Simple Network Management Protocol Agent for NetX Duo (NetX Duo SNMP)

User Guide

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Contents

Chapter 1

Introduction to NetX Duo SNMP

The Simple Network Management Protocol (SNMP) is a protocol designed for managing devices on the internet. SNMP is a protocol that utilizes the connectionless User Datagram Protocol (UDP) services to perform its management function. The NetX Duo SNMP implementation is that of an SNMP Agent. An agent is responsible for responding to SNMP Manager's commands and sending event driven traps.

NetX Duo SNMP supports both IPv4 and IPv6 communication with SNMP Managers. NetX SNMP applications should compile and run in NetX Duo SNMP. However, the developer is encouraged to port existing SNMP applications to using the equivalent "duo" services. For example, when sending SNMP trap messages, the following 'duo' services should replace their NetX equivalent:

nxd_snmp_object_trap_send
nxd_snmp_object_trapv2_send
nxd_snmp_object_trapv3_send

For more details, see **Description of SNMP Agent Services** elsewhere in this User Guide for more details.

NetX Duo SNMP Agent Requirements

The NetX Duo SNMP package requires that an IP instance has already been created. In addition, UDP must be enabled on that same IP instance.

The NetX Duo SNMP Agent has several additional requirements. First, it requires access to port 161 for handling all SNMP manager requests. It also requires access to port 162 for sending trap messages to the Manager.

To use NetX Duo SNMP Agent with over IPv6 and to obtain IPv6 objects, IPv6 must be enabled in NetX Duo. See the ***NetX Duo User Guide*** for details on enabling the IP instance for IPv6 services.

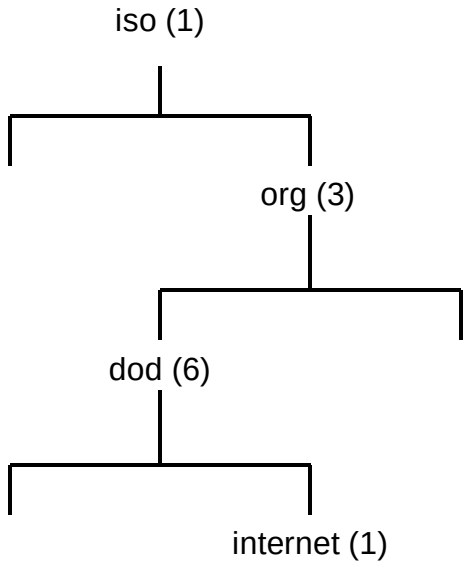
NetX Duo SNMP Constraints

The NetX Duo SNMP protocol implements SNMP Version 1, 2, and 3. The SNMPv3 implementation supports MD5 and SHA authentication, and DES encryption. This version of the NetX Duo SNMP Agent has the following constraints:

1. One SNMP Agent per NetX IP Instance
2. No support for RMON
3. SNMP v3 Inform messages are not supported

SNMP Object Names

The SNMP protocol is designed to manage devices on the internet. To accomplish this, each SNMP managed device has a set of objects that are defined by the Structure of Management Information (SMI) as defined by RFC 1155. The structure is a hierarchical tree type of structure that looks like the following:



Each node in the tree is an object. The “dod” object in the tree is identified by the notation 1.3.6, while the “internet” object in the tree is identified by the notation 1.3.6.1. All SNMP object names begin with the notation 1.3.6.

An SNMP Manager uses this object notation to specify what object in the device it wishes to get or set. The NetX Duo SNMP Agent interprets such manager requests and provides mechanisms for the application to perform the requested operation.

SNMP Manager Requests

The SNMP has a simple mechanism for managing devices. There is a set of standard SNMP commands that are issued by the SNMP Manager to the SNMP device on port 161. The following shows some of the basic SNMP Manager commands:

SNMP Command	Meaning
GET	*Get the specified object*
GETNEXT	*Get the next logical object after the specified object ID*
GETBULK	*Get the multiple logical objects after the specified object ID*
SET	*Set the specified object*

These commands are encoded in the Abstract Syntax Notation One (ASN.1) format and reside in the payload of the UDP packet sent by the SNMP Manager. The NetX Duo SNMP Agent processes the request and then calls the corresponding handling routine specified in the ***nx_snmp_agent_create*** call.

NetX Duo SNMP Agent Traps

The NetX Duo SNMP Agent provides the ability to also alert an SNMP Manager of events asynchronously. This is done via an SNMP trap command. There is a unique API for each version of SNMP for sending traps to an SNMP Manager. By default, the traps are sent to the SNMP Manager on port 162.

The NetX Duo SNMP Agent provides separate security keys for SNMPv3 trap messages. To do so, the SNMP application must create a separate set of keys from those applied to responses to Manager requests. Trap security enables the SNMP Agent to use the same or different passwords for authentication and privacy. For more information on creating security keys, see **NetX Duo SNMP Authentication and Encryption** in the next section.

A list of standard SNMP trap variables is enumerated at the top of *nxd_snmp.h*:

```
#define NX_SNMP_TRAP_COLDSTART                0
#define NX_SNMP_TRAP_WARMSTART                1
#define NX_SNMP_TRAP_LINKDOWN                 2
#define NX_SNMP_TRAP_LINKUP                   3
#define NX_SNMP_TRAP_AUTHENTICATE_FAILURE     4
#define NX_SNMP_TRAP_EGPNEIGHBORLOSS          5
#define NX_SNMP_TRAP_ENTERPRISESPECIFIC       6
```

To include these variables in the trap message, the `trap_type` input argument in *nx_snmp_agent_trapv2_send* (SNMPv2) or *nx_snmp_agent_trapv3_send* (SNMPv3) is set to the enumerated value of these variables. An example is shown below for SNMPv2 to notify the SNMP Manager of a cold start event:

```
UINT trap_type = NX_SNMP_TRAP_COLDSTART;

status = nx_snmp_agent_trapv2_send(&my_agent, MIB_IP_ADDRESS,
                                   (UCHAR *)"public", trap_type,
                                   tx_time_get(), NX_NULL);
```

To include proprietary variables in the trap message, the trap_type input argument is set to NX_SNMP_TRAP_CUSTOM and the trap list input argument contains the proprietary data. Note that the trap message will contain as the system up time (1.3.6.1.6.3.1.1.4.1.0). An example is shown below for SNMPv2:

```
NX_SNMP_TRAP_OBJECT trap_list[3];
NX_SNMP_OBJECT_DATA trap_data0;

    /* Load the data into the OBJECT. */
    nx_snmp_object_id_get((void*)"1.3.6.1.4.1.7428.1.3.2.0", &trap_data0);

    /* Update the Trap Object with the object and OID. */
    trap_list[0].nx_snmp_object_string_ptr = (UCHAR *)"1.3.6.1.6.3.1.1.4.0";
    trap_list[0].nx_snmp_object_data  = &trap_data0;

    /* Null terminate the trap list. */
    trap_list[1].nx_snmp_object_string_ptr = NX_NULL;

    status = nx_snmp_agent_trapv2_send(&my_agent, MIB_IP_ADDRESS,
                                       (UCHAR *)"trapduo",
                                       NX_SNMP_TRAP_CUSTOM,
                                        tx_time_get(), trap_list);
```

NetX Duo SNMP Authentication and Encryption

There are two flavors of authentication, namely *basic* and *digest*. Basic authentication is equivalent to a simple plain text *username* authentication found in many protocols. In SNMP basic authentication, the user simply verifies that the supplied username is valid for performing SNMP operations. Basic authentication is the only option for SNMP versions 1 and 2.

The main disadvantage of basic authentication is the username is transmitted in plain text. The SNMPv3 digest authentication addresses this problem by never transmitting the username in plain text. Instead, an algorithm is used to derive a 96-bit 'digest' from the username, context engine, and other information. The NetX Duo SNMP Agent supports both MD5 and SHA digest algorithms.

To enable authentication, the SNMP Agent must set its Context Engine ID using the *nx_snmp_agent_context_engine_set* service. The Context Engine ID is used in the creation of the authentication key.

Encryption of SNMPv3 data is available using the DES algorithm. Encryption requires that authentication be enabled (one cannot encrypt data without setting the authentication parameters).

