstaInfo502: Contains information about a computer environment. For details, see section [2.2.5.4](#).

WkstaInfo1013: Contains information about the state of the SMB network redirector. For details, see section [2.2.5.5](#)

WkstaInfo1018: Contains information about the state of the SMB network redirector. For details, see section [2.2.5.6](#).

WkstaInfo1046: Contains information about the state of the SMB network redirector. For details, see section [2.2.5.7](#).

2.2.5 Structures

2.2.5.1 WKSTA_INFO_100

The **WKSTA_INFO_100** structure contains information about a computer environment, including platform-specific information, the names of the domain and the local computer, and information about the operating system.

```
typedef struct _WKSTA_INFO_100 {
    unsigned long wki100_platform_id;
    [string] wchar_t* wki100_computername;
    [string] wchar_t* wki100_langgroup;
    unsigned long wki100_ver_major;
    unsigned long wki100_ver_minor;
} WKSTA_INFO_100,
*PWKSTA_INFO_100,
*LPWKSTA_INFO_100;
```

wki100_platform_id: Represents the type of operating system. This MUST be one of the following values.

Value	Meaning
0x0000012C	DOS. Decimal value 300.
0x00000190	OS2. Decimal value 400.
0x000001F4	Windows. Decimal value 500.
0x00000258	OSF. Decimal value 600.
0x000002BC	VMS. Decimal value 700.

wki100_computername: MUST be a null-terminated, **Internet host name** or **NetBIOS name** [RFC1001] of the local computer.

wki100_langgroup: MUST be a null-terminated, **fully qualified domain name (FQDN)** of the domain to which the computer belongs.

wki100_ver_major: MUST specify the major version number of the operating system running on the computer.

wki100_ver_minor: MUST specify the minor version number of the operating system running on the computer.

2.2.5.2 WKSTA_INFO_101

The **WKSTA_INFO_101** structure contains information about a computer environment, including platform-specific information, the name of the domain and the local computer, and information about the operating system.

```
typedef struct _WKSTA_INFO_101 {
    unsigned long wki101_platform_id;
    [string] wchar_t* wki101_computername;
```

```

[string] wchar_t* wki101_langgroup;
unsigned long wki101_ver_major;
unsigned long wki101_ver_minor;
[string] wchar_t* wki101_lanroot;
} WKSTA_INFO_101,
*PWKSTA_INFO_101,
*LPWKSTA_INFO_101;

```

wki101_platform_id: MUST be the same as wki100_platform_id (see section [2.2.5.1](#)).

wki101_computername: MUST be a null-terminated, Internet host name or NetBIOS name [\[RFC1001\]](#) of the local computer.

wki101_langgroup: MUST be a null-terminated, fully qualified domain name (FQDN) of the domain to which the computer belongs.

wki101_ver_major: MUST be the major version number of the operating system running on the computer.

wki101_ver_minor: MUST be the minor version number of the operating system running on the computer.

wki101_lanroot: This parameter is not used. MUST be returned as NULL by the server.

2.2.5.3 WKSTA_INFO_102

The **WKSTA_INFO_102** structure contains information about a computer environment, including platform-specific information, the name of the domain and the local computer, and information about the operating system and the number of logged-on users.

```

typedef struct _WKSTA_INFO_102 {
    unsigned long wki102_platform_id;
    [string] wchar_t* wki102_computername;
    [string] wchar_t* wki102_langgroup;
    unsigned long wki102_ver_major;
    unsigned long wki102_ver_minor;
    [string] wchar_t* wki102_lanroot;
    unsigned long wki102_logged_on_users;
} WKSTA_INFO_102,
*PWKSTA_INFO_102,
*LPWKSTA_INFO_102;

```

wki102_platform_id: Represents the type of operating system. The values MUST be the same as those for wki100_platform_id (see section [2.2.5.1](#)).

wki102_computername: MUST be a null-terminated, Internet host name or NetBIOS name [\[RFC1001\]](#) of the local computer.

wki102_langgroup: MUST be a null-terminated, fully qualified domain name (FQDN) of the domain to which the computer belongs.

wki102_ver_major: MUST be the major version number of the operating system running on the computer.

wki102_ver_minor: MUST be the minor version number of the operating system running on the computer.

wki102_lanroot: This parameter is not used. MUST be returned as NULL by the server.

wki102_logged_on_users: MUST specify the number of users who are currently active on the computer.

2.2.5.4 WKSTA_INFO_502

The **WKSTA_INFO_502** structure contains information about a computer environment.

```
typedef struct _WKSTA_INFO_502 {
    unsigned long wki502_char_wait;
    unsigned long wki502_collection_time;
    unsigned long wki502_maximum_collection_count;
    unsigned long wki502_keep_conn;
    unsigned long wki502_max_cmds;
    unsigned long wki502_sess_timeout;
    unsigned long wki502_siz_char_buf;
    unsigned long wki502_max_threads;
    unsigned long wki502_lock_quota;
    unsigned long wki502_lock_increment;
    unsigned long wki502_lock_maximum;
    unsigned long wki502_pipe_increment;
    unsigned long wki502_pipe_maximum;
    unsigned long wki502_cache_file_timeout;
    unsigned long wki502_dormant_file_limit;
    unsigned long wki502_read_ahead_throughput;
    unsigned long wki502_num_mailslot_buffers;
    unsigned long wki502_num_srv_announce_buffers;
    unsigned long wki502_max_illegal_datagram_events;
    unsigned long wki502_illegal_datagram_event_reset_frequency;
    int wki502_log_election_packets;
    int wki502_use_opportunistic_locking;
    int wki502_use_unlock_behind;
    int wki502_use_close_behind;
    int wki502_buf_named_pipes;
    int wki502_use_lock_read_unlock;
    int wki502_utilize_nt_caching;
    int wki502_use_raw_read;
    int wki502_use_raw_write;
    int wki502_use_write_raw_data;
    int wki502_use_encryption;
    int wki502_buf_files_deny_write;
    int wki502_buf_read_only_files;
    int wki502_force_core_create_mode;
    int wki502_use_512_byte_max_transfer;
} WKSTA_INFO_502,
*PWKSTA_INFO_502,
*LPWKSTA_INFO_502;
```

wki502_char_wait: Can be set to any value when sent and MUST be ignored on receipt.

wki502_collection_time: Can be set to any value when sent and MUST be ignored on receipt.

wki502_maximum_collection_count: Can be set to any value when sent and MUST be ignored on receipt.

wki502_keep_conn: The number of seconds the SMB network redirector maintains an inactive SMB connection to a remote computer's resource before closing it.

wki502_max_cmds: The number of simultaneous network commands that can be sent to the SMB network redirector.

wki502_sess_timeout: The number of seconds the server waits before disconnecting an inactive session.

wki502_siz_char_buf: Can be set to any value when sent and MUST be ignored on receipt.

wki502_max_threads: Can be set to any value when sent and MUST be ignored on receipt.

wki502_lock_quota: Can be set to any value when sent and MUST be ignored on receipt.

wki502_lock_increment: Can be set to any value when sent and MUST be ignored on receipt.

wki502_lock_maximum: Can be set to any value when sent and MUST be ignored on receipt.

wki502_pipe_increment: Can be set to any value when sent and MUST be ignored on receipt.

wki502_pipe_maximum: Can be set to any value when sent and MUST be ignored on receipt.

wki502_cache_file_timeout: Can be set to any value when sent and MUST be ignored on receipt.

wki502_dormant_file_limit: The maximum number of file or printer handles the SMB network redirector can continue to keep open, even after the application has closed the corresponding handle.

wki502_read_ahead_throughput: Can be set to any value when sent and MUST be ignored on receipt.

wki502_num_mailslot_buffers: Can be set to any value when sent and MUST be ignored on receipt.

wki502_num_srv_announce_buffers: Can be set to any value when sent and MUST be ignored on receipt.

wki502_max_illegal_datagram_events: Can be set to any value when sent and MUST be ignored on receipt.

wki502_illegal_datagram_event_reset_frequency: Can be set to any value when sent and MUST be ignored on receipt.

wki502_log_election_packets: Can be set to any value when sent and MUST be ignored on receipt.

wki502_use_opportunistic_locking: Can be set to any value when sent and MUST be ignored on receipt.

wki502_use_unlock_behind: Can be set to any value when sent and MUST be ignored on receipt.

wki502_use_close_behind: Can be set to any value when sent and MUST be ignored on receipt.

wki502_buf_named_pipes: Can be set to any value when sent and MUST be ignored on receipt.

wki502_use_lock_read_unlock: Can be set to any value when sent and MUST be ignored on receipt.

wki502_utilize_nt_caching: Can be set to any value when sent and MUST be ignored on receipt.

wki502_use_raw_read: Can be set to any value when sent and MUST be ignored on receipt.

wki502_use_raw_write: Can be set to any value when sent and MUST be ignored on receipt.

wki502_use_write_raw_data: Can be set to any value when sent and MUST be ignored on receipt.

wki502_use_encryption: Can be set to any value when sent and MUST be ignored on receipt.

wki502_buf_files_deny_write: Can be set to any value when sent and MUST be ignored on receipt.

wki502_buf_read_only_files: Can be set to any value when sent and MUST be ignored on receipt.

wki502_force_core_create_mode: Can be set to any value when sent and MUST be ignored on receipt.

wki502_use_512_byte_max_transfer: Can be set to any value when sent and MUST be ignored on receipt.

The **wki502_keep_conn**, **wki502_max_cmds**, **wki502_sess_timeout**, and **wki502_dormant_file_limit** fields are the only fields the server can use to configure the redirector. The server MUST store all the values and return back the existing values upon a client's request.

2.2.5.5 WKSTA_INFO_1013

The **WKSTA_INFO_1013** structure contains information about the state of the SMB network redirector.

```
typedef struct _WKSTA_INFO_1013 {
    unsigned long wki1013_keep_conn;
} WKSTA_INFO_1013,
*PWKSTA_INFO_1013,
*LPWKSTA_INFO_1013;
```

wki1013_keep_conn: The number of seconds the SMB network redirector maintains an inactive SMB connection to a remote computer's resource before closing it.

2.2.5.6 WKSTA_INFO_1018

The **WKSTA_INFO_1018** structure contains information about the state of the SMB network redirector.

```
typedef struct _WKSTA_INFO_1018 {
    unsigned long wki1018_sess_timeout;
} WKSTA_INFO_1018,
*PWKSTA_INFO_1018,
*LPWKSTA_INFO_1018;
```

wki1018_sess_timeout: The number of seconds the server MUST wait before disconnecting an inactive session.

2.2.5.7 WKSTA_INFO_1046

The **WKSTA_INFO_1046** structure contains information about the state of the SMB network redirector.

```
typedef struct _WKSTA_INFO_1046 {
    unsigned long wki1046_dormant_file_limit;
} WKSTA_INFO_1046,
*PWKSTA_INFO_1046,
*LPWKSTA_INFO_1046;
```

wki1046_dormant_file_limit: The maximum number of file or printer handles the SMB network redirector can continue to keep open, even after the application has closed the corresponding handle.

2.2.5.8 WKSTA_TRANSPORT_INFO_0

The **WKSTA_TRANSPORT_INFO_0** structure contains information about the network transport protocol that the SMB network redirector uses.

```
typedef struct _WKSTA_TRANSPORT_INFO_0 {
    unsigned long wkti0_quality_of_service;
    unsigned long wkti0_number_of_vcs;
    [string] wchar_t* wkti0_transport_name;
    [string] wchar_t* wkti0_transport_address;
    unsigned long wkti0_wan_ish;
} WKSTA_TRANSPORT_INFO_0,
*PWKSTA_TRANSPORT_INFO_0,
*LPWKSTA_TRANSPORT_INFO_0;
```

wkti0_quality_of_service: Unused. Can be set to any value when sent and MUST be ignored on receipt.

wkti0_number_of_vcs: MUST be the current number of remote connections using this transport protocol.

wkti0_transport_name: MUST be the null-terminated, implementation-specific<5> name of the device that implements the transport protocol.

wkti0_transport_address: MUST be the null-terminated, implementation-specific<6> string that represents the address of the transport protocol.

wkti0_wan_ish: MUST specify whether the transport protocol is a **routable protocol**. If set to TRUE, this is a routable protocol. If set to FALSE, this is not a routable protocol.

2.2.5.9 WKSTA_USER_INFO_0

The **WKSTA_USER_INFO_0** structure contains the name of a user who is currently active on the computer.

```
typedef struct _WKSTA_USER_INFO_0 {
    [string] wchar_t* wkui0_username;
} WKSTA_USER_INFO_0,
*PWKSTA_USER_INFO_0,
*LPWKSTA_USER_INFO_0;
```

wkui0_username: Null-terminated name of a user<7> who is currently active on the computer. Multiple users can be currently active on a computer; this MUST be the name of any such user.

2.2.5.10 WKSTA_USER_INFO_1

The **WKSTA_USER_INFO_1** structure contains user information as it pertains to a specific computer.

```
typedef struct _WKSTA_USER_INFO_1 {
    [string] wchar_t* wkui1_username;
    [string] wchar_t* wkui1_logon_domain;
    [string] wchar_t* wkui1_oth_domains;
    [string] wchar_t* wkui1_logon_server;
} WKSTA_USER_INFO_1,
*PWKSTA_USER_INFO_1,
*LPWKSTA_USER_INFO_1;
```

wkui1_username: MUST specify a null-terminated name of a user who is currently active on the computer.

wkui1_logon_domain: MUST specify a null-terminated name of the domain to which the user belongs.

wkui1_oth_domains: MUST specify null-terminated, NetBIOS names of other domains browsed by the computer, according to the [OtherDomains Name Abstract Data Model \(section 3.2.1.3\)](#).

wkui1_logon_server: MUST specify a null-terminated, NetBIOS name of the server that authenticated the user.

2.2.5.11 STAT_WORKSTATION_0

The **STAT_WORKSTATION_0** structure contains statistical information about the SMB network redirector.

```
typedef struct _STAT_WORKSTATION_0 {
    LARGE_INTEGER StatisticsStartTime;
    LARGE_INTEGER BytesReceived;
    LARGE_INTEGER SmbReceived;
    LARGE_INTEGER PagingReadBytesRequested;
    LARGE_INTEGER NonPagingReadBytesRequested;
    LARGE_INTEGER CacheReadBytesRequested;
    LARGE_INTEGER NetworkReadBytesRequested;
    LARGE_INTEGER BytesTransmitted;
    LARGE_INTEGER SmbTransmitted;
    LARGE_INTEGER PagingWriteBytesRequested;
    LARGE_INTEGER NonPagingWriteBytesRequested;
    LARGE_INTEGER CacheWriteBytesRequested;
    LARGE_INTEGER NetworkWriteBytesRequested;
    unsigned long InitiallyFailedOperations;
    unsigned long FailedCompletionOperations;
    unsigned long ReadOperations;
    unsigned long RandomReadOperations;
    unsigned long ReadSmb;
    unsigned long LargeReadSmb;
    unsigned long SmallReadSmb;
    unsigned long WriteOperations;
    unsigned long RandomWriteOperations;
    unsigned long WriteSmb;
    unsigned long LargeWriteSmb;
    unsigned long SmallWriteSmb;
    unsigned long RawReadsDenied;
    unsigned long RawWritesDenied;
    unsigned long NetworkErrors;
    unsigned long Sessions;
    unsigned long FailedSessions;
    unsigned long Reconnects;
    unsigned long CoreConnects;
    unsigned long Lanman20Connects;
    unsigned long Lanman21Connects;
    unsigned long LanmanNtConnects;
    unsigned long ServerDisconnects;
    unsigned long HungSessions;
    unsigned long UseCount;
    unsigned long FailedUseCount;
    unsigned long CurrentCommands;
} STAT_WORKSTATION_0,
*PSTAT_WORKSTATION_0,
*LPSTAT_WORKSTATION_0;
```

StatisticsStartTime: The time that statistics collection started. The value MUST be stored as the number of seconds elapsed since 00:00:00, January 1, 1970 GMT.

BytesReceived: The total number of bytes the SMB network redirector has received.

SmbReceived: The total number of SMB messages that the SMB network redirector has received.

PagingReadBytesRequested: If applicable to the server, it is a server implementation-specific value (section [3.2.4.7](#)). Otherwise, it MUST be set to zero.

NonPagingReadBytesRequested: If applicable to the server, it is a server implementation-specific value (section [3.2.4.7](#)). Otherwise, it MUST be set to zero.

CacheReadBytesRequested: If applicable to the server, it is a server implementation-specific value (section [3.2.4.7](#)). Otherwise, it MUST be set to zero.

NetworkReadBytesRequested: If applicable to the server, it is a server implementation-specific value (section [3.2.4.7](#)). Otherwise, it MUST be set to zero.

BytesTransmitted: The total number of bytes that the SMB network redirector has transmitted.

SmbTransmitted: The total number of SMB messages that the SMB network redirector has transmitted.

PagingWriteBytesRequested: If applicable to the server, it is a server implementation-specific value (section [3.2.4.7](#)). Otherwise, it MUST be set to zero.

NonPagingWriteBytesRequested: If applicable to the server, it is a server implementation-specific value (section [3.2.4.7](#)). Otherwise, it MUST be set to zero.

CacheWriteBytesRequested: If applicable to the server, it is a server implementation-specific value (section [3.2.4.7](#)). Otherwise, it MUST be set to zero.

NetworkWriteBytesRequested: If applicable to the server, it is a server implementation-specific value (section [3.2.4.7](#)). Otherwise, it MUST be set to zero.

InitiallyFailedOperations: The total number of network operations that have failed to start.

FailedCompletionOperations: The total number of network operations that have failed to complete.

ReadOperations: The total number of read operations that the SMB network redirector has initiated.

RandomReadOperations: If applicable to the server, it is a server implementation-specific value (section [3.2.4.7](#)). Otherwise, it MUST be set to zero.

ReadSmb: The total number of read requests that the SMB network redirector has sent to remote computers.

LargeReadSmb: The total number of read requests greater than twice the size of the remote computer's negotiated buffer size that the SMB network redirector has sent to remote computers.

SmallReadSmb: The total number of read requests that are less than one-quarter the size of the remote computer's negotiated buffer size that the SMB network redirector has sent to remote computers.

WriteOperations: The total number of write operations that the SMB network redirector has initiated.

RandomWriteOperations: If applicable to the server, it is a server implementation-specific value (section [3.2.4.7](#)). Otherwise, it MUST be set to zero.

WriteSmb: The total number of write requests that the SMB network redirector has sent to remote computers.

LargeWriteSmb: The total number of write requests that are greater than twice the size of the remote computer's negotiated buffer size and that the SMB network redirector has sent to remote computers.

SmallWriteSmb: The total number of write requests that are less than one-quarter the size of the remote computer's negotiated buffer size and that the SMB network redirector has sent to remote computers, as specified in [\[MS-CIFS\]](#), section [3.2.4.15](#).

RawReadsDenied: The total number of raw read requests made by the SMB network redirector that have been denied by the remote computer. This field MAY [<8>](#) be ignored.

RawWritesDenied: The total number of raw write requests made by the SMB network redirector that have been denied by the remote computer. This field MAY [<9>](#) be ignored.

NetworkErrors: The total number of network errors that the SMB network redirector has received.

Sessions: The total number of remote SMB sessions that the SMB network redirector has established.

FailedSessions: The number of times that the SMB network redirector has attempted to create an SMB session but failed.

Reconnects: The total number of SMB connections that have failed.

CoreConnects: The total number of SMB connections to remote computers supporting the PCNET1 dialect that have succeeded ([\[MS-CIFS\]](#), section [3.2.4.2.2](#)).

Lanman20Connects: The total number of SMB connections that have succeeded to remote computers supporting the LM1.2X002 dialect ([\[MS-CIFS\]](#), section [3.2.4.2.2](#)).

Lanman21Connects: The total number of SMB connections that have succeeded to remote computers supporting the LANMAN2.1 dialect ([\[MS-CIFS\]](#), section [3.2.4.2.2](#)).

LanmanNtConnects: The total number of SMB connections that have succeeded to remote computers supporting the NTLANMAN dialect ([\[MS-CIFS\]](#), section [3.2.4.2.2](#)).

ServerDisconnects: The number of times that a remote computer has disconnected the SMB network redirector.

HungSessions: The total number of SMB sessions that have timed out due to lack of response from the remote computer.

UseCount: The total number of SMB connections that the SMB network redirector has established.

FailedUseCount: The total number of failed SMB connections for the SMB network redirector.

CurrentCommands: The number of current requests that the SMB network redirector has completed.

2.2.5.12 WKSTA_USER_INFO_0_CONTAINER

The **WKSTA_USER_INFO_0_CONTAINER** structure contains a value that indicates the number of entries that the [NetrWkstaUserEnum](#) method returns, as well as a pointer to the buffer.

```

typedef struct _WKSTA_USER_INFO_0_CONTAINER {
    unsigned long EntriesRead;
    [size_is(EntriesRead)] LPWKSTA_USER_INFO_0 Buffer;
} WKSTA_USER_INFO_0_CONTAINER,
*PWKSTA_USER_INFO_0_CONTAINER,
*LPWKSTA_USER_INFO_0_CONTAINER;

```

EntriesRead: MUST be the number of entries that the method returned.

Buffer: MUST specify the names of the user accounts logged on to the remote computer.

2.2.5.13 WKSTA_USER_INFO_1_CONTAINER

The **WKSTA_USER_INFO_1_CONTAINER** structure contains a value that indicates the number of entries that the [NetrWkstaUserEnum](#) method returns, as well as a pointer to the buffer.

```

typedef struct _WKSTA_USER_INFO_1_CONTAINER {
    unsigned long EntriesRead;
    [size_is(EntriesRead)] LPWKSTA_USER_INFO_1 Buffer;
} WKSTA_USER_INFO_1_CONTAINER,
*PWKSTA_USER_INFO_1_CONTAINER,
*LPWKSTA_USER_INFO_1_CONTAINER;

```

EntriesRead: MUST be the number of entries that the method returned.

Buffer: MUST specify information about the user accounts logged on to the remote computer.

2.2.5.14 WKSTA_USER_ENUM_STRUCT

The **WKSTA_USER_ENUM_STRUCT** structure is used by the [NetrWkstaUserEnum](#) method to encapsulate the **_WKSTA_USER_ENUM_UNION** union.

```

typedef struct _WKSTA_USER_ENUM_STRUCT {
    unsigned long Level;
    [switch_is(Level)] union _WKSTA_USER_ENUM_UNION {
        [case(0)]
            LPWKSTA_USER_INFO_0_CONTAINER Level0;
        [case(1)]
            LPWKSTA_USER_INFO_1_CONTAINER Level1;
        [default]
            ;
    } WkstaUserInfo;
} WKSTA_USER_ENUM_STRUCT,
*PWKSTA_USER_ENUM_STRUCT,
*LPWKSTA_USER_ENUM_STRUCT;

```

Level: Specifies the information level of the data and, in turn, determines the type of structure that the method returns. MUST be one of the following values.

Value	Meaning
0x00000000	Specifies the WKSTA_USER_INFO_0_CONTAINER type.

Value	Meaning
0x00000001	Specifies the WKSTA_USER_INFO_1_CONTAINER type.

WkstaUserInfo: Contains a **WKSTA_USER_INFO_0_CONTAINER** or a **WKSTA_USER_INFO_1_CONTAINER** structure as specified by the Level member.

2.2.5.15 WKSTA_TRANSPORT_INFO_0_CONTAINER

The **WKSTA_TRANSPORT_INFO_0_CONTAINER** structure is used by the [NetrWkstaTransportEnum](#) method. This structure holds a value that specifies the number of entries and a pointer to the base structure type [WKSTA_TRANSPORT_INFO_0](#) returned by the method.

```
typedef struct _WKSTA_TRANSPORT_INFO_0_CONTAINER {
    unsigned long EntriesRead;
    [size_is(EntriesRead)] LPWKSTA_TRANSPORT_INFO_0 Buffer;
} WKSTA_TRANSPORT_INFO_0_CONTAINER,
*PWKSTA_TRANSPORT_INFO_0_CONTAINER,
*LPWKSTA_TRANSPORT_INFO_0_CONTAINER;
```

EntriesRead: Number of entries that the method call returned.

Buffer: Pointer to the array of **WKSTA_TRANSPORT_INFO_0** structures that hold information about transport protocols.

2.2.5.16 WKSTA_TRANSPORT_ENUM_STRUCT

The **WKSTA_TRANSPORT_ENUM_STRUCT** structure is used by the [NetrWkstaTransportEnum](#) method. The *Level* parameter in the submitted structure determines the information level of the data that the method returns.

```
typedef struct _WKSTA_TRANSPORT_ENUM_STRUCT {
    unsigned long Level;
    [switch_is(Level)] union WKSTA_TRANSPORT_ENUM_UNION {
        [case(0)]
            LPWKSTA_TRANSPORT_INFO_0_CONTAINER Level0;
        [default]
            ;
    } WkstaTransportInfo;
} WKSTA_TRANSPORT_ENUM_STRUCT,
*PWKSTA_TRANSPORT_ENUM_STRUCT,
*LPWKSTA_TRANSPORT_ENUM_STRUCT;
```

Level: Value that specifies the data's information level.

Note MUST be set to zero.

WkstaTransportInfo: Contains a pointer to a [WKSTA_TRANSPORT_INFO_0_CONTAINER](#) structure.

2.2.5.17 JOINPR_USER_PASSWORD

The **JOINPR_USER_PASSWORD** structure represents a decrypted password in the **Buffer** member of a [JOINPR_ENCRYPTED_USER_PASSWORD](#) structure.

```
typedef struct _JOINPR_USER_PASSWORD {
    unsigned char Obfuscator[JOIN_OBFUSCATOR_LENGTH];
    wchar_t Buffer[JOIN_MAX_PASSWORD_LENGTH];
    unsigned long Length;
} JOINPR_USER_PASSWORD,
*PJOINPR_USER_PASSWORD;
```

Obfuscator: An array of unsigned characters that contains a salt, which **MUST** be filled with random bytes by the caller.

Buffer: A cleartext string of no more than `JOIN_MAX_PASSWORD_LENGTH` (section [2.2.1.1](#)) **UTF-16** characters in **little-endian** order. The start of the string **MUST** be **Length** number of bytes from the end of the buffer. The unused portion of the buffer contains indeterminate values.

Length: An unsigned integer, in little-endian order, that specifies the length in bytes of the cleartext string in the **Buffer** member.

2.2.5.18 JOINPR_ENCRYPTED_USER_PASSWORD

The **JOINPR_ENCRYPTED_USER_PASSWORD** structure is the container for a password during the encoding, encryption, decryption and decoding process.

```
typedef struct _JOINPR_ENCRYPTED_USER_PASSWORD {
    unsigned char Buffer[JOIN_OBFUSCATOR_LENGTH + (JOIN_MAX_PASSWORD_LENGTH * sizeof(wchar_t))
+ sizeof(unsigned long)];
} JOINPR_ENCRYPTED_USER_PASSWORD,
*PJOINPR_ENCRYPTED_USER_PASSWORD;
```

Buffer: An array of bytes that contains a [JOINPR_USER_PASSWORD \(section 2.2.5.17\)](#) structure.

The sections that follow specify the encoding, encryption, decryption, and decoding of a password. (Encoding and encryption are performed by the client, but their explanations are included for completeness and to facilitate the reader's understanding of server message processing.) The server decrypts and decodes a **Buffer** structure to extract the cleartext password.

The encoding, encryption, decryption, and decoding of a password requires the following steps:

1. Encoding the cleartext password (section [2.2.5.18.1](#)).
2. Initializing **JOINPR_USER_PASSWORD** with the result of step 1 (section [2.2.5.18.2](#)).

3. Initializing **JOINPR_ENCRYPTED_USER_PASSWORD.Buffer** with the encrypted result of step 2, and subsequently decrypting **JOINPR_ENCRYPTED_USER_PASSWORD.Buffer** (section [2.2.5.18.3](#)).
4. Decoding the result of step 3, as a **JOINPR_USER_PASSWORD** structure, to recover the cleartext password (section [2.2.5.18.4](#)).

2.2.5.18.1 Password Encoding

The implementer **MUST** use the following algorithm to encode the password. However, the implementer **MAY** use alternate data structures as long as the resulting value is the same.

First, the cleartext password represented as a Unicode string in little-endian format is encoded using the following sequence:

PasswordLength: The number of characters in the cleartext password.

EncodedPassword: A buffer of length $((\textit{PasswordLength} + 2) * 2)$ bytes.

Seed: A single byte.

The buffer *EncodedPassword* **MUST** be initialized such that every bit is zero.

Seed **MUST** be equal to a nonzero value of 8 bits chosen at random.

Copy the cleartext password into the buffer *EncodedPassword* beginning at the third byte (zero-based index of 2).

The third byte (zero-based index 2) of the buffer *EncodedPassword* **MUST** be set to the bitwise XOR of the existing third byte and the bitwise OR value of *Seed* combined with 0x43.

For each subsequent byte *I*, beginning at index 3, it **MUST** be set equal to the result of *EncodedPassword*[*I*] combined using bitwise XOR with the result of a bitwise XOR operation of *EncodedPassword*[*I*-1] with the value of *Seed*. This operation **MUST** be completed for all subsequent bytes except the last two bytes of *EncodedPassword*.

The first byte of the buffer *EncodedPassword* **MUST** be equal to the value of *Seed*.

The second byte of the buffer *EncodedPassword* **MUST** be equal to 0.

The following is an example of the preceding algorithm:

- *PasswordLength* is the number of characters in the cleartext password.
- *EncodedPassword* is a zero-initialized buffer of $((\textit{PasswordLength} + 2) * 2)$ bytes.
- The *Seed* is set to a nonzero value chosen at random, 0xAB in this example.
- Copy the cleartext password (which is a Unicode string in little-endian format) into *EncodedPassword* beginning at the third byte (zero-based index of 2). In this example, the cleartext password is "PASSWORD".

