

[MS-SNID-Diff]:

Server Network Information Discovery Protocol

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Revision Summary

Date	Revision History	Revision Class	Comments
8/8/2013	1.0	New	Released new document.
11/14/2013	2.0	Major	Updated and revised the technical content.
2/13/2014	2.0	None	No changes to the meaning, language, or formatting of the technical content.
5/15/2014	2.0	None	No changes to the meaning, language, or formatting of the technical content.
6/30/2015	2.0	None	No changes to the meaning, language, or formatting of the technical content.
7/14/2016	2.0	None	No changes to the meaning, language, or formatting of the technical content.
6/1/2017	2.0	None	No changes to the meaning, language, or formatting of the technical content.
9/12/2018	3.0	Major	Significantly changed the technical content.

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1 (Updated Section) Introduction

The Server Network Information Discovery Protocol enables is used by protocol clients to discover protocol servers within a UDP broadcast/multicast boundary and to on the same network. It enables protocol clients to get the server's NetBIOS name, IP address, and networking configuration information.

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

1.1 (Updated Section) Glossary

This document uses the following terms:

broadcast: A style of resource location or data transmission in which a client makes a request to all parties on a network simultaneously (a one-to-many communication). Also, a mode of resource location that does not use a name service.

Domain Name System (DNS): A hierarchical, distributed database that contains mappings of domain names to various types of data, such as IP addresses. DNS enables the location of computers and services by user-friendly names, and it also enables the discovery of other information stored in the database.

Internet Protocol version 4 (IPv4): An Internet protocol that has 32-bit source and destination addresses. IPv4 is the predecessor of IPv6.

Internet Protocol version 6 (IPv6): A revised version of the Internet Protocol (IP) designed to address growth on the Internet. Improvements include a 128-bit IP address size, expanded routing capabilities, and support for authentication and privacy.

multicast: Allows a host to send data to only those destinations that specifically request to receive the data. In this way, multicasting differs from sending broadcast data, because broadcast data is sent to all hosts. multicasting saves network bandwidth because multicast data is received only by those hosts that request the data, and the data travels over any link only once. multicasting saves server bandwidth because a server has to send only one multicast message per network instead of one unicast message per receiver.

NetBIOS name: A 16-byte address that is used to identify a NetBIOS resource on the network. For more information, see [RFC1001] and [RFC1002].

scope: A range of IP addresses and associated configuration options that are allocated to DHCP clients in a specific subnet.

Unicode string: A Unicode 8-bit string is an ordered sequence of 8-bit units, a Unicode 16-bit string is an ordered sequence of 16-bit code units, and a Unicode 32-bit string is an ordered sequence of 32-bit code units. In some cases, it could be acceptable not to terminate with a terminating null character. Unless otherwise specified, all Unicode strings follow the UTF-16LE encoding scheme with no Byte Order Mark (BOM).

User Datagram Protocol (UDP): The connectionless protocol within TCP/IP that corresponds to the transport layer in the ISO/OSI reference model.

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

1.2 References

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

1.2.1 Normative References

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

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

[RFC768] Postel, J., "User Datagram Protocol", STD 6, RFC 768, August 1980, <http://www.rfc-editor.org/rfc/rfc768.txt>

1.2.2 (Updated Section) Informative References

None.

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

[RFC1002] Network Working Group, "Protocol Standard for a NetBIOS Service on a TCP/UDP Transport: Detailed Specifications", STD 19, RFC 1002, March 1987, <http://www.rfc-editor.org/rfc/rfc1002.txt>

1.3 (Updated Section) Overview

The Server Network Information Discovery Protocol defines a pair of request and response messages by which a protocol client can locate protocol servers within the broadcast /multicast scope. The protocol client can get network information from the servers, such as NetBIOS name, (see [RFC1001] and [RFC1002]), Internet Protocol version 4 (IPv4), and Internet Protocol version 6 (IPv6) addresses. The protocol transports messages over User Datagram Protocol (UDP) as specified in [RFC768]. A protocol client sends a UDP package to the IPv4 broadcast address and the IPv6 link-local scope multicast address using UDP. Protocol servers reply to the protocol client with a UDP package containing its NetBIOS name and Domain Name System (DNS) configuration of the protocol server.

1.4 Relationship to Other Protocols

The protocol relies on User Datagram Protocol (UDP) as specified in [RFC768].

1.5 Prerequisites/Preconditions

The protocol server allows the incoming UDP package from port 8912 in the firewall.

1.6 (Updated Section) Applicability Statement

The protocol server and client are connected to the same subnet with IPv4 broadcast support or IPv4/IPv6 link-local scope multicast support.

1.7 Versioning and Capability Negotiation

The protocol version specifies the interoperability capability of the protocol on different Windows operating systems. See section 6 for detailed product behaviors of protocol versions and corresponding supported operating system. Protocol servers and clients with different protocol versions are not able to negotiate with each other.