To create authentication and privacy keys, the following API are used:

```
UINT  _nx_snmp_agent_md5_key_create(NX_SNMP_AGENT *agent_ptr,
                                    UCHAR *password, NX_SNMP_SECURITY_KEY
                                   *destination_key)

UINT  _nx_snmp_agent_sha_key_create(NX_SNMP_AGENT *agent_ptr,
                                    UCHAR *password, NX_SNMP_SECURITY_KEY
                                   *destination_key)
```

Next, the SNMP agent must be configured to use these keys. To register a key with the SNMP agent, the following API are used:

```
UINT  _nx_snmp_agent_authenticate_key_use(NX_SNMP_AGENT *agent_ptr,
                                          NX_SNMP_SECURITY_KEY *key)

UINT  _nx_snmp_agent_privacy_key_use(NX_SNMP_AGENT *agent_ptr,
                                     NX_SNMP_SECURITY_KEY *key)
```

Separate keys can be created for trap messages. To apply keys for trap messages the following API are available:

```
UINT  _nx_snmp_agent_auth_trap_key_use(NX_SNMP_AGENT *agent_ptr,
                                       NX_SNMP_SECURITY_KEY *key)

UINT  _nx_snmp_agent_priv_trap_key_use(NX_SNMP_AGENT *agent_ptr,
                                       NX_SNMP_SECURITY_KEY *key)
```

To disable authentication or encryption for response messages and sending traps, use these services with the key pointer input set to NULL.

NetX Duo SNMP Community Strings

The NetX Duo SNMP Agent supports both public and private community strings. The public string is set with the *nx_snmp_agent _public_string_set* service. The NetX Duo SNMP Agent private string is set using the *nx_snmp_agent_private_string_set* service.

NetX Duo SNMP Username Callback

The NetX Duo SNMP Agent package allows the application to specify (via the ***nx_snmp_agent_create*** call) a username callback routine that is called at the beginning of handling each SNMP Client request.

The callback routine provides the NetX Duo SNMP Agent with the username. If the supplied username is valid or if no username check is necessary for the responding to the request, the username callback should return the value of **NX_SUCCESS**. Otherwise, the routine should return **NX_SNMP_ERROR** to indicate the specified username is invalid.

The format of the application username callback routine is defined below:

```
UINT nx_snmp_agent_username_process(NX_SNMP_AGENT *agent_ptr,
                                    UCHAR *username);
```

The input parameters are defined as follows:

Parameter	Meaning
agent_ptr	Pointer to calling SNMP agent
username	Destination for the pointer to the required username

For SNMPv1 and SNMPv2/v2C sessions, the application will want to examine the community string on an incoming SNMP request to determine if the SNMP request has a valid community string. There are several services for the SNMP application to do this.

The SNMP application can inquire if the current SNMP Manager request is a GET (e.g. GET, GETNEXT, or GETBULK) or SET type of request using this service:

```
UINT nx_snmp_agent_request_get_type_test(NX_SNMP_AGENT *agent_ptr,
                                         UINT *is_get_type);
```

If the request is a GET type, the application will want to compare the input community string to the SNMP Agent's public string:

```
UINT nx_snmp_agent_public_string_test(NX_SNMP_AGENT *agent_ptr,
                                      UCHAR *username,
                                      UINT *is_public)
```

Similarly if the request is a SET type, the application will want to compare the input community string to the SNMP Agent's private string:

```
UINT nx_snmp_agent_private_string_test(NX_SNMP_AGENT *agent_ptr,
                                       UCHAR *username,
                                       UINT *is_private)
```

The `is_public` and `is_private` return values indicate respectively if the input community string is a valid public or private community string.

The return value of the username callback routine indicates if the username is valid. The value **NX_SUCCESS** is returned if the username is valid, or **NX_SNMP_ERROR** if the username is invalid.

NetX Duo SNMP Agent GET Callback

The application must set a callback routine for handling GET object requests from the SNMP Manager. The callback retrieves the value of the object specified in the request.

The application GET request callback routine is defined below:

```
UINT nx_snmp_agent_get_process(NX_SNMP_AGENT *agent_ptr,
                               UCHAR *object_requested,
                               NX_SNMP_OBJECT_DATA *object_data);
```

The input parameters are defined as follows:

Parameter	Meaning
agent_ptr	Pointer to calling SNMP agent.

object_requested	ASCII string representing the object ID the GET operation is for.
object_data	Data structure to hold the value retrieved by the callback. This can be set with a series of NetX Duo SNMP API's described below.

If the callback function cannot find the requested object, the **NX_SNMP_ERROR_NOSUCHNAME** error code should be returned. If any other error is detected, the **NX_SNMP_ERROR** should be returned.

NetX Duo SNMP Agent GETNEXT Callback

The application must also set the callback routine for handling GETNEXT object requests from the SNMP Manager. The GETNEXT callback retrieves the value of the next object specified by the request.

The application GETNEXT request callback routine is defined below:

```
UINT nx_snmp_agent_getnext_process(NX_SNMP_AGENT *agent_ptr,
                                   UCHAR *object_requested,
                                   NX_SNMP_OBJECT_DATA *object_data);
```

The input parameters are defined as follows:

Parameter	Meaning
agent_ptr	Pointer to calling SNMP agent.
object_requested	ASCII string representing the object ID the GETNEXT operation is for.
object_data	Data structure to hold the value retrieved by the callback. This can be set with a series of NetX Duo SNMP API's described below.

If the callback function cannot find the requested object, the **NX_SNMP_ERROR_NOSUCHNAME** error code should be returned. If any other error is detected, the **NX_SNMP_ERROR** should be returned.

NetX Duo SNMP Agent SET Callback

The application should set the callback routine for handling SET object requests from the SNMP Manager. The SET callback sets the value of the object specified by the request.

The application SET request callback routine is defined below:

```
UINT nx_snmp_agent_set_process(NX_SNMP_AGENT *agent_ptr,
                               UCHAR *object_requested,
                               NX_SNMP_OBJECT_DATA *object_data);
```

The input parameters are defined as follows:

Parameter	Meaning
agent_ptr	Pointer to calling SNMP agent.
object_requested	ASCII string representing the object ID the SET operation is for.
object_data	Data structure that contains the new value for the specified object. The actual operation can be done using the NetX Duo SNMP API's described below.

If the callback function cannot find the requested object, the **NX_SNMP_ERROR_NOSUCHNAME** error code should be returned.

If the NetX Duo SNMP host has created private community strings, and the SNMP sender of the SET request does not have the matching private string, it may return an **NX_SNMP_ERROR_NOACCESS** error. If any other error is detected, the **NX_SNMP_ERROR** should be returned.

Note that although NetX Duo SNMP Agent supplies an SNMP MIB database with the distribution, it is primarily for testing and development purposes. The developer will likely require a proprietary MIB database for a professional SNMP application.

Changing SNMP Version at Run Time

The SNMP Agent host can change SNMP version for each of the three versions at run time using the *nx_snmp_agent_set_version* service. The

SNMP Agent is by default enabled for all three versions when the SNMP Agent is created in *nx_snmp_agent_create*. However, the application can limit that to a subset of all versions.

Note: if the configuration options NX_SNMP_DISABLE_V1, NX_SNMP_DISABLE_V2 and/or NX_SNMP_DISABLE_V3 are defined, this function will have no effect enabling the effected versions.

The SNMP Agent can retrieve the SNMP version of the latest SNMP packet received using the *nx_snmp_agent_get_current_version* service.

SNMPv3 Discovery

The SNMP Agent, if enabled for SNMPv3, will respond to discovery requests from the SNMP Manager. Such a request contains security parameter data with null values for Authoritative Engine ID, user name, boot count and boot time. Authentication parameters are not applied to the DISCOVERY message. The variable binding list in the request is empty (contains zero items). The SNMP agent responds with a zero boot time and count, and the variable binding list containing 1 item, *usmStatsUnknownEngineIDs*, which is the count of requests received with an unknown (null) engine ID. On the subsequent GETNEXT request from the Browser/Manager, the boot data and security parameters are filled in only if security is enabled. If so it will also send a NotInTime data update in the PDU. The security parameters, e.g. authentication prove the identity of the Agent to the Manager.

More detailed information on SNMPv3 authentication is available in RFC 3414 “User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)”.

NetX Duo SNMP RFCs

NetX Duo SNMP is compliant with RFC1155, RFC1157, RFC1215, RFC1901, RFC1905, RFC1906, RFC1907, RFC1908, RFC2571, RFC2572, RFC2574, RFC2575, RFC 3414 and related RFCs.