Then the buffer, *EncodedPassword*, interpreted as an array of double byte characters, or `wchar_t`, could be represented graphically as:

0	1	2	3	4	5	6	7	8	9
0	P	A	S	S	W	O	R	D	0

Figure 3: EncodedPassword characters

Then the buffer, *EncodedPassword*, interpreted as an array of bytes, where each element is depicted as a hexadecimal 8-bit value, could be represented graphically as:

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9
0x00	0x00	0x50	0x00	0x41	0x00	0x53	0x00	0x53	0x00	0x57	0x00	0x4F	0x00	0x52	0x00	0x44	0x00	0x00	0x00

Figure 4: EncodedPassword buffer

The third byte is set as follows.

$EncodedPassword[2] = EncodedPassword[2] \text{ XOR } (Seed \text{ OR } 0x43)$

Subsequent bytes, except for the last two, are set as follows:

$EncodedPassword[I] = EncodedPassword[I] \text{ XOR } (EncodedPassword[I-1] \text{ XOR } Seed)$

In this way, the caller communicates the *Seed* necessary for decoding Buffer at the server during message processing.

Each iteration of the encoding algorithm applied to the encoding buffer follows.

```

00 00 50 00 41 00 53 00 53 00 57 00 4F 00 52 00 44 00 00 00
00 00 BB 00 41 00 53 00 53 00 57 00 4F 00 52 00 44 00 00 00
00 00 BB 10 41 00 53 00 53 00 57 00 4F 00 52 00 44 00 00 00
00 00 BB 10 FA 00 53 00 53 00 57 00 4F 00 52 00 44 00 00 00
00 00 BB 10 FA 51 53 00 53 00 57 00 4F 00 52 00 44 00 00 00
00 00 BB 10 FA 51 A9 00 53 00 57 00 4F 00 52 00 44 00 00 00
00 00 BB 10 FA 51 A9 02 53 00 57 00 4F 00 52 00 44 00 00 00
00 00 BB 10 FA 51 A9 02 FA 00 57 00 4F 00 52 00 44 00 00 00
00 00 BB 10 FA 51 A9 02 FA 51 57 00 4F 00 52 00 44 00 00 00
00 00 BB 10 FA 51 A9 02 FA 51 AD 00 4F 00 52 00 44 00 00 00
00 00 BB 10 FA 51 A9 02 FA 51 AD 06 4F 00 52 00 44 00 00 00
00 00 BB 10 FA 51 A9 02 FA 51 AD 06 E2 00 52 00 44 00 00 00
00 00 BB 10 FA 51 A9 02 FA 51 AD 06 E2 49 52 00 44 00 00 00
00 00 BB 10 FA 51 A9 02 FA 51 AD 06 E2 49 B0 00 44 00 00 00
00 00 BB 10 FA 51 A9 02 FA 51 AD 06 E2 49 B0 1B 44 00 00 00
00 00 BB 10 FA 51 A9 02 FA 51 AD 06 E2 49 B0 1B f4 00 00 00
00 00 BB 10 FA 51 A9 02 FA 51 AD 06 E2 49 B0 1B f4 5F 00 00

```

Finally set the first byte equal to the *Seed* and the second byte to 0.

```
AB 00 BB 10 FA 51 A9 02 FA 51 AD 06 E2 49 B0 1B F4 5F 00 00
```

The encoding is complete. The example buffer would look like the following:

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9
0x AB	0x 00	0x BB	0x 10	0x FA	0x 51	0x A9	0x 02	0x FA	0x 51	0x AD	0x 06	0x E2	0x 49	0x B0	0x 1B	0x F4	0x 5F	0x 00	0x 00

Figure 5: EncodedPassword complete

2.2.5.18.2 Initializing JOINPR_USER_PASSWORD

An *EncodedPassword* is packed into the [JOINPR_USER_PASSWORD \(section 2.2.5.17\)](#) structure as follows:

- **JOINPR_USER_PASSWORD.Obfuscator** is initialized with [JOIN_OBFUSCATOR_LENGTH \(section 2.2.1.2\)](#) bytes of random data.
- **JOINPR_USER_PASSWORD.Buffer** is initialized with the value of *EncodedPassword*. The start of the string *EncodedPassword* MUST be **JOIN_USER_PASSWORD.Length** bytes from the end of the buffer. Any remaining bits MUST be initialized with random data.
- **JOINPR_USER_PASSWORD.Length** is initialized with the number of bytes in *EncodedPassword*.

2.2.5.18.3 Encryption and Decryption

The algorithm that encrypts [JOINPR_USER_PASSWORD \(section 2.2.5.17\)](#), beginning at **JOINPR_USER_PASSWORD.Buffer** and including **JOINPR_USER_PASSWORD.Length**, is specified by the following pseudocode. **JOINPR_USER_PASSWORD.Obfuscator** MUST NOT be encrypted, because it salts the shared secret session key used for encryption and decryption.

```
CALL MD5Init(md5context)
CALL MD5Update(md5context, user-session-key, 16)
CALL MD5Update(md5context, JOINPR_USER_PASSWORD.Obfuscator, 8)
CALL MD5Final(md5context)
CALL rc4_key(rc4key, 16, md5context.digest)
CALL rc4(rc4key, 516, encrypted-buffer)
```

The **Buffer** member of [JOINPR_ENCRYPTED_USER_PASSWORD \(section 2.2.5.18\)](#) is initialized with the encrypted **JOINPR_USER_PASSWORD**.

The symbolic elements of the pseudocode are defined as follows:

- **MD5Init**, **MD5Update**, and **MD5Final** are predicates/functions [\[RFC1321\]](#).
- *md5Context* is a variable of type **MD5_CTX** [\[RFC1321\]](#).
- **rc4_key** and **rc4** are functions/predicates [SCHNEIER].
- *rc4key* is a variable of type **RC4_KEYSTRUCT** [SCHNEIER].
- *encrypted-buffer* is the size of **JOINPR_USER_PASSWORD.Buffer** and **JOINPR_USER_PASSWORD.Length**, which is (([JOIN_MAX_PASSWORD_LENGTH \(section 2.2.1.1\)](#)) * sizeof(wchar_t)) + sizeof(unsigned long)) bytes.

- *user-session-key* is a 16-byte value obtained from the 16-byte SMB session key, as specified in [\[MS-SMB\] Per SMB Session \(section 3.2.1.3\)](#).

2.2.5.18.4 Password Decoding

Decrypt the encrypted portion of the structure [JOINPR_USER_PASSWORD \(section 2.2.5.17\)](#).

The implementer **MUST** use the following algorithm to decode the password. However, the implementer **MAY** use alternate data structures, so long as the result is the same.

The cleartext password represented as a Unicode string is decoded using the following sequence:

PasswordLength: The number of characters in the cleartext password.

EncodedPassword: A buffer of length **JOINPR_USER_PASSWORD.Length** bytes.

Seed: A single byte.

I: An unsigned integer used to index the bytes of the buffer *EncodedPassword*.

The buffer *EncodedPassword* **MUST** be initialized such that every bit is zero.

PasswordLength **MUST** be equal to $(\text{JOINPR_USER_PASSWORD.Length} / 2) - 1$.

EncodedPassword **MUST** be equal to the last **JOINPR_USER_PASSWORD.Length** bytes of **JOINPR_USER_PASSWORD.Buffer**.

Seed **MUST** be equal to the first byte of *EncodedPassword*.

I **MUST** be **JOINPR_USER_PASSWORD.Length** - 1.

For the initial value of *I* and all preceding values of $I > 1$, *EncodedPassword*[*I*-1] **MUST** be the result of *EncodedPassword*[*I*-1] combined using a bitwise **XOR** operator with the result of a bitwise **XOR** operation of *EncodedPassword*[*I*-2] with the value of *Seed*.

EncodedPassword[0] **MUST** be the result of 0x43 combined using a bitwise **XOR** operator with the value of *Seed*.

Then the buffer beginning at *EncodedPassword*[2], interpreted as an array of double byte characters, or `wchar_t`, is the cleartext password.

2.2.5.19 UNICODE_STRING

The **UNICODE_STRING** structure specifies a Unicode string.

```
typedef struct _UNICODE_STRING {
    unsigned short Length;
    unsigned short MaximumLength;
    [size_is(MaximumLength / 2), length_is((Length) / 2)]
    unsigned short* Buffer;
} UNICODE_STRING,
*PUNICODE_STRING;
```

Length: The length, in bytes, of the string pointed to by the **Buffer** member, not including the terminating null character, if any. This value **MUST** be a multiple of 2.

MaximumLength: The total size, in bytes, of the **Buffer**. If this value is not a multiple of 2, the server **MUST** decrement this value by 1. This value **MUST NOT** be less than **Length**.

Buffer: The Unicode **UTF-8** string. If the **MaximumLength** value is greater than zero, this field **MUST** contain a non-null character. **Buffer** can contain a terminating null character.

2.2.5.20 NET_COMPUTER_NAME_ARRAY

The **NET_COMPUTER_NAME_ARRAY** structure specifies the number of names associated with a computer and a buffer containing the names.

```
typedef struct _NET_COMPUTER_NAME_ARRAY {
    unsigned long EntryCount;
    [size_is(EntryCount)] PUNICODE_STRING ComputerNames;
} NET_COMPUTER_NAME_ARRAY,
*PNET_COMPUTER_NAME_ARRAY;
```

EntryCount: **MUST** be the number of entries that the method call returns.

ComputerNames: **MUST** specify the names as an array of **UNICODE STRINGS** that are associated with a machine.

2.3 Directory Service Schema Elements

The Workstation Service Remote Protocol (WKSSVC) accesses the **directory service (DS) schema** classes and attributes that are listed in the following table. For the syntactic specifications of the <Class> or <Class> <Attribute> pairs, refer to [\[MS-ADSC\]](#), [\[MS-ADA1\]](#), [\[MS-ADA2\]](#), and [\[MS-ADA3\]](#).

Class	Attribute
computer	dNSHostName msDS-AdditionalDnsHostName displayName objectClass
securityPrincipal	sAMAccountName displayName objectClass
user	servicePrincipalName unicodePwd userAccountControl displayName objectClass
organizationalUnit	All

3 Protocol Details

The methods comprising this RPC interface MUST all return 0x00000000 on success, and a non-zero, implementation-specific error code on failure. Unless otherwise specified in the following sections, a server-side implementation of this protocol can choose any non-zero Win32 error value to signify an error condition, as discussed in section [1.8](#). The client side of the Workstation Service Remote Protocol MUST NOT interpret returned error codes. The **client side** of the protocol MUST simply return error codes to the invoking application without taking any protocol action.

Note that the terms client side and server side refer to the initiating and receiving ends of the protocol, respectively, rather than to client or server versions of an operating system. These methods MUST all behave the same regardless of whether the server side of the protocol is running in a client or server version of an operating system.

3.1 wkssvc Client Details

3.1.1 Abstract Data Model

No abstract data model is required.

3.1.2 Timers

No protocol timers are required beyond those used internally by the RPC to implement resiliency to network outages, as specified in [\[MS-RPCE\]](#).

3.1.3 Initialization

The client MUST create an RPC connection to the remote computer, using the details specified in section [2.1](#).

3.1.4 Message Processing Events and Sequencing Rules

No sequence of method calls is imposed on this protocol.

When a method completes, the values that the RPC returns MUST be returned unmodified to the upper layer.

The client MUST ignore errors that the RPC server returns and notify the application invoker of the error received in the higher layer. Otherwise, no special message processing is required on the client beyond the processing required in the underlying RPC protocol.

3.1.5 Timer Events

There are no timer events.

3.1.6 Other Local Events

There are no local events.

3.2 wkssvc Server Details

3.2.1 Abstract Data Model

This section describes a conceptual model of possible data organization that an implementation maintains to participate in this protocol. The described organization is provided to facilitate the explanation of how the protocol behaves. This specification does not mandate that implementations adhere to this model as long as their external behavior is consistent with that described in this specification.

A server implementing this RPC interface contains several logical elements: an SMB network redirector, one or more network protocol transports, a list of users (and associated domain information) who are using the server, and names that identify the server on the network.

One or more network protocol transports are associated with an SMB network redirector. A transport is a protocol that is logically the layer below the redirector and provides reliable delivery of redirector messages.

Transports can be dynamically enabled and disabled from a redirector. A transport **MUST** be enabled for a redirector before the redirector can transmit messages through the transport. A transport has an implementation-specific name; transport names are unique on a per-computer basis.

Users are logical entities that make use of a computer. A server maintains a list of users who are currently active on it. This is referred to as the "user list". Users can be logical members of a domain; in that case, associated with each logical user is the domain of which the user is a member.

The server data model is defined as follows:

DormantFileLimit: The maximum number of file or printer handles the SMB network redirector can hold open after the application has closed its handle.

Keep_Connection: The number of seconds the SMB connection keeps active.

Max_Commands: The number of simultaneous network commands that can be sent to the SMB network redirector.

Platform_Id: The type of operating system running on the computer.

Session_TimeOut: The number of seconds that the server waits before disconnecting an inactive session.

Ver_Major: The major version number of the operating system running on the computer.

Ver_Minor: The minor version number of the operating system running on the computer.

3.2.1.1 Access Control Abstract Data Model

Access Rights: The access rights defined by this protocol are specified by the bit settings in the following table.

Name	Value	Informative Summary
WKSTA_NETAPI_CHANGE_CONFIG	0x1	Granted to security principals that are allowed to make changes to the state of the server during message processing. For example, members of the Administrators group are granted this access right.

Name	Value	Informative Summary
WKSTA_NETAPI_QUERY	0x2	Granted to security principals that are allowed to query the state of the server during message processing. For example, authenticated users are granted this access right.

NetSecurityDescriptor: A **security descriptor** that is used for the verification of access security during message processing. If present, this security descriptor MUST NOT be changed. Its value can be expressed as follows in [Security Descriptor Description Language \(SDDL\)](#) ([MS-DTYP] section 2.5.1).<10>

```
O:NSG:NSD:(A;;;%x3;;;SY)(A;;;%x3;;;BA)(A;;;%x2;;;AU)
```

The **rights** field in each **NetSecurityDescriptor** ACE string uses the values defined in **Access Rights**. The value of the **NetSecurityDescriptor** expresses the following information: this object is owned by the network service; this object has the network service as its primary group; local system and built-in administrator accounts are granted query and change rights to this object; authenticated users are granted query rights to this object.

Method Access Control Algorithm: During message processing, the server implementing this protocol performs access security verification on the caller's identity using the algorithm specified by the [Access Check Algorithm Pseudocode](#) ([MS-DTYP] section 2.5.3.2). For this protocol, the input parameters of that algorithm are mapped as follows:

- *SecurityDescriptor:* This MUST be the **NetSecurityDescriptor** specified previously in this section. If the security descriptor does not exist, the client is automatically granted access.
- *Token:* This MUST be the identity of the client, retrieved as specified in [\[MS-RPCE\]](#) section 3.3.3.4.3.
- *Access Request mask:* This is specified by each method's message processing logic and MUST be one or more of the **Access Rights** specified previously in this section.
- *Object Tree:* This parameter MUST be NULL.
- *PrincipalSelfSubst SID:* This parameter MUST be NULL.

3.2.1.2 Alternate Computer Name Abstract Data Model

alternate-computer-names: A list of tuples containing:

- **NetBIOS:** An alternate NetBIOS name of the computer.
- **FQDN:** An alternate Internet host name of the computer.

The list of **alternate-computer-names** MAY be empty.<11>

3.2.1.3 OtherDomains Name Abstract Data Model

OtherDomains: Specifies a list of NetBIOS names of domains browsed by the computer. Each name MUST be at most 15 characters in length and MUST NOT contain trailing spaces or NetBIOS suffix as defined in [\[MS-BRWS\]](#) section 2.1.1. The names in the OtherDomains list MUST be separated by spaces.

This element is shared with the Common Internet File System (CIFS) Browser Protocol [MS-BRWS] and the Common Internet File System (CIFS) Browser Auxiliary Protocol [MS-BRWSA] through the [WkstaQueryOtherDomains](#) event (section 3.2.6.1).

OtherDomainsInitialization: Contains the list of NetBIOS names of domains always to be browsed by the computer. This list SHOULD be empty. <12>

This element MUST be set locally by a principal with administrator privileges.

3.2.1.4 Transport Information Abstract Data Model

The server data model for transport information is defined as follows:

TransportList: A list of transports the workstation service is active on. Each transport MUST have the following properties:

Transport.Address: The address of the transport.

Transport.Name: The name of the transport.

Transport.VC_Count: The number of clients that are communicating with the server using this protocol.

Transport.Wannish: A Boolean value that indicates whether the transport is routable.

3.2.1.5 External Abstract Data Model Elements

DomainNameNetBIOS: the NetBIOS name of the domain that the machine is joined to, or the name of the workgroup; this ADM element is single-sourced with DomainName.NetBIOS in [MS-DISO] section 4.3.1.1.

DomainNameFQDN: the FQDN name of the domain that the machine is joined to; this ADM element is single-sourced with DomainName.FQDN in [MS-DISO] section 4.3.1.1.

DomainSid: the SID, as defined in [MS-DTYP] section 2.4.2, of the domain that the machine is joined to; this ADM element is single-sourced with DomainSid in [MS-DISO] section 4.3.1.1.

ComputerNameNetBIOS: the NetBIOS name of the machine; this ADM element is single-sourced with ComputerName.NetBIOS in [MS-DISO] section 4.3.1.1.

ComputerNameFQDN: the FQDN name of the machine; this ADM element is single-sourced with ComputerName.FQDN in [MS-DISO] section 4.3.1.1.

3.2.2 Timers

This protocol requires no timers.

3.2.3 Initialization

Section 2.1 specifies the parameters necessary to initialize the RPC protocol.

The server SHOULD initialize the **OtherDomains** abstract data model element based on the **OtherDomainsInitialization** element ([OtherDomains Name Abstract Data Model](#) section 3.2.1.3).

The server MUST enable advertising of the workstation service by invoking [MS-SRVS] section 3.1.6.12, passing SV_TYPE_WORKSTATION as the input parameter.

The initialization of the server data model (section [3.2.1](#)) is defined as follows:

DormantFileLimit: This element SHOULD be set to an implementation-defined value. [<13>](#)

Keep_Connection: This element SHOULD be set to an implementation-defined value. [<14>](#)

Max_Commands: This element SHOULD be set to an implementation-defined value. [<15>](#)

Platform_Id: This element SHOULD be set to an implementation-defined value. [<16>](#)

Session_TimeOut: This element SHOULD be set to an implementation-defined value. [<17>](#)

Ver_Major: This element SHOULD be set to an implementation-defined value. [<18>](#)

Ver_Minor: This element SHOULD be set to an implementation-defined value. [<19>](#)

The server SHOULD initialize the **TransportList** abstract data model element based on the list of network interfaces on the system. The initialization of the transport information model (section [3.2.1.4](#)) is defined as follows:

Transport.Address: This element SHOULD be set to an implementation-defined value. [<20>](#)

Transport.Name: This element SHOULD be set to an implementation-defined value. [<21>](#)

Transport.VC_Count: This element SHOULD be set to an implementation-defined value. [<22>](#)

Transport.Wannish: This element SHOULD be set to an implementation-defined value. [<23>](#)

3.2.4 Message Processing Events and Sequencing Rules

This protocol requires the following:

- The RPC runtime MUST perform a strict **network data representation (NDR)** data consistency check at target level 6.0, as specified in [\[MS-RPCE\]](#) section 3.1.1.5.3.3.
- The RPC runtime MUST reject a NULL unique or full pointer with a nonzero conformant value, as specified in [\[MS-RPCE\]](#) section 3.1.1.5.3.3.1.2.

Methods that accept any of the following types of handles as parameters MUST return an implementation specific error to the caller, if the impersonation level for the RPC connection that refers to the handle is not set to **SECURITY_IDENTIFICATION** ([\[MS-RPCE\]](#) section 2.2.1.1.10):

- [WKSSVC IDENTIFY HANDLE \(section 2.2.2.1\)](#)
- [WKSSVC IMPERSONATE HANDLE \(section 2.2.2.2\)](#)
- [handle_t \(section 2.2.2.3\)](#)

The server SHOULD [<24>](#) enforce security measures to verify that the caller has the required permissions to execute the methods in this protocol. For information on how to determine the identity of the caller for the purpose of performing an access check, see [\[MS-RPCE\]](#) section 3.3.3.1.4.

The following methods make up the **wkssvc** interface.

Methods in RPC Opnum Order

Method	Description
<u>NetrWkstaGetInfo</u>	Returns information about the configuration of a workstation. Opnum: 0
<u>NetrWkstaSetInfo</u>	Configures the permanent settings for a workstation. Opnum: 1
<u>NetrWkstaUserEnum</u>	Lists information about all users currently logged on to a workstation. Opnum: 2
Opnum3NotUsedOnWire	Reserved for local use. Opnum: 3
Opnum4NotUsedOnWire	Reserved for local use. Opnum: 4
<u>NetrWkstaTransportEnum</u>	Returns information about the settings of the network redirector. Opnum: 5
<u>NetrWkstaTransportAdd</u>	Binds the transport to the network redirector. Opnum: 6
<u>NetrWkstaTransportDel</u>	Unbinds the transport from the network redirector. Opnum: 7
Opnum8NotUsedOnWire	Reserved for local use. Opnum: 8
Opnum9NotUsedOnWire	Reserved for local use. Opnum: 9
Opnum10NotUsedOnWire	Reserved for local use. Opnum: 10
Opnum11NotUsedOnWire	Reserved for local use. Opnum: 11
Opnum12NotUsedOnWire	Reserved for local use. Opnum: 12
<u>NetrWorkstationStatisticsGet</u>	Retrieves workstation statistics. Opnum: 13
Opnum14NotUsedOnWire	Reserved for local use. Opnum: 14
Opnum15NotUsedOnWire	Reserved for local use. Opnum: 15
Opnum16NotUsedOnWire	Reserved for local use. Opnum: 16

Method	Description
Opnum17NotUsedOnWire	Reserved for local use. Opnum: 17
Opnum18NotUsedOnWire	Reserved for local use. Opnum: 18
Opnum19NotUsedOnWire	Reserved for local use. Opnum: 19
NetrGetJoinInformation	Retrieves join-status information for a specified computer. Opnum: 20
Opnum21NotUsedOnWire	Reserved for local use. Opnum: 21
NetrJoinDomain2	Uses encrypted credentials to join a computer to a workgroup or domain. Opnum: 22
NetrUnjoinDomain2	Uses encrypted credentials to unjoin a computer from a workgroup or domain. Opnum: 23
NetrRenameMachineInDomain2	Uses encrypted credentials to rename a computer in a domain. Opnum: 24
NetrValidateName2	Uses encrypted credentials to verify the validity of a computer, workgroup, or domain name. Opnum: 25
NetrGetJoinableOUs2	Uses encrypted credentials to retrieve a list of organizational units (OUs) for account creation. Opnum: 26
NetrAddAlternateComputerName	Adds an alternate name for a specified server. Opnum: 27
NetrRemoveAlternateComputerName	Removes an alternate name for a specified server. Opnum: 28
NetrSetPrimaryComputerName	Sets the primary computer name for a specified server. Opnum: 29
NetrEnumerateComputerNames	Returns a list of computer names for a specified server. Opnum: 30

In the preceding table, the term "Reserved for local use" means that the client MUST NOT send the **opnum**, and the server behavior is undefined [<25>](#) because it does not affect interoperability.

All methods MUST NOT throw exceptions.

Note All methods that establish SMB sessions in the course of message processing MUST close such sessions immediately prior to returning, by providing the server name and the security principal for each session that is being closed, as specified in [\[MS-SMB2\] Application Requests Terminating an Authenticated Context \(section 3.2.4.23\)](#), unless otherwise stated. All methods that establish SMB share connections in the course of message processing MUST close such share connections immediately prior to returning, by providing the server name, the share name, and each security principal that is requesting a share be closed, as specified in [\[MS-SMB2\] Application Requests Closing a Share Connection \(section 3.2.4.22\)](#), unless otherwise stated. <26>

3.2.4.1 NetrWkstaGetInfo (Opnum 0)

The **NetrWkstaGetInfo** method returns information about the configuration of a remote computer, including the computer name and major and minor version numbers of the operating system.

```
unsigned long NetrWkstaGetInfo(
    [in, string, unique] WKSSVC_IDENTIFY_HANDLE ServerName,
    [in] unsigned long Level,
    [out, switch_is(Level)] LPWKSTA_INFO WkstaInfo
);
```

ServerName: A [WKSSVC_IDENTIFY_HANDLE \(section 2.2.2.1\)](#) that identifies the server. The client MUST map this structure to an RPC binding handle ([\[C706\] sections 4.3.5 and 5.1.5.2](#)). The server MUST ignore this parameter.

Level: The information level of the data. This parameter MUST be one of the following values.

Value	Meaning
0x00000064	Information to be returned is of type WKSTA_INFO_100 structure (section 2.2.5.1) .
0x00000065	Information to be returned is of type WKSTA_INFO_101 structure (section 2.2.5.2) .
0x00000066	Information to be returned is of type WKSTA_INFO_102 structure (section 2.2.5.3) .
0x000001F6	Information to be returned is of type WKSTA_INFO_502 structure (section 2.2.5.4) .

WkstaInfo: A pointer to the buffer that receives the data. The format of this data depends on the value of the *level* parameter.

Return Values: When the message processing result meets the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\] section 2.2](#)).

Return value/code	Description
0x00000000 ERROR_SUCCESS	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	The caller does not have the permissions to perform the operation.

Return value/code	Description
0x0000007C ERROR_INVALID_LEVEL	The information level is invalid.

The response of the server depends on the value of the *Level* parameter. If the *Level* parameter is not equal to one of the valid values, then the server MUST fail the call and return **ERROR_INVALID_LEVEL**.

The server SHOULD [<27>](#) enforce security measures to verify that the caller has the required permissions to execute this routine. If the server enforces security measures, and the caller does not have the required credentials, then the server MUST fail the call and return **ERROR_ACCESS_DENIED**. For more details on how to determine the identity of the caller for the purpose of performing an access check, see [\[MS-RPCE\]](#) section 3.3.3.1.4.

If the *Level* parameter equals 0x00000064, then the server MUST fill in the **WkstaInfo100** member (**WKSTA_INFO_100** section 2.2.5.1) of the *WkstaInfo* parameter as follows:

- **wki100_computername** MUST be set to **ComputerNameNetBIOS**
- **wki100_langroup** MUST be set to **DomainNameFQDN**
- **wki100_platform_id** MUST be set to **Platform_Id** (section [3.2.1](#))
- **wki100_ver_major** MUST be set to **Ver_Major** (section [3.2.1](#))
- **wki100_ver_minor** MUST be set to **Ver_Minor** (section [3.2.1](#))

If the *Level* parameter equals 0x00000065, then the server MUST fill in the **WkstaInfo101** member (**WKSTA_INFO_101** section 2.2.5.2) of the *WkstaInfo* parameter as follows:

- **wki101_computername** MUST be set to **ComputerNameNetBIOS**
- **wki101_langroup** MUST be set to **DomainNameFQDN**
- **wki101_platform_id** MUST be set to **Platform_Id**
- **wki101_ver_major** MUST be set to **Ver_Major**
- **wki101_ver_minor** MUST be set to **Ver_Minor**
- **wki101_lanroot** MUST be set to NULL

If the *Level* parameter equals 0x00000066, then the server MUST fill in the **WkstaInfo102** member (**WKSTA_INFO_102** section 2.2.5.3) of the *WkstaInfo* parameter as follows:

- **wki102_computername** MUST be set to **ComputerNameNetBIOS**
- **wki102_langroup** MUST be set to **DomainNameFQDN**
- **wki102_platform_id** MUST be set to **Platform_Id**
- **wki102_ver_major** MUST be set to **Ver_Major**
- **wki102_ver_minor** MUST be set to **Ver_Minor**
- **wki102_lanroot** MUST be set to NULL

- **wki102_logged_on_users** MUST be set to the number of users who are currently active on the computer

If the *Level* parameter equals 0x000001F6, then the server MUST fill in the **WkstaInfo502** member (**WKSTA_INFO_502** section 2.2.5.4) of the *WkstaInfo* parameter as follows:

- **wki502_keep_conn** MUST be set to **Keep_Connection** (section 3.2.1)
- **wki502_max_cmds** MUST be set to **Max_Commands** (section 3.2.1)
- **wki502_sess_timeout** MUST be set to **Session_TimeOut** (section 3.2.1)
- **wki502_dormant_file_limit** SHOULD <28> be set to **DormantFileLimit** (section 3.2.1)

3.2.4.2 NetrWkstaSetInfo (Opnum 1)

The **NetrWkstaSetInfo** method configures a remote computer according to the information structure passed in the call.

```
unsigned long NetrWkstaSetInfo(
    [in, string, unique] WKSSVC_IDENTIFY_HANDLE ServerName,
    [in] unsigned long Level,
    [in, switch_is(Level)] LPWKSTA_INFO WkstaInfo,
    [in, out, unique] unsigned long* ErrorParameter
);
```

ServerName: A [WKSSVC_IDENTIFY_HANDLE \(section 2.2.2.1\)](#) that identifies the server. The client MUST map this structure to an RPC binding handle ([\[C706\]](#) sections 4.3.5 and 5.1.5.2). The server MUST ignore this parameter.

Level: The information level of the data. This parameter SHOULD be one of the following values.

Value	Meaning
0x000001F6	The <i>WkstaInfo</i> parameter points to a WKSTA_INFO_502 structure (section 2.2.5.4) that contains information about the computer environment.
0x000003F5	The <i>WkstaInfo</i> parameter points to a WKSTA_INFO_1013 structure (section 2.2.5.5) .
0x000003FA	The <i>WkstaInfo</i> parameter points to a WKSTA_INFO_1018 structure (section 2.2.5.6) .
0x00000416	The <i>WkstaInfo</i> parameter points to a WKSTA_INFO_1046 structure (section 2.2.5.7) .