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

Parameter	Value	Reference
UDP port	8912	http://www.iana.org/assignments/service-names-port-numbers/service-names-port-numbers.xml

2 Messages

2.1 (Updated Section) Transport

The protocol transports messages over UDP as specified in [RFC768]. A protocol client MUST send one UDP package to the broadcast (IPv4) address and multicast (IPv6 link-local scope all nodes) address using UDP port 8912. Protocol servers MUST reply to the protocol client with a UDP package containing its NetBIOS name and DNS configuration of the protocol server as specified later in this section.

2.2 Message Syntax

2.2.1 Enumerations

2.2.1.1 Id Enumeration

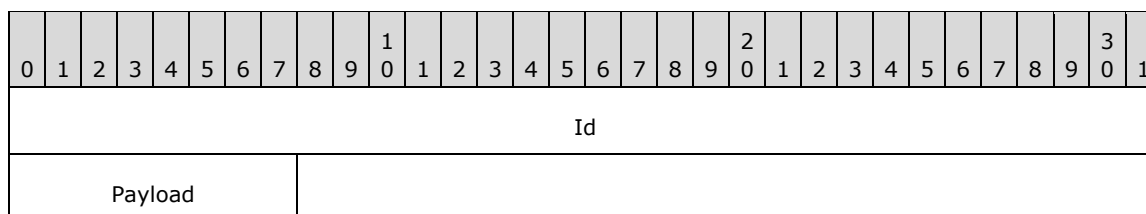
The **Id** enumeration is used to distinguish the Network Information Discovery request and Network Information Discovery response package types.

Field/Value	Description
RequestIdentifier 0x00000000	Indicates that the package is a Network Information Discovery request from the protocol client to the protocol server.
ResponseIdentifier 0xFFFFFFFF	Indicates that the package is a Network Information Discovery response from the protocol server to the protocol client.

2.2.2 Structures

2.2.2.1 Network Information Discovery Request

The package from protocol clients MUST set the **Id** field to **RequestIdentifier** and SHOULD include a single byte payload of any value.



Id (4 bytes): A message identifier to specify the package type of Network Information Discovery Request. The value MUST be **RequestIdentifier**, defined in 2.2.1.1.

Payload (1 byte): A package payload that contains the value.

2.2.2.2 SOCKADDR_STORAGE

SOCKADDR_STORAGE is a 128-byte structure that is formatted as follows.

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
Family										Buffer (variable)																					
...																															
Reserved (variable)																															
...																															

Family (2 bytes): The address family of the socket. This field MUST contain one of the following values.

Value	Meaning
InterNetwork 0x0002	When set, this indicates an IPv4 address in the socket.
InterNetworkV6 0x0017	When set, this indicates an IPv6 address in the socket.

Buffer (variable): A variable-length buffer that contains the socket address information. If the value of the **Family** field is 0x0002, this field MUST be interpreted as SOCKADDR_IN (section 2.2.2.2.1). Otherwise, if the value of the **Family** field is 0x0017, this field MUST be interpreted as SOCKADDR_IN6 (section 2.2.2.2.2).

Reserved (variable): The remaining bytes within the size of the **SOCKADDR_STORAGE** structure (128 bytes) MUST NOT be used and MUST be reserved. The server SHOULD set this to zero, and the client MUST ignore it on receipt.

2.2.2.2.1 SOCKADDR_IN

SOCKADDR_IN is a 14-byte structure formatted as follows. All fields in this structure are in network byte order.

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
Port										IPv4Address																					
...														Reserved																	
...																															
...																															

Port (2 bytes): This field MUST NOT be used and MUST be reserved. The server SHOULD set this field to zero, and the client MUST ignore it on receipt.

IPv4Address (4 bytes): The IPv4 address.

Reserved (8 bytes): This field MUST NOT be used and MUST be reserved. The server SHOULD set this field to zero, and the client MUST ignore it on receipt.

2.2.2.2.2 SOCKADDR_IN6

SOCKADDR_IN6 is a 26-byte structure formatted as follows. All fields in this structure are in network byte order.

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
Port										FlowInfo																					
...										IPv6Address (16 bytes)																					
...																															
...																															
...										ScopeId																					
...																															

Port (2 bytes): This field MUST NOT be used and MUST be reserved. The server SHOULD set this field to zero, and the client MUST ignore it on receipt.

FlowInfo (4 bytes): The server SHOULD set this field to zero, and the client MUST ignore it on receipt.

IPv6Address (16 bytes): IPv6 address.

ScopeId (4 bytes): The server SHOULD set this field to zero, and the client MUST ignore it on receipt.

2.2.2.3 Network Information Discovery Response

The package from protocol servers MUST set all fields with the format described in this section. There is no alignment requirement for fields after the variable **SERVER_NAME**, but all fields after that variable are presented in a specific structure with fixed size.