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Chapter 2

Installation and Use of the NetX Duo SNMP Agent

This chapter contains a description of various issues related to installation, setup, and usage of the NetX Duo SNMP Agent component.

Product Distribution

SNMP Agent for NetX Duo is shipped on a single CD-ROM compatible disk. The package includes four source files, one include file, and a PDF file that contains this document, as follows:

nxd_snmp.h	Header file for SNMP for NetX Duo
demo_snmp_helper.h	Header file for SNMP MIB data
nxd_snmp.c	C Source file for SNMP Agent for NetX Duo
nx_md5.c	MD5 digest algorithms
nx_sha.c	SHA digest algorithms
nx_des.c	DES encryption algorithms
nxd_snmp.pdf	User Guide for SNMP Agent for NetX Duo
demo_netxduo_snmp.c	Simple SNMP demonstration
demo_netxduo_mib2.c	Simple MIB2 demonstration (MIB has IPv6 address elements)
demo_snmp_helper.h	Header file defining MIB elements

NetX Duo SNMP Agent Installation

In order to use NetX Duo SNMP, the entire distribution mentioned previously should be copied to the same directory where NetX Duo is installed. For example, if NetX Duo is installed in the directory "*threadx**arm7**green*" then the *nxd_snmp.h*, *nxd_snmp.c*, *nx_md5.c, nx_sha.c* and nx*_des.c* files should be copied into this directory.

Using the NetX Duo SNMP Agent

The application must have *nxd_snmp.c*, *nx_md5.c, nx_sha.c*, and *nx_des.c* in the build project. The application code must also include *nxd_snmp.h* after it includes *nx_api.h* to be able to invoke SNMP services.

These files must be compiled in the same manner as other application files and its object form must be linked to the NetX Duo library. This is all that is required to use NetX Duo SNMP.

Note that if **NX_SNMP_NO_SECURITY** is specified in the build process, the *nx_md5.c, nx_sha.c, and nx_des.c* files are not needed.

Note also that since NetX Duo SNMP utilizes UDP services, UDP must be enabled with the *nx_udp_enable* call prior to using SNMP.

Small Example System

An example of how to use NetX Duo SNMP Agent is described in Figure 1.0 that appears below. In this example, the SNMP include file *nxd_snmp.h* is brought in at line 6. The header file that defines the MIB database elements, *demo_snmp_helper.h,* is brought in at line 8. The MIB is defined starting on line 32. Next, the SNMP Agent is created in "*tx_application_define*" at line 129. Note that the SNMP Agent control block "*my_agent*" was defined as a global variable at line 18 previously. If IPv6 is enabled, the IPv6 addresses are registered with the IP instance in lines 166-223. SNMP Agent is started at line 229. SNMP object callback definitions for SNMP manager GET, GETNEXT and SET requests, as well as username and MIB update requests, are processed starting at line 250. For this example, no authenticate is performed.