WkstaInfo: A pointer to a buffer that specifies the data. The format of this data depends on the value of the *Level* parameter.

ErrorParameter: A pointer to a value that receives an unsigned 32-bit integer. This parameter is meaningful only if the method returns **ERROR_INVALID_PARAMETER** and *Level* is equal to one of the values specified in the preceding table.

The *ErrorParameter* value corresponds to the member of the [WKSTA_INFO \(section 2.2.4.1\)](#) structure, specified by the *WkstaInfo* parameter, which caused the **ERROR_INVALID_PARAMETER** error.

Return Values: When the message processing result meets the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x00000057 ERROR_INVALID_PARAMETER	One of the function parameters is not valid.

Any other return value MUST conform to the error code requirements specified in [Protocol Details \(section 3\)](#).

On receiving the **NetrWkstaSetInfo** method, if the *Level* parameter does not equal one of the valid values, then the server MUST fail the call as follows.

Note All value ranges are inclusive.

Invalid Level value	Failure processing
0x00000000--0x000001F5, 0x000001F7--0x000003F4, 0x000003F6--0x000003F9, 0x000003FB--0x00000415 0x00000417--0xFFFFFFFF	The server SHOULD return ERROR_INVALID_LEVEL .<29>

Otherwise, if the *Level* parameter equals 0x000001F6, then the server MUST store values from the **WkstaInfo502** member (**WKSTA_INFO_502** section 2.2.5.4) of the *WkstaInfo* parameter into elements of the abstract data model, as follows:

- **wki502_keep_conn** stored in **Keep_Connection** (section [3.2.1](#))
- **wki502_max_cmds** stored in **Max_Commands** (section [3.2.1](#))
- **wki502_sess_timeout** stored in **Session_TimeOut** (section [3.2.1](#))
- **wki502_dormant_file_limit** stored in **DormantFileLimit** (section [3.2.1](#))

If the *Level* parameter equals 0x000003F5, then the server MUST store values from the **WkstaInfo1013** member (**WKSTA_INFO_1013** section 2.2.5.5) of the *WkstaInfo* parameter into elements of the abstract data model, as follows:

- **wki1013_keep_conn** stored in **Keep_Connection**.

If the *Level* parameter equals 0x000003FA, then the server MUST store values from the **WkstaInfo1018** member (**WKSTA_INFO_1018** section 2.2.5.6) of the *WkstaInfo* parameter into elements of the abstract data model, as follows:

- **wki1018_sess_timeout** stored in **Session_TimeOut**.

If the *Level* parameter equals 0x00000416, then the server MUST store values from the **WkstaInfo1046** member (**WKSTA_INFO_1046** section 2.2.5.7) of the *WkstaInfo* parameter into elements of the abstract data model, as follows:

- **wki1046_dormant_file_limit** stored in **DormantFileLimit**.

The server MUST validate the values stored from members of **WKSTA_INFO** structures specified by the *WkstaInfo* parameter. If this validation fails, a value SHOULD be returned in the *ErrorParameter* parameter according to the following table.

For Level value 0x000001F6

Member	Valid Range	ErrorParameter Value Returned
wki502_char_wait	This field is not used. The sender SHOULD initialize it to any value between 0-65535. The receiver SHOULD ignore this field.<30>	0x0000000A
wki502_collection_time	This field is not used. The sender SHOULD initialize it to any value between 0-65535000. The receiver SHOULD ignore this field.<31>	0x0000000B
wki502_maximum_collection_count	This field is not used. The sender SHOULD initialize it to any value between 0-65535. The receiver SHOULD ignore this field.<32>	0x0000000C
wki502_keep_conn	1 - 65535	0x0000000D
wki502_max_cmds	50 - 65535	0x00000000
wki502_sess_timeout	60 - 65535	0x00000012
wki502_siz_char_buf	This field is not used. The sender SHOULD initialize it to any value between 64-4096. The receiver SHOULD ignore this field.<33>	0x00000017
wki502_max_threads	This field is not used. The sender SHOULD initialize it to any value between 1-256. The receiver SHOULD ignore this field.<34>	0x00000021
wki502_lock_quota	This field is not used. The sender SHOULD initialize it to any value between 0-0xFFFFFFFF. The receiver SHOULD ignore this field.<35>	0x00000029
wki502_lock_increment	This field is not used. The sender SHOULD initialize it to	0x0000002A

Member	Valid Range	ErrorParameter Value Returned
	any value between 0-0xFFFFFFFF. The receiver SHOULD ignore this field. <36>	
wki502_lock_maximum	This field is not used. The sender SHOULD initialize it to any value between 0-0xFFFFFFFF. The receiver SHOULD ignore this field. <37>	0x0000002B
wki502_pipe_increment	This field is not used. The sender SHOULD initialize it to any value between 0-0xFFFFFFFF. The receiver SHOULD ignore this field. <38>	0x0000002C
wki502_pipe_maximum	This field is not used. The sender SHOULD initialize it to any value between 0-0xFFFFFFFF. The receiver SHOULD ignore this field. <39>	0x0000002D
wki502_cache_file_timeout	0 - 0xFFFFFFFF	0x0000002F
wki502_dormant_file_limit	1 - 0xFFFFFFFF	0x0000002E
wki502_read_ahead_throughput	This field is not used. The sender SHOULD initialize it to any value between 0-0xFFFFFFFF. The receiver SHOULD ignore this field. <40>	0x0000003E
wki502_num_mailslot_buffers	This field is not used. The sender MAY initialize it to any value. The receiver SHOULD ignore this field. <41>	Not in use.
wki502_num_srv_announce_buffers	This field is not used. The sender MAY initialize it to any value. The receiver SHOULD ignore this field. <42>	Not in use.
wki502_max_illegal_datagram_events	This field is not used. The sender MAY initialize it to any value. The receiver SHOULD ignore this field. <43>	Not in use.
wki502_illegal_datagram_event_reset_frequency	This field is not used. The sender MAY initialize it to any value. The receiver SHOULD ignore this field. <44>	Not in use.
wki502_log_election_packets	This field is not used. The sender MAY initialize it to any value. The receiver SHOULD ignore this field. <45>	Not in use.

Member	Valid Range	ErrorParameter Value Returned
wki502_use_opportunistic_locking	This field is not used. The sender SHOULD initialize it to 0. The receiver SHOULD ignore this field. .<46>	0x00000030
wki502_use_unlock_behind	This field is not used. The sender SHOULD initialize it to 0. The receiver SHOULD ignore this field. .<47>	0x00000031
wki502_use_close_behind	This field is not used. The sender SHOULD initialize it to 0. The receiver SHOULD ignore this field. .<48>	0x00000032
wki502_buf_named_pipes	This field is not used. The sender SHOULD initialize it to 0. The receiver SHOULD ignore this field. .<49>	0x00000033
wki502_use_lock_read_unlock	This field is not used. The sender SHOULD initialize it to 0. The receiver SHOULD ignore this field. .<50>	0x00000034
wki502_utilize_nt_caching	This field is not used. The sender SHOULD initialize it to 0. The receiver SHOULD ignore this field. .<51>	0x00000035
wki502_use_raw_read	This field is not used. The sender SHOULD initialize it to 0. The receiver SHOULD ignore this field. .<52>	0x00000036
wki502_use_raw_write	This field is not used. The sender SHOULD initialize it to 0. The receiver SHOULD ignore this field. .<53>	0x00000037
wki502_use_write_raw_data	This field is not used. The sender SHOULD initialize it to 0. The receiver SHOULD ignore this field. .<54>	0x00000038
wki502_use_encryption	This field is not used. The sender SHOULD initialize it to 0. The receiver SHOULD ignore this field. .<55>	0x00000039
wki502_buf_files_deny_write	This field is not used. The sender SHOULD initialize it to 0. The receiver SHOULD ignore this field. .<56>	0x0000003A
wki502_buf_read_only_files	This field is not used. The sender SHOULD initialize it to	0x0000003B

Member	Valid Range	ErrorParameter Value Returned
	0. The receiver SHOULD ignore this field.<57>	
wki502_force_core_create_mode	This field is not used. The sender SHOULD initialize it to 0. The receiver SHOULD ignore this field.<58>	0x0000003C
wki502_use_512_byte_max_transfer	This field is not used. The sender SHOULD initialize it to 0. The receiver SHOULD ignore this field.<59>	0x0000003D

For Level value 0x000003F5

Member	Valid Range	ErrorParameter Value Returned
wki1013_keep_conn	1-65535	0x0000000D

For Level value 0x000003FA

Member	Valid Range	ErrorParameter Value Returned
wki1018_sess_timeout	60-65535	0x00000012

For Level value 0x00000416

Member	Valid Range	ErrorParameter Value Returned
wki1046_dormant_file_limit	1-0xFFFFFFFF	0x0000002E

The server SHOULD <60> enforce security measures to verify that the caller has the required permissions to execute this routine. If the server enforces security measures, and the caller does not have the required credentials, then the server MUST fail the call with **ERROR_ACCESS_DENIED**. For more information on how to determine the identity of the caller for the purpose of performing an access check, see [MS-RPCE] section 3.3.3.1.4.

3.2.4.3 NetrWkstaUserEnum (Opnum 2)

The **NetrWkstaUserEnum** method returns information about users who are currently active on a remote computer.

```

unsigned long NetrWkstaUserEnum(
    [in, string, unique] WKSSVC_IDENTIFY_HANDLE ServerName,
    [in, out] LPWKSTA_USER_ENUM_STRUCT UserInfo,
    [in] unsigned long PreferredMaximumLength,
    [out] unsigned long* TotalEntries,
    [in, out, unique] unsigned long* ResumeHandle
);

```

ServerName: A [WKSSVC_IDENTIFY_HANDLE \(section 2.2.2.1\)](#) that identifies the server. The client MUST map this structure to an RPC binding handle ([\[C706\]](#) sections [4.3.5](#) and [5.1.5.2](#)). The server MUST ignore this parameter.

UserInfo: A pointer to the buffer to receive the data. The data MUST be returned as a [WKSTA_USER_ENUM_STRUCT \(section 2.2.5.14\)](#) structure that contains a **Level** member that specifies the type of structure to return.

PreferredMaximumLength: The number of bytes to allocate for the return data.

TotalEntries: The total number of entries that could have been enumerated if the buffer were big enough to hold all the entries.

ResumeHandle: A pointer that, if specified, and if this method returns **ERROR_MORE_DATA**, MUST receive an implementation-specific value [<61>](#) that can be passed in subsequent calls to this method, to continue with the enumeration of currently logged-on users.

If this parameter is NULL or points to zero, then the enumeration MUST start from the beginning of the list of currently logged-on users.

Return Values: When the message processing result matches the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2). The most common error codes are listed in the following table.

Return value/code	Description
0x00000000 ERROR_SUCCESS	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x0000007C ERROR_INVALID_LEVEL	The information level is invalid.
0x000000EA ERROR_MORE_DATA	More entries are available. The <i>UserInfo</i> buffer was not large enough to contain all the entries.

Any other return value MUST conform to the error code requirements specified in [Protocol Details \(section 3\)](#).

The server SHOULD [<62>](#) enforce security measures to verify that the caller has the required permissions to execute this routine. If the server enforces security measures, and the caller does not have the required credentials, then the server MUST fail the call with **ERROR_ACCESS_DENIED**. For more information on how to determine the identity of the caller for the purpose of performing an access check, see [\[MS-RPCE\]](#) section 3.3.3.1.4.

If the **Level** member of the **WKSTA_USER_ENUM_STRUCT** (section 2.2.5.14) structure passed in the *UserInfo* parameter does not equal 0x00000000 or 0x00000001, then the server MUST fail the call.

If the **Level** member equals 0x00000000, then the server MUST return an array of the names of users currently logged on the computer. The server MUST return this information by filling the [WKSTA_USER_INFO_0_CONTAINER \(section 2.2.5.12\)](#) in the **WkstaUserInfo** field of the *UserInfo* parameter.

If the **Level** member equals 0x00000001, then the server MUST return an array of the names and domain information of each user currently logged on the computer, and a list of **OtherDomains** (section 3.2.1.3) in the computer.

If the *PreferredMaximumLength* parameter equals **MAX_PREFERRED_LENGTH** (section 2.2.1.3), the server MUST return all the requested data. Otherwise, if the *PreferredMaximumLength* is insufficient to hold all the entries, then the server MUST return the maximum number of entries that will fit in the *UserInfo* buffer and return **ERROR_MORE_DATA**.

The following rules specify processing of the *ResumeHandle* parameter:

- If the *ResumeHandle* parameter is either NULL or points to 0x00000000, then the enumeration MUST start from the beginning of the list of the currently logged on users. <63>
- If the *ResumeHandle* parameter points to a non-zero value, then the server MUST continue enumeration based on the value of *ResumeHandle*. The server is not required to maintain any state between calls to the **NetrWkstaUserEnum** method.
- If the client specifies a *ResumeHandle*, and if the server returns **ERROR_MORE_DATA**, then the server MUST set the value to which *ResumeHandle* points to some implementation-specific value that will allow the server to continue with this enumeration on a subsequent call to this method, with the same value for *ResumeHandle*.

The server is not required to maintain any state between calls to the **NetrWkstaUserEnum** method. If the server returns **ERROR_SUCCESS** or **ERROR_MORE_DATA**, then it MUST set the *TotalEntries* parameter to equal the total number of entries that could have been enumerated from the current resume position.

3.2.4.4 NetrWkstaTransportEnum (Opnum 5)

The **NetrWkstaTransportEnum** method provides information about the transport protocols currently enabled for use by the SMB network redirector on a remote computer.

```
unsigned long NetrWkstaTransportEnum(  
    [in, string, unique] WKSSVC_IDENTIFY_HANDLE ServerName,  
    [in, out] LPWKSTA_TRANSPORT_ENUM_STRUCT TransportInfo,  
    [in] unsigned long PreferredMaximumLength,  
    [out] unsigned long* TotalEntries,  
    [in, out, unique] unsigned long* ResumeHandle  
);
```

ServerName: A **WKSSVC_IDENTIFY_HANDLE** (section 2.2.2.1) that identifies the server. The client MUST map this structure to an RPC binding handle ([C706] sections 4.3.5 and 5.1.5.2). The server MUST ignore this parameter.

TransportInfo: A pointer to a buffer that receives a **WKSTA_TRANSPORT_ENUM_STRUCT** structure (section 2.2.5.16). This structure contains a **Level** member that MUST be set to zero.

PreferredMaximumLength: The number of bytes to allocate for the return data.

TotalEntries: The total number of entries that could have been enumerated from the current resume position. This field can be set to any value when sent and MUST be ignored on receipt.

ResumeHandle: A pointer that, if specified, and if this method returns **NERR_BufTooSmall**, MUST receive an implementation-specific value<64> that can be passed in subsequent calls to this method, to continue with the enumeration of currently enabled transport protocols.

If this parameter is NULL or points to zero, then the enumeration MUST start from the beginning of the list of currently enabled transport protocols.

Return Values: When the message processing result matches the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x0000007C ERROR_INVALID_LEVEL	The information level is invalid.
0x0000084B NERR_BufTooSmall	More entries are available. The <i>TransportInfo</i> buffer was not large enough to contain all the entries.

Any other return value MUST conform to the error code requirements specified in [Protocol Details \(section 3\)](#).

The server SHOULD<65> enforce security measures to verify that the caller has the required permissions to execute this routine. If the server enforces security measures, and the caller does not have the required credentials, then the server MUST fail the call with **ERROR_ACCESS_DENIED**. For more information on how to determine the identity of the caller for the purpose of performing an access check, see [\[MS-RPCE\]](#) section 3.3.3.1.4.

For any other conditions, this method MUST return any other value, and the client MUST treat all other values the same.

If the **Level** member in the **WKSTA_TRANSPORT_ENUM_STRUCT** structure passed in the *TransportInfo* parameter does not equal 0x00000000, then the server MUST fail the call.

If the **Level** member is 0x00000000, then the server MUST return an array of information about the transport protocols currently enabled for use by the SMB network redirector. The server MUST return this information by filling the **WkstaTransportInfo** member ([WKSTA_TRANSPORT_INFO_0_CONTAINER](#) section 2.2.5.15) of the *TransportInfo* parameter for each transport in **TransportList** ([Transport Information Abstract Data Model](#) section 3.2.1.4), as follows:

- **wkti0_transport_address** set to **Transport.Address** (section [3.2.1.4](#))
- **wkti0_transport_name** set to **Transport.Name** (section [3.2.1.4](#))
- **wkti0_number_of_vcs** set to **Transport.VC_Count** (section [3.2.1.4](#))
- **wkti0_wan-ish** set to **Transport.Wannish** (section [3.2.1.4](#))

If the *PreferredMaximumLength* parameter equals **MAX_PREFERRED_LENGTH (section 2.2.1.3)**, the server MUST return all the requested data. If the *PreferredMaximumLength* is insufficient to hold

all the entries, then the server MUST return the maximum number of entries that will fit in the *TransportInfo* buffer and return **NERR_BufTooSmall**.

The following rules specify processing of the *ResumeHandle* parameter:

- If the *ResumeHandle* parameter is either NULL or points to 0x00000000, then the enumeration MUST start from the beginning of the list of the currently enabled transport protocols. [<66>](#)
- If the *ResumeHandle* parameter is nonzero, then the server MUST begin enumeration based on the value of *ResumeHandle*. The server is not required to maintain any state between calls invoking the **NetrWkstaTransportEnum** method.
- If the client specified a *ResumeHandle*, and if the server returns **NERR_BufTooSmall**, then the server MUST set *ResumeHandle* to some implementation-specific value that will allow the server to continue with this enumeration on a subsequent call to this method, using the same value for *ResumeHandle*.

The server is not required to maintain any state between calls to the **NetrWkstaTransportEnum** method. If the server returns **NERR_Success**, then it MUST set the *TotalEntries* parameter to equal the total number of entries that could have been enumerated from the current resume position. If the server returns **NERR_BufTooSmall**, then it SHOULD set the *TotalEntries* value to the total number of entries that could have been enumerated from the current resume position. [<67>](#)

3.2.4.5 NetrWkstaTransportAdd (Opnum 6)

The **NetrWkstaTransportAdd** method enables the SMB network redirector to use a transport protocol on a remote computer.

```
unsigned long NetrWkstaTransportAdd(  
    [in, string, unique] WKSSVC_IDENTIFY_HANDLE ServerName,  
    [in] unsigned long Level,  
    [in] LPWKSTA_TRANSPORT_INFO_0 TransportInfo,  
    [in, out, unique] unsigned long* ErrorParameter  
);
```

ServerName: A [WKSSVC_IDENTIFY_HANDLE \(section 2.2.2.1\)](#) that identifies the server. The client MUST map this structure to an RPC binding handle ([\[C706\]](#) sections [4.3.5](#) and [5.1.5.2](#)). The server MUST ignore this parameter.

Level: The information level of the data. *Level* MUST be set to zero, meaning the *TransportInfo* parameter points to a [WKSTA_TRANSPORT_INFO_0](#) structure.

TransportInfo: A pointer to a **WKSTA_TRANSPORT_INFO_0 structure** (section 2.2.5.8).

ErrorParameter: A pointer to a value that receives the index, starting at 0, of the first member of the *TransportInfo* structure that causes the function to return **ERROR_INVALID_PARAMETER**. If this parameter is NULL, the index is not returned on error.

Return Values: When the message processing result meets the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x00000057 ERROR_INVALID_PARAMETER	One of the function parameters is not valid.
0x0000007C ERROR_INVALID_LEVEL	The information level is invalid.

Any other return value MUST conform to the error code requirements specified in [Protocol Details \(section 3\)](#).

If the *Level* parameter is not equal to zero, then the server MUST fail the call and return **ERROR_INVALID_LEVEL**.

If the server does not support this method then it SHOULD be processed as follows.

If any of the input parameters are invalid, then the server SHOULD return **ERROR_INVALID_PARAMETER**. Otherwise it SHOULD return **NERR_Success**.[<68>](#)

The server SHOULD[<69>](#) enforce security measures to verify that the caller has the required permissions to execute this routine. If the server enforces security measures and the caller does not have the required credentials, then the server SHOULD fail the call with **ERROR_ACCESS_DENIED**. For more information on how to determine the identity of the caller for the purpose of performing an access check, see [\[MS-RPCE\]](#) section 3.3.3.1.4.

The *TransportInfo* parameter contains information about the transport protocol that is to be enabled. If any of the input parameters are invalid, then the server MUST return **ERROR_INVALID_PARAMETER**. If the caller has passed the *ErrorParameter* parameter, then the server MUST return the zero-based index of the first member of the structure the *TransportInfo* parameter points to that was invalid.

If this method call is successful, then the server MUST store values from members of the **WKSTA_TRANSPORT_INFO_0** structure passed in the *TransportInfo* parameter into the abstract data model elements for each transport in **TransportList** ([Transport Information Abstract Data Model](#) section 3.2.1.4), as follows:

- **wkti0_transport_address** stored in **Transport.Address** (section [3.2.1.4](#))
- **wkti0_transport_name** stored in **Transport.Name** (section [3.2.1.4](#))
- **wkti0_number_of_vcs** stored in **Transport.VC_Count** (section [3.2.1.4](#))
- **wkti0_wan_ish** stored in **Transport.Wannish** (section [3.2.1.4](#))

3.2.4.6 NetrWkstaTransportDel (Opnum 7)

The **NetrWkstaTransportDel** method disables the use of a transport protocol by the SMB network redirector on a remote computer. The transport can be re-enabled by calling the [NetrWkstaTransportAdd](#) method.


```

unsigned long NetrWkstaTransportDel(
    [in, string, unique] WKSSVC_IDENTIFY_HANDLE ServerName,
    [in, string, unique] wchar_t* TransportName,
    [in] unsigned long ForceLevel
);

```

ServerName: A [WKSSVC_IDENTIFY_HANDLE \(section 2.2.2.1\)](#) that identifies the server. The client MUST map this structure to an RPC binding handle ([\[C706\]](#) sections [4.3.5](#) and [5.1.5.2](#)). The server MUST ignore this parameter.

TransportName: A pointer to a string that specifies the name of the transport protocol to disconnect from the SMB network redirector.

ForceLevel: The action to take if there are handles open to files or printers using the transport protocol. This parameter MUST be one of the following values:

Value	Meaning
USE_NOFORCE 0x00000000	Do not disconnect or close the open handles if open handles are using the transport protocol.
USE_FORCE 0x00000001	Same as 0x00000000 (USE_NOFORCE); do not disconnect or close the open handles if open handles are using the transport protocol.
USE_LOTS_OF_FORCE 0x00000002	Forcefully close any open handles and disable the specified transport protocol from the SMB network redirector.

Return Values: When the message processing result meets the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x00000057 ERROR_INVALID_PARAMETER	One of the function parameters is invalid.
0x00002401 ERROR_OPEN_FILES	There are open files, or printer handles are using the transport protocol pending on this connection.
0x00002404 ERROR_DEVICE_IN_USE	The device or open directory handle is using the transport protocol and cannot be disconnected.

If the *ForceLevel* parameter does not equal 0x00000000, 0x00000001, or 0x00000002, then the server MUST fail the call with ERROR_INVALID_PARAMETER. If the *ForceLevel* parameter is 0x00000000 or 0x00000001 and any open directory handle is using the transport protocol provided in the *TransportName* field, then the server MUST fail the call with **ERROR_DEVICE_IN_USE**. If the *ForceLevel* parameter is 0x00000000 or 0x00000001 and any open files or printer handles are using the transport protocol provided in the *TransportName* field, then fail the call with **ERROR_OPEN_FILES**.

If the server does not support this method, then it SHOULD return **NERR_Success** if the *ForceLevel* parameter is valid. <70> If the server does support this method, it MUST be processed as follows.

The server SHOULD <71> enforce security measures to verify that the caller has the required permissions to execute this routine. If the server enforces security measures and the caller does not have the required credentials, then the server MUST fail the call with **ERROR_ACCESS_DENIED**. For more information on how to determine the identity of the caller for the purpose of performing an access check, see [\[MS-RPCE\]](#) section 3.3.3.1.4.

If any open file or printer handles are using the transport protocol that this call is trying to disable, then the server behavior MUST depend on the value of the *ForceLevel* parameter. If the *ForceLevel* parameter is 0x00000000 or 0x00000001, then the server MUST fail the call. If the *ForceLevel* parameter is 0x00000002, the server MUST forcefully close all open handles and disable the transport protocol.

If this method call is successful, then the server MUST remove this protocol from its list of currently enabled transport protocols.

3.2.4.7 NetrWorkstationStatisticsGet (Opnum 13)

The **NetrWorkstationStatisticsGet** method returns various statistics about the SMB network redirector on a remote computer.

```
unsigned long NetrWorkstationStatisticsGet(  
    [in, string, unique] WKSSVC_IDENTIFY_HANDLE ServerName,  
    [in, string, unique] wchar_t* ServiceName,  
    [in] unsigned long Level,  
    [in] unsigned long Options,  
    [out] LPSTAT_WORKSTATION_0* Buffer  
);
```

ServerName: A [WKSSVC_IDENTIFY_HANDLE \(section 2.2.2.1\)](#) that identifies the server. The client MUST map this structure to an RPC binding handle ([\[C706\]](#) sections [4.3.5](#) and [5.1.5.2](#)). The server MUST ignore this parameter.

ServiceName: A pointer to a string specifying the name of the workstation service. This value MUST be ignored on receipt.

Level: The information level of the data. This value MUST be zero.

Options: This value MUST be zero.

Buffer: A pointer to a [STAT_WORKSTATION_0 structure \(section 2.2.5.11\)](#) that contains the statistical information.

Return Values: When the message processing result matches the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005	Access is denied.

Return value/code	Description
ERROR_ACCESS_DENIED	
0x0000007C ERROR_INVALID_LEVEL	The information level is invalid.
0x00000057 ERROR_INVALID_PARAMETER	One of the function parameters is invalid.

If the *Level* parameter does not equal 0x00000000, then the server MUST fail the call and return ERROR_INVALID_LEVEL.

If the *Options* parameter does not equal 0x00000000, then the server MUST fail the call and return ERROR_INVALID_PARAMETER. The server SHOULD <72> enforce security measures to verify that the caller has the required permissions to execute this routine. If the server enforces security measures and the caller does not have the required credentials, then the server MUST fail the call and return ERROR_ACCESS_DENIED.

The server MUST fill in all the members of the **STAT_WORKSTATION_0** structure that the *Buffer* parameter points to with the corresponding statistics about the SMB network redirector.

Some fields of the **STAT_WORKSTATION_0** structure are implementation-specific, as described in section 2.2.5.11. These fields indicate certain performance characteristics of an operating system and do not apply to all servers. If a field does not apply to the server, then it MUST set that field to zero. <73>

3.2.4.8 NetrGetJoinInformation (Opnum 20)

The **NetrGetJoinInformation** method retrieves information about the workgroup or domain to which the specified computer is joined.

```
unsigned long NetrGetJoinInformation(
    [in, string, unique] WKSSVC_IMPERSONATE_HANDLE ServerName,
    [in, out, string] wchar_t** NameBuffer,
    [out] PNETSETUP_JOIN_STATUS BufferType
);
```

ServerName: A **WKSSVC IMPERSONATE HANDLE** that specifies the server. The client MUST map this structure to an RPC binding handle ([C706] sections 4.3.5 and 5.1.5.2). The server MUST ignore this parameter.

NameBuffer: A pointer to the address of the buffer that receives the name of the domain or workgroup to which the computer is joined, and that also holds the computer name as input. The server MUST ignore this parameter on input.

BufferType: A pointer to a value from the **NETSETUP_JOIN_STATUS enumeration (section 2.2.3.1)** that specifies the status of a workstation.

Return Values: When the message processing result meets the description in column two of the following table, this method MUST return one of the following values ([MS-ERREF] section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x000006A7 RPC_S_PROTSEQ_NOT_SUPPORTED	The RPC protocol sequence is not supported.

Any other return value MUST conform to the error code requirements specified in [Protocol Details \(section 3\)](#).

The following ordered statements describe the sequence of message-processing operations.

1. The server MUST retrieve the RPC protocol sequence used for the current call, as specified in [\[MS-RPCE\]](#) section 3.1.3.4.1, specifying the server binding handle maintained by the RPC runtime ([\[C706\]](#) section [6.2.1](#)). If that RPC protocol sequence is not **NCACN_NP**, the server SHOULD return **RPC_S_PROTSEQ_NOT_SUPPORTED**.[<74>](#)
2. The server MUST check that the caller has been granted access rights using the algorithm specified in the [Access Control Abstract Data Model \(section 3.2.1.1\)](#), with *Access Request mask* initialized to **WKSTA_NETAPI_QUERY**; if not, the server MUST return **ERROR_ACCESS_DENIED**.
3. The server MUST compute the response in the following way.
 - If **DomainNameFQDN** is set to NULL, then *BufferType* MUST be set to *NetSetupUnjoined*, and *NameBuffer* MUST be set to NULL.
 - Else if **DomainSid** is set to NULL, then *BufferType* MUST be set to *NetSetupWorkgroupName* and *NameBuffer* MUST be set to **DomainNameNetBIOS**.
 - Else *BufferType* MUST be set to *NetSetupDomainName* and *NameBuffer* MUST be set to **DomainNameFQDN**.

If no errors occur, the server MUST return **NERR_Success**.

3.2.4.9 NetrJoinDomain2 (Opnum 22)

The **NetrJoinDomain2** method uses encrypted credentials to join a computer to a domain or a workgroup.[<75>](#)

```
unsigned long NetrJoinDomain2(
    [in] handle_t RpcBindingHandle,
    [in, string, unique] wchar_t* ServerName,
    [in, string] wchar_t* DomainNameParam,
    [in, string, unique] wchar_t* MachineAccountOU,
    [in, string, unique] wchar_t* AccountName,
    [in, unique] PJOINPR_ENCRYPTED_USER_PASSWORD Password,
    [in] unsigned long Options
);
```

RpcBindingHandle: An RPC binding handle [\[C706\]](#).