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
Id																															
SERVER_NAME (variable)																															
...																															
VERSION																															
LOWEST_VERSION																															
IPv4_DNS_NUM																															
IPv4_DNS_ADDRESS (variable)																															

...
IPv6_DNS_NUM
IPv6_DNS_ADDRESS (variable)
...

Id (4 bytes): Message identifier to specify the package type of Network Information Discovery Response. The value MUST be **ResponseIdentifier**, defined in section 2.2.1.1.

SERVER_NAME (variable): The protocol server's NetBIOS name in a null-terminated Unicode string.

VERSION (4 bytes): The current version of the protocol package. The protocol server MUST set this field to the corresponding protocol version it is using. The value for this field MUST be 256 or 512. If the field is set to 256, all fields starting from **IPv4_DNS_NUM** are ignored by the protocol client.

LOWEST_VERSION (4 bytes): The lowest version of the protocol package that the protocol server supports. The value of this field MUST be 256 or 512.

IPv4_DNS_NUM (4 bytes): The number of elements stored in **IPv4_DNS_ADDRESS**. This field is set to a value greater than or equal to 0x00000000 if the following IP address fields are used. It is set to 0xFFFFFFFF to ignore all following fields in the message.

IPv4_DNS_ADDRESS (variable): A list of IP addresses stored in the **SOCKADDR_STORAGE** structure, 128 bytes each. The total number MUST be equal to **IPv4_DNS_NUM**.

IPv6_DNS_NUM (4 bytes): The number of elements stored in **IPv6_DNS_ADDRESS**. The value MUST be greater than or equal to 0x00000000.

IPv6_DNS_ADDRESS (variable): A list of IP addresses stored in the **SOCKADDR_STORAGE** structure, 128 bytes each. The total number MUST be equal to **IPv6_DNS_NUM**.

2.2.3 Namespaces

None.

2.2.4 Messages

Message	Description
Network information discovery request	The UDP broadcast packages are sent from protocol clients to discover protocol servers within the broadcast scope.
Network information discovery response	The UDP packages are sent from protocol servers to protocol clients to respond to the discovery package and to carry the protocol server network information.

2.3 Directory Service Schema Elements

None.

3 Protocol Details

3.1 Client Details

3.1.1 Abstract Data Model

None.

3.1.2 Timers

None.

3.1.3 Initialization

None.

3.1.4 Higher-Layer Triggered Events

None.

3.1.5 Message Processing Events and Sequencing Rules

The protocol client creates a socket on a randomly selected port and sends a Network Information Discovery Request with an Id (section 2.2.1.1) defined and a payload to the IPv4 broadcast address and IPv6 link-local all nodes multicast address.

The protocol client then listens to the same port waiting for the Network Information Discovery Response.

3.1.6 Timer Events

None.

3.1.7 Other Local Events

None.

3.2 Server Details

3.2.1 Abstract Data Model

None.

3.2.2 Timers

None.

3.2.3 Initialization

The protocol server creates a UDP socket that listens to port 8912 when the protocol is started.

3.2.4 Higher-Layer Triggered Events

None.

3.2.5 Message Processing Events and Sequencing Rules

When the server receives a UDP Network Information Discovery request package from port 8912, it checks the **Id** in the package. If the **Id** is not a correct request **Id** as defined in section 2.2.1.1, the package is ignored. If the **Id** is the correct request **Id** as defined in section 2.2.1.1, the server finds the NetBIOS name and all DNS addresses on its network adapters and then sets the corresponding fields of the Network Information Discovery response package.

3.2.6 Timer Events

None.

3.2.7 Other Local Events

None.

4 (Updated Section) Protocol Examples

Network Information Discovery Request

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
0x00000000																															
0x01																															

Network Information Discovery Response

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
0xFFFFFFFF																															
s	v	r	n	a	m	e	\0	0x0000																							
0x0100																0x0000															
0x0100																0x00															
0x0004																															
...																															
0x0006																															
...																															

The example response package's **IPv4_DNS_ADDRESS** field contains four elements of **structure** the **SOCKADDR_STORAGE** **structure**, and the **IPv6_DNS_ADDRESS** field contains six elements of **structure** **SOCKADDR_STORAGE** **structure**.

5 Security

5.1 Security Considerations for Implementers

None.

5.2 Index of Security Parameters

None.

6 (Updated Section) Appendix A: 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~~ updates to those products.

- Windows Home Server 2011 server software
- Windows Small Business Server 2011 Essentials
- Windows Server 2012 operating system
- Windows Server 2012 R2 operating system
- Windows Server 2016 operating system
- Windows Server 2019 operating system

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

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

7 Change Tracking

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

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

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

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

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

The changes made to this document are listed in the following table. For more information, please contact dochelp@microsoft.com.

Section	Description	Revision class
6 Appendix A: Product Behavior	Added Windows Server 2019 to the list of applicable products.	Major

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