Note that the MIB2 table shown below is simply an example. The application may use a different MIB and include it in separate files, as well as define GET, GETNEXT, or SET processing as per their application requirements.

```
1    /* This is a small demo of the NetX SNMP Agent on the high-performance NetX TCP/IP
2        stack. This demo relies on ThreadX and NetX to show simple SNMP the SNMP
3       GET/GETNEXT/SET requests on MIB-2 objects.  */
4
5    #include  "tx_api.h"
6    #include  "nx_api.h"
7    #include  "nxd_snmp.h"
8    #include  "demo_snmp_helper.h"
9
10   #define     DEMO_STACK_SIZE         4096
11   #define     AGENT_PRIMARY_ADDRESS   IP_ADDRESS(192, 2, 2, 66)
12
13   /* Define the ThreadX and NetX object control blocks...  */
14
15   TX_THREAD               thread_0;
16   NX_PACKET_POOL          pool_0;
17   NX_IP                   ip_0;
18   NX_SNMP_AGENT           my_agent;
19
20
21   /* Indicate if using IPv6 to communicate with SNMP servers. Note that
22      IPv6 must be enabled in the NetX Duo library first. Further, IPv6
23      and ICMPv6 services are enabled before starting the SNMP agent. */
24   #define USE_IPV6
```

```
25
26
27  /* Define authentication and privacy keys.  */
28
29  #ifdef AUTHENTICATION_REQUIRED
30  NX_SNMP_SECURITY_KEY    my_authentication_key;
31  #endif
32
33  #ifdef PRIVACY_REQUIRED
34  NX_SNMP_SECURITY_KEY    my_privacy_key;
35  #endif
36
37  /* Define an error counter variable. */
38  UINT error_counter = 0;
39
40  /* This binds a secondary interfaces to the primary IP network interface
41     if SNMP is required for required for that interface. */
42  /* #define  MULTI_HOMED_DEVICE */
43
44  /* Define function prototypes.  A generic ram driver is used in this demo.  However
45     to properly run an SNMP agent demo, a real driver should be substituted. */
46
47  VOID    thread_agent_entry(ULONG thread_input);
48  VOID    _nx_ram_network_driver(NX_IP_DRIVER *driver_req_ptr);
49  UINT    mib2_get_processing(NX_SNMP_AGENT *agent_ptr, UCHAR *object_requested,
                                NX_SNMP_OBJECT_DATA *object_data);
50  UINT    mib2_getnext_processing(NX_SNMP_AGENT *agent_ptr, UCHAR *object_requested,
                                NX_SNMP_OBJECT_DATA *object_data);
51  UINT    mib2_set_processing(NX_SNMP_AGENT *agent_ptr, UCHAR *object_requested,
                                NX_SNMP_OBJECT_DATA *object_data);
52  UINT    mib2_username_processing(NX_SNMP_AGENT *agent_ptr, UCHAR *username);
53  VOID    mib2_variable_update(NX_IP *ip_ptr, NX_SNMP_AGENT *agent_ptr);
54
55
56  UCHAR context_engine_id[] = {0x80, 0x00, 0x0d, 0xfe, 0x03, 0x00, 0x11, 0x23, 0x23,
                                 0x44, 0x55};
57  UINT  context_engine_size = 11;
58  UCHAR context_name[] = {0x69, 0x6e, 0x69, 0x74, 0x69, 0x61, 0x6c};
59  UINT  context_name_size = 7;
60
61  /* Define main entry point.  */
62
63  int main()
64  {
65
66      /* Enter the ThreadX kernel.  */
67      tx_kernel_enter();
68  }
69
70
71  /* Define what the initial system looks like.  */
72  void    tx_application_define(void *first_unused_memory)
73  {
74
75  UCHAR   *pointer;
76  UINT    status;
77
78
79      /* Setup the working pointer.  */
80      pointer =  (UCHAR *) first_unused_memory;
81
82      status = tx_thread_create(&thread_0, "agent thread", thread_agent_entry, 0,
83              pointer, DEMO_STACK_SIZE,
84              4, 4, TX_NO_TIME_SLICE, TX_AUTO_START);
85      if (status != NX_SUCCESS)
86      {
87           return;
88      }
89
90      pointer =  pointer + DEMO_STACK_SIZE;
91
92
93      /* Initialize the NetX system.  */
94      nx_system_initialize();
95
96      /* Create packet pool.  */
97      status = nx_packet_pool_create(&pool_0, "NetX Packet Pool 0", 2048,
                                       pointer, 20000);
98
99      if (status != NX_SUCCESS)
100     {
```

```
101          return;
102      }
103
104      pointer = pointer + 20000;
105
106      /* Create an IP instance.  */
107      status = nx_ip_create(&ip_0, "SNMP Agent IP Instance", AGENT_PRIMARY_ADDRESS,
108                            0xFFFFFF00UL, &pool_0, _nx_ram_network_driver,
109                            pointer, 4096, 1);
110
111      if (status != NX_SUCCESS)
112      {
113          return;
114      }
115
116      pointer =  pointer + 4096;
117
118      /* Enable ARP and supply ARP cache memory for IP Instance 0.  */
119      nx_arp_enable(&ip_0, (void *) pointer, 1024);
120      pointer = pointer + 1024;
121
122      /* Enable UPD processing for IP instance.  */
123      nx_udp_enable(&ip_0);
124
125      /* Enable ICMP for ping.  */
126      nx_icmp_enable(&ip_0);
127
128      /* Create an SNMP agent instance.  */
129      status = nx_snmp_agent_create(&my_agent, "SNMP Agent", &ip_0, pointer, 4096,
                                      &pool_0,
                                      mib2_username_processing, mib2_get_processing,
                                      mib2_getnext_processing,
                                      mib2_set_processing);
130
131
132
133      if (status != NX_SUCCESS)
134      {
135          return;
136      }
137
138      pointer =  pointer + 4096;
139
140      status = nx_snmp_agent_context_engine_set(&my_agent, context_engine_id,
                                                  context_engine_size);
141
142      if (status != NX_SUCCESS)
143      {
144          error_counter++;
145      }
146
147      return;
148  }
149
150  VOID thread_agent_entry(ULONG thread_input)
151  {
152
153  #ifdef USE_IPV6
154  UINT        iface_index, address_index;
155  UINT        status;
156  NXD_ADDRESS agent_ipv6_address;
157  #endif
158
159
160      /* Allow NetX time to get initialized. */
161      tx_thread_sleep(100);
162
163      /* If using IPv6, enable IPv6 and ICMPv6 services and get IPv6 addresses
164         registered with NetX Dou. */
165
166  #ifdef USE_IPV6
167
168      /* Enable IPv6 on the IP instance. */
169      status = nxd_ipv6_enable(&ip_0);
170
171      /* Check for enable errors.  */
172      if (status)
173      {
174
175          error_counter++;
176          return;
```

```
177       }
178      /* Enable ICMPv6 on the IP instance. */
179      status = nxd_icmp_enable(&ip_0);
180
181      /* Check for enable errors.  */
182      if (status)
183      {
184
185          error_counter++;
186          return;
187      }
188
189      agent_ipv6_address.nxd_ip_address.v6[3] = 0x101;
190      agent_ipv6_address.nxd_ip_address.v6[2] = 0x0;
191      agent_ipv6_address.nxd_ip_address.v6[1] = 0x0000f101;
192      agent_ipv6_address.nxd_ip_address.v6[0] = 0x20010db8;
193      agent_ipv6_address.nxd_ip_version = NX_IP_VERSION_V6;
194
195      /* Set the primary interface for our DNS IPv6 addresses. */
196      iface_index = 0;
197
198      /* This assumes we are using the primary network interface (index 0). */
199      status = nxd_ipv6_address_set(&ip_0, iface_index, NX_NULL, 10, &address_index);
200
201      /* Check for link local address set error.  */
202      if (status)
203      {
204
205          error_counter++;
206          return;
207       }
208
209      /* Set the host global IP address. We are assuming a 64
210         bit prefix here but this can be any value (< 128). */
211      status = nxd_ipv6_address_set(&ip_0, iface_index, &agent_ipv6_address, 64,
                                      &address_index);
212
213      /* Check for global address set error.  */
214      if (status)
215      {
216
217          error_counter++;
218          return;
219       }
220
221      /* Wait while NetX Duo validates the link local and global address. */
222      tx_thread_sleep(500);
223  #endif
224
225  #ifdef AUTHENTICATION_REQUIRED
226
227      /* Create an authentication key.  */
228      nx_snmp_agent_md5_key_create(&my_agent, "authpassword", &my_authentication_key);
229
230      /* Use the authentication key.  */
231      nx_snmp_agent_authenticate_key_use(&my_agent, &my_authentication_key);
232  #endif
233
234  #ifdef PRIVACY_REQUIRED
235
236      /* Create a privacy key.  */
237      nx_snmp_agent_md5_key_create(&my_agent, "privpassword", &my_privacy_key);
238
239      /* Use the privacy key.  */
240      nx_snmp_agent_privacy_key_use(&my_agent, &my_privacy_key);
241  #endif
242
243      /* Start the SNMP instance.  */
244      nx_snmp_agent_start(&my_agent);
245
246  }
247
248  /* Define the application's GET processing routine.  */
249
250  UINT    mib2_get_processing(NX_SNMP_AGENT *agent_ptr, UCHAR *object_requested,
                                NX_SNMP_OBJECT_DATA *object_data)
251  {
252
253  UINT    i;
254  UINT    status;
255
```

```
256
257     printf("SNMP Manager GET Request For:  %s", object_requested);
258
259     /* Loop through the sample MIB to see if we have information for the supplied
           variable.  */
260     i =  0;
261     status =  NX_SNMP_ERROR;
262     while (mib2_mib[i].object_name)
263     {
264
265         /* See if we have found the matching entry.  */
266         status =  nx_snmp_object_compare(object_requested, mib2_mib[i].object_name);
267
268         /* Was it found?  */
269         if (status == NX_SUCCESS)
270         {
271
272             /* Yes it was found.  */
273             break;
274         }
275
276         /* Move to the next index.  */
277         i++;
278     }
279
280     /* Determine if a not found condition is present.  */
281     if (status != NX_SUCCESS)
282     {
283
284         printf(" NO SUCH NAME!\n");
285
286         /* The object was not found - return an error.  */
287         return(NX_SNMP_ERROR_NOSUCHNAME);
288     }
289
290     /* Determine if the entry has a get function.  */
291     if (mib2_mib[i].object_get_callback)
292     {
293
294         /* Yes, call the get function.  */
295         status =  (mib2_mib[i].object_get_callback)(mib2_mib[i].object_value_ptr,
                                                       object_data);
296     }
297     else
298     {
299
300         printf(" NO GET FUNCTION!");
301
302         /* No get function, return no access.  */
303         status =  NX_SNMP_ERROR_NOACCESS;
304     }
305
306     printf("\n");
307
308     /* Return the status.  */
309     return(status);
310 }
311
312
313 /* Define the application's GETNEXT processing routine.  */
314
315 UINT    mib2_getnext_processing(NX_SNMP_AGENT *agent_ptr, UCHAR *object_requested,
                                    NX_SNMP_OBJECT_DATA *object_data)
316 {
317
318 UINT    i;
319 UINT    status;
320
321
322     printf("SNMP Manager GETNEXT Request For:  %s", object_requested);
323
324     /* Loop through the sample MIB to see if we have information for the supplied
           variable.  */
325     i =  0;
326     status =  NX_SNMP_ERROR;
327     while (mib2_mib[i].object_name)
328     {
329
330         /* See if we have found the next entry.  */
331         status =  nx_snmp_object_compare(object_requested, mib2_mib[i].object_name);
332
```

```
333          /* Is the next entry the mib greater?  */
334          if (status == NX_SNMP_NEXT_ENTRY)
335          {
336
337              /* Yes it was found.  */
338              break;
339          }
340
341          /* Move to the next index.  */
342          i++;
343      }
344
345      /* Determine if a not found condition is present.  */
346      if (status != NX_SNMP_NEXT_ENTRY)
347      {
348
349          printf(" NO SUCH NAME!\n");
350
351          /* The object was not found - return an error.  */
352          return(NX_SNMP_ERROR_NOSUCHNAME);
353      }
354
355
356      /* Copy the new name into the object.  */
357      nx_snmp_object_copy(mib2_mib[i].object_name, object_requested);
358
359      printf(" Next Name is: %s", object_requested);
360
361      /* Determine if the entry has a get function.  */
362      if (mib2_mib[i].object_get_callback)
363      {
364
365          /* Yes, call the get function.  */
366          status =  (mib2_mib[i].object_get_callback)(mib2_mib[i].object_value_ptr,
                                                        object_data);
367
368          /* Determine if the object data indicates an end-of-mib condition.  */
369          if (object_data -> nx_snmp_object_data_type == NX_SNMP_END_OF_MIB_VIEW)
370          {
371
372              /* Copy the name supplied in the mib table.  */
373              nx_snmp_object_copy(mib2_mib[i].object_value_ptr, object_requested);
374          }
375      }
376      else
377      {
378
379          printf(" NO GET FUNCTION!");
380
381          /* No get function, return no access.  */
382          status =  NX_SNMP_ERROR_NOACCESS;
383      }
384
385      printf("\n");
386
387      /* Return the status.  */
388      return(status);
389  }
390
391
392  /* Define the application's SET processing routine.  */
393
394  UINT    mib2_set_processing(NX_SNMP_AGENT *agent_ptr, UCHAR *object_requested,
                                NX_SNMP_OBJECT_DATA *object_data)
395  {
396
397  UINT    i;
398  UINT    status;
399
400
401      printf("SNMP Manager SET Request For:  %s", object_requested);
402
403      /* Loop through the sample MIB to see if we have information for the supplied
variable.  */
404      i =  0;
405      status =  NX_SNMP_ERROR;
406      while (mib2_mib[i].object_name)
407      {
408
409          /* See if we have found the matching entry.  */
410          status =  nx_snmp_object_compare(object_requested, mib2_mib[i].object_name);
```

```
411
412         /* Was it found?  */
413         if (status == NX_SUCCESS)
414         {
415
416             /* Yes it was found.  */
417             break;
418         }
419
420         /* Move to the next index.  */
421         i++;
422     }
423
424     /* Determine if a not found condition is present.  */
425     if (status != NX_SUCCESS)
426     {
427
428         printf(" NO SUCH NAME!\n");
429
430         /* The object was not found - return an error.  */
431         return(NX_SNMP_ERROR_NOSUCHNAME);
432     }
433
434
435     /* Determine if the entry has a set function.  */
436     if (mib2_mib[i].object_set_callback)
437     {
438
439         /* Yes, call the set function.  */
440         status =  (mib2_mib[i].object_set_callback)(mib2_mib[i].object_value_ptr,
                                                       object_data);
441     }
442     else
443     {
444
445         printf(" NO SET FUNCTION!");
446
447         /* No get function, return no access.  */
448         status =  NX_SNMP_ERROR_NOACCESS;
449     }
450
451     printf("\n");
452
453     /* Return the status.  */
454     return(status);
455 }
456
457
458 /* Define the application's authentication routine.  */
459
460 UINT  mib2_username_processing(NX_SNMP_AGENT *agent_ptr, UCHAR *username)
461 {
462
463     printf("Username is:  %s\n", username);
464
465     /* Update MIB-2 objects. In this example, it is only the SNMP objects.  */
466     mib2_variable_update(&ip_0, &my_agent);
467
468     /* No authentication is done, just return success!  */
469     return(NX_SUCCESS);
470 }
471
472
473 /* Define the application's update routine.  */
474
475 VOID  mib2_variable_update(NX_IP *ip_ptr, NX_SNMP_AGENT *agent_ptr)
476 {
477
478     /* Update the snmp parameters.  */
479     snmpInPkts =                agent_ptr -> nx_snmp_agent_packets_received;
480     snmpOutPkts =               agent_ptr -> nx_snmp_agent_packets_sent;
481     snmpInBadVersions =         agent_ptr -> nx_snmp_agent_invalid_version;
482     snmpInBadCommunityNames =   agent_ptr -> nx_snmp_agent_authentication_errors;
483     snmpInBadCommunityUsers =   agent_ptr -> nx_snmp_agent_username_errors;
484     snmpInASNParseErrs =        agent_ptr -> nx_snmp_agent_internal_errors;
485     snmpInTotalReqVars =        agent_ptr -> nx_snmp_agent_total_get_variables;
486     snmpInTotalSetVars =        agent_ptr -> nx_snmp_agent_total_set_variables;
487     snmpInGetRequests =         agent_ptr -> nx_snmp_agent_get_requests;
488     snmpInGetNexts =            agent_ptr -> nx_snmp_agent_getnext_requests;
489     snmpInSetRequests =         agent_ptr -> nx_snmp_agent_set_requests;
490     snmpOutTooBigs =            agent_ptr -> nx_snmp_agent_too_big_errors;
```

```
491      snmpOutNoSuchNames =        agent_ptr -> nx_snmp_agent_no_such_name_errors;
492      snmpOutBadValues =          agent_ptr -> nx_snmp_agent_bad_value_errors;
493      snmpOutGenErrs =            agent_ptr -> nx_snmp_agent_general_errors;
494      snmpOutTraps =              agent_ptr -> nx_snmp_agent_traps_sent;
495  }
496
```