ServerName: This parameter has no effect on message processing in any environment. The client MUST set this parameter to a value that resolves to the IP protocol layer destination address of the RPC packets it transmits (see section 2.1.1.2 of [MS-RPCE] for more details). The server MUST ignore this parameter.

DomainNameParam: A pointer to a string that specifies the domain name or workgroup name to join, and optionally the domain controller machine name within the domain. This parameter MUST NOT be NULL.

If the string specifies the name of the preferred domain controller to perform the join operation, then the string MUST be of the form *DomainNameToJoin\MachineName*, where *DomainNameToJoin* is the domain to join, "\" is a delimiter, and *MachineName* is the name of the domain controller to perform the join operation. In all cases, the *DomainNameToJoin* portion of this parameter MUST be either the NetBIOS name of the domain or the fully qualified domain name (FQDN) of the domain. If the *MachineName* is passed, it MUST be either the NetBIOS name of the domain controller or the Internet host name of the domain controller. The format of *DomainNameToJoin* places no constraint on the format of *MachineName* and vice versa; thus, each of the following permutations are accepted:

- NetBIOS name\NetBIOS name
- NetBIOS name\Internet host name
- FQDN\NetBIOS name

MachineAccountOU: A pointer to a string that MUST contain [RFC1777] the format name of the organizational unit (OU) directory object under which the **machine account** directory object is created. This parameter is optional. If specified, this string MUST contain the full path; for example, OU=testOU,DC=domain,DC=Domain,DC=com.

AccountName: A pointer to a string that specifies an account name in the domain *DomainNameParam* to use when connecting to a domain controller. This parameter is optional. If this parameter is NULL, the caller's account name MUST be used. If this parameter is specified, the format MUST be one of the following:

<NetBIOSDomainName>\<UserName>,
 <FullyQualifiedDNSDomainName>\<UserName>, or
 <UserName>@<FullyQualifiedDNSDomainName>

Password: A pointer to a **JOINPR ENCRYPTED USER PASSWORD structure (section 2.2.5.18)** that specifies the encrypted password to use with the *AccountName* parameter. Sections 3.2.4.9.1 and 3.2.4.9.2 specify the processing of this parameter.

Options: A 32-bit bitfield that specifies modifications to default server behavior in message processing. <76>

Value	Meaning
NETSETUP_JOIN_DOMAIN 0x00000001	Joins the computer to a domain. The default action is to join the computer to a workgroup.
NETSETUP_ACCT_CREATE 0x00000002	Creates the account on the domain. The name is the persisted abstract state ComputerNameNetBIOS unless this behavior is altered by another option such as NETSETUP_JOIN_WITH_NEW_NAME.

Value	Meaning
NETSETUP_ACCT_DELETE 0x00000004	Disables the old account when the join operation occurs on a computer that is already joined to a domain. Important This flag is neither supported nor tested for use with NetrJoinDomain2 ; its use is therefore not specified in any message processing.
NETSETUP_DOMAIN_JOIN_IF_JOINED 0x00000020	Allows a join to a new domain even if the computer is already joined to a domain.
NETSETUP_JOIN_UNSECURE 0x00000040	Performs an unsecured join. MUST be used only in conjunction with the NETSETUP_MACHINE_PWD_PASSED flag.
NETSETUP_MACHINE_PWD_PASSED 0x00000080	Indicates that the <i>Password</i> parameter SHOULD <77> specify the password for the machine joining the domain. This flag is valid only for unsecured joins, which MUST be indicated by setting the NETSETUP_JOIN_UNSECURE flag. If this flag is set, the value of <i>Password</i> determines the value stored for the computer password during the join process.
NETSETUP_DEFER_SPN_SET 0x00000100	Indicates that the service principal name (SPN) and the DnsHostName properties on the computer SHOULD NOT <78> be updated at this time, but instead SHOULD <79> be updated during a subsequent call to NetrRenameMachineInDomain2 (section 3.2.4.11) .
NETSETUP_JOIN_DC_ACCOUNT 0x00000200	Indicates that the join SHOULD <80> be allowed if an existing account exists and it is a domain controller account. <81>
NETSETUP_JOIN_WITH_NEW_NAME 0x00000400	Indicates that the join SHOULD <82> occur using the new computer name.
NETSETUP_INSTALL_INVOCATION 0x00040000	Indicates that the protocol method was invoked during installation of Windows.

Return Values: When the message processing result meets the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x00000032 ERROR_NOT_SUPPORTED	The request is not supported.
0x00000056 ERROR_INVALID_PASSWORD	The specified network password is not correct.

Return value/code	Description
0x00000057 ERROR_INVALID_PARAMETER	The parameter is incorrect.
0x0000052D ERROR_PASSWORD_RESTRICTION	Unable to update the password. The value provided for the new password does not meet the length, complexity, or history requirements of the domain.
0x0000054A ERROR_INVALID_DOMAIN_ROLE	The name of a domain controller was provided in the <i>DomainNameParam</i> parameter, and validation of that domain controller failed. Validation is described in the message-processing steps for the section "Domain Join" later.
0x000006A7 RPC_S_PROTSEQ_NOT_SUPPORTED	The RPC protocol sequence is not supported.
0x000006FF RPC_S_CALL_IN_PROGRESS	A remote procedure call is already in progress. <83>
0x00000A83 NERR_SetupAlreadyJoined	This computer is already joined to a domain.
0x00000A85 NERR_SetupDomainController	This computer is a domain controller and cannot be unjoined from a domain.
0x00000A87 NERR_InvalidWorkgroupName	The specified workgroup name is invalid.

Any other return value MUST conform to the error code requirements specified in [Protocol Details \(section 3\)](#).

Message processing for the **NetrJoinDomain2** method specifies the behavior of joining either a domain or a workgroup. The behavior of this method is covered in the following subsections:

- Section [3.2.4.9.1](#) specifies the message processing that is common to both domain and workgroup joins.
- Section [3.2.4.9.2](#) specifies the message processing that is involved in a domain join.
- Section [3.2.4.9.3](#) specifies the message processing that is involved in a workgroup join.

Several password data elements are involved in message processing for the **NetrJoinDomain2** method, and they are distinguished as follows:

Password: A parameter to this method, either the password corresponding to the *AccountName* that is used to authenticate at the domain controller or the password used for the computer account. The bits in the *Options* parameter determine how *Password* is used. This element is distinct from the client data model element **Password** that is defined in [\[MS-DISO\]](#) section 4.3.1.1

PasswordString: The Unicode UTF-8 string that corresponds to the **plaintext** form of the password in *Password*. This variable is relevant to sections [3.2.4.9.1](#) and [3.2.4.9.2](#).

ComputerPasswordString: The **ASCII** string that contains the plaintext form of the password for the computer account. This variable is relevant to section [3.2.4.9.2](#).

3.2.4.9.1 Common Message Processing

The following statements pertain to all message processing:

- The server MUST ignore any flags set in the *Options* parameter that it does not support. <84>
<85><86>
- Unless otherwise noted, if the server encounters an error during message processing, the following actions are specified:
 - The server SHOULD revert any state changes made.
 - The server MUST stop message processing.
 - The server MUST return the error to the caller.

The following ordered statements specify the sequence of message processing operations:

1. The server MUST retrieve the RPC protocol sequence used for the current call, as specified in [MS-RPCE] section 3.1.3.4.1, specifying the server binding handle maintained by the RPC runtime ([C706] section 6.2.1). If that RPC protocol sequence is not **NCACN_NP**, the server SHOULD return **RPC_S_PROTSEQ_NOT_SUPPORTED**. <87>
2. The server MUST check that the caller has been granted access rights using the algorithm specified in the [Access Control Abstract Data Model \(section 3.2.1.1\)](#), with *Access Request mask* initialized to **WKSTA_NETAPI_CHANGE_CONFIG**; if not, the server MUST return **ERROR_ACCESS_DENIED**.
3. If *Password* is NULL, then *PasswordString* MUST be NULL. Otherwise, the server MUST decrypt and decode the *Password*, as specified in section 2.2.5.18. *PasswordString* MUST be equal to the decrypted and decoded value. The decrypted buffer is represented as **JOINPR_USER_PASSWORD**, as specified in section 2.2.5.17. The value of the Length member MUST be less than 513; otherwise, message processing is stopped, and the server MUST return **ERROR_INVALID_PASSWORD**.
4. If the value of the *DomainNameParam* parameter is NULL, the server MUST stop message processing and return **ERROR_INVALID_PARAMETER**. Otherwise, message processing continues.
5. The server SHOULD return **ERROR_NOT_SUPPORTED** if the server does not support processing of this message. <88>
6. If the server that is processing the message is a domain controller, the server MUST stop message processing and return **NERR_SetupDomainController**. Otherwise, message processing continues.
7. If *Options* does not have the **NETSETUP_JOIN_DOMAIN** bit set, then the server MUST continue processing this message, as specified in section 3.2.4.9.3; otherwise, the server MUST process the message as specified in section 3.2.4.9.2.

3.2.4.9.2 Domain Join Specific Message Processing

The following definitions are used in the specification of message processing that follows.

- *DomainNameString*: A Unicode UTF-8 string with the same properties specified for the parameter *DomainNameParam*.

- *DomainControllerString*: A UTF-8 string that contains the name of a domain controller in the domain that the server is joining.

The following ordered statements describe the sequence of message-processing operations:

1. If the **NETSETUP_MACHINE_PWD_PASSED** bit is set in *Options*, and the **NETSETUP_JOIN_UNSECURE** bit is not set in *Options*, the server MUST return **ERROR_INVALID_PARAMETER**. Otherwise, message processing continues.
2. If the **NETSETUP_MACHINE_PWD_PASSED** bit is set in *Options*, and *AccountName* is not NULL, the server MUST return **ERROR_INVALID_PARAMETER**. Otherwise, message processing continues.
3. If the **NETSETUP_MACHINE_PWD_PASSED** bit is set in *Options*, and either *Password* is NULL or the length of the *PasswordString* is zero, the server MUST return **ERROR_PASSWORD_RESTRICTION**. Otherwise, message processing continues.
4. If the **NETSETUP_MACHINE_PWD_PASSED** bit is set in *Options*, the value of *PasswordString* MUST be copied to the value of *ComputerPasswordString*, and *PasswordString* MUST be set to NULL.
5. If the server processing the message is already joined to a domain, and the **NETSETUP_DOMAIN_JOIN_IF_JOINED** bit is not set in *Options*, the server MUST return **NERR_SetupAlreadyJoined**. Otherwise, message processing continues.
6. If *DomainNameString* contains the character "\", *DomainNameString* MUST be truncated such that the value of *DomainNameString* is equal to the substring of *DomainNameString* that ends prior to the first "\" character, and *DomainControllerString* MUST be equal to the substring beginning after the first "\" character. This is the name of the target domain controller as specified by the caller.

The specified domain controller MUST be validated by invoking the **DsrGetDcNameEx2** method (see section [3.5.5.3.1](#) in [\[MS-NRPC\]](#)) on the *DomainControllerString* computer, specifying the following parameters:

ComputerName = *DomainControllerString*

AccountName = NULL

AllowableAccountControlBits = 0

DomainName = *DomainNameString*

SiteName = 0

Flags = B | J | R

If the call succeeds and *DomainControllerInfo->DomainControllerName* matches *DomainControllerString*, execution continues at step 7.

If the call fails, or the returned domain controller name does not match *DomainControllerString*, the server MUST invoke the **DsrGetDcNameEx2** method (see section [3.5.5.3.1](#) in [\[MS-NRPC\]](#)) on the *DomainControllerString* computer, specifying the following parameters:

ComputerName = *DomainControllerString*

AccountName = NULL

AllowableAccountControlBits = 0

DomainName = *DomainNameString*

SiteName = 0

Flags = B | J | S

If the call succeeds and *DomainControllerInfo->DomainControllerName* matches *DomainControllerString*, execution continues at step 7. Otherwise, the server MUST stop message processing and return **ERROR_INVALID_DOMAIN_ROLE**.

7. *DomainNameString* MUST be a validated domain name. The validation process is specified in section [3.2.4.12](#), where *NameType* is **NetSetupDomain** from the [NETSETUP_NAME_TYPE](#) (section [2.2.3.2](#)) enumeration. If this validation fails, the server MUST stop message processing and return the error specified in the validation process.
8. If **ComputerNameNetBIOS** is identical to *DomainNameString*, the server MUST return **ERROR_INVALID_DOMAINNAME**. Otherwise, message processing continues.
9. If the **NETSETUP_ACCT_CREATE** bit is not set in *Options*, and the machine account does not exist in the domain, the server MUST return an implementation specific error.
10. The server MUST apply all state changes specified in [\[MS-DISO\]](#) for the appropriate task. This SHOULD be accomplished by invoking the task with *Options* input parameters specified as follows:

Options	Task
If the NETSETUP_JOIN_UNSECURE bit is not set.	"Joining a Domain by Creating an Account via LDAP" ([MS-DISO] section 8), <89> where: <ul style="list-style-type: none">▪ TaskInputDomainName is <i>DomainNameString</i>.▪ TaskInputDomainController is <i>DomainControllerString</i>.▪ TaskInputDomainAdminAccount is the <i>AccountName</i> parameter to this method.▪ TaskInputDomainAdminPassword is <i>PasswordString</i>.
If the NETSETUP_JOIN_UNSECURE bit is set.	"Joining a Domain using Predefined Account" ([MS-DISO] section 6), where: <ul style="list-style-type: none">▪ TaskInputDomainName is <i>DomainNameString</i>.▪ TaskInputDomainController is <i>DomainControllerString</i>.

If no errors occur, the server MUST return NERR_Success.

3.2.4.9.3 Workgroup Join Specific Message Processing

The following ordered statements describe the sequence of message processing operations.

1. If the server processing the message is already joined to a domain, the server MUST return **NERR_SetupAlreadyJoined**. Otherwise, message processing continues.
2. The *DomainNameParam* parameter MUST be validated as a valid workgroup name. The validation process is specified in section [3.2.4.12](#), where *NameType* is **NetSetupWorkgroup** from the **NETSETUP_NAME_TYPE** enumeration (section [2.2.3.2](#)). If this validation fails, the server MUST return the error specified in the preceding validation process.
3. The client elements in [\[MS-DISO\]](#) section 4.3.1.1 MUST be set as follows:
 - **DomainName.NetBIOS** = *DomainNameParam*
 - **DomainName.FQDN** = NULL
 - **DomainGUID** = NULL
 - **DomainSid** = NULL

If no errors occur, the server MUST return **NERR_Success**.

3.2.4.10 NetrUnjoinDomain2 (Opnum 23)

The **NetrUnjoinDomain2** method uses encrypted credentials to unjoin a computer from a workgroup or domain. [<90>](#)

```
unsigned long NetrUnjoinDomain2(  
    [in] handle_t RpcBindingHandle,  
    [in, string, unique] wchar_t* ServerName,  
    [in, string, unique] wchar_t* AccountName,  
    [in, unique] PJOINPR_ENCRYPTED_USER_PASSWORD Password,  
    [in] unsigned long Options  
);
```

RpcBindingHandle: An RPC binding handle [\[C706\]](#).

ServerName: This parameter has no effect on message processing in any environment. The client MUST set this parameter to a value that resolves to the IP protocol layer destination address of the RPC packets it transmits (see section [2.1.1.2](#) of [\[MS-RPCE\]](#) for more details). The server MUST ignore this parameter.

AccountName: A pointer to a string that specifies the account name in the joined domain to use when connecting to a domain controller. This parameter is optional. If this parameter is NULL, the caller's account name MUST be used.

Password: An optional pointer to a [JOINPR_ENCRYPTED_USER_PASSWORD structure \(section 2.2.5.18\)](#) that specifies the encrypted password to use with the *AccountName* parameter. If this parameter is NULL, the caller's **security context** MUST be used.

Options: A 32-bit bitfield specifying modifications to default message processing behavior.

Value	Meaning
NETSETUP_ACCT_DELETE 0x00000004	Disables the account when the unjoin operation occurs.
NETSETUP_IGNORE_UNSUPPORTED_FLAGS 0x10000000	The server ignores undefined flags when this bit is set<91>. This option is present to allow for the addition of new optional values in the future.

Return Values: When the message processing result meets the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x00000056 ERROR_INVALID_PASSWORD	The specified network password is not correct.
0x000003EC ERROR_INVALID_FLAGS	Invalid option flags are specified.
0x000006A7 RPC_S_PROTSEQ_NOT_SUPPORTED	The RPC protocol sequence is not supported.
0x00000A84 NERR_SetupNotJoined	This computer is not currently joined to a domain.
0x00000A85 NERR_SetupDomainController	This computer is a domain controller and cannot be unjoined from a domain.

Any other return value MUST conform to the error code requirements specified in [Protocol Details \(section 3\)](#).

Unless otherwise noted, if the server encounters an error during message processing, the server SHOULD revert any state changes made, MUST stop message processing, and MUST return the error to the caller.<92>

The following definitions are used in the specification of message processing that follows.

- *DomainObject*: An object in the domain database ([\[MS-ADTS\]](#) section 7.4) having the value of **ComputerNameNetBIOS** suffixed with a "\$" character for the **SamAccountName** attribute.
- *PasswordString*: A UTF-8 string that contains a password in cleartext.

The following ordered statements describe the sequence of message processing operations.

1. The server MUST retrieve the RPC protocol sequence used for the current call, as specified in [\[MS-RPCE\]](#) section 3.1.3.4.1, specifying the server binding handle maintained by the RPC runtime ([\[C706\]](#) section 6.2.1). If that RPC protocol sequence is not **NCACN_NP**, the server SHOULD return **RPC_S_PROTSEQ_NOT_SUPPORTED**.<93>

2. The server MUST check that the caller has been granted access rights using the algorithm specified in the [Access Control Abstract Data Model \(section 3.2.1.1\)](#), with *Access Request mask* initialized to **WKSTA_NETAPI_CHANGE_CONFIG**; if not, the server MUST return **ERROR_ACCESS_DENIED**.
3. If *Password* is NULL, then *PasswordString* MUST be NULL. Otherwise, the server MUST decrypt and decode the *Password* (section [2.2.5.18](#)). *PasswordString* MUST equal the decrypted and decoded value. The decrypted buffer is represented as a [JOINPR_USER_PASSWORD](#). The value of the **Length** member MUST be less than 513; otherwise, message processing is stopped, and the server MUST return **ERROR_INVALID_PASSWORD**.
4. The server MUST stop message processing and return **NERR_SetupNotJoined** if **DomainSid** ([\[MS-DISO\]](#) section 4.3.1.1) is NULL.
5. If any bits other than **NETSETUP_ACCT_DELETE** are set in *Options*, the server MUST check the **NETSETUP_IGNORE_UNSUPPORTED_FLAGS** bit. If it is not set, the server MUST stop message processing and return **ERROR_INVALID_FLAGS**. Otherwise, message processing continues.
6. The server MUST stop message processing and return **NERR_SetupDomainController** if the server processing the message is a domain controller. Otherwise, message processing continues.
7. The server MUST invoke the "Removing a Domain Member" task ([\[MS-DISO\]](#) section 9), specifying *AccountName* for the **TaskInputDomainAdministratorName** parameter and *Password* for the **TaskInputDomainAdministratorPassword** parameter. If the **NETSETUP_ACCT_DELETE** bit is set in *Options*, TRUE is specified for the **TaskInputDisableMachineAccount** parameter; otherwise, FALSE is specified.

If no errors occur, the server MUST return **NERR_Success**.

3.2.4.11 NetrRenameMachineInDomain2 (Opnum 24)

The **NetrRenameMachineInDomain2** method uses encrypted credentials to change the locally persisted **ComputerNameNetBIOS**, and to optionally rename the computer account for a server currently in a domain, without first removing the computer from the domain and then adding it back. [<94>](#)

```

unsigned long NetrRenameMachineInDomain2(
    [in] handle_t RpcBindingHandle,
    [in, string, unique] wchar_t* ServerName,
    [in, string, unique] wchar_t* MachineName,
    [in, string, unique] wchar_t* AccountName,
    [in, unique] PJOINPR_ENCRYPTED_USER_PASSWORD Password,
    [in] unsigned long Options
);

```

RpcBindingHandle: An RPC binding handle [\[C706\]](#).

ServerName: This parameter has no effect on message processing in any environment. The client MUST set this parameter to a value that resolves to the IP protocol layer destination address of the RPC packets it transmits (see section [2.1.1.2](#) of [\[MS-RPCE\]](#) for more details). The server MUST ignore this parameter.

MachineName: A pointer to a string that specifies the new computer name. This parameter is optional. If this parameter is NULL, the current machine name is used.

AccountName: A pointer to a string that specifies an account name in the joined domain to use when connecting to a domain controller. This parameter is optional. If this parameter is NULL, the caller's account name is used.

Password: An optional pointer to a [JOINPR_ENCRYPTED_USER_PASSWORD structure \(section 2.2.5.18\)](#) that specifies the encrypted password to use with the *AccountName* parameter. If this parameter is NULL, the caller's security context MUST be used.

Options: A 32-bit bitfield that specifies modifications to default server behavior in message processing.

Value	Meaning
NETSETUP_ACCT_CREATE 0x00000002	Renames the computer account in the domain. If this flag is not set, the computer name is changed locally but no changes are made to the computer account in the domain.
NETSETUP_DNS_NAME_CHANGES_ONLY 0x00001000	Limits any updates to DNS -based names only.

Return Values: When the message processing result meets the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x00000032 ERROR_NOT_SUPPORTED	The request is not supported.
0x00000056 ERROR_INVALID_PASSWORD	The specified network password is not correct.
0x00000057 ERROR_INVALID_PARAMETER	The parameter is incorrect.
0x000006A7 RPC_S_PROTSEQ_NOT_SUPPORTED	The RPC protocol sequence is not supported.
0x00000A84 NERR_SetupNotJoined	This computer is not currently joined to a domain.
0x00000A85 NERR_SetupDomainController	This computer is a domain controller and cannot be renamed.<95>

Any other return value MUST conform to the error code requirements specified in [Protocol Details \(section 3\)](#).

Unless otherwise noted, if the server encounters an error during message processing, the server SHOULD revert any state changes made, MUST stop message processing, and MUST return the error to the caller.<96>

The following definitions are used in the specification of message processing that follows.

- *DomainControllerString*: A UTF-8 string that contains the name of a domain controller in the domain to which the server is joined.
- *DomainObject*: An object in the domain database ([\[MS-ADTS\]](#) section 7.4) that has the value of **ComputerNameNetBIOS** suffixed with a "\$" character for the **SamAccountName** attribute.
- *OldComputerAccountString*: A UTF-8 string that contains the value **ComputerNameNetBIOS** concatenated with a "\$" character.
- *NewComputerAccountString*: A UTF-8 string that contains the value to be stored in the **SamAccountName** attribute of the server's computer account in the domain database.
- *ComputerNameString*: A UTF-8 string that contains the new NetBIOS name of the server.
- *DNSComputerNameString*: A UTF-8 string that contains the new Internet host name of the server.
- *Spn1*: A UTF-8 string.
- *Spn2*: A UTF-8 string.
- *PasswordString*: A UTF-8 string that contains a password in cleartext.
- *DomainControllerString*: A UTF-8 string that contains the name of a domain controller in the domain that the server is joining.
- *DomainControllerConnection*: An **ADCONNECTION_HANDLE** ([\[MS-DTYP\]](#)) to a domain controller.
- *LdapResultMessages*: A list of **LDAPMessage** ([\[RFC2251\]](#)) containing results from an operation performed on **DomainControllerConnection**.
- *ComputerAccountDN*: A UTF-8 string that contains the DN of the computer account.

The following ordered statements describe the sequence of message processing operations.

1. The server MUST retrieve the RPC protocol sequence used for the current call, as specified in [\[MS-RPCE\]](#) section 3.1.3.4.1, specifying the server binding handle maintained by the RPC runtime ([\[C706\]](#) section [6.2.1](#)). If that RPC protocol sequence is not **NCACN_NP**, the server SHOULD return **RPC_S_PROTSEQ_NOT_SUPPORTED**.<97>
2. The server MUST check that the caller has been granted access rights using the algorithm specified in the [Access Control Abstract Data Model \(section 3.2.1.1\)](#), with *Access Request mask* initialized to **WKSTA_NETAPI_CHANGE_CONFIG**; if not, the server MUST return **ERROR_ACCESS_DENIED**.
3. If *Password* is NULL then *PasswordString* MUST be NULL. Otherwise, the server MUST decrypt and decode the *Password* (section [2.2.5.18](#)). *PasswordString* MUST be equal to the decrypted and decoded value. The decrypted buffer is represented as a **JOINPR_USER_PASSWORD**. The value of the **Length** member MUST be less than 513; otherwise, message processing is stopped, and the server MUST return **ERROR_INVALID_PASSWORD**.
4. If the server is not a domain controller, or is not a member of a domain, then the server MUST fail the call with **NERR_SetupNotJoined**. Otherwise, message processing continues.
5. If the server is an **RODC** ([\[MS-DRDM\]](#) section 5.6), the server MUST fail the call with **ERROR_NOT_SUPPORTED**. Otherwise, message processing continues.

6. If the *Options* parameter does not contain **NETSETUP_ACCT_CREATE**, the server MUST apply the new name locally, updating **ComputerNameNetBIOS** so that other protocols on the server can operate using the new name. If this operation fails, the server MUST return an implementation-specific error and stop message processing. If the operation is successful, then the server MUST stop message processing and return successfully.
7. If the *Options* parameter contains **NETSETUP_ACCT_CREATE**, the server MUST continue message processing.
8. The server MUST convert<98> the name in the *MachineName* parameter to a string NetBIOS name. This conversion MUST match with the conversion used in [Netlogon Remote Protocol](#). *ComputerNameString* MUST equal the resulting value. *NewComputerAccountString* MUST equal the resulting value concatenated with the "\$" character. *OldComputerAccountString* MUST equal the concatenation of the old NetBIOS name of the machine with "\$" character.
9. The server MUST use the security context associated with the credentials provided in the *AccountName* and *Password* parameters to perform the rest of the remote operations.
10. The server MUST locate a writable domain controller for the domain to which the server is joined, by invoking the **DsrGetDcNameEx2** method on the local [MS-NRPC] server specifying the following parameters:
 - *ComputerName* = NULL
 - *AccountName* = ComputerNameNetBIOS
 - *AllowableAccountControlBits* = ADS_UF_WORKSTATION_TRUST_ACCOUNT | ADS_UF_SERVER_TRUST_ACCOUNT ([\[MS-ADTS\] \(section 2.2.15\)](#))
 - *DomainName* = DomainNameFQDN
 - *DomainGuid* = NULL
 - *SiteName* = NULL
 - *Flags* = (DS_WRITABLE_FLAG | DS_DS_FLAG) ([\[MS-ADTS\] \(section 7.3.1.2\)](#)).

If the **DsrGetDcNameEx2** method fails, the server MUST retry the call specifying the following parameters:

- *ComputerName* = NULL
- *AccountName* = NULL
- *AllowableAccountControlBits* = 0
- *DomainName* = DomainNameFQDN
- *DomainGuid* = NULL
- *SiteName* = NULL
- *Flags* = (DS_WRITABLE_FLAG | DS_DS_FLAG) ([MS-ADTS] (section 7.3.1.2)).

If both calls fail, the method MUST fail.

Otherwise, *DomainControllerString* MUST equal the string name of the returned writable domain controller.

11. If the `NETSETUP_DNS_NAME_CHANGES_ONLY` bit is not set in *Options*, then the server MUST make the following attribute update:
 - `samAccountName` updated to equal `NewComputerAccountString`.
12. `DNSComputerNameString` MUST be the concatenation of `ComputerNameString` and the DNS suffix on the server. <99>
13. `Spn1` MUST be the concatenation of "HOST/" with `DNSComputerNameString`.
14. `Spn2` MUST be the concatenation of "HOST/" with `ComputerNameString`.
15. The server invokes [LDAP Bind \(section 3.2.4.18.2\)](#) with the following parameters:

- `DomainControllerBindTarget`: `DomainControllerString`
- `AccountNameForBind`: `AccountName`
- `PasswordForBind`: `PasswordString`
- `Encrypt`: FALSE
- `DisallowReferrals`: FALSE

The result is stored in `DomainControllerConnection`.

16. The server invokes [Query Computer Account DN for the Local Machine \(section 3.2.4.18.1\)](#), specifying `DomainControllerString` for the `DomainControllerQueryTarget` parameter, storing the result in `ComputerAccountDN`.
17. The server invokes the "Performing an LDAP Operation on an ADConnection" task of [\[MS-ADSO\]](#) section 6.2.6.1.6 with the following parameters:
 - `TaskInputADConnection`: `DomainControllerConnection`
 - `TaskInputRequestMessage`: LDAP modifyRequest message [\[RFC2251\]](#) section 4.6 as follows:
 - Object: `ComputerAccountDN`
 - The modification sequence has two list entries, set as follows:
 - First list entry
 - operation: replace
 - modification:
 - type: `DnsHostName`
 - vals: `DNSComputerNameString`
 - Second list entry
 - operation: replace
 - modification:
 - type: `ServicePrincipalName`

- vals: Spn1 and Spn2
 - *TaskOutputResultMessages*: LDAPResultMessages
18. The server invokes [LDAP Unbind \(section 3.2.4.18.3\)](#) with `ADConnectionToUnbind` set to `DomainControllerConnection`.
19. If any of these updates fail, the server MUST fail the request and return the error from the writable domain controller.
20. The server SHOULD [<100>](#) update the writable domain controller named by the value of `DomainControllerString` with the following LDAP attribute on the `DomainObject`:
- **displayName** updated to equal `NewComputerNameString`.
21. The server SHOULD continue processing if this optional update fails. [<101>](#)
22. The server MUST apply the new name locally, updating **ComputerNameNetBIOS** so that other protocols on the server can operate using the new name.
- If no errors occur, the server MUST return **NERR_Success**.