Figure 1.0 Example of SNMP Agent use with NetX Duo

Configuration Options

There are several configuration options for building SNMP for NetX Duo. Following is a list of all options, where each is described in detail:

Define	Meaning
NX_SNMP_AGENT_PRIORITY	The priority of the SNMP AGENT thread. By default, this value is defined as 16 to specify priority 16.
NX_SNMP_TYPE_OF_SERVICE	Type of service required for the SNMP UDP responses. By default, this value is defined as NX_IP_NORMAL to indicate normal IP packet service. This define can be set by the application prior to inclusion of *nxd_snmp.h*.
NX_SNMP_FRAGMENT_OPTION	Fragment enable for SNMP UDP requests. By default, this value is NX_DONT_FRAGMENT to disable SNMP UDP fragmenting. This define can be set by the application prior to inclusion of *nxd_snmp.h*.
NX_SNMP_TIME_TO_LIVE	Specifies the time to live before it expires. The default value is set to 0x80, but can be redefined prior to inclusion of *nxd_snmp.h.*
NX_SNMP_AGENT_TIMEOUT	Specifies the number of ThreadX ticks that internal services will suspend for. The default value is set to 100, but can be redefined prior to inclusion of *nxd_snmp.h.*
NX_SNMP_MAX_OCTET_STRING	Specifies the maximum number of bytes allowed in an octet string in the SNMP Agent.

	The default value is set to 255, but can be redefined prior to inclusion of *nxd_snmp.h.*
NX_SNMP_MAX_CONTEXT_STRING	Specifies the maximum number of bytes for a context engine string in the SNMP Agent. The default value is set to 32, but can be redefined prior to inclusion of *nxd_snmp.h.*
NX_SNMP_MAX_USER_NAME	Specifies the maximum number of bytes in a username (including community strings). The default value is set to 64, but can be redefined prior to inclusion of *nxd_snmp.h.*
NX_SNMP_MAX_SECURITY_KEY	Specifies the number of bytes allowed in a security key string. The default value is set to 64, but can be redefined prior to nclusion of *nxd_snmp.h.*
NX_SNMP_PACKET_SIZE	Specifies the minimum size of the packets in the pool specified at SNMP Agent creation. The minimum size is needed to ensure the complete SNMP payload can be contained in one packet. The default value is set to 560, but can be redefined prior to inclusion of *nxd_snmp.h.*
NX_SNMP_AGENT_PORT	Specifies the UDP port to field SNMP Manager requests on. The default port is UDP port 161, but can be redefined prior to inclusion of *nxd_snmp.h.*
NX_SNMP_MANAGER_TRAP_PORT	Specifies the UDP port to send SNMP Agent trap requests to. The default port is UDP port 162, but can be redefined prior to

	inclusion of *nxd_snmp.h.*
NX_SNMP_MAX_TRAP_NAME	Specifies the size of the array to hold the username sent with trap messages. The default value is 64.
NX_SNMP_MAX_TRAP_KEY	Specifies the size of the authentication and privacy keys for trap messages. The default value is 64.
NX_SNMP_TIME_INTERVAL	This determines the sleep interval in timer ticks taken by the SNMP thread task between processing received SNMP packets. The default value is 100. During this sleep interval the host application has access to SNMP API services.
NX_SNMP_DISABLE_V1	Defined, this removes all the SNMP Version 1 processing in *nxd_snmp.c*. By default this is not defined.
NX_SNMP_DISABLE_V2	Defined, this removes all the SNMP Version 2 processing in *nxd_snmp.c*. By default this is not defined.
NX_SNMP_DISABLE_V3	Defined, this removes all the SNMPv3 processing in *nxd_snmp.c*. By default this is not defined.

Chapter 3

Description of SNMP Agent Services

This chapter contains a description of all NetX Duo SNMP Agent services (listed below) in alphabetic order.