3.2.4.12 NetrValidateName2 (Opnum 25)

The **NetrValidateName2** method verifies the validity of a computer, workgroup, or domain name. [<102>](#)

```
unsigned long NetrValidateName2(
    [in] handle_t RpcBindingHandle,
    [in, string, unique] wchar_t* ServerName,
    [in, string] wchar_t* NameToValidate,
    [in, string, unique] wchar_t* AccountName,
    [in, unique] PJOINPR_ENCRYPTED_USER_PASSWORD Password,
    [in] NETSETUP_NAME_TYPE NameType
);
```

RpcBindingHandle: An RPC binding handle [\[C706\]](#).

ServerName: This parameter has no effect on message processing in any environment. The client MUST set this parameter to a value that resolves to the IP protocol layer destination address of the RPC packets it transmits (see section [2.1.1.2](#) of [\[MS-RPCE\]](#) for more details). The server MUST ignore this parameter.

NameToValidate: A pointer to a string that specifies the name to validate, according to its type.

AccountName: The server SHOULD ignore this parameter.

Password: The server SHOULD ignore this parameter.

NameType: Specifies the type of validation to perform (section [2.2.3.2](#)).

Return Values: When the message processing result matches the description in column 2 of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x00000034 ERROR_DUP_NAME	The connection was denied because a duplicate name exists on the network.
0x00000056 ERROR_INVALID_PASSWORD	The specified network password is incorrect.
0x00000057 ERROR_INVALID_PARAMETER	The parameter is incorrect.
0x0000007B ERROR_INVALID_NAME	The file name, directory name, or volume label syntax is incorrect.
0x000004BC ERROR_INVALID_DOMAINNAME	The format of the specified domain name is invalid.
0x0000054B ERROR_NO_SUCH_DOMAIN	The specified domain either does not exist or could not be contacted.
0x000006A7 RPC_S_PROTSEQ_NOT_SUPPORTED	The RPC protocol sequence is not supported.
0x0000092F NERR_InvalidComputer	This computer name is invalid.
0x00000A87 NERR_InvalidWorkgroupName	The specified workgroup name is invalid.
0x00002554 DNS_ERROR_NON_RFC_NAME	The Internet host name does not comply with RFC specifications.
0x00002558 DNS_ERROR_INVALID_NAME_CHAR	The Internet host name contains an invalid character.
0x8001011C RPC_E_REMOTE_DISABLED	Remote calls are not allowed for this process.

Any other return value MUST conform to the error code requirements specified in [Protocol Details \(section 3\)](#).

The following definition is used in the specification of message processing that follows.

- *PasswordString*: A Unicode UTF-8 string containing a password in cleartext.

The following ordered statements describe the sequence of message processing operations.

1. The server MUST retrieve the RPC protocol sequence used for the current call, as specified in [\[MS-RPCE\]](#) section 3.1.3.4.1, specifying the server binding handle maintained by the RPC runtime ([\[C706\]](#) section [6.2.1](#)). If that RPC protocol sequence is not **NCACN_NP**, the server SHOULD return **RPC_S_PROTSEQ_NOT_SUPPORTED**.[<103>](#)

2. The server SHOULD<104> stop message processing and return an implementation-specific error if the caller is not local. For information on how to identify whether the caller is local, see [MS-RPCE].
3. The server MUST check that the caller has been granted access rights using the algorithm specified in the [Access Control Abstract Data Model \(section 3.2.1.1\)](#), with *Access Request mask* initialized to **WKSTA_NETAPI_QUERY**; if not, the server MUST return **ERROR_ACCESS_DENIED**.
4. If *Password* is NULL then *PasswordString* MUST be NULL. Otherwise, the server MUST decrypt and decode the *Password* (section [2.2.5.18](#)). *PasswordString* MUST equal the decrypted and decoded value. The decrypted buffer is represented as a **JOINPR_USER_PASSWORD**. The value of the **Length** member MUST be less than 513; otherwise, message processing is stopped, and the server MUST return **ERROR_INVALID_PASSWORD**.
5. If *NameType* is *NetSetupUnknown* the server MUST stop message processing and return **ERROR_INVALID_PARAMETER**.
6. First, the method MUST perform syntactic validation of the name as follows. For all types of validation except the **NetSetupDnsMachine** type, the syntactic validation is performed on the name expressed in the **OEM character set**.

NetSetupWorkgroup

- The length of the name MUST NOT be less than 1 or greater than 15 characters, inclusive.
- The name MUST NOT contain characters that have any one of the following octal values:

```
001, 002, 003, 004, 005, 006, 007, 010, 011, 012, 013, 014,
015, 016, 017, 020, 021, 022, 023, 024, 025, 026, 027, 030,
031, 032, 033, 034, 035, 036, 037
```

- The name MUST NOT contain any of the following characters:

```
" / \ [ ] : | < > + = ; , ?
```

- The name MUST NOT consist entirely of the dot and space characters.

Error **NERR_InvalidWorkgroupName** MUST be returned if the check fails unless the conditions of this type are being checked as part of another type, which specifies alternate error return behavior.

NetSetupMachine

All conditions for the **NetSetupWorkgroup** type apply for this type. Additionally:

- The name MUST NOT contain an asterisk (*).
- The first character and the last character of the name MUST NOT be the space character.

Error **NERR_InvalidComputer** MUST be returned if the check fails.

NetSetupDomain

- The name MUST NOT consist entirely of the dot and space characters.

Error **ERROR_INVALID_NAME** MUST be returned if this condition is violated.

All conditions for the **NetSetupWorkgroup** type apply for this type. If the checks for **NetSetupWorkgroup** fail, then all conditions for the **NetSetupDnsMachine** apply for this type.

NetSetupNonExistentDomain

All conditions for the **NetSetupDomain** type apply for this type. Additionally:

- The name MUST contain only characters [\[RFC1035\]](#).

Error **DNS_ERROR_NON_RFC_NAME** MUST be returned if this restriction is violated.

NetSetupDnsMachine

The validation [\[RFC1035\]](#) is performed in the following order. Specifically, the name MUST NOT:

- Contain characters that have any one of the following octal values:

```
001, 002, 003, 004, 005, 006, 007, 010, 011, 012, 013, 014,  
015, 016, 017, 020, 021, 022, 023, 024, 025, 026, 027, 030,  
031, 032, 033, 034, 035, 036, 037
```

- Be longer than 255 octets.
- Contain a label longer than 63 octets.
- Contain two or more consecutive dots.
- Begin with a dot.

Error **ERROR_INVALID_NAME** MUST be returned if any condition in this group is violated.

- Contain a space.
- Contain any of the following characters:

```
{ | } ~ [ \ ] ^ ' : ; < = > ? @ ! " # $ % ^ ` ( ) + / , *
```

Error **DNS_ERROR_INVALID_NAME_CHAR** MUST be returned if any condition in this group is violated.

7. Second, after validating the name syntactically, the method MUST perform the following verification for the respective types of validation:

NetSetupWorkgroup

- The name MUST NOT be the name of the server receiving this call. Error **NERR_InvalidWorkgroupName** MUST be returned if this condition is violated.
- The name MUST be valid for registration as a NetBIOS group name [\[RFC1001\].<105>](#) If the name is not valid then **ERROR_INVALID_PARAMETER** MUST be returned.

NetSetupMachine

- The name MUST be valid for registration as a NetBIOS unique name [\[RFC1001\]](#). Otherwise, the server MUST return **NERR_InvalidComputer**.
- The name MUST NOT be in use by a computer accessible on the network except for the server receiving this call. Error **ERROR_DUP_NAME** MUST be returned if this condition is violated. [<106>](#)

NetSetupDomain

- The name MUST differ from the name of the **built-in domain**, "BUILTIN" ([Builtin Domain Principal View](#), [\[MS-LSAT\]](#) section 3.1.1.1.3); the comparison MUST be case-insensitive. Error **NERR_InvalidComputer** MUST be returned if this condition is violated.
- The name MUST be a name of an existing domain. Error **ERROR_NO_SUCH_DOMAIN** MUST be returned if this condition is not satisfied. [<107>](#)

NetSetupNonExistentDomain

- The name MUST differ from the name of the built-in domain, "BUILTIN" (Builtin Domain Principal View, [\[MS-LSAT\]](#) section 3.1.1.1.3); the comparison MUST be case-insensitive. Error **NERR_InvalidComputer** MUST be returned if this condition is violated.
- The name MUST NOT be a name of an existing domain accessible on the network. Error **ERROR_DUP_NAME** MUST be returned if this condition is not satisfied. [<108>](#)

If no errors occur, the server MUST return **NERR_Success**.

3.2.4.13 NetrGetJoinableOUs2 (Opnum 26)

The **NetrGetJoinableOUs2** method returns a list of organizational units (OUs) in which the user can create an object. [<109>](#)

```
unsigned long NetrGetJoinableOUs2(
    [in] handle_t RpcBindingHandle,
    [in, string, unique] wchar_t* ServerName,
    [in, string] wchar_t* DomainNameParam,
    [in, string, unique] wchar_t* AccountName,
    [in, unique] PJOINPR_ENCRYPTED_USER_PASSWORD Password,
    [in, out] unsigned long* OUCount,
    [out, string, size_is(*OUCount)]
    wchar_t*** OUs
);
```

RpcBindingHandle: An RPC binding handle [\[C706\]](#).

ServerName: This parameter has no effect on message processing in any environment. The client MUST set this parameter to a value that resolves to the IP protocol layer destination address of the RPC packets it transmits (see section [2.1.1.2](#) of [\[MS-RPCE\]](#) for more details). The server MUST ignore this parameter.

DomainNameParam: A pointer to a string that specifies the root domain under which the method will search for OUs. This parameter is also the domain of the account that the *AccountName* parameter is in.

AccountName: A pointer to a string that specifies the account name to use when connecting to a domain controller. This parameter is optional. If this parameter is NULL, the caller's account name MUST be used.

Password: An optional pointer to a [JOINPR_ENCRYPTED_USER_PASSWORD structure \(section 2.2.5.18\)](#) that specifies the encrypted password to use with the *AccountName* parameter. If the *AccountName* parameter is NULL, the caller's security context MUST be used, and this parameter MUST be ignored.

OUCount: A pointer to the count of OUs that the method returned. The server MUST ignore this parameter on input.

OUs: A pointer to a pointer of size *OUCount* to a block of strings that are the joinable OUs that the method returned.

Return Values: When the message processing result matches the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x00000057 ERROR_INVALID_PARAMETER	A parameter is incorrect. <110>
0x000006A7 RPC_S_PROTSEQ_NOT_SUPPORTED	The RPC protocol sequence is not supported.
0x0000085E NERR_InvalidAPI	The requested API is not supported on domain controllers.

Any other return value MUST conform to the error code requirements specified in [Protocol Details \(section 3\)](#).

The following definitions are used in the specification of message processing that follows.

- *PasswordString*: A Unicode UTF-8 string containing a password in cleartext.
- *DomainControllerString*: A UTF-8 string that contains the name of a domain controller in the domain that the server is joining.
- *DomainControllerConnection*: An ADCONNECTION_HANDLE ([\[MS-DTYP\]](#)) to a domain controller.
- *LdapResultMessages*: A list of LDAPMessage ([\[RFC2251\]](#)) containing results from an operation performed on DomainControllerConnection.
- *ComputerAccountDN*: A UTF-8 string that contains the DN of the computer account.

The following ordered statements describe the sequence of message processing operations.

1. The server MUST retrieve the RPC protocol sequence used for the current call, as specified in [\[MS-RPCE\]](#) section 3.1.3.4.1, specifying the server binding handle maintained by the RPC

runtime ([\[C706\]](#) section [6.2.1](#)). If that RPC protocol sequence is not **NCACN_NP**, the server SHOULD return **RPC_S_PROTSEQ_NOT_SUPPORTED**.[<111>](#)

2. The server SHOULD[<112>](#) ensure that the caller is local. For information on how to identify that the caller is local, see [MS-RPCE].
3. The server MUST check that the caller has been granted access rights using the algorithm specified in the [Access Control Abstract Data Model \(section 3.2.1.1\)](#), with *Access Request mask* initialized to **WKSTA_NETAPI_QUERY**; if not, the server MUST return **ERROR_ACCESS_DENIED**.
4. If *Password* is NULL then *PasswordString* MUST be NULL. Otherwise, the server MUST decrypt and decode the *Password* (section [2.2.5.18](#)). *PasswordString* MUST equal the decrypted and decoded value. The decrypted buffer is represented as a **JOINPR_USER_PASSWORD**. The value of the **Length** member MUST be less than 513; otherwise, message processing is stopped, and the server MUST return **ERROR_INVALID_PARAMETER**.
5. The server SHOULD[<113>](#) enforce that this call fails on a domain controller. Otherwise, message processing continues.
6. The server MUST locate a domain controller in the domain, by invoking the **DsrGetDcNameEx2** method on the local [\[MS-NRPC\]](#) server specifying the following parameters:
 - *ComputerName* = NULL
 - *AccountName* = NULL
 - *AllowableAccountControlBits* = 0
 - *DomainName* = DomainNameFQDN
 - *DomainGuid* = NULL
 - *SiteName* = NULL
 - *Flags* = (DS_DS_FLAG) ([\[MS-ADTS\]](#) (section [7.3.1.2](#))).

If a domain controller cannot be located, the method MUST fail. Otherwise, *DomainControllerString* MUST equal the string name of the returned writable domain controller.

7. The server invokes [LDAP Bind \(section 3.2.4.18.2\)](#) with the following parameters:
 - *DomainControllerBindTarget*: DomainControllerString
 - *AccountNameForBind*: AccountName
 - *PasswordForBind*: PasswordString
 - *Encrypt*: FALSEThe result is stored in *DomainControllerConnection*.
8. The server invokes the "Performing an LDAP Operation on an ADConnection" task of [\[MS-ADSO\]](#) section 6.2.6.1.6 with the following parameters:
 - *TaskInputADConnection*: DomainControllerConnection
 - *TaskInputRequestMessage*: LDAP SearchRequest message [\[RFC2251\]](#) section 4.5.1 as follows:

- baseObject: The root of the default naming context
 - scope: wholeSubtree
 - filter: ObjectClass=OrganizationalUnit
 - attributes: AllowedChildClassesEffective
 - derefAliases: neverDerefAliases
 - typesOnly: FALSE
 - *TaskOutputResultMessages*: LDAPResultMessages
9. The server MUST process the results returned from the DC in LDAPResultMessages. For each entry (SearchResultEntry, [RFC2251](#) section 4.5.2) returned by the search in LDAPResultMessages, if the AllowedChildClassesEffective attribute contains the value "computer", the server MUST add the DN of that entry to the results to be returned in OUs as a NULL-terminated string, and increment the value in *OUCount*.
10. The server invokes [LDAP Unbind \(section 3.2.4.18.3\)](#) with *ADConnectionToUnbind* set to DomainControllerConnection.

If no errors occur, the server MUST return **NERR_Success**.

3.2.4.14 NetrAddAlternateComputerName (Opnum 27)

The **NetrAddAlternateComputerName** method adds an alternate name for a specified server. [<114>](#)

```
unsigned long NetrAddAlternateComputerName(
    [in] handle_t RpcBindingHandle,
    [in, string, unique] wchar_t* ServerName,
    [in, string, unique] wchar_t* AlternateName,
    [in, string, unique] wchar_t* DomainAccount,
    [in, unique] PJOINPR_ENCRYPTED_USER_PASSWORD EncryptedPassword,
    [in] unsigned long Reserved
);
```

RpcBindingHandle: An RPC binding handle [\[C706\]](#).

ServerName: This parameter has no effect on message processing in any environment. The client MUST set this parameter to a value that resolves to the IP protocol layer destination address of the RPC packets it transmits (see section [2.1.1.2](#) of [\[MS-RPCE\]](#) for more details). The server MUST ignore this parameter.

AlternateName: A pointer to a string that specifies the new alternate name to add. The name MUST be a valid DNS host name [\[RFC1035\]](#).

DomainAccount: A pointer to a string that specifies the account name in the domain to use when connecting to a domain controller. This parameter is optional. If this parameter is NULL, the caller's account name MUST be used. If this parameter is specified, the format MUST be one of the following:

- <NetBIOSDomainName>\<UserName>
- <FullyQualifiedDNSDomainName>\<UserName>

- <UserName>@<FullyQualifiedDNSDomainName>

EncryptedPassword: An optional pointer to a [JOINPR ENCRYPTED USER PASSWORD structure \(section 2.2.5.18\)](#) that specifies the encrypted password to use with the *DomainAccount* parameter. If the *DomainAccount* parameter is NULL, the caller's security context MUST be used, and this parameter MUST be ignored.

Reserved: A 32-bit bitfield that SHOULD be set to zero.

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	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I U

Where the bits are defined as:

Value	Description
IU NET_IGNORE_UNSUPPORTED_FLAGS	If 1, the server MUST ignore the values of the other bits in this field. If 0, the values of the other bits in this field MUST be 0; otherwise, the server MUST return ERROR_INVALID_FLAGS .<115>

Return Values: When the message processing result matches the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x00000032 ERROR_NOT_SUPPORTED	This method is not supported by this server.
0x00000056 ERROR_INVALID_PASSWORD	The specified network password is incorrect.
0x0000007B ERROR_INVALID_NAME	The file name, directory name, or volume label syntax is incorrect.
0x000003EC ERROR_INVALID_FLAGS	Reserved contains an invalid value.
0x000006A7 RPC_S_PROTSEQ_NOT_SUPPORTED	The RPC protocol sequence is not supported.
0x000006FF RPC_S_CALL_IN_PROGRESS	A remote procedure call is already in progress.<116>

Return value/code	Description
0x00002558 DNS_ERROR_INVALID_NAME_CHAR	The Internet host name contains an invalid character.

Any other return value MUST conform to the error code requirements specified in [Protocol Details \(section 3\)](#).

Unless otherwise noted, if the server encounters an error during message processing, it SHOULD revert any state changes made, MUST stop message processing, and MUST return the error to the caller. <117>

These definitions are used in the specification of message processing that follows.

- *DomainObject*: An object in the domain database ([\[MS-ADTS\]](#) section 7.4) that has the value of **ComputerNameNetBIOS** suffixed with a "\$" character for the **SamAccountName** attribute.
- *NewAlternateNames*: MUST be a new tuple entry for **alternate-computer-names** (section [3.2.1.2](#)).
- *PasswordString*: A UTF-8 string containing a password in cleartext.
- *DomainControllerString*: A UTF-8 string that contains the name of a domain controller in the domain that the server is joining.
- *DomainControllerConnection*: An ADConnection ([\[MS-ADSO\]](#) section 6.2.3) to a domain controller.
- *WritableDomainControllerDN*: A UTF-8 string that contains the DN of the nTDSDSA object for the domain controller named in *DomainControllerString*.
- *ReadOnlyDomainControllerConnection*: An ADConnection ([\[MS-ADSO\]](#) section 6.2.3) to a read-only domain controller.
- *LdapResultMessages*: A list of LDAPMessage ([\[RFC2251\]](#)) containing results from an operation performed on DomainControllerConnection.
- *ComputerAccountDN*: A UTF-8 string that contains the DN of the computer account.
- *ComputerAccountExtendedDN*: A UTF-8 string that contains the extended DN of the computer account.
- *IsRODC*: A Boolean that is TRUE if the server is a read-only domain controller as specified in [\[MS-DRDM\]](#) section 5.6 and FALSE otherwise.

The following ordered statements describe the sequence of message processing operations.

1. The server MUST retrieve the RPC protocol sequence used for the current call, as specified in [\[MS-RPCE\]](#) section 3.1.3.4.1, specifying the server binding handle maintained by the RPC runtime ([\[C706\]](#) section [6.2.1](#)). If that RPC protocol sequence is not **NCACN_NP**, the server SHOULD return **RPC_S_PROTSEQ_NOT_SUPPORTED**. <118>
2. The server MUST check that the caller has been granted access rights using the algorithm specified in the [Access Control Abstract Data Model \(section 3.2.1.1\)](#), with *Access Request mask* initialized to **WKSTA_NETAPI_CHANGE_CONFIG**; if not, the server MUST return **ERROR_ACCESS_DENIED**.

3. The server SHOULD [<119>](#) stop message processing and return **ERROR_NOT_SUPPORTED** if the server is a client **Stock Keeping Unit (SKU)**. Otherwise, message processing continues.
4. If *EncryptedPassword* is NULL, then *PasswordString* MUST be NULL. Otherwise, the server MUST decrypt and decode the *EncryptedPassword* (section [2.2.5.18](#)). *PasswordString* MUST be equal to the decrypted and decoded value. The decrypted buffer is represented as a [JOINPR USER PASSWORD](#). The value of the **Length** member MUST be less than 513; otherwise, message processing is stopped, and the server MUST return **ERROR_INVALID_PASSWORD**.
5. The server MUST validate *AlternateName*. The validation [\[RFC1035\]](#) is performed in the following order. Specifically, the name MUST NOT:
 - Be longer than 255 octets.
 - Contain a label longer than 63 octets.
 - Contain two or more consecutive dots.
 - Begin with a dot.
6. The error **ERROR_INVALID_NAME** MUST be returned if any condition in the preceding group is violated. Otherwise, *AlternateName* validation continues. The name MUST NOT:
 - Contain a space.
 - Contain any of the following characters:


```
{ | } ~ [ \ ] ^ ' : ; < = > ? @ ! " # $ % ^ ` ( ) + / , *
```
7. The error **DNS_ERROR_INVALID_NAME_CHAR** MUST be returned if any condition in the preceding group is violated. Otherwise, *AlternateName* validation continues.
 - *NewAlternateNames.FQDN* MUST be equal to *AlternateName*.
 - *NewAlternateNames.NetBIOS* MUST be equal to *NewAlternateNames.FQDN* converted to a NetBIOS name. [<120>](#)
8. *NewAlternateNames* MUST be appended to the list in **alternate-computer-names** persisted locally such that the set of NetBIOS and Internet host name currently assigned to this computer can be resolved on the network ([\[RFC1001\]](#) and [\[NIS\]](#)).
9. If the server is joined to a domain ([\[MS-ADTS\]](#) section 7.4), the server MUST make the following update in the domain.
10. The server MUST locate a writable domain controller for the domain to which the computer is joined, by invoking the **DsrGetDcNameEx2** method on the local [\[MS-NRPC\]](#) server specifying the following parameters:
 - *ComputerName* = NULL
 - *AccountName* = *ComputerNameNetBIOS*
 - *AllowableAccountControlBits* = ADS_UF_WORKSTATION_TRUST_ACCOUNT | ADS_UF_SERVER_TRUST_ACCOUNT ([\[MS-ADTS\]](#) (section [2.2.15](#)))
 - *DomainName* = *DomainNameFQDN*

- *DomainGuid* = NULL
- *SiteName* = NULL
- *Flags* = (DS_WRITABLE_FLAG | DS_DS_FLAG) ([\[MS-ADTS\] \(section 7.3.1.2\)](#)).

If a domain controller cannot be located, the method MUST fail.

Otherwise, *DomainControllerString* MUST equal the string name of the returned writable domain controller.

11. The server invokes section [3.2.4.18.2](#), "LDAP Bind", with the following parameters:

- *DomainControllerBindTarget*: *DomainControllerString*
- *AccountNameForBind*: *AccountName*
- *PasswordForBind*: *PasswordString*
- *Encrypt*: FALSE
- *DisallowReferrals*: TRUE

The result is stored in *DomainControllerConnection*.

12. If *IsRODC* is TRUE, the server invokes section [3.2.4.18.2](#), "LDAP Bind", with the following parameters:

- *DomainControllerBindTarget*: **ComputerNameNetBIOS**
- *AccountNameForBind*: *AccountName*
- *PasswordForBind*: *PasswordString*
- *Encrypt*: FALSE
- *DisallowReferrals*: TRUE

The result is stored in *ReadOnlyDomainControllerConnection*.

13. The server invokes [Query Computer Account DN for the Local Machine \(section 3.2.4.18.1\)](#), specifying *DomainControllerString* for the *DomainControllerQueryTarget* parameter, storing the result in *ComputerAccountDN*.

14. The server invokes the "Performing an LDAP Operation on an ADConnection" task of [\[MS-ADSO\] section 6.2.6.1.6](#) with the following parameters:

- *TaskInputADConnection*: *DomainControllerConnection*
- *TaskInputRequestMessage*: LDAP modifyRequest message ([\[RFC2251\] section 4.6](#)) as follows:
 - Object: *ComputerAccountDN*
 - The modification sequence has one list entry, set as follows:
 - First list entry
 - operation: replace

- modification:
 - type: msDS-AdditionalDnsHostName
 - vals: NewAlternateNames.FQDN
- controls: Sequence of one Control structure, as follows:
 - controlType: LDAP_SERVER_PERMISSIVE_MODIFY_OID ([\[MS-ADTS\] \(section 3.1.1.3.4.1.8\)](#))
 - criticality: FALSE
- *TaskOutputResultMessages*: LDAPResultMessages

15.If *IsRODC* is TRUE, the server invokes the "Performing an LDAP Operation on an ADConnection" task of [\[MS-ADSO\]](#) section 6.2.6.1.6 with the following parameters:

- *TaskInputADConnection*: DomainControllerConnection
- *TaskInputRequestMessage*: LDAP SearchRequest message ([\[RFC2251\]](#) section 4.5.1) as follows:
 - baseObject: DN of the rootDSE (empty string)
 - scope: base
 - filter: ObjectClass=*
 - attributes: dsServiceName
 - derefAliases: neverDerefAliases
 - typesOnly: FALSE
- *TaskOutputResultMessages*: LDAPResultMessages

The server MUST process the results returned from the DC in LDAPResultMessages. For the entry (SearchResultEntry, [\[RFC2251\]](#) section 4.5.2) returned by the search in LDAPResultMessages, WritableDomainControllerDN MUST equal the value of the attribute dsServiceName.

16.If *IsRODC* is TRUE, the server invokes the "Performing an LDAP Operation on an ADConnection" task of [\[MS-ADSO\]](#) section 6.2.6.1.6 with the following parameters:

- *TaskInputADConnection*: DomainControllerConnection
- *TaskInputRequestMessage*: LDAP SearchRequest message ([\[RFC2251\]](#) section 4.5.1) as follows:
 - baseObject: ComputerAccountDN
 - scope: base
 - filter: ObjectClass=*
 - attributes: distinguishedName, serverReferenceBL
 - derefAliases: neverDerefAliases

- typesOnly: FALSE
- controls: Sequence of one Control structure, as follows:
 - controlType: LDAP_SERVER_EXTENDED_DN_OID ([\[MS-ADTS\]](#) section 3.1.1.3.4.1.5)
 - criticality: TRUE
- *TaskOutputResultMessages*: LDAPResultMessages

The server MUST process the results returned from the DC in LDAPResultMessages. For the entry (SearchResultEntry, [\[RFC2251\]](#) section 4.5.2) returned by the search in LDAPResultMessages, ComputerAccountExtendedDN MUST equal the value of the attribute distinguishedName unless distinguishedName contains the character ';'. If ';' is present, ComputerAccountExtendedDN MUST equal distinguishedName truncated at the first occurrence of the character ';', exclusive of the ';' itself.

17.If *IsRODC* is TRUE, the server invokes the "Performing an LDAP Operation on an ADConnection" task of [\[MS-ADSO\]](#) section 6.2.6.1.6 with the following parameters:

- *TaskInputADConnection*: ReadOnlyDomainControllerConnection
- *TaskInputRequestMessage*: LDAP modifyRequest message ([\[RFC2251\]](#) section 4.6) as follows:
 - Object: DN of the rootDSE (empty string)
 - The modification sequence has one list entry, set as follows:
 - First list entry
 - operation: replace
 - modification:
 - type: replicateSingleObject ([\[MS-ADTS\]](#) section 3.1.1.3.3.17)
 - vals: WritableDomainControllerDN:ComputerAccountExtendedDN
- *TaskOutputResultMessages*: LDAPResultMessages

18.The server invokes "LDAP Unbind" (section [3.2.4.18.3](#)) with ADConnectionToUnbind set to DomainControllerConnection.

19.If *IsRODC* is TRUE, the server invokes "LDAP Unbind" (section [3.2.4.18.3](#)) with ADConnectionToUnbind set to ReadOnlyDomainControllerConnection.

If no errors occur, the server MUST return **NERR_Success**.

3.2.4.15 NetrRemoveAlternateComputerName (Opnum 28)

The **NetrRemoveAlternateComputerName** method removes an alternate name for a specified server. [<121>](#)

```
unsigned long NetrRemoveAlternateComputerName(
    [in] handle_t RpcBindingHandle,
    [in, string, unique] wchar_t* ServerName,
    [in, string, unique] wchar_t* AlternateName,
    [in, string, unique] wchar_t* DomainAccount,
```

```

[in, unique] PJOINPR_ENCRYPTED_USER_PASSWORD EncryptedPassword,
[in] unsigned long Reserved
);

```

RpcBindingHandle: An RPC binding handle [\[C706\]](#).

ServerName: This parameter has no effect on message processing in any environment. The client MUST set this parameter to a value that resolves to the IP protocol layer destination address of the RPC packets it transmits (see section [2.1.1.2](#) of [\[MS-RPCE\]](#) for more details). The server MUST ignore this parameter.

AlternateName: A pointer to a string that specifies the alternate name to remove. The name MUST be a valid DNS host name [\[RFC1035\]](#).

DomainAccount: A pointer to a string that specifies the account name in the domain to use when connecting to a domain controller. This parameter is optional. If this parameter is NULL, the caller's account name MUST be used. If this parameter is specified, the format MUST be one of the following:

- <NetBIOSDomainName>\<UserName>
- <FullyQualifiedDNSDomainName>\<UserName>
- <UserName>@<FullyQualifiedDNSDomainName>

EncryptedPassword: An optional pointer to a [JOINPR_ENCRYPTED_USER_PASSWORD structure \(section 2.2.5.18\)](#) that specifies the encrypted password to use with the *DomainAccount* parameter. If the *DomainAccount* parameter is NULL, the caller's security context MUST be used, and this parameter MUST be ignored.

Reserved: A 32-bit bitfield that SHOULD be set to zero.

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	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I
																															U	

Where the bits are defined as:

Value	Description
IU NET_IGNORE_UNSUPPORTED_FLAGS	If 1, the server MUST ignore the values of the other bits in this field. If 0, the values of the other bits in this field MUST be 0; otherwise, the server MUST return ERROR_INVALID_FLAGS . <122>

Return Values: When the message processing result matches the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x00000032 ERROR_NOT_SUPPORTED	This method is not supported by this server.
0x00000056 ERROR_INVALID_PASSWORD	The specified network password is not correct.
0x0000007B ERROR_INVALID_NAME	An invalid name parameter is specified.
0x000003EC ERROR_INVALID_FLAGS	The <i>Reserved</i> parameter contains an invalid value.
0x00000490 ERROR_NOT_FOUND	<i>AlternateName</i> was not found in the current list of alternate names.
0x000006A7 RPC_S_PROTSEQ_NOT_SUPPORTED	The RPC protocol sequence is not supported.
0x000006FF RPC_S_CALL_IN_PROGRESS	A remote procedure call is already in progress. <123>
0x00002558 DNS_ERROR_INVALID_NAME_CHAR	The Internet host name contains an invalid character.

Any other return value MUST conform to the error code requirements specified in [Protocol Details \(section 3\)](#).

Unless otherwise noted, if the server encounters an error during message processing, the server SHOULD revert any state changes made, MUST stop message processing, and MUST return the error to the caller. <124>

The following definitions are used in the specification of message processing that follows.

- *DomainObject*: MUST be an object in the domain database ([\[MS-ADTS\]](#) section 7.4) that has the value of **ComputerNameNetBIOS** suffixed with a "\$" character for the **SamAccountName** attribute.
- *OldAlternateNames*: MUST be a tuple entry for **alternate-computer-names** (section [3.2.1.2](#)).
- *PasswordString*: A UTF-8 string containing a password in cleartext.
- *DomainControllerString*: A UTF-8 string that contains the name of a domain controller in the domain that the server is joining.
- *DomainControllerConnection*: An ADCONNECTION_HANDLE ([\[MS-DTYP\]](#)) to a domain controller.
- *WritableDomainControllerDN*: A UTF-8 string that contains the DN of the nTDSDSA object for the domain controller named in *DomainControllerString*.

- *ReadOnlyDomainControllerConnection*: An ADConnection ([\[MS-ADSO\]](#) section 6.2.3) to a read-only domain controller.
- *LdapResultMessages*: A list of LDAPMessage ([\[RFC2251\]](#)) containing results from an operation performed on DomainControllerConnection.
- *ComputerAccountDN*: A UTF-8 string that contains the DN of the computer account.
- *ComputerAccountExtendedDN*: A UTF-8 string that contains the extended DN of the computer account.
- *IsRODC*: A Boolean that is TRUE if the server is a read-only domain controller as specified in [\[MS-DRDM\]](#) section 5.6 and FALSE otherwise.

The following ordered statements describe the sequence of message processing operations.

1. The server MUST retrieve the RPC protocol sequence used for the current call, as specified in [\[MS-RPCE\]](#) section 3.1.3.4.1, specifying the server binding handle maintained by the RPC runtime ([\[C706\]](#) section [6.2.1](#)). If that RPC protocol sequence is not **NCACN_NP**, the server SHOULD return **RPC_S_PROTSEQ_NOT_SUPPORTED**.[<125>](#)
2. The server MUST check that the caller has been granted access rights using the algorithm specified in the [Access Control Abstract Data Model \(section 3.2.1.1\)](#), with *Access Request mask* initialized to **WKSTA_NETAPI_CHANGE_CONFIG**; if not, the server MUST return **ERROR_ACCESS_DENIED**.
3. The server SHOULD[<126>](#) return **ERROR_NOT_SUPPORTED** if the server is a client SKU configuration.
4. If *EncryptedPassword* is NULL, then *PasswordString* MUST be NULL. Otherwise, the server MUST decrypt and decode the *EncryptedPassword* (section [2.2.5.18](#)). *PasswordString* MUST equal the decrypted and decoded value. The decrypted buffer is represented as a [JOINPR_USER_PASSWORD](#). The value of the **Length** member MUST be less than 513; otherwise, message processing is stopped, and the server MUST return **ERROR_INVALID_PASSWORD**.
5. The server MUST validate *AlternateName*. The validation [\[RFC1035\]](#) is performed in the following order. Specifically, the name MUST NOT:
 - Be longer than 255 octets.
 - Contain a label longer than 63 octets.
 - Contain two or more consecutive dots.
 - Begin with a dot.
6. The error **ERROR_INVALID_NAME** MUST be returned if any condition in the preceding group is violated. Otherwise, *AlternateName* validation continues. The name MUST NOT:
 - Contain a space.
 - Contain any of the following characters:

{ | } ~ [\] ^ ' : ; < = > ? @ ! " # \$ % ^ ` () + / , *

7. The error **DNS_ERROR_INVALID_NAME_CHAR** MUST be returned if any condition in the preceding group is violated. Otherwise, *AlternateName* validation continues.
 - The server MUST locate the tuple *OldAlternateNames* in **alternate-computer-names** (section [3.2.1.2](#)), where *OldAlternateNames.FQDN* MUST equal *AlternateName*.
 - *OldAlternateNames.NetBIOS* MUST equal *AlternateName* converted to a NetBIOS name. [<127>](#) If tuple *OldAlternateNames* cannot be found the server MUST return **ERROR_NOT_FOUND**.
8. If *OldAlternateNames* is found, then *OldAlternateNames* MUST be removed from the list in **alternate-computer-names** persisted locally, so that the set of NetBIOS and Internet host names currently assigned to this computer can be resolved on the network [\[RFC1001\]](#) [\[NIS\]](#).
9. If the server is joined to a domain ([\[MS-ADTS\]](#) section 7.4), then the server MUST make the following update in the domain.
10. The server MUST locate a writable domain controller for the domain to which the computer is joined, by invoking the **DsrGetDcNameEx2** method on the local [\[MS-NRPC\]](#) server specifying the following parameters:
 - *ComputerName* = NULL
 - *AccountName* = *ComputerNameNetBIOS*
 - *AllowableAccountControlBits* = ADS_UF_WORKSTATION_TRUST_ACCOUNT | ADS_UF_SERVER_TRUST_ACCOUNT ([\[MS-ADTS\]](#) (section [2.2.15](#)))
 - *DomainName* = *DomainNameFQDN*
 - *DomainGuid* = NULL
 - *SiteName* = NULL
 - *Flags* = (DS_WRITABLE_FLAG | DS_DS_FLAG) ([\[MS-ADTS\]](#) (section [7.3.1.2](#))).

If a domain controller cannot be located, the method MUST fail.

Otherwise, *DomainControllerString* MUST equal the string name of the returned writable domain controller.

11. The server invokes section [3.2.4.18.2](#), "LDAP Bind", with the following parameters:
 - *DomainControllerBindTarget*: *DomainControllerString*
 - *AccountNameForBind*: *AccountName*
 - *PasswordForBind*: *PasswordString*
 - *Encrypt*: FALSE
 - *DisallowReferrals*: TRUE

The result is stored in *DomainControllerConnection*.

12. If *IsRODC* is TRUE, the server invokes section [3.2.4.18.2](#), "LDAP Bind", with the following parameters:
 - *DomainControllerBindTarget*: **ComputerNameNetBIOS**

- *AccountNameForBind*: AccountName
- *PasswordForBind*: PasswordString
- *Encrypt*: FALSE
- *DisallowReferrals*: TRUE

The result is stored in *ReadOnlyDomainControllerConnection*.

13. The server invokes section [3.2.4.18.1](#), "Query computer account DN for the local machine", specifying *DomainControllerString* for the *DomainControllerQueryTarget* parameter, storing the result in *ComputerAccountDN*.

14. The server invokes the "Performing an LDAP Operation on an ADConnection" task of [\[MS-ADSO\]](#) section 6.2.6.1.6 with the following parameters:

- *TaskInputADConnection*: DomainControllerConnection
- *TaskInputRequestMessage*: LDAP modifyRequest message ([\[RFC2251\]](#) section 4.6) as follows:
 - Object: ComputerAccountDN
 - The modification sequence has one list entry, set as follows:
 - First list entry
 - operation: delete
 - modification:
 - type: msDS-AdditionalDnsHostName
 - vals: OldAlternateNames.FQDN
 - controls: Sequence of one Control structure, as follows:
 - controlType: LDAP_SERVER_PERMISSIVE_MODIFY_OID ([\[MS-ADTS\]](#) (section [3.1.1.3.4.1.8](#)))
 - criticality: FALSE
- *TaskOutputResultMessages*: LDAPResultMessages

15. If *IsRODC* is TRUE, the server invokes the "Performing an LDAP Operation on an ADConnection" task of [\[MS-ADSO\]](#) section 6.2.6.1.6 with the following parameters:

- *TaskInputADConnection*: DomainControllerConnection
- *TaskInputRequestMessage*: LDAP SearchRequest message ([\[RFC2251\]](#) section 4.5.1) as follows:
 - baseObject: DN of the rootDSE (empty string)
 - scope: base
 - filter: ObjectClass=*
 - attributes: dsServiceName

- *derefAliases*: neverDerefAliases
- *typesOnly*: FALSE
- *TaskOutputResultMessages*: LDAPResultMessages

The server MUST process the results returned from the DC in LDAPResultMessages. For the entry (SearchResultEntry, [\[RFC2251\]](#) section 4.5.2) returned by the search in LDAPResultMessages, the WritableDomainControllerDN MUST equal the value of the attribute dsServiceName.

16.If *IsRODC* is TRUE, the server invokes the "Performing an LDAP Operation on an ADConnection" task of [\[MS-ADSO\]](#) section 6.2.6.1.6 with the following parameters:

- *TaskInputADConnection*: DomainControllerConnection
- *TaskInputRequestMessage*: LDAP SearchRequest message ([\[RFC2251\]](#) section 4.5.1) as follows:
 - *baseObject*: ComputerAccountDN
 - *scope*: base
 - *filter*: ObjectClass=*
 - *attributes*: distinguishedName, serverReferenceBL
 - *derefAliases*: neverDerefAliases
 - *typesOnly*: FALSE
 - *controls*: Sequence of one Control structure, as follows:
 - *controlType*: LDAP_SERVER_EXTENDED_DN_OID ([\[MS-ADTS\]](#) section 3.1.1.3.4.1.5)
 - *criticality*: TRUE
- *TaskOutputResultMessages*: LDAPResultMessages

The server MUST process the results returned from the DC in LDAPResultMessages. For the entry (SearchResultEntry, [\[RFC2251\]](#) section 4.5.2) returned by the search in LDAPResultMessages, ComputerAccountExtendedDN MUST equal the value of the attribute distinguishedName unless distinguishedName contains the character ';'. If ';' is present, ComputerAccountExtendedDN MUST equal distinguishedName truncated at the first occurrence of the character ';', exclusive of the ';' itself.

17.If *IsRODC* is TRUE, the server invokes the "Performing an LDAP Operation on an ADConnection" task of [\[MS-ADSO\]](#) section 6.2.6.1.6 with the following parameters:

- *TaskInputADConnection*: ReadOnlyDomainControllerConnection
- *TaskInputRequestMessage*: LDAP modifyRequest message ([\[RFC2251\]](#) section 4.6) as follows:
 - *Object*: DN of the rootDSE (empty string)
 - The modification sequence has one list entry, set as follows:
 - First list entry
 - *operation*: replace

- modification:
 - type: replicateSingleObject ([\[MS-ADTS\]](#) section 3.1.1.3.3.17)
 - vals: WritableDomainControllerDN:ComputerAccountExtendedDN
 - *TaskOutputResultMessages*: LDAPResultMessages
18. The server invokes section [3.2.4.18.3](#), "LDAP Unbind", with ADConnectionToUnbind set to DomainControllerConnection.
19. If *IsRODC* is TRUE, the server invokes "LDAP Unbind" (section [3.2.4.18.3](#)) with ADConnectionToUnbind set to ReadOnlyDomainControllerConnection.
- If no errors occur, the server MUST return **NERR_Success**.

3.2.4.16 NetrSetPrimaryComputerName (Opnum 29)

The **NetrSetPrimaryComputerName** method sets the primary computer name for a specified server. [<128>](#)

```
unsigned long NetrSetPrimaryComputerName(
    [in] handle_t RpcBindingHandle,
    [in, string, unique] wchar_t* ServerName,
    [in, string, unique] wchar_t* PrimaryName,
    [in, string, unique] wchar_t* DomainAccount,
    [in, unique] PJOINPR_ENCRYPTED_USER_PASSWORD EncryptedPassword,
    [in] unsigned long Reserved
);
```

RpcBindingHandle: An RPC binding handle [\[C706\]](#).

ServerName: This parameter has no effect on message processing in any environment. The client MUST set this parameter to a value that resolves to the IP protocol layer destination address of the RPC packets it transmits (see section [2.1.1.2](#) of [\[MS-RPCE\]](#) for more details). The server MUST ignore this parameter.

PrimaryName: A pointer to a string that specifies the primary computer name to set. The name MUST be a valid DNS host name [\[RFC1035\]](#).

DomainAccount: A pointer to a string that specifies the account name in the joined domain to use when connecting to a domain controller. This parameter is optional. If this parameter is NULL, the caller's account name MUST be used. This parameter is not used if the server is not joined to a domain.

- <NetBIOSDomainName>\<UserName>
- <FullyQualifiedDNSDomainName>\<UserName>
- <UserName>@<FullyQualifiedDNSDomainName>

EncryptedPassword: An optional pointer to a [JOINPR_ENCRYPTED_USER_PASSWORD structure \(section 2.2.5.18\)](#) that specifies the encrypted password to use with the *DomainAccount* parameter. If the *DomainAccount* parameter is NULL, the caller's security context MUST be used, and this parameter MUST be ignored.

Reserved: A 32-bit bitfield that SHOULD be set to zero.

0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I
																															U	

Where the bits are defined as:

Value	Description
IU NET_IGNORE_UNSUPPORTED_FLAGS	If 1, the server MUST ignore the values of the other bits in this field. If 0, the values of the other bits in this field MUST be 0; otherwise, the server MUST return ERROR_INVALID_FLAGS.<129>

Return Values: When the message processing result matches the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x00000032 ERROR_NOT_SUPPORTED	This method is not supported by this server.
0x00000056 ERROR_INVALID_PASSWORD	The specified network password is incorrect.
0x00000057 ERROR_INVALID_PARAMETER	The parameter is incorrect.
0x0000007B ERROR_INVALID_NAME	An invalid name parameter is specified.
0x000003EC ERROR_INVALID_FLAGS	Reserved contains an invalid value.
0x000006A7 RPC_S_PROTSEQ_NOT_SUPPORTED	The RPC protocol sequence is not supported.
0x000006FF RPC_S_CALL_IN_PROGRESS	A remote procedure call is already in progress.<130>
0x00002558 DNS_ERROR_INVALID_NAME_CHAR	The Internet host name contains an invalid character.

Any other return value MUST conform to the error code requirements specified in [Protocol Details \(section 3\)](#).

Unless otherwise noted, if the server encounters an error during message processing, the server SHOULD revert any state changes made, MUST stop message processing, and MUST return the error to the caller. <131>

The following definitions are used in the specification of message processing that follows.

- *DomainObject*: An object in the domain database ([\[MS-ADTS\]](#) section 7.4) that has the value of **ComputerNameNetBIOS** suffixed with a "\$" character for the **SamAccountName** attribute.
- *OldAlternateNames*: MUST be a tuple entry for **alternate-computer-names** (section [3.2.1.2](#)).
- *NewAlternateNames*: MUST be a new tuple entry for **alternate-computer-names** (section [3.2.1.2](#)).
- *NetBIOSNameString*: A Unicode UTF-8 string containing the value of *PrimaryName* converted to a NetBIOS name.
- *I*: Unsigned integer used for indexing **alternate-computer-names**.
- *ComputerAccountString*: A UTF-8 string containing the value to be stored in the **samAccountName** attribute of the computer object in the domain database.
- *PasswordString*: A UTF-8 string containing a password in cleartext.
- *DomainControllerString*: A UTF-8 string that contains the name of a domain controller in the domain that the server is joining.
- *DomainControllerConnection*: An ADCONNECTION_HANDLE ([\[MS-DTYP\]](#)) to a domain controller.
- *WritableDomainControllerDN*: A UTF-8 string that contains the DN of the nTDSDSA object for the domain controller named in *DomainControllerString*.
- *ReadOnlyDomainControllerConnection*: An ADConnection ([\[MS-ADSO\]](#) section 6.2.3) to a read-only domain controller.
- *LdapResultMessages*: A list of LDAPMessage ([\[RFC2251\]](#)) containing results from an operation performed on DomainControllerConnection.
- *ComputerAccountDN*: A UTF-8 string that contains the DN of the computer account.
- *ComputerAccountExtendedDN*: A UTF-8 string that contains the extended DN of the computer account.
- *ServerObjectDN*: A UTF-8 string that contains the DN of the nTDSDSA object for the server, when the server is an RODC.
- *IsRODC*: A Boolean that is TRUE if the server is a read-only domain controller as specified in [\[MS-DRDM\]](#) section 5.6 and FALSE otherwise.

The following ordered statements describe the sequence of message processing operations.

1. The server MUST retrieve the RPC protocol sequence used for the current call, as specified in [\[MS-RPCE\]](#) section 3.1.3.4.1, specifying the server binding handle maintained by the RPC runtime ([\[C706\]](#) section [6.2.1](#)). If that RPC protocol sequence is not **NCACN_NP**, the server SHOULD return **RPC_S_PROTSEQ_NOT_SUPPORTED**. <132>
2. The server MUST check that the caller has been granted access rights using the algorithm specified in the [Access Control Abstract Data Model \(section 3.2.1.1\)](#), with *Access Request mask*

initialized to **WKSTA_NETAPI_CHANGE_CONFIG**; if not, the server MUST return **ERROR_ACCESS_DENIED**.

3. The server SHOULD [<133>](#) return **ERROR_NOT_SUPPORTED** if the server is a client SKU configuration.
4. If *EncryptedPassword* is NULL, then *PasswordString* MUST be NULL. Otherwise, the server MUST decrypt and decode the *EncryptedPassword* (section [2.2.5.18](#)). *PasswordString* MUST equal the decrypted and decoded value. The decrypted buffer is represented as a [JOINPR_USER_PASSWORD](#). The value of the **Length** member MUST be less than 513; otherwise, message processing is stopped, and the server MUST return **ERROR_INVALID_PASSWORD**.
5. The server MUST validate *PrimaryName*. The validation [\[RFC1035\]](#) is performed in the following order. Specifically, the name MUST NOT:
 - Be longer than 255 octets.
 - Contain a label longer than 63 octets.
 - Contain two or more consecutive dots.
 - Begin with a dot.
6. Error **ERROR_INVALID_NAME** MUST be returned if any condition in the preceding group is violated. Otherwise, *PrimaryName* validation continues. The name MUST NOT:
 - Contain a space.
 - Contain any of the following characters:


```
{ | } ~ [ \ ] ^ ' : ; < = > ? @ ! " # $ % ^ ` ( ) + / , * 
```
7. Error **DNS_ERROR_INVALID_NAME_CHAR** MUST be returned if any condition in the preceding group is violated. Otherwise, processing continues.
8. The server MUST convert the name in the *PrimaryName* parameter to a string NetBIOS name. [<134>](#) This conversion MUST match the conversion used in [\[MS-NRPC\]](#). *NetBIOSNameString* MUST be equal to this converted value.
9. The server MUST locate the tuple in the list of **alternate-computer-names** (section [3.2.1.2](#)), where *alternate-computer-names[I].FQDN* is equal to *PrimaryName* and *alternate-computer-names[I].NetBIOS* MUST be equal to *NetBIOSNameString*. *OldAlternateNames* MUST be equal to the tuple identified.
10. The server MUST remove the tuple located above from the list in **alternate-computer-names** persisted locally.
11. *NewAlternateNames.FQDN* MUST be equal to the current **ComputerNameFQDN**.
12. *NewAlternateNames.NetBIOS* MUST be equal to the current **ComputerNameNetBIOS**.
13. *NewAlternateNames* MUST be appended to the list in **alternate-computer-names** persisted locally.
14. The server MUST set **ComputerNameNetBIOS** to equal *NetBIOSNameString*.

15. The server MUST set **ComputerNameFQDN** to equal *PrimaryName*.
16. *ComputerAccountString* MUST be a UTF-8 string consisting of **ComputerNameNetBIOS** suffixed with a "\$" character.
17. The server MUST store the values **ComputerName.NetBIOS**, **ComputerName.FQDN**, and names in **alternate-computer-names** locally so that the set of NetBIOS and Internet host names currently assigned to this computer can be resolved on the network ([\[RFC1001\]](#) and [\[NIS\]](#)).
18. If the server is joined to a domain ([\[MS-ADTS\]](#) section 7.4), then the server MUST make the following updates in the domain.
19. The server MUST locate a writable domain controller by invoking the **DsrGetDcNameEx2** method on the local [MS-NRPC] server specifying the following parameters:
 - *ComputerName* = NULL
 - *AccountName* = *ComputerNameNetBIOS*
 - *AllowableAccountControlBits* = ADS_UF_WORKSTATION_TRUST_ACCOUNT | ADS_UF_SERVER_TRUST_ACCOUNT ([\[MS-ADTS\]](#) (section 2.2.15))
 - *DomainName* = *DomainNameFQDN*
 - *DomainGuid* = NULL
 - *SiteName* = NULL
 - *Flags* = (DS_WRITABLE_FLAG | DS_DS_FLAG) ([\[MS-ADTS\]](#) (section 7.3.1.2)).

If a domain controller cannot be located, the method MUST fail.

Otherwise, *DomainControllerString* MUST equal the string name of the returned writable domain controller.

20. The server invokes section [3.2.4.18.2](#), "LDAP Bind", with the following parameters:

- *DomainControllerBindTarget*: *DomainControllerString*
- *AccountNameForBind*: *AccountName*
- *PasswordForBind*: *PasswordString*
- *Encrypt*: FALSE
- *DisallowReferrals*: TRUE

The result is stored in *DomainControllerConnection*.

21. If *IsRODC* is TRUE, the server invokes section [3.2.4.18.2](#), "LDAP Bind", with the following parameters:

- *DomainControllerBindTarget*: **ComputerNameNetBIOS**
- *AccountNameForBind*: *AccountName*
- *PasswordForBind*: *PasswordString*

- *Encrypt*: FALSE
- *DisallowReferrals*: TRUE

The result is stored in *ReadOnlyDomainControllerConnection*.

22. The server invokes [Query Computer Account DN for the Local Machine \(section 3.2.4.18.1\)](#), specifying *DomainControllerString* for the *DomainControllerQueryTarget* parameter, storing the result in *ComputerAccountDN*.

23. The server invokes the "Performing an LDAP Operation on an ADConnection" task of [\[MS-ADSO\]](#) section 6.2.6.1.6 with the following parameters:

- *TaskInputADConnection*: *DomainControllerConnection*
- *TaskInputRequestMessage*: LDAP modifyRequest message ([\[RFC2251\]](#) section 4.6) as follows:
 - Object: *ComputerAccountDN*
 - The modification sequence has three list entries, set as follows:
 - First list entry
 - operation: replace
 - modification:
 - type: *DnsHostName*
 - vals: *ComputerNameFQDN*
 - Second list entry
 - operation: add
 - modification:
 - type: *msDS-AdditionalDnsHostName*
 - vals: *NewAlternateNames.FQDN*
 - Third list entry
 - operation: delete
 - modification:
 - type: *msDS-AdditionalDnsHostName*
 - vals: *OldAlternateNames.FQDN*
 - controls: Sequence of one Control structure, as follows:
 - controlType: *LDAP_SERVER_PERMISSIVE_MODIFY_OID* ([\[MS-ADTS\]](#) (section [3.1.1.3.4.1.8](#)))
 - criticality: FALSE
- *TaskOutputResultMessages*: *LDAPResultMessages*

24.If *IsRODC* is TRUE, the server invokes the "Performing an LDAP Operation on an ADConnection" task of [\[MS-ADSO\]](#) section 6.2.6.1.6 with the following parameters:

- *TaskInputADConnection*: DomainControllerConnection
- *TaskInputRequestMessage*: LDAP SearchRequest message ([\[RFC2251\]](#) section 4.5.1) as follows:
 - baseObject: DN of the rootDSE (empty string)
 - scope: base
 - filter: ObjectClass=*
 - attributes: dsServiceName
 - derefAliases: neverDerefAliases
 - typesOnly: FALSE
- *TaskOutputResultMessages*: LDAPResultMessages

The server MUST process the results returned from the DC in LDAPResultMessages. For the entry (SearchResultEntry, [\[RFC2251\]](#) section 4.5.2) returned by the search in LDAPResultMessages, WritableDomainControllerDN MUST equal the value of the attribute dsServiceName.

25.If *IsRODC* is TRUE, the server invokes the "Performing an LDAP Operation on an ADConnection" task of [\[MS-ADSO\]](#) section 6.2.6.1.6 with the following parameters:

- *TaskInputADConnection*: DomainControllerConnection
- *TaskInputRequestMessage*: LDAP SearchRequest message ([\[RFC2251\]](#) section 4.5.1) as follows:
 - baseObject: ComputerAccountDN
 - scope: base
 - filter: ObjectClass=*
 - attributes: distinguishedName, serverReferenceBL
 - derefAliases: neverDerefAliases
 - typesOnly: FALSE
 - controls: Sequence of one Control structure, as follows:
 - controlType: LDAP_SERVER_EXTENDED_DN_OID ([\[MS-ADTS\]](#) section 3.1.1.3.4.1.5)
 - criticality: TRUE
- *TaskOutputResultMessages*: LDAPResultMessages

The server MUST process the results returned from the DC in LDAPResultMessages. For the entry (SearchResultEntry, [\[RFC2251\]](#) section 4.5.2) returned by the search in LDAPResultMessages, ComputerAccountExtendedDN MUST equal the value of the attribute distinguishedName unless distinguishedName contains the character ';'. If ';' is present, ComputerAccountExtendedDN

MUST equal distinguishedName truncated at the first occurrence of the character ';', exclusive of the ';' itself.

26.If *IsRODC* is TRUE, the server invokes the "Performing an LDAP Operation on an ADConnection" task of [\[MS-ADSO\]](#) section 6.2.6.1.6 with the following parameters:

- *TaskInputADConnection*: ReadOnlyDomainControllerConnection
- *TaskInputRequestMessage*: LDAP modifyRequest message ([\[RFC2251\]](#) section 4.6) as follows:
 - Object: DN of the rootDSE (empty string)
 - The modification sequence has one list entry, set as follows:
 - First list entry
 - operation: replace
 - modification:
 - type: replicateSingleObject ([\[MS-ADTS\]](#) section 3.1.1.3.3.17)
 - vals: WritableDomainControllerDN:ComputerAccountExtendedDN
- *TaskOutputResultMessages*: LDAPResultMessages

27.The server invokes "LDAP Unbind" (section [3.2.4.18.3](#)) with *ADConnectionToUnbind* set to DomainControllerConnection.

28.If *IsRODC* is TRUE, the server invokes "LDAP Unbind" (section [3.2.4.18.3](#)) with *ADConnectionToUnbind* set to ReadOnlyDomainControllerConnection.

If no errors occur, the server MUST return **NERR_Success**.

3.2.4.17 NetrEnumerateComputerNames (Opnum 30)

The **NetrEnumerateComputerNames** method returns a list of computer names for a specified server. The results of the query are determined by the type of the name. [<135>](#)

```
unsigned long NetrEnumerateComputerNames(  
    [in, string, unique] WKSSVC_IMPERSONATE_HANDLE ServerName,  
    [in] NET_COMPUTER_NAME_TYPE NameType,  
    [in] unsigned long Reserved,  
    [out] PNET_COMPUTER_NAME_ARRAY* ComputerNames  
);
```

ServerName: A [WKSSVC_IMPERSONATE_HANDLE \(section 2.2.2.2\)](#) that specifies the server. The client MUST map this structure to an RPC binding handle ([\[C706\]](#) sections [4.3.5](#) and [5.1.5.2](#)). The server MUST ignore this parameter.

NameType: The type of query issued. For more information, see [NET_COMPUTER_NAME_TYPE \(section 2.2.3.3\)](#).

Reserved: A 32-bit bitfield that SHOULD be set to zero.

0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I U

Where the bits are defined as:

Value	Description
IU NET_IGNORE_UNSUPPORTED_FLAGS	If 1, the server MUST ignore the values of the other bits in this field. If 0, the values of the other bits in this field MUST be 0; otherwise, the server MUST return ERROR_INVALID_FLAGS . <136>

ComputerNames: A pointer to structure containing a list of computer name strings (section [2.2.5.20](#)).

Return Values: When the message processing result meets the description in column two of the following table, this method MUST return one of the following values ([\[MS-ERREF\]](#) section 2.2).

Return value/code	Description
0x00000000 NERR_Success	The operation completed successfully.
0x00000005 ERROR_ACCESS_DENIED	Access is denied.
0x00000057 ERROR_INVALID_PARAMETER	The parameter is incorrect.
0x00000032 ERROR_NOT_SUPPORTED	This method is not supported by this server.
0x000003EC ERROR_INVALID_FLAGS	Reserved contains an invalid value.
0x000006A7 RPC_S_PROTSEQ_NOT_SUPPORTED	The RPC protocol sequence is not supported.