In the “Return Values” section in the following API descriptions, values in **BOLD** are not affected by the **NX_DISABLE_ERROR_CHECKING** define that is used to disable API error checking, while non-bold values are completely disabled.

nx_snmp_agent_auth_trap_key_use
Specify authentication key (SNMP v3 only) for trap messages

nx_snmp_agent_authenticate_key_use
Specify authentication key (SNMP v3 only) for response messages

nx_snmp_agent_community_get
Retrieve community name

nx_snmp_agent_context_engine_set
Set context engine (SNMP v3 only)

nx_snmp_agent_context_name_set
Set context name (SNMP v3 only)

nx_snmp_agent_create
Create SNMP agent

nx_snmp_agent_current_version_set
Get the SNMP version of received packet

nx_snmp_agent_request_get_type_test
Indicate if last SNMP request is GET or SET type

nx_snmp_agent_private_string_test
Determine if string matches agent private string

nx_snmp_agent_public_string_test

Determine if string matches agent public string

nx_snmp_agent_set_interface
Set network interface for SNMP messaging

nx_snmp_agent_private_string_set
Set the SNMP agent private community string

nx_snmp_agent_public_string_set
Set the SNMP agent public community string

nx_snmp_agent_version_set
Set the SNMP agent status for all SNMP versions

nx_snmp_agent_delete
Delete SNMP agent

nx_snmp_agent_md5_key_create
Create md5 key (SNMP v3 only)

nx_snmp_agent_ priv_trap_key_use
Specify encryption key (SNMP v3 only) for trap messages

nx_snmp_agent_privacy_key_use
Specify encryption key (SNMP v3 only) for response messages

nx_snmp_agent_sha_key_create
Create sha key (SNMP v3 only)

nx_snmp_agent_start
Start SNMP agent

nx_snmp_agent_stop
Stop SNMP agent

nx_snmp_agent_trap_send
Send SNMP v1 trap (IPv4 only)

nx_snmp_agent_trapv2_send
Send SNMP v2 trap (IPv4 only)

nx_snmp_agent_trapv2_send_oid
Send SNMP v2 trap (IPv4 only) specifying the OID

nx_snmp_agent_trapv3_send
Send SNMP v3 trap (IPv4 only)

nx_snmp_agent_trapv3_send_oid
Send SNMP v2 trap (IPv4 only) specifying the OID

nxd_snmp_agent_trap_send
Send SNMP v1 trap (IPv4 and IPv6)

nxd_snmp_agent_trapv2_send
Send SNMP v2 trap (IPv4 and IPv6)

nxd_snmp_agent_trapv2_send_oid
Send SNMP v2 trap (IPv4/IPv6) specifying the OID

nxd_snmp_agent_trapv3_send
Send SNMP v3 trap (IPv4 and IPv6)

nxd_snmp_agent_trapv3_send_oid
Send SNMP v2 trap (IPv4/IPv6) specifying the OID

nx_snmp_agent_v3_context_boots_set
Set the number of reboots

nx_snmp_object_compare
Compare two objects

nx_snmp_object_copy
Copy an object

nx_snmp_object_counter_get
Get counter object

nx_snmp_object_counter_set
Set counter object

nx_snmp_object_counter64_get
Get 64-bit counter object

nx_snmp_object_counter64_set
Set 64-bit counter object

nx_snmp_object_end_of_mib
Set end-of-mib value

nx_snmp_object_gauge_get

Get gauge object

nx_snmp_object_gauge_set
Set gauge object

nx_snmp_object_id_get
Get object id

nx_snmp_object_id_set
Set object id

nx_snmp_object_integer_get
Get integer object

nx_snmp_object_integer_set
Set integer object

nx_snmp_object_ip_address_get
Get IP address object (IPv4 only)

nx_snmp_object_ip_address_set
Set IP address object (IPv4 only)

nx_snmp_object_ipv6_address_get
Get IP address object (IPv6 only)

nx_snmp_object_ipv6_address_set
Set IP address object (IPv6 only)

nx_snmp_object_no_instance
Set no-instance value

nx_snmp_object_not_found
Set not-found value

nx_snmp_object_octet_string_get
Get octet string object

nx_snmp_object_octet_string_set
Set octet string object

nx_snmp_object_string_get
Get ASCII string object

nx_snmp_object_string_set
Set ASCII string object

nx_snmp_object_timetics_get
Get timetics object

nx_snmp_object_timetics_set
Set timetics object

nx_snmp_agent_auth_trap_key_use

Specify authentication key for trap messages

Prototype

```
UINT nx_snmp_agent_auth_trap_key_use(NX_SNMP_AGENT *agent_ptr,
                                     NX_SNMP_SECURITY_KEY *key);
```

Description

This service specifies the key to be used for setting authentication parameters in the SNMPv3 security header in trap messages. Supplying a NX_NULL value for the key disables authentication.

Note: The key must be previously created. See `nx_snmp_agent_md5_key_create` or `nx_snmp_agent_sha_key_create`.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
key	Pointer to a previously created MD5 or SHA key.

Return Values

NX_SUCCESS	(0x00)	Successful authentication key set.
NX_NOT_ENABLED	(0x14)	SNMP Security disabled
NX_PTR_ERROR	(0x07)	Invalid SNMP Agent pointer.

Allowed From

Initialization, Threads

Example

```
/* Use previously created “my_key” for SNMPv3 trap message authentication.  */
status =  nx_snmp_agent_auth_trap_key_use(&my_agent, &my_key);

/* If status is NX_SUCCESS the SNMP Agent will use “my_key” for
   for authentication parameters in trap messages.  */
```

nx_snmp_agent_authenticate_key_use

Specify authentication key for response messages

Prototype

```
UINT nx_snmp_agent_authenticate_key_use(NX_SNMP_AGENT *agent_ptr,
                                        NX_SNMP_SECURITY_KEY *key);
```

Description

This service specifies the key to be used for authentication parameters in the SNMPv3 security parameter for all requests made after it is set. Supplying a NX_NULL value for the key disables authentication.

Note: The key must be previously created. See `nx_snmp_agent_md5_key_create` or `nx_snmp_agent_sha_key_create`.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
key	Pointer to a previously created MD5 or SHA key.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP key set.
NX_NOT_ENABLED	(0x14)	SNMP Security disabled
NX_PTR_ERROR	(0x07)	Invalid SNMP Agent pointer.

Allowed From

Initialization, Threads

Example

```
/* Use previously created “my_key” for SNMPv3 authentication.  */
status =  nx_snmp_agent_authenticate_key_use(&my_agent, &my_key);

/* If status is NX_SUCCESS the SNMP Agent will use “my_key” for
   for setting the authentication parameters of SNMPv3 requests.  */
```

nx_snmp_agent_community_get

Retrieve community name

Prototype

```
UINT nx_snmp_agent_community_get(NX_SNMP_AGENT *agent_ptr,
                                 UCHAR **community_string_ptr);
```

Description

This service retrieves the community name from the most recent SNMP request received by the SNMP Agent.

Input Parameters

agent_ptr Pointer to SNMP Agent control block.

community_string_ptr
Pointer to a string pointer to return the SNMP Agent community string.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP community get.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
UCHAR *string_ptr;

/* Pickup the community string pointer for my_agent.  */
status =  nx_snmp_agent_community_get(&my_agent, &string_ptr);


/* If status is NX_SUCCESS the pointer “string_ptr” points to the
   last community name supplied to the SNMP agent.  */
```

nx_snmp_agent_request_get_type_test

Indicate if last SNMP request is GET or SET type

Prototype

```
UINT nx_snmp_agent_request_get_type_test(NX_SNMP_AGENT *agent_ptr,
                                         UINT *is_get_type);
```

Description

This service indicates if the most recent request from the SNMP Manager is a GET (GET, GETNEXT, or GETBULK) or SET type. It is intended for use with the username callback where the SNMPv1 or SNMPv2 application will want to compare the received community string to the SNMP Agent public string if the request is a GET type, or to the SNMP Agent private string if the request is a SET type.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
is_get_type	Pointer to request type status: NX_TRUE if GET type NX_FALSE if SET type

Return Values

NX_SUCCESS	(0x00)	Successfully returned type
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
UINT is_get_type;

/* Determine if the current SNMP request is a GET or SET type.  */
status =  nx_snmp_agent_request_get_type_test(&my_agent, &is_get_type);

/* If status is NX_SUCCESS, is_get_type will indicate the request type.  */
```

nx_snmp_agent_context_engine_set

Set context engine (SNMP v3 only)

Prototype

```
UINT nx_snmp_agent_context_engine_set(NX_SNMP_AGENT *agent_ptr,
                                      UCHAR *context_engine,
                                      UINT context_engine_size);
```

Description

This service sets the context engine of the SNMP Agent. It is only applicable for SNMPv3 processing. This should be called before creating security keys if the application is using authentication and encryption, since the context engine ID is used in the key creation process. If not, NetX Duo SNMP provides a default context engine id at the top of *nxd_snmp.c:*

```
UCHAR _nx_snmp_default_context_engine[NX_SNMP_MAX_CONTEXT_STRING] =
                {0x80, 0x00, 0x03, 0x10, 0x01, 0xc0, 0xa8, 0x64, 0xaf};
```