Any other return value MUST conform to the error code requirements specified in [Protocol Details \(section 3\)](#).

The following ordered statements describe the sequence of message processing operations.

1. The server MUST retrieve the RPC protocol sequence used for the current call, as specified in [\[MS-RPCE\]](#) section 3.1.3.4.1, specifying the server binding handle maintained by the RPC runtime ([\[C706\]](#) section [6.2.1](#)). If that RPC protocol sequence is not **NCACN_NP**, the server SHOULD return **RPC_S_PROTSEQ_NOT_SUPPORTED**.<137>
2. The server MUST check that the caller has been granted access rights using the algorithm specified in the [Access Control Abstract Data Model \(section 3.2.1.1\)](#), with *Access Request mask*

initialized to **WKSTA_NETAPI_CHANGE_CONFIG**; if not, the server MUST return **ERROR_ACCESS_DENIED**.

3. The server SHOULD [<138>](#) return **ERROR_NOT_SUPPORTED** if the server is a client SKU configuration.
4. The server MUST return **ERROR_INVALID_PARAMETER** if *NameType* is greater than or equal to **NetComputerNameTypeMax**.
5. The server MUST initialize the output parameter *ComputerNames* as follows depending on the input query type specified in *NameType*.

- **NetPrimaryComputerName:**

The server MUST set *ComputerNames.EntryCount* to 1 and initialize the UNICODE_STRING values in *ComputerNames* to **ComputerNameFQDN**.

- **NetAlternateComputerNames:**

The server MUST set *ComputerNames.EntryCount* to the number of tuples contained in **alternate-computer-names**. For each tuple, *I*, the server MUST initialize the next available UNICODE_STRING elements in the *ComputerNames* array to equal the values stored in *alternate-computer-names[I].FQDN*.

- **NetAllComputerNames:**

The server MUST set *ComputerNames.EntryCount* to the number of tuples contained in **alternate-computer-names** + 1. The *ComputerNames* array MUST be initialized to return all the names specified for the **NetPrimaryComputerName** and **NetAlternateComputerNames** input query types.

If no errors occur, the server MUST return **NERR_Success**.

3.2.4.18 Common Message Processing

The following sections represent common processing tasks used by several of the above opnums.

3.2.4.18.1 Query Computer Account DN for the Local Machine

This task accepts as input the following:

- *DomainControllerQueryTarget*: the name of the domain controller to query.

Upon success, this task returns the following:

- *ComputerAccountDN*: A UTF-8 string that contains the DN of the computer account DN for the local machine.

Otherwise, a failure is returned.

1. The server MUST bind to the DRS RPC endpoint ([\[MS-DRDM\]](#) section 2.1) on *DomainControllerQueryTarget*.
2. The server MUST invoke the **IDL_DRSCrackNames** method ([\[MS-DRDM\]](#) section 4.1.3) with the following parameter values:

- *rpNames* = DomainNameNetBIOS "\\ ComputerNameNetBIOS
 - *formatOffered* = DS_NT4_ACCOUNT_NAME
 - *formatDesired* = DS_FQDN_1779_NAME
3. If step 2 succeeds, and only one result was returned, the task sets ComputerAccountDN equal to the DN returned from the **IDL_DRSCrackNames** call, and returns it. Otherwise, the task returns an error.

3.2.4.18.2 LDAP Bind

This task accepts as input the following:

- *DomainControllerBindTarget*: the name of the domain controller to bind to
- *AccountNameForBind*: the account name used for authentication on the bind
- *PasswordForBind*: the password used to authenticate the bind
- *Encrypt*: specifies whether to set LDAP_OPT_ENCRYPT to LDAP_OPT_ON on the returned connection
- *DisallowReferrals*: specifies whether to set LDAP_OPT_REFERRALS to LDAP_OPT_OFF on the returned connection

Upon success, this task returns the following:

- NewADConnection: an ADCONNECTION_HANDLE ([\[MS-DTYP\]](#)).

1. The server invokes the "Initializing an ADConnection" task of [\[MS-ADSO\]](#) section 6.2.6.1.1 with the following parameters:

- *TaskInputTargetName*: DomainControllerBindTarget
- *TaskInputPortNumber*: 389

Upon success, the result is stored in NewADConnection.

2. The server invokes the "Setting an LDAP option on an ADConnection" task ([\[MS-ADSO\]](#) section 6.2.6.1.2) with the following parameters:

- *TaskInputADConnection*: NewADConnection
- *TaskInputOptionName*: LDAP_OPT_AUTH_INFO
- *TaskInputOptionValue*:
 - Mechanism: SASL, using the GSS-SPNEGO protocol ([\[MS-ADTS\]](#) (section 5.1.1.1))
 - Credentials: The credentials with username AccountNameForBind and password PasswordForBind

3. The server invokes the "Setting an LDAP option on an ADConnection" task ([\[MS-ADSO\]](#) section 6.2.6.1.2) with the following parameters:

- *TaskInputADConnection*: NewADConnection

- *TaskInputOptionName*: LDAP_OPT_AREC_EXCLUSIVE
 - *TaskInputOptionValue*: TRUE
4. If *Encrypt* is equal to TRUE, the server invokes the "Setting an LDAP option on an ADConnection" task ([\[MS-ADSO\]](#) section 6.2.6.1.2) with the following parameters:
- *TaskInputADConnection*: NewADConnection
 - *TaskInputOptionName*: LDAP_OPT_ENCRYPT
 - *TaskInputOptionValue*: LDAP_OPT_ON
5. If *DisallowReferrals* is equal to TRUE, the server invokes the "Setting an LDAP option on an ADConnection" task ([\[MS-ADSO\]](#) section 6.2.6.1.2) with the following parameters:
- *TaskInputADConnection*: NewADConnection
 - *TaskInputOptionName*: LDAP_OPT_REFERRALS
 - *TaskInputOptionValue*: LDAP_OPT_OFF
6. The server invokes the "Establishing an ADConnection" task ([\[MS-ADSO\]](#) section 6.2.6.1.3) with the *TaskInputADConnection* parameter set to NewADConnection.
7. The server invokes the "Performing an LDAP Bind on an ADConnection" task ([\[MS-ADSO\]](#) section 6.2.6.1.4) with the *TaskInputADConnection* parameter set to NewADConnection.
8. Upon success, NewADConnection is returned to the caller. Otherwise, an error is returned.

3.2.4.18.3 LDAP Unbind

This task accepts as input the following:

- *ADConnectionToUnbind*: an ADCONNECTION_HANDLE ([\[MS-DTYP\]](#)) to unbind.
- The server invokes the "Performing an LDAP Unbind on an ADConnection" task ([\[MS-ADSO\]](#) section 6.2.6.1.5) with the *TaskInputADConnection* parameter set to *ADConnectionToUnbind*.

3.2.5 Timer Events

No protocol timer events are required on the client beyond the timers required in the underlying **RPC transport**.

3.2.6 Other Local Events

The following subsections specify local events that are invoked by the **browser server** and used by the Common Internet File System (CIFS) Browser Protocol [\[MS-BRWS\]](#) and the Common Internet File System (CIFS) Browser Auxiliary Protocol [\[MS-BRWSA\]](#).

3.2.6.1 WkstaQueryOtherDomains Event

The calling application requests the list of **OtherDomains** from the server. The calling application provides no parameters, and the server returns the **OtherDomains** list, as specified in the [OtherDomains Name Abstract Data Model \(section 3.2.1.3\)](#).

3.2.6.2 WkstaAddOtherDomains Event

The calling application provides a list of NetBIOS domains in the format specified in the [OtherDomains Name Abstract Data Model \(section 3.2.1.3\)](#). The server appends entries to the **OtherDomains** list that are not already present.

4 Protocol Examples

4.1 NetrWkstaGetInfo Example

As an example, the client calls the [NetrWkstaGetInfo](#) method on a server named `srvr1.example.com`.

```
NetrWkstaGetInfo (  
    [in,string,unique] WKSSVC_IDENTIFY_HANDLE ServerName  
        = "srvr1.example.com",  
    [in] unsigned long Level = 0x00000064,  
    [out, switch_is(Level)] LPWKSTA_INFO WkstaInfo  
);
```

On receiving this method the server executes the method locally and returns

```
(type unsigned long) return_status = ERROR_SUCCESS  
NetrWkstaGetInfo (  
    [in,string,unique] WKSSVC_IDENTIFY_HANDLE ServerName  
        = {unchanged},  
    [in] unsigned long Level = {unchanged},  
    [out, switch_is(Level)] LPWKSTA_INFO WkstaInfo  
        = {filled in as shown below}  
);
```

where *WkstaInfo* is set as follows.

```
typedef struct _WKSTA_INFO_100 {  
    unsigned long wki100_platform_id = 0x000001F4;  
    wchar_t* wki100_computername = "srvr1.example.com";  
    wchar_t* wki100_langroup = "example.com";  
    unsigned long wki100_ver_major = 0x00000005;  
    unsigned long wki100_ver_minor = 0x00000000;  
} WKSTA_INFO_100, *PWKSTA_INFO_100, *LPWKSTA_INFO_100;
```

4.2 NetrWkstaUserEnum Example

In this example, the client calls the [NetrWkstaUserEnum \(section 3.2.4.3\)](#) method to enumerate the names of currently logged-on users on a server named "SrvrA". Five **active users** are logged on to server "SrvrA".

The client calls **NetrWkstaUserEnum** with *ServerName* equal to "SrvrA" and the **Level** field of the [WKSTA_USER_ENUM_STRUCT \(section 2.2.5.14\)](#) structure passed in the *UserInfo* parameter set to 0x00000000. The client also sets the *PreferredMaximumLength* parameter to 0x00000100 and passes a non-NULL pointer in parameters *TotalEntries* and *ResumeHandle*.

Only the names of the first two logged-on users will fit into 0x00000100 bytes. On receiving this method, the server executes the method locally and returns `ERROR_MORE_DATA`. The server returns the names of the first two logged-on users in the *UserInfo* parameter. It also sets the value of *TotalEntries* to 0x00000005 and *ResumeHandle* to 0x00000120. The value of *ResumeHandle* is implementation-specific.

To continue enumerating the names of logged-on users, the client calls **NetrWkstaUserEnum** with *ServerName* equal to "SrvrA", and the **Level** field of the **WKSTA_USER_ENUM_STRUCT** structure passed in the *UserInfo* parameter set to 0x00000000. The client also sets the *PreferredMaximumLength* parameter to **MAX_PREFERRED_LENGTH (section 2.2.1.3)** and passes a non-NULL pointer as *TotalEntries*. The client also passes the unchanged value of *ResumeHandle* (0x000000120).

On receiving this method, the server executes the method locally to continue enumeration based on a *ResumeHandle* value of 0x00000120, and returns ERROR_SUCCESS. The server returns the names of the next three logged-on users in the *UserInfo* parameter. It also sets the value of *TotalEntries* to 0x00000005. The value of *ResumeHandle* is irrelevant.

5 Security

5.1 Security Considerations for Implementers

As specified in section [2.1](#), this protocol allows any user to connect to the server. Therefore, any security bug in the server implementation could be exploitable. The server implementation should enforce security on each method.

5.2 Index of Security Parameters

There is only one Security Parameter, [Authentication Protocol \(section 2.1\)](#).

5.3 Entropy Sources

How entropy is acquired is up to the implementer of any protocol. The literature on measurement of entropy and on methods of harvesting entropy in computer systems is extensive and well known to anyone skilled in the cryptographic art. Probably the best entropy source is a properly verified hardware random bit generator that has circuitry attached to monitor all bits produced and verify their entropy, raising an error condition if the hardware starts to malfunction. Such a hardware source of entropy can be used to drive a conditioning function (sometimes called a "whitening" function) and might be used to drive a **pseudo-random number generator (PRNG)**. If a PRNG is used, it should be compliant with recognized standards, such as FIPS 140-2 Annex C, as specified in [\[FIPS140\]](#).

6 Appendix A: Full IDL

For ease of implementation, the full **IDL** is provided below, where "ms-dtyp.idl" is the IDL found in [\[MS-DTYP\]](#) Appendix A.

```
import "ms-dtyp.idl";

[
    uuid(6BFFD098-A112-3610-9833-46C3F87E345A), version(1.0),
    pointer_default(unique)
]
interface wkssvc
{
    typedef enum _NETSETUP_JOIN_STATUS {
        NetSetupUnknownStatus = 0,
        NetSetupUnjoined,
        NetSetupWorkgroupName,
        NetSetupDomainName
    } NETSETUP_JOIN_STATUS, *PNETSETUP_JOIN_STATUS;

    typedef enum _NETSETUP_NAME_TYPE {
        NetSetupUnknown = 0,
        NetSetupMachine,
        NetSetupWorkgroup,
        NetSetupDomain,
        NetSetupNonExistentDomain,
        NetSetupDnsMachine
    } NETSETUP_NAME_TYPE, *PNETSETUP_NAME_TYPE;

    typedef enum _NET_COMPUTER_NAME_TYPE {
        NetPrimaryComputerName = 0,
        NetAlternateComputerNames,
        NetAllComputerNames,
        NetComputerNameTypeMax
    } NET_COMPUTER_NAME_TYPE, *PNET_COMPUTER_NAME_TYPE;

    typedef struct _STAT_WORKSTATION_0 {
        LARGE_INTEGER    StatisticsStartTime;
        LARGE_INTEGER    BytesReceived;
        LARGE_INTEGER    SmbReceived;
        LARGE_INTEGER    PagingReadBytesRequested;
        LARGE_INTEGER    NonPagingReadBytesRequested;
        LARGE_INTEGER    CacheReadBytesRequested;
        LARGE_INTEGER    NetworkReadBytesRequested;
        LARGE_INTEGER    BytesTransmitted;
        LARGE_INTEGER    SmbTransmitted;
        LARGE_INTEGER    PagingWriteBytesRequested;
        LARGE_INTEGER    NonPagingWriteBytesRequested;
        LARGE_INTEGER    CacheWriteBytesRequested;
        LARGE_INTEGER    NetworkWriteBytesRequested;
        unsigned long    InitiallyFailedOperations;
        unsigned long    FailedCompletionOperations;
        unsigned long    ReadOperations;
        unsigned long    RandomReadOperations;
        unsigned long    ReadSmb;
        unsigned long    LargeReadSmb;
        unsigned long    SmallReadSmb;
        unsigned long    WriteOperations;
    };
};
```

```

    unsigned long    RandomWriteOperations;
    unsigned long    WriteSmb;
    unsigned long    LargeWriteSmb;
    unsigned long    SmallWriteSmb;
    unsigned long    RawReadsDenied;
    unsigned long    RawWritesDenied;
    unsigned long    NetworkErrors;
    unsigned long    Sessions;
    unsigned long    FailedSessions;
    unsigned long    Reconnects;
    unsigned long    CoreConnects;
    unsigned long    Lanman20Connects;
    unsigned long    Lanman21Connects;
    unsigned long    LanmanNtConnects;
    unsigned long    ServerDisconnects;
    unsigned long    HungSessions;
    unsigned long    UseCount;
    unsigned long    FailedUseCount;
    unsigned long    CurrentCommands;
} STAT_WORKSTATION_0, *PSTAT_WORKSTATION_0, *LPSTAT_WORKSTATION_0;

typedef struct _WKSTA_INFO_100 {
    unsigned long    wki100_platform_id;
    [string] wchar_t* wki100_computername;
    [string] wchar_t* wki100_langroup;
    unsigned long    wki100_ver_major;
    unsigned long    wki100_ver_minor;
} WKSTA_INFO_100, *PWKSTA_INFO_100, *LPWKSTA_INFO_100;

typedef struct _WKSTA_INFO_101 {
    unsigned long    wki101_platform_id;
    [string] wchar_t* wki101_computername;
    [string] wchar_t* wki101_langroup;
    unsigned long    wki101_ver_major;
    unsigned long    wki101_ver_minor;
    [string] wchar_t* wki101_lanroot;
} WKSTA_INFO_101, *PWKSTA_INFO_101, *LPWKSTA_INFO_101;

typedef struct _WKSTA_INFO_102 {
    unsigned long    wki102_platform_id;
    [string] wchar_t* wki102_computername;
    [string] wchar_t* wki102_langroup;
    unsigned long    wki102_ver_major;
    unsigned long    wki102_ver_minor;
    [string] wchar_t* wki102_lanroot;
    unsigned long    wki102_logged_on_users;
} WKSTA_INFO_102, *PWKSTA_INFO_102, *LPWKSTA_INFO_102;

typedef struct _WKSTA_INFO_502 {
    unsigned long    wki502_char_wait;
    unsigned long    wki502_collection_time;
    unsigned long    wki502_maximum_collection_count;
    unsigned long    wki502_keep_conn;
    unsigned long    wki502_max_cmds;
    unsigned long    wki502_sess_timeout;
    unsigned long    wki502_siz_char_buf;
    unsigned long    wki502_max_threads;
    unsigned long    wki502_lock_quota;
    unsigned long    wki502_lock_increment;
}

```

```

    unsigned long   wki502_lock_maximum;
    unsigned long   wki502_pipe_increment;
    unsigned long   wki502_pipe_maximum;
    unsigned long   wki502_cache_file_timeout;
    unsigned long   wki502_dormant_file_limit;
    unsigned long   wki502_read_ahead_throughput;
    unsigned long   wki502_num_mailslot_buffers;
    unsigned long   wki502_num_srv_announce_buffers;
    unsigned long   wki502_max_illegal_datagram_events;
    unsigned long   wki502_illegal_datagram_event_reset_frequency;
    int   wki502_log_election_packets;
    int   wki502_use_opportunistic_locking;
    int   wki502_use_unlock_behind;
    int   wki502_use_close_behind;
    int   wki502_buf_named_pipes;
    int   wki502_use_lock_read_unlock;
    int   wki502_utilize_nt_caching;
    int   wki502_use_raw_read;
    int   wki502_use_raw_write;
    int   wki502_use_write_raw_data;
    int   wki502_use_encryption;
    int   wki502_buf_files_deny_write;
    int   wki502_buf_read_only_files;
    int   wki502_force_core_create_mode;
    int   wki502_use_512_byte_max_transfer;
} WKSTA_INFO_502, *PWKSTA_INFO_502, *LPWKSTA_INFO_502;

typedef struct _WKSTA_INFO_1013 {
    unsigned long   wki1013_keep_conn;
} WKSTA_INFO_1013, *PWKSTA_INFO_1013, *LPWKSTA_INFO_1013;

typedef struct _WKSTA_INFO_1018 {
    unsigned long   wki1018_sess_timeout;
} WKSTA_INFO_1018, *PWKSTA_INFO_1018, *LPWKSTA_INFO_1018;

typedef struct _WKSTA_INFO_1046 {
    unsigned long   wki1046_dormant_file_limit;
} WKSTA_INFO_1046, *PWKSTA_INFO_1046, *LPWKSTA_INFO_1046;

typedef struct _WKSTA_USER_INFO_0 {
    [string] wchar_t* wkui0_username;
} WKSTA_USER_INFO_0, *PWKSTA_USER_INFO_0, *LPWKSTA_USER_INFO_0;

typedef struct _WKSTA_USER_INFO_1 {
    [string] wchar_t* wkui1_username;
    [string] wchar_t* wkui1_logon_domain;
    [string] wchar_t* wkui1_oth_domains;
    [string] wchar_t* wkui1_logon_server;
} WKSTA_USER_INFO_1, *PWKSTA_USER_INFO_1, *LPWKSTA_USER_INFO_1;

typedef struct _WKSTA_TRANSPORT_INFO_0 {
    unsigned long   wkti0_quality_of_service;
    unsigned long   wkti0_number_of_vcs;
    [string] wchar_t* wkti0_transport_name;
    [string] wchar_t* wkti0_transport_address;
    unsigned long   wkti0_wan_ish;
} WKSTA_TRANSPORT_INFO_0, *PWKSTA_TRANSPORT_INFO_0,
*LPWKSTA_TRANSPORT_INFO_0;

```



```

typedef [handle] wchar_t* WKSSVC_IDENTIFY_HANDLE;

typedef [handle] wchar_t* WKSSVC_IMPERSONATE_HANDLE;

typedef [switch_type(unsigned long)] union _WKSTA_INFO {
    [case(100)]
        LPWKSTA_INFO_100 WkstaInfo100;
    [case(101)]
        LPWKSTA_INFO_101 WkstaInfo101;
    [case(102)]
        LPWKSTA_INFO_102 WkstaInfo102;
    [case(502)]
        LPWKSTA_INFO_502 WkstaInfo502;
    [case(1013)]
        LPWKSTA_INFO_1013 WkstaInfo1013;
    [case(1018)]
        LPWKSTA_INFO_1018 WkstaInfo1018;
    [case(1046)]
        LPWKSTA_INFO_1046 WkstaInfo1046;
    [default]
        ;
} WKSTA_INFO, *PWKSTA_INFO, *LPWKSTA_INFO;

unsigned long
NetrWkstaGetInfo (
    [in,string,unique] WKSSVC_IDENTIFY_HANDLE ServerName,
    [in] unsigned long Level,
    [out, switch_is(Level)] LPWKSTA_INFO WkstaInfo
);

unsigned long
NetrWkstaSetInfo (
    [in,string,unique] WKSSVC_IDENTIFY_HANDLE ServerName,
    [in] unsigned long Level,
    [in, switch_is(Level)] LPWKSTA_INFO WkstaInfo,
    [in,out,unique] unsigned long* ErrorParameter
);

typedef struct _WKSTA_USER_INFO_0_CONTAINER {
    unsigned long EntriesRead;
    [size_is(EntriesRead)] LPWKSTA_USER_INFO_0 Buffer;
} WKSTA_USER_INFO_0_CONTAINER, *PWKSTA_USER_INFO_0_CONTAINER,
*LPWKSTA_USER_INFO_0_CONTAINER;

typedef struct _WKSTA_USER_INFO_1_CONTAINER {
    unsigned long EntriesRead;
    [size_is(EntriesRead)] LPWKSTA_USER_INFO_1 Buffer;
} WKSTA_USER_INFO_1_CONTAINER, *PWKSTA_USER_INFO_1_CONTAINER,
*LPWKSTA_USER_INFO_1_CONTAINER;

typedef struct _WKSTA_USER_ENUM_STRUCT {
    unsigned long Level;
    [switch_is(Level)] union _WKSTA_USER_ENUM_UNION {
        [case(0)]
            LPWKSTA_USER_INFO_0_CONTAINER Level0;
        [case(1)]
            LPWKSTA_USER_INFO_1_CONTAINER Level1;
        [default]
    }
}

```

```

        ;
    } WkstaUserInfo;
} WKSTA_USER_ENUM_STRUCT,
 *PWKSTA_USER_ENUM_STRUCT,
 *LPWKSTA_USER_ENUM_STRUCT;

unsigned long
NetrWkstaUserEnum (
    [in,string,unique] WKSSVC_IDENTIFY_HANDLE ServerName,
    [in,out] LPWKSTA_USER_ENUM_STRUCT UserInfo,
    [in] unsigned long PreferredMaximumLength,
    [out] unsigned long* TotalEntries,
    [in,out,unique] unsigned long* ResumeHandle
);

void Opnum3NotUsedOnWire(void);

void Opnum4NotUsedOnWire(void);

typedef struct _WKSTA_TRANSPORT_INFO_0_CONTAINER {
    unsigned long EntriesRead;
    [size_is(EntriesRead)] LPWKSTA_TRANSPORT_INFO_0 Buffer;
} WKSTA_TRANSPORT_INFO_0_CONTAINER,
 *PWKSTA_TRANSPORT_INFO_0_CONTAINER,
 *LPWKSTA_TRANSPORT_INFO_0_CONTAINER;

typedef struct _WKSTA_TRANSPORT_ENUM_STRUCT {
    unsigned long Level;
    [switch_is(Level)] union _WKSTA_TRANSPORT_ENUM_UNION {
        [case(0)]
            LPWKSTA_TRANSPORT_INFO_0_CONTAINER Level0;
        [default]
            ;
    } WkstaTransportInfo;
} WKSTA_TRANSPORT_ENUM_STRUCT, *PWKSTA_TRANSPORT_ENUM_STRUCT,
 *LPWKSTA_TRANSPORT_ENUM_STRUCT;

unsigned long
NetrWkstaTransportEnum (
    [in,string,unique] WKSSVC_IDENTIFY_HANDLE ServerName,
    [in,out] LPWKSTA_TRANSPORT_ENUM_STRUCT TransportInfo,
    [in] unsigned long PreferredMaximumLength,
    [out] unsigned long* TotalEntries,
    [in,out,unique] unsigned long* ResumeHandle
);

unsigned long
NetrWkstaTransportAdd (
    [in,string,unique] WKSSVC_IDENTIFY_HANDLE ServerName,
    [in] unsigned long Level,
    [in] LPWKSTA_TRANSPORT_INFO_0 TransportInfo,
    [in,out,unique] unsigned long* ErrorParameter
);

unsigned long
NetrWkstaTransportDel (
    [in,string,unique] WKSSVC_IDENTIFY_HANDLE ServerName,
    [in,string,unique] wchar_t* TransportName,
    [in] unsigned long ForceLevel

```

```

);

void Opnum8NotUsedOnWire(void);

void Opnum9NotUsedOnWire(void);

void Opnum10NotUsedOnWire(void);

void Opnum11NotUsedOnWire(void);

void Opnum12NotUsedOnWire(void);

unsigned long
NetrWorkstationStatisticsGet(
    [in,string,unique] WKSSVC_IDENTIFY_HANDLE ServerName,
    [in,string,unique] wchar_t* ServiceName,
    [in] unsigned long Level,
    [in] unsigned long Options,
    [out] LPSTAT_WORKSTATION_0* Buffer
);

void Opnum14NotUsedOnWire(void);

void Opnum15NotUsedOnWire(void);

void Opnum16NotUsedOnWire(void);

void Opnum17NotUsedOnWire(void);

void Opnum18NotUsedOnWire(void);

void Opnum19NotUsedOnWire(void);

unsigned long
NetrGetJoinInformation(
    [in,string,unique] WKSSVC_IMPERSONATE_HANDLE ServerName,
    [in,out,string] wchar_t** NameBuffer,
    [out] PNETSETUP_JOIN_STATUS BufferType
);

void Opnum21NotUsedOnWire(void);

#define JOIN_OBFUSCATOR_LENGTH 8
#define JOIN_MAX_PASSWORD_LENGTH 256

typedef struct _JOINPR_USER_PASSWORD {
    unsigned char Obfuscator[JOIN_OBFUSCATOR_LENGTH];
    wchar_t Buffer[JOIN_MAX_PASSWORD_LENGTH];
    unsigned long Length;
} JOINPR_USER_PASSWORD,
*PJOINPR_USER_PASSWORD;

typedef struct _JOINPR_ENCRYPTED_USER_PASSWORD {
    unsigned char Buffer[JOIN_OBFUSCATOR_LENGTH +
        (JOIN_MAX_PASSWORD_LENGTH * sizeof(wchar_t)) +
        sizeof(unsigned long)];
} JOINPR_ENCRYPTED_USER_PASSWORD,
*PJOINPR_ENCRYPTED_USER_PASSWORD;

```

```

typedef struct _UNICODE_STRING {
    unsigned short Length;
    unsigned short MaximumLength;
    [size_is(MaximumLength / 2), length_is((Length) / 2)]
    unsigned short* Buffer;
} UNICODE_STRING,
 *PUNICODE_STRING;

unsigned long
NetrJoinDomain2(
    [in] handle_t RpcBindingHandle,
    [in,string,unique] wchar_t* ServerName,
    [in,string] wchar_t* DomainNameParam,
    [in,string,unique] wchar_t* MachineAccountOU,
    [in,string,unique] wchar_t* AccountName,
    [in,unique] PJOINPR_ENCRYPTED_USER_PASSWORD Password,
    [in] unsigned long Options
);

unsigned long
NetrUnjoinDomain2(
    [in] handle_t RpcBindingHandle,
    [in,string,unique] wchar_t* ServerName,
    [in,string,unique] wchar_t* AccountName,
    [in,unique] PJOINPR_ENCRYPTED_USER_PASSWORD Password,
    [in] unsigned long Options
);

unsigned long
NetrRenameMachineInDomain2(
    [in] handle_t RpcBindingHandle,
    [in,string,unique] wchar_t* ServerName,
    [in,string,unique] wchar_t* MachineName,
    [in,string,unique] wchar_t* AccountName,
    [in,unique] PJOINPR_ENCRYPTED_USER_PASSWORD Password,
    [in] unsigned long Options
);

unsigned long
NetrValidateName2(
    [in] handle_t RpcBindingHandle,
    [in,string,unique] wchar_t* ServerName,
    [in,string] wchar_t* NameToValidate,
    [in,string,unique] wchar_t* AccountName,
    [in,unique] PJOINPR_ENCRYPTED_USER_PASSWORD Password,
    [in] NETSETUP_NAME_TYPE NameType
);

unsigned long
NetrGetJoinableOUs2(
    [in] handle_t RpcBindingHandle,
    [in,string,unique] wchar_t* ServerName,
    [in,string] wchar_t* DomainNameParam,
    [in,string,unique] wchar_t* AccountName,
    [in,unique] PJOINPR_ENCRYPTED_USER_PASSWORD Password,
    [in,out] unsigned long* OUCount,
    [out,string,size_is(*OUCount)] wchar_t*** OUs
);

```

```

unsigned long
NetrAddAlternateComputerName(
    [in] handle_t RpcBindingHandle,
    [in,string,unique] wchar_t* ServerName,
    [in,string,unique] wchar_t* AlternateName,
    [in,string,unique] wchar_t* DomainAccount,
    [in,unique] PJOINPR_ENCRYPTED_USER_PASSWORD EncryptedPassword,
    [in] unsigned long Reserved
);

unsigned long
NetrRemoveAlternateComputerName(
    [in] handle_t RpcBindingHandle,
    [in,string,unique] wchar_t* ServerName,
    [in,string,unique] wchar_t* AlternateName,
    [in,string,unique] wchar_t* DomainAccount,
    [in,unique] PJOINPR_ENCRYPTED_USER_PASSWORD EncryptedPassword,
    [in] unsigned long Reserved
);

unsigned long
NetrSetPrimaryComputerName(
    [in] handle_t RpcBindingHandle,
    [in,string,unique] wchar_t* ServerName,
    [in,string,unique] wchar_t* PrimaryName,
    [in,string,unique] wchar_t* DomainAccount,
    [in,unique] PJOINPR_ENCRYPTED_USER_PASSWORD EncryptedPassword,
    [in] unsigned long Reserved
);

typedef struct _NET_COMPUTER_NAME_ARRAY {
    unsigned long EntryCount;
    [size_is(EntryCount)] PUNICODE_STRING ComputerNames;
} NET_COMPUTER_NAME_ARRAY, *PNET_COMPUTER_NAME_ARRAY;

unsigned long
NetrEnumerateComputerNames(
    [in,string,unique] WKSSVC_IMPERSONATE_HANDLE ServerName,
    [in] NET_COMPUTER_NAME_TYPE NameType,
    [in] unsigned long Reserved,
    [out] PNET_COMPUTER_NAME_ARRAY *ComputerNames
);
}

```

7 Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs:

- Microsoft Windows NT® operating system
- Microsoft Windows® 2000 operating system
- Windows® XP operating system
- Windows Server® 2003 operating system
- Windows Server® 2003 R2 operating system
- Windows Vista® operating system
- Windows Server® 2008 operating system
- Windows® 7 operating system
- Windows Server® 2008 R2 operating system

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product 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.