Input Parameters

agent_ptr Pointer to SNMP Agent control block.

context_engine Pointer to the context engine string.

context_engine_size
Size of context engine string. Note that the maximum number of bytes in a context engine is defined by NX_SNMP_MAX_CONTEXT_STRING.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP context engine set.
NX_NOT_ENABLED	(0x14)	SNMPv3 is not enabled
NX_SNMP_ERROR	(0x100)	Context engine size error.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
UCHAR my_engine[] = {0x80, 0x00, 0x01, 0x02, 0x03, 0x04, 0x05, 0x06, 0x07};

/* Set the context engine for my_agent.  */
status =  nx_snmp_agent_context_engine_set(&my_agent, my_engine, 9);


/* If status is NX_SUCCESS the context engine has been set.  */
```

nx_snmp_agent_context_name_set

Set context name (SNMP v3 only)

Prototype

```
UINT nx_snmp_agent_context_name_set(NX_SNMP_AGENT *agent_ptr,
                                    UCHAR *context_name,
                                    UINT context_name_size);
```

Description

This service sets the context name of the SNMP Agent. It is only applicable for SNMPv3 processing. If not called, NetX Duo SNMP Agent will leave the context name blank.

Input Parameters

agent_ptr Pointer to SNMP Agent control block.

context_name Pointer to the context name string.

context_name_size
Size of context name string. Note that the maximum number of bytes in a context name is defined by NX_SNMP_MAX_CONTEXT_STRING.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP context name set.
NX_SNMP_ERROR	(0x100)	Context name size error.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
/* Set the context name for my_agent.  */
status =  nx_snmp_agent_context_name_set(&my_agent, “my_context_name”, 15);

/* If status is NX_SUCCESS the context name has been set.  */
```

nx_snmp_agent_create

Create SNMP agent

Prototype

```
UINT nx_snmp_agent_create(NX_SNMP_AGENT *agent_ptr,
      CHAR *snmp_agent_name, NX_IP *ip_ptr, VOID *stack_ptr,
      ULONG stack_size, NX_PACKET_POOL *pool_ptr,
      UINT (*snmp_agent_username_process)(struct NX_SNMP_AGENT_STRUCT
                                  *agent_ptr, UCHAR *username),
      UINT (*snmp_agent_get_process)(struct NX_SNMP_AGENT_STRUCT
                  *agent_ptr, UCHAR *object_requested,
                  NX_SNMP_OBJECT_DATA *object_data),
      UINT (*snmp_agent_getnext_process)(struct NX_SNMP_AGENT_STRUCT
                  *agent_ptr, UCHAR *object_requested,
                  NX_SNMP_OBJECT_DATA *object_data),
      UINT (*snmp_agent_set_process)(struct NX_SNMP_AGENT_STRUCT
                  *agent_ptr, UCHAR *object_requested,
                  NX_SNMP_OBJECT_DATA *object_data));
```

Description

This service creates a SNMP Agent on the specified IP instance.

Input Parameters

agent_ptr Pointer to SNMP Agent control block.

snmp_agent_name Pointer to the SNMP Agent name string.

ip_ptr Pointer to IP instance.

stack_ptr Pointer to SNMP Agent thread stack pointer.

stack_size Stack size in bytes.

pool_ptr Pointer the default packet pool for this SNMP Agent.

snmp_agent_username_process

Function pointer to application's username handling routine.

snmp_agent_get_process

Function pointer to application's GET request handling routine.

snmp_agent_getnext_process

Function pointer to application's GETNEXT request handling routine.

snmp_agent_set_process

Function pointer to application's SET request handling routine.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP Agent create.
NX_SNMP_ERROR	(0x100)	SNMP Agent create error.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
NX_SNMP_AGENT my_agent;

/* Create the SNMP Agent "my_agent."  */
status =  nx_snmp_agent_create(&my_agent, "My SNMP Agent", &ip_0, stack_start_ptr,
                4096, &pool_0, my_username_processing, my_get_processing,
                my_getnext_processing, my_set_processing);


/* If status is NX_SUCCESS the SNMP Agent "my_agent" has been created.  */
```

nx_snmp_agent_current_version_get

Get the SNMP packet version

Prototype

```
UINT nx_snmp_agent_current_version_get(NX_SNMP_AGENT *agent_ptr,
                                       UINT *version);
```

Description

This service retrieves the SNMP version parsed from the most recent SNMP packet received.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
version	Pointer to the SNMP version parsed from received SNMP packet

Return Values

NX_SUCCESS	(0x00)	Successful SNMP version get
NX_PTR_ERROR	(0x07)	Invalid pointer input

Allowed From

Threads

Example

```
UINT          snmp_version;
NX_SNMP_AGENT my_agent;

/* Get the version of the last received SNMP packet. */
status =  nx_snmp_agent_current_version_get (&my_agent, &snmp_version);


/* If status is NX_SUCCESS, snmp_version contains the received packet SNMP
version.  */
```

nx_snmp_agent_private_string_test

Verify private string matches Agent private string

Prototype

```
UINT nx_snmp_agent_private_string_test(NX_SNMP_AGENT *agent_ptr,
                                       UCHAR *community_string,
                                       UINT *is_private);
```

Description

This service compares the null terminated input community string with the SNMP agent private string and indicates if they match.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
community_string	Pointer to string to compare
is_private	Pointer to result of comparison NX_TRUE - string matches NX_FALSE - string does not match

Return Values

NX_SUCCESS	(0x00)	Successful comparison
NX_PTR_ERROR	(0x07)	Invalid pointer input

Allowed From

Threads

Example

```
UINT           is_private;
UCHAR          *community_string_ptr;
NX_SNMP_AGENT  my_agent;

/* Determine if the community string matches the agent private string */
status =  nx_snmp_agent_private_string_test(&my_agent, community_string_ptr,
                                            &is_private);


/* If status is NX_SUCCESS, is_private will indicate if there is a match. If
is_private is NX_TRUE, they match.  */
```

nx_snmp_agent_public_string_test

Verify received public string matches Agent's public string

Prototype

```
UINT nx_snmp_agent_public_string_test(NX_SNMP_AGENT *agent_ptr,
                                      UCHAR *community_string,
                                      UINT *is_public);
```

Description

This service compares a null terminated input community string with the SNMP agent public string and indicates if they match.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
community_string	Pointer to string to compare
is_public	Pointer to result of comparison NX_TRUE - string matches NX_FALSE - string does not match

Return Values

NX_SUCCESS	(0x00)	Successful comparison
NX_PTR_ERROR	(0x07)	Invalid pointer input

Allowed From

Threads

Example

```
UINT           is_public;
UCHAR          *community_string_ptr;
NX_SNMP_AGENT  my_agent;


/* Determine if the community string matches the agent public string */
status =  nx_snmp_agent_public_string_test(&my_agent, community_string_ptr,
                                           &is_public);


/* If status is NX_SUCCESS, is_public will indicate if there is a match. If
is_public is true they match.  */
```

nx_snmp_agent_version_set

Set the SNMP agent status for each SNMP version

Prototype

```
UINT nx_snmp_agent_version_set(NX_SNMP_AGENT *agent_ptr,
                               UINT enabled_v1, UINT enable_v2,
                               UINT enable_v3);
```

Description

This service sets the status (enabled/disabled) for each of the SNMP versions, V1, V2 and V3 on the SNMP agent. Note that the user configurable options, NX_SNMP_DISABLE_V1, NX_SNMP_DISABLE_V2, and NX_SNMP_DISABLE_V3, will override these run time settings. By default, the SNMP agent is enabled for all three versions.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
enabled_v1	Sets enabled status for SNMP V1 to on/off.
enabled_v2	Sets enabled status for SNMP V2 to on/off.
enabled_v3	Sets enabled status for SNMP V3 to on/off.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP version set
NX_PTR_ERROR	(0x07)	Invalid pointer input

Allowed From

Threads

Example

```
UINT          v1_on = NX_TRUE;
UINT          v2_on = NX_TRUE;
UINT          v3_on = NX_FALSE;

NX_SNMP_AGENT my_agent;

/* Enable/Disable each SNMP protocol (version) for the SNMP Agent) */
```

```
status =  nx_snmp_agent_version_set(&my_agent, v1_on, v2_on, v3_on);

/* If status is NX_SUCCESS, my_agent is enabled only for V1 and V2 assuming
NX_SNMP_DISABLE_V1 and NX_SNMP_DISABLE_V2 are not defined. */
```

nx_snmp_agent_private_string_set

Set the SNMP agent private string

Prototype

```
UINT nx_snmp_agent_private_string_set(NX_SNMP_AGENT *agent_ptr,
                                      UCHAR *community_string);
```

Description

This service sets the SNMP agent private community string with the input null terminated string. The default value is NULL (no private string set), such that any SNMP packet received with a “private” community string will not be accepted by the SNMP agent for read/write access. The input string must be less than or equal to the user configurable NX_SNMP_MAX_USER_NAME-1 (to allow room for null termination) size.

Input Parameters

agent_ptr Pointer to SNMP Agent control block.

community_string Pointer to the private string to assign

Return Values

NX_SUCCESS	(0x00)	Successfully set private string
NX_SNMP_ERROR_TOOBIG	(0x01)	String size too large
NX_PTR_ERROR	(0x07)	Invalid pointer input

Allowed From

Threads

Example

```
NX_SNMP_AGENT my_agent;

/* Set the SNMP agent's private community string */
status =  nx_snmp_agent_private_string_set(&my_agent, "private"));

/* If status is NX_SUCCESS, the SNMP agent private string is set.  */
```

nx_snmp_agent_public_string_set

Set the SNMP agent public string

Prototype

```
UINT nx_snmp_agent_public_string_set(NX_SNMP_AGENT *agent_ptr,
                                     UCHAR *community_string);
```

Description

This service sets the SNMP agent public community string with the input null terminated string. The `community string` must be less than or equal to the user configurable `NX_SNMP_MAX_USER_NAME-1` (to allow room for null termination) size.

Input Parameters

agent_ptr Pointer to SNMP Agent control block.

community_string Pointer to the public string to assign

Return Values

NX_SUCCESS	(0x00)	Successfully set public string
NX_SNMP_ERROR_TOOBIG	(0x01)	String size too large
NX_PTR_ERROR	(0x07)	Invalid pointer input

Allowed From

Threads

Example

```
NX_SNMP_AGENT my_agent;

/* Set the SNMP agent's public string. */
nx_snmp_agent_public_string_set(&my_agent, "my_public"));

/* If status is NX_SUCCESS, the SNMP agent public string is set.  */
```

nx_snmp_agent_delete

Delete SNMP agent

Prototype

```
UINT nx_snmp_agent_delete(NX_SNMP_AGENT *agent_ptr);
```

Description

This service deletes a previously created SNMP Agent.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP Agent delete.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
/* Delete the SNMP Agent "my_agent."  */
status =  nx_snmp_agent_delete(&my_agent);

/* If status is NX_SUCCESS the SNMP Agent "my_agent" has been deleted.  */
```

nx_snmp_agent_set_interface

Set the SNMP agent network interface

Prototype

```
UINT nx_snmp_agent_set_interface(NX_SNMP_AGENT *agent_ptr,
                                 UINT if_index);
```

Description

This service sets the SNMP network interface for the SNMP Agent as specified by the input interface index. This is only useful for SNMP host applications with NetX Duo 5.6 or higher which support multiple network interfaces. The default value if not specified by the host is zero, for the primary interface.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
If_index	Index specifying the SNMP interface.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP interface set.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
/* Set the SNMP Agent "my_agent" to the secondary interface.  */
if_index = 1;
status =  nx_snmp_agent_set_interface(&my_agent, if_index);

/* If status is NX_SUCCESS the SNMP agent interface is set.  */
```

nx_snmp_agent_md5_key_create

Create md5 key (SNMP v3 only)

Prototype

```
UINT nx_snmp_agent_md5_key_create(NX_SNMP_AGENT *agent_ptr,
                                  UCHAR *password,
                                  NX_SNMP_SECURITY_KEY
                                       *destination_key);
```

Description

This service creates a MD5 key that can be used for authentication and encryption.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
password	Pointer to password string.
destination_key	Pointer to SNMP key data structure.

Return Values

NX_SUCCESS	(0x00)	Successful key create.
NX_NOT_ENABLED	(0x14)	Security not enabled.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
NX_SNMP_SECURITY_KEY my_key;

/* Create the MD5 key for "my_agent."   */
status =  nx_snmp_agent_md5_key_create(&my_agent, "authpw", &my_key);

/* If status is NX_SUCCESS an MD5 key has been created.  */
```

nx_snmp_agent_priv_trap_key_use

Specify encryption key for trap messages

Prototype

```
UINT nx_snmp_agent_priv_trap_key_use(NX_SNMP_AGENT *agent_ptr,
                                     NX_SNMP_SECURITY_KEY *key);
```

Description

This service specifies that a previously created privacy key is to be used for encryption and decryption of SNMPv3 trap messages.

Note that an authentictation key must be previously created. SNMP v3 privacy (encryption) requires authentication. See `nx_snmp_agent_auth_trap_key_use` for details.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
key	Pointer to previously create key.

Return Values

NX_SUCCESS	(0x00)	Successful privacy key set.
NX_NOT_ENABLED	(0x14)	Security not enabled.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
/* Use the “my_privacy_key” for the SNMP Agent “my_agent” trap messages.   */
status =  nx_snmp_agent_priv_trap_key_use(&my_agent, &my_privacy_key);

/* If status is NX_SUCCESS the privacy key is registered with the SNMP agent.  */
```

nx_snmp_agent_privacy_key_use

Specify encryption key for response messages

Prototype

```
UINT nx_snmp_agent_privacy_key_use(NX_SNMP_AGENT *agent_ptr,
                                   NX_SNMP_SECURITY_KEY *key);
```

Description

This service specifies that the previously created key is to be used for encryption and decryption of SNMPv3 response messages.

Note that an authentication key must have previously been specified. SNMP v3 encryption requires creation of an authentication key as well. See `nx_snmp_agent_authentiation_key_use` for details.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
key	Pointer to previously create key.

Return Values

NX_SUCCESS	(0x00)	Successful privacy key set.
NX_NOT_ENABLED	(0x14)	Security not enabled.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
/* Use the “my_privacy_key” for the SNMP Agent “my_agent.”   */
status =  nx_snmp_agent_privacy_key_use(&my_agent, &my_privacy_key);

/* If status is NX_SUCCESS the privacy key is registered with the SNMP agent.  */
```

nx_snmp_agent_sha_key_create

Create SHA key (SNMP v3 only)

Prototype

```
UINT nx_snmp_agent_sha_key_create(NX_SNMP_AGENT *agent_ptr,
                                  UCHAR *password,
                                  NX_SNMP_SECURITY_KEY
                                  *destination_key);
```

Description

This service creates a SHA key that can be used for authentication and encryption.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
password	Pointer to password string.
destination_key	Pointer to SNMP key data structure.

Return Values

NX_SUCCESS	(0x00)	Successful key create.
NX_SNMP_ERROR	(0x100)	Key create error.
NX_PTR_ERROR	(0x07)	Invalid SNMP Agent or key pointer.

Allowed From

Initialization, Threads

Example

```
NX_SNMP_SECURITY_KEY my_key;

/* Create the SHA key for “my_agent.”   */
status =  nx_snmp_agent_sha_key_create(&my_agent, “authpw”, &my_key);

/* If status is NX_SUCCESS the key for the password “authpw” has been created.  */
```

nx_snmp_agent_start

Start SNMP agent

Prototype

```
UINT nx_snmp_agent_start(NX_SNMP_AGENT *agent_ptr);
```

Description

This service binds the UDP socket to the SNMP port 161 and starts the SNMP Agent thread task.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.

Return Values

NX_SUCCESS	(0x00)	Successful start of SNMP Agent.
NX_SNMP_ERROR	(0x100)	SNMP Agent start error.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
/* Start the previously created SNMP Agent “my_agent.”   */
status =  nx_snmp_agent_start(&my_agent);

/* If status is NX_SUCCESS the SNMP Agent “my_agent” has been started.  */
```

nx_snmp_agent_stop

Stop SNMP agent

Prototype

```
UINT nx_snmp_agent_stop(NX_SNMP_AGENT *agent_ptr);
```

Description

This service stops the SNMP Agent thread task and unbinds the UDP socket to the SNMP port.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.

Return Values

NX_SUCCESS	(0x00)	Successful stop of SNMP Agent.
NX_PTR_ERROR	(0x07)	Invalid SNMP Agent pointer.

Allowed From

Threads