[<1> Section 1.4:](#) Windows implementations use the **DsrGetDcNameEx2** method of the local [\[MS-NRPC\]](#) server to locate a domain controller when communication to a domain controller is specified.

[<2> Section 1.4:](#) Windows implementations use LDAP as a client when queries or modifications to directory objects are specified.

[<3> Section 1.8:](#) Windows only uses the values in [\[MS-ERREF\]](#).

[<4> Section 2.1:](#) Windows uses the identity of the caller to perform method-specific access checks.

[<5> Section 2.2.5.8:](#) Windows servers represent the name of the device in the form "\\Device\`<device_name>`", where `<device_name>` is a local device in the NT namespace.

Examples:

- \\Device\NetbiosSmb
- \\Device\NetBT_Tcpip_{E30E2FF4-044F-403B-9906-8E58FDFAD018}

Note that the names are driver-specific.

[<6> Section 2.2.5.8:](#) Windows NT, Windows 2000, Windows Server 2003 and Windows Server 2003 R2 implementations set **wkti0_transport_address** for the NetBIOS over **TCP**/IP (NetBT) transport protocol to a string that represents the IEEE 802.1 Media Access Control (MAC) address [\[IEEE802.1X\]](#) of the transport protocol. The string is formatted as described in IEEE 802.1 but with

separator characters removed. For example, the MAC address "00-0F-FE-51-DE-3B" results in the **wksti0_transport_address** string "000FFE51DE3B".

<7> [Section 2.2.5.9](#): In the Windows implementation, the name of the user is the account name that was used to authenticate the user on the computer.

<8> [Section 2.2.5.11](#): On Windows 2000, Windows XP, Windows Server 2003, Windows Server 2003 R2, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2, **RawReadsDenied** contains an indeterminate value on send and is ignored on receipt.

<9> [Section 2.2.5.11](#): On Windows 2000, Windows XP, Windows Server 2003, Windows Server 2003 R2, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2, **RawWritesDenied** contains an indeterminate value on send and is ignored on receipt.

<10> [Section 3.2.1.1](#): The **NetSecurityDescriptor** security descriptor exists on Windows XP SP2, Windows Server 2003 with SP1, Windows Server 2003 R2, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2.

<11> [Section 3.2.1.2](#): Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implement **alternate-computer-names**. The default state for this list is empty.

<12> [Section 3.2.1.3](#): Windows 2000, Windows XP, Windows Server 2003, Windows Server 2003 R2, Windows Vista, and Windows Server 2008 servers retrieve **OtherDomainsInitialization** from local **registry** values. Windows 7 and Windows Server 2008 R2 servers do not retrieve **OtherDomainsInitialization** from the registry, and they always return an empty list.

<13> [Section 3.2.3](#): Windows 2000, Windows XP, Windows Server 2003, Windows Server 2003 R2, Windows Vista, and Windows Server 2008 servers initialize this value to 45. Windows 7 and Windows Server 2008 R2 servers initialize this value to 1023.

<14> [Section 3.2.3](#): Windows servers initialize this value to 600 seconds.

<15> [Section 3.2.3](#): Windows servers initialize this value to 50.

<16> [Section 3.2.3](#): Windows servers initialize this value to 0x000001F4, which specifies Windows (section [2.2.5.1](#)).

<17> [Section 3.2.3](#): Windows servers initialize this value to 60 seconds.

<18> [Section 3.2.3](#): Windows servers initialize this value to the major version number of the operating system running on the server.

<19> [Section 3.2.3](#): Windows servers initialize this value to the minor version number of the operating system running on the server.

<20> [Section 3.2.3](#): Windows-based servers set this to hexadecimal string representation of the 6-byte physical address of the interface.

<21> [Section 3.2.3](#): Windows-based servers use the name of the transport device name associated with the transport, as specified in [WKSTA_TRANSPORT_INFO_0 \(section 2.2.5.8\)](#).

<22> [Section 3.2.3](#): Windows-based servers set this to any value.

<23> [Section 3.2.3](#): Windows-based servers set this to TRUE for NetBIOS transports.

<24> [Section 3.2.4](#): Windows: The underlying security subsystem is used to determine the permissions for the caller.

<25> [Section 3.2.4:](#) Gaps in the opnum numbering sequence apply to Windows as follows:

Opnum	Description
3	Only used locally by Windows, never remotely.
4	Only used locally by Windows, never remotely.
8	Only used locally by Windows, never remotely.
9	Only used locally by Windows, never remotely.
10	Only used locally by Windows, never remotely.
11	Only used locally by Windows, never remotely.
12	Only used locally by Windows, never remotely.
14	Only used locally by Windows, never remotely.
15	Only used locally by Windows, never remotely.
16	Just returns ERROR_NOT_SUPPORTED. It is never used.
17	Just returns ERROR_NOT_SUPPORTED. It is never used.
18	Just returns ERROR_NOT_SUPPORTED. It is never used.
19	Just returns ERROR_NOT_SUPPORTED. It is never used.
21	Just returns ERROR_NOT_SUPPORTED. It is never used.

Windows error codes are specified in [\[MS-ERREF\]](#) section 2.2.

<26> [Section 3.2.4:](#) Windows XP, Windows Server 2003, Windows Server 2003 R2, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations do not establish SMB sessions or SMB share connections in the course of message processing.

<27> [Section 3.2.4.1:](#) Windows requires that if the *Level* parameter is equal to 0x00000066 or 0x000001F6, then the caller must be a member of the Administrators group. If the caller is not a member of the Administrators group, then the server fails the method with **ERROR_ACCESS_DENIED**.

<28> [Section 3.2.4.1:](#) Windows 2000, Windows XP, Windows Server 2003, Windows Server 2003 R2, Windows Vista, Windows Server 2008 and Windows Server 2008 R2 servers set `wki502_dormant_file_limit` to 0.

<29> [Section 3.2.4.2:](#) If the *Level* is invalid, Windows-based servers fail the call with **ERROR_INVALID_PARAMETER**.

<30> [Section 3.2.4.2:](#) Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<31> [Section 3.2.4.2:](#) Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<32> [Section 3.2.4.2:](#) Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<33> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<34> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<35> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<36> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<37> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<38> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

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<45> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<46> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<47> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<48> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<49> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<50> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<51> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<52> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<53> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<54> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<55> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<56> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<57> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<58> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<59> [Section 3.2.4.2](#): Windows never uses this value to configure the SMB redirector. The server stores the value and returns it when the client requests it.

<60> [Section 3.2.4.2](#): Windows requires that the caller is a member of the Administrators group. If the caller is not a member of the Administrators group then the server fails the method with **ERROR_ACCESS_DENIED**.

<61> [Section 3.2.4.3](#): The Windows implementation returns the zero-based index of the user to be enumerated from the list of currently logged-on users.

<62> [Section 3.2.4.3](#): Windows requires that the caller is a member of the Administrators group.

<63> [Section 3.2.4.3](#): The server identifies each active user by a logon number. Logon numbers are monotonically increasing in order. Active users are enumerated in increasing order of logon number. *ResumeHandle* stores the logon number of the last user returned to the client. If [NetrWkstaUserEnum](#) is called with a nonzero *ResumeHandle*, then the server only enumerates those active users who have a logon number greater than the *ResumeHandle*.

<64> [Section 3.2.4.4](#): The Windows implementation returns the zero-based index of the transport protocol to be enumerated from the list of currently enabled transport protocols.

<65> [Section 3.2.4.4](#): Windows-based server does not enforce this security measure.

<66> [Section 3.2.4.4](#): The server maintains an array of transport protocols currently enabled for use by the SMB network redirector. Currently enabled transport protocols are enumerated starting at the beginning of this array. *ResumeHandle* stores the position in this array of the last transport protocol returned to the client. If [NetrWkstaTransportEnum](#) is called with a non-zero *ResumeHandle*, then the server begins enumerating the array from one position ahead of the *ResumeHandle*. If transport protocols are added or deleted from this array in-between calls to [NetrWkstaTransportEnum](#), then some transports might not be enumerated at all, or some transports might be enumerated multiple times.

<67> [Section 3.2.4.4](#): Windows implementations set the *TotalEntries* value to zero.

<68> [Section 3.2.4.5](#): On Windows 2000, Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2, this method is deprecated. If the

Level parameter is set to zero, and the caller belongs to the administrator group, then these servers always return **ERROR_INVALID_FUNCTION** without any further processing.

<69> [Section 3.2.4.5](#): Windows NT 4.0 requires that the caller must be a member of the Administrators group.

<70> [Section 3.2.4.6](#): On Windows 2000, Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2, this method is deprecated. If the *ForceLevel* parameter is set to equal 0x00000000, 0x00000001, or 0x00000002, and the caller belongs to the Administrators group, then these servers always return **ERROR_INVALID_FUNCTION**.

<71> [Section 3.2.4.6](#): Windows NT 4.0 requires that the caller must be a member of the Administrators group.

<72> [Section 3.2.4.7](#): Windows requires that the caller is a member of the Administrators or **standard user** group.

<73> [Section 3.2.4.7](#): Windows implements these implementation-specific values as counters of the number of I/Os performed for each type. For information on paging, and the I/O system for background on these values, see [WININTERNALS] chapters 7 and 9.

<74> [Section 3.2.4.8](#): Windows XP SP2, Windows Server 2003 with SP1, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations enforce the verification of the proper RPC protocol sequence.

<75> [Section 3.2.4.9](#): This method was added in Windows 2000 and is available in Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2.

<76> [Section 3.2.4.9](#): Apart from the values mentioned in the table in section 3.2.4.9, the following option is applicable only to Windows servers.

Value	Meaning
NETSETUP_WIN9X_UPGRADE 0x00000010	The join operation is occurring as part of an upgrade from Windows 95, Windows 98, or Windows Millennium Edition to Windows NT, Windows 2000, or Windows XP.

<77> [Section 3.2.4.9](#): Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implement this.

<78> [Section 3.2.4.9](#): Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations do not update the **DnsHostName** and service principal name (SPN) properties on the computer during message processing when **NETSETUP_DEFER_SPN_SET** is specified. The values are updated in a subsequent call to [NetrRenameMachineInDomain2 \(section 3.2.4.11\)](#).

<79> [Section 3.2.4.9](#): Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations do not update the **DnsHostName** and SPN properties on the computer during message processing when **NETSETUP_DEFER_SPN_SET** is specified. The values are updated in a subsequent call to [NetrRenameMachineInDomain2 \(section 3.2.4.11\)](#).

<80> [Section 3.2.4.9](#): Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations continue message processing of a domain join when the domain-

object already exists and that object is a domain controller account and **NETSETUP_JOIN_DC_ACCOUNT** is specified.

<81> [Section 3.2.4.9](#): Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations support **NETSETUP_JOIN_DC_ACCOUNT**. Clients on Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 pass **NETSETUP_JOIN_DC_ACCOUNT**, which servers on Windows NT, Windows 2000, Windows XP, and Windows Server 2003 ignore. Clients on Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2, when setting this flag, always locate a domain controller of Windows Server 2008 version or higher. The location mechanism is specified in the **DsrGetDcNameEx2** method of [\[MS-NRPC\]](#); the flag description for **DS_FULL_SECRET_DOMAIN_6_FLAG** is specified in [\[MS-ADTS\]](#) section 7.3.3.2. The use of **DS_FULL_SECRET_DOMAIN_6_FLAG** ensures the location of a domain controller on Windows Server 2008 and Windows Server 2008 R2.

<82> [Section 3.2.4.9](#): Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations always use the most recently set computer name during a domain join when **NETSETUP_JOIN_WITH_NEW_NAME** is specified. In the Windows implementation of a computer rename, a computer must be restarted before a new name can be used. This flag allows the new name to be used for a join before a restart. For example, processing a [NetrRenameMachineInDomain2 message \(section 3.2.4.11\)](#) would change the persisted abstract state **ComputerName** ([\[MS-DISO\]](#) section 4.3.1.1), but the change would not be effective until after a machine restart. Specifying this flag would cause the join operation to use the new **ComputerName** when joining the domain.

<83> [Section 3.2.4.9](#): Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations indicate that concurrent calls to this method are not supported.

<84> [Section 3.2.4.9.1](#): Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 client implementations pass **NETSETUP_MACHINE_PWD_PASSED** or **NETSETUP_DEFER_SPN**. This flag is ignored by Windows 2000 and Windows NT server implementations.

<85> [Section 3.2.4.9.1](#): Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 client implementations define **NETSETUP_IGNORE_UNSUPPORTED_FLAGS** but do not set the flag. This flag is ignored by Windows 2000, Windows NT, and Windows XP server implementations.

<86> [Section 3.2.4.9.1](#): Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations support **NETSETUP_JOIN_DC_ACCOUNT**. When setting this flag, Windows Server 2008 and Windows Server 2008 R2 client implementations always locate a domain controller on Windows Server 2008 or Windows Server 2008 R2. Using the **DS_FULL_SECRET_DOMAIN_6_FLAG** flag ([\[MS-ADTS\]](#) section 7.3.3.2) ensures locating a domain controller with that version.

<87> [Section 3.2.4.9.1](#): Windows XP SP2, Windows Server 2003 with SP1, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations enforce the verification of the proper RPC protocol sequence. If the server identifies a previous RPC call that is modifying the identity of the machine, the server returns **RPC_S_CALL_IN_PROGRESS**.

<88> [Section 3.2.4.9.1](#): Windows Vista Home Basic and Windows Vista Home Premium implementations return **ERROR_NOT_SUPPORTED** if this method is invoked.

<89> [Section 3.2.4.9.2](#): Windows 2000, Windows 2000 Server, Windows XP, Windows Server 2003, Windows Vista, and Windows Server 2008 use the task "Joining a Domain by Creating an Account via SAMR" ([\[MS-DISO\]](#) section 7, specifying the following parameters:

- **TaskInputDomainName** is *DomainNameString*.
- **TaskInputDomainController** is *DomainControllerString*.
- **TaskInputDomainAdminAccount** is the *AccountName* parameter passed to the *NetrJoinDomain2* method.
- **TaskInputDomainAdminPassword** is *PasswordString*.

<90> [Section 3.2.4.10](#): This method was added in Windows 2000 and is available in Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2.

<91> [Section 3.2.4.10](#): Windows NT, Windows 2000, and Windows XP do not support this flag.

<92> [Section 3.2.4.10](#): Windows implementations save the original state in memory for the duration of message processing before making any changes, and when message processing encounters an error, the original state is restored before returning to the caller. This state is not persisted or retained beyond the processing duration of a call. Persisted state manipulations are performed using local services or other network protocols as referenced in the message processing section. This is done on a best-effort basis; if an error is encountered during the restoration process, the computer is left in a different state than it was immediately before the call was processed

<93> [Section 3.2.4.10](#): Windows XP SP2, Windows Server 2003 with SP1, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations enforce the verification of the proper RPC protocol sequence.

<94> [Section 3.2.4.11](#): This method was added in Windows 2000 and is available in Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2.

<95> [Section 3.2.4.11](#): Only Windows 2000 implementations return this error.

<96> [Section 3.2.4.11](#): Windows implementations save the original state in memory for the duration of message processing prior to making any changes, and when message processing encounters an error the original state is restored prior to returning to the caller. This state is not persisted or retained beyond the processing duration of a call. Persisted state manipulations are performed using local services or other network protocols as referenced in the message processing section. This is done on a best-effort basis; if an error is encountered during the restoration process, the server is left in a state different than it was in immediately prior to the call being processed.

<97> [Section 3.2.4.11](#): Windows XP SP2, Windows Server 2003 with SP1, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations enforce the verification of the proper RPC protocol sequence.

<98> [Section 3.2.4.11](#): Windows uses a syntactic/textual conversion. This conversion limits computer names to be the common subset of the names. Specifically, the name's leftmost label is truncated to 15-bytes of OEM characters in uppercase.

<99> [Section 3.2.4.11](#): Windows populates the DNS suffix using **Group Policy** from the domain. Group Policy updates the following registry key:

HKLM\Software\Policies\Microsoft\System\DNSClientNV PrimaryDnsSuffix

If this setting is not available, the TCP/IP setting for the domain is queried and is used as the DNS suffix.

If that is not available either, the fully qualified domain name (FQDN) of the domain is used as the DNS suffix.

[<100> Section 3.2.4.11](#): Windows tries to update this property, but does not fail the operation if this modification fails.

[<101> Section 3.2.4.11](#): Windows tries to update this property, but does not fail the operation if this modification fails.

[<102> Section 3.2.4.12](#): This method was added in Windows 2000 and is available in Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2.

[<103> Section 3.2.4.12](#): Windows XP SP2, Windows Server 2003 with SP1, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations enforce the verification of the proper RPC protocol sequence.

[<104> Section 3.2.4.12](#): Windows XP SP2, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations verify that the caller is local and return **RPC_E_REMOTE_DISABLED** if not.

[<105> Section 3.2.4.12](#): Windows implementation: The name is added as a NetBIOS group name. If the operation succeeds, the name is verified as valid; the name [\[RFC1001\]](#) is deleted to undo the addition of the name. Otherwise, the name is not valid; error **ERROR_INVALID_PARAMETER** is returned.

[<106> Section 3.2.4.12](#): Windows implementation: The name is added as a NetBIOS unique name. If the operation succeeds, the name is verified as valid and not in use; the name [\[RFC1001\]](#) is deleted to undo the addition of the name. Otherwise, the name is not valid; error **ERROR_DUP_NAME** is returned if the name [\[RFC1001\]](#) is already in use.

[<107> Section 3.2.4.12](#): Windows implementation: The **DsrGetDcNameEx2** method of the local [\[MS-NRPC\]](#) server is used to verify that a domain controller can be found for the domain. If the locator succeeds in finding any domain controller in the domain, this condition is verified. Otherwise, error **ERROR_NO_SUCH_DOMAIN** is returned.

[<108> Section 3.2.4.12](#): Windows implementation: The **DsrGetDcNameEx2** method of the local [\[MS-NRPC\]](#) server is used to determine if a domain controller can be found for the domain. If the locator finds a domain controller in the domain, error **ERROR_DUP_NAME** is returned. Otherwise, this condition is verified.

[<109> Section 3.2.4.13](#): This method was added in Windows 2000 and is available in Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2.

[<110> Section 3.2.4.13](#): Windows implementations return this error to indicate that the password is incorrect.

[<111> Section 3.2.4.13](#): Windows XP SP2, Windows Server 2003 with SP1, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations enforce the verification of the proper RPC protocol sequence.

[<112> Section 3.2.4.13](#): Windows XP SP2, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations verify that the caller is local.

<113> [Section 3.2.4.13](#): Windows XP SP2, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations fail this call on a domain controller, and **NERR_InvalidAPI** is returned.

<114> [Section 3.2.4.14](#): This method was added in Windows XP and is available in Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2.

<115> [Section 3.2.4.14](#): Windows Server 2003, Windows Server 2008, and Windows Server 2008 R2 check the NET_IGNORE_UNSUPPORTED_FLAGS bit.

<116> [Section 3.2.4.14](#): Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations indicate that concurrent calls to this method are not supported.

<117> [Section 3.2.4.14](#): Windows implementations save the original state in memory for the duration of message processing prior to making any changes, and when message processing encounters an error the original state is restored prior to returning to the caller. This state is not persisted or retained beyond the processing duration of a call. Persisted state manipulations are performed using local services or other network protocols as referenced in the message processing section. This is done on a best-effort basis: if an error is encountered during the restoration process, the computer is left in a different state than it was before the call was processed.

<118> [Section 3.2.4.14](#): Windows XP SP2, Windows Server 2003 with SP1, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementation enforce the verification of the proper RPC protocol sequence. If the server identifies a previous RPC call that is modifying the identity of the machine, the server returns **RPC_S_CALL_IN_PROGRESS**.

<119> [Section 3.2.4.14](#): Windows XP, Windows Vista, and Windows 7 return **ERROR_NOT_SUPPORTED** if this method is invoked.

<120> [Section 3.2.4.14](#): Windows uses a syntactic/textual conversion. This conversion limits the names of computers to be the common subset of the names. Specifically, the leftmost label of the name is truncated to 15 bytes of OEM characters in uppercase.

<121> [Section 3.2.4.15](#): This method was added in Windows XP and is available in Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2.

<122> [Section 3.2.4.15](#): Windows Server 2003, Windows Server 2008, and Windows Server 2008 R2 check the NET_IGNORE_UNSUPPORTED_FLAGS bit.

<123> [Section 3.2.4.15](#): Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations indicate that concurrent calls to this method are not supported.

<124> [Section 3.2.4.15](#): Windows implementations save the original state in memory for the duration of message processing prior to making any changes, and when message processing encounters an error, the original state is restored prior to returning to the caller. This state is not persisted or retained beyond the processing duration of a call. Persisted state manipulations are performed by using local services or other network protocols as referenced in the message processing section. This is done on a best-effort basis: If an error is encountered during the restoration process, the computer is left in a different state than it was before the call was processed.

<125> [Section 3.2.4.15](#): Windows XP SP2, Windows Server 2003 with SP1, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations enforce the verification of the proper RPC protocol sequence. If the server identifies a previous RPC call that is modifying the identity of the machine, the server returns **RPC_S_CALL_IN_PROGRESS**.

<126> [Section 3.2.4.15](#): Windows XP, Windows Vista, and Windows 7 return **ERROR_NOT_SUPPORTED** if this method is invoked.

<127> [Section 3.2.4.15](#): Windows uses a syntactic/textual conversion. This conversion limits the names of computers to the common subset of the names. Specifically, the leftmost label of the name is truncated to 15-bytes of OEM characters in uppercase.

<128> [Section 3.2.4.16](#): This method was added in Windows XP and is available in Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2.

<129> [Section 3.2.4.16](#): Windows Server 2003, Windows Server 2008, and Windows Server 2008 R2 check the **NET_IGNORE_UNSUPPORTED_FLAGS** bit.

<130> [Section 3.2.4.16](#): Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations indicate that concurrent calls to this method are not supported.

<131> [Section 3.2.4.16](#): Windows implementations save the original state in memory for the duration of message processing prior to making any changes, and when message processing encounters an error, the original state is restored prior to returning to the caller. This state is not persisted or retained beyond the processing duration of a call. Persisted state manipulations are performed by using local services or other network protocols as referenced in the message processing section. This is done on a best-effort basis: If an error is encountered during the restoration process, the computer is left in a different state than it was before the call was processed.

<132> [Section 3.2.4.16](#): Windows XP SP2, Windows Server 2003 with SP1, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations enforce the verification of the proper RPC protocol sequence. If the server identifies a previous RPC call that is modifying the identity of the machine, the server returns **RPC_S_CALL_IN_PROGRESS**.

<133> [Section 3.2.4.16](#): Windows XP, Windows Vista, and Windows 7 return **ERROR_NOT_SUPPORTED** if this method is invoked.

<134> [Section 3.2.4.16](#): Windows uses a syntactic/textual conversion. This conversion limits the names of computers to the common subset of the names. Specifically, the leftmost label of the name is truncated to 15 bytes of OEM characters in uppercase.

<135> [Section 3.2.4.17](#): This method was added in Windows XP and is available in Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2.

<136> [Section 3.2.4.17](#): Windows Server 2003, Windows Server 2008, and Windows Server 2008 R2 check the **NET_IGNORE_UNSUPPORTED_FLAGS** bit.

<137> [Section 3.2.4.17](#): Windows XP SP2, Windows Server 2003 with SP1, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implementations enforce the verification of the proper RPC protocol sequence.

<138> [Section 3.2.4.17](#): Windows XP, Windows Vista, and Windows 7 return **ERROR_NOT_SUPPORTED** if this method is invoked.

8 Change Tracking

This section identifies changes that were made to the [MS-WKST] protocol document between the January 2011 and February 2011 releases. Changes are classified as New, Major, Minor, Editorial, or No change.

The revision class **New** means that a new document is being released.

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 or functionality.
- An extensive rewrite, addition, or deletion of major portions of content.
- The removal of a document from the documentation set.
- Changes made for template compliance.

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 **Editorial** means that the language and formatting in the technical content was changed. Editorial changes apply to grammatical, formatting, and style issues.

The revision class **No change** means that no new technical or language changes were introduced. The technical content of the document is identical to the last released version, but minor editorial and formatting changes, as well as updates to the header and footer information, and to the revision summary, may have been made.

Major and minor changes can be described further using the following change types:

- New content added.
- Content updated.
- Content removed.
- New product behavior note added.
- Product behavior note updated.
- Product behavior note removed.
- New protocol syntax added.
- Protocol syntax updated.
- Protocol syntax removed.
- New content added due to protocol revision.
- Content updated due to protocol revision.
- Content removed due to protocol revision.
- New protocol syntax added due to protocol revision.

- Protocol syntax updated due to protocol revision.
- Protocol syntax removed due to protocol revision.
- New content added for template compliance.
- Content updated for template compliance.
- Content removed for template compliance.
- Obsolete document removed.

Editorial changes are always classified with the change type **Editorially updated**.

Some important terms used in the change type descriptions are defined as follows:

- **Protocol syntax** refers to data elements (such as packets, structures, enumerations, and methods) as well as interfaces.
- **Protocol revision** refers to changes made to a protocol that affect the bits that are sent over the wire.

The changes made to this document are listed in the following table. For more information, please contact protocol@microsoft.com.

Section	Tracking number (if applicable) and description	Major change (Y or N)	Change type
2.2.5.8 WKSTA_TRANSPORT_INFO_0	63901 Added Windows Server 2003 R2 to the list of versions for which <code>wksti0_transport_address</code> is set to a string that represents the MAC address of the transport protocol.	N	Product behavior note updated.
2.2.5.11 STAT_WORKSTATION_0	63907 Added Windows Server 2003 R2 to the list of versions for which <code>RawReadsDenied</code> contains an indeterminate value on send and is ignored on receipt.	N	Product behavior note updated.
2.2.5.11 STAT_WORKSTATION_0	63912 Added Windows Server 2003 R2 to the list of versions for which <code>RawWritesDenied</code> contains an indeterminate value on send and is ignored on receipt.	N	Product behavior note updated.
3.2.1.1 Access Control Abstract Data Model	63916 Added Windows Server 2003 R2 to the list of versions on which the <code>NetSecurityDescriptor</code> security descriptor exists.	N	Product behavior note updated.
3.2.1.3 OtherDomains Name Abstract Data	63920 Added Windows Server 2003 R2 to the	N	Product behavior

Section	Tracking number (if applicable) and description	Major change (Y or N)	Change type
Model	list of versions that retrieve OtherDomainsInitialization from local registry values.		note updated.
3.2.3 Initialization	63934 Added Windows Server 2003 R2 to the list of versions that initialize the DormantFileLimit value to 45.	N	Product behavior note updated.
3.2.4 Message Processing Events and Sequencing Rules	63973 Added Windows Server 2003 R2 to the list of versions that do not establish SMB sessions or SMB share connections in the course of message processing.	N	Product behavior note updated.
3.2.4.1 NetrWkstaGetInfo (Opnum 0)	63978 Added Windows Server 2003 R2 to the list of versions in which wki502_dormant_file_limit is set to 0.	N	Product behavior note updated.
3.2.4.1 NetrWkstaGetInfo (Opnum 0)	63979 Added Windows Server 2008 R2 to the list of versions in which wki502_dormant_file_limit is set to 0.	N	Product behavior note updated.
3.2.4.11 NetrRenameMachineInDomain2 (Opnum 24)	Added reference to [MS-DRDM] for all instances of the term "RODC".	N	Content updated.
3.2.4.13 NetrGetJoinableOUs2 (Opnum 26)	Changed "false" to "FALSE" for typesOnly value.	N	Content updated.
3.2.4.14 NetrAddAlternateComputerName (Opnum 27)	63784 Added definitions used in the specification of message processing. Added message processing operations.	Y	Content updated.
3.2.4.15 NetrRemoveAlternateComputerName (Opnum 28)	63784 Added definitions used in the specification of message processing. Added message processing operations.	Y	Content updated.
3.2.4.16 NetrSetPrimaryComputerName (Opnum 29)	63789 Added definitions used in the specification of message processing. Added message processing operations.	Y	Content updated.
Z Appendix B: Product Behavior	63895 Added Windows Server 2003 R2 to the list of applicable versions.	N	Content updated.

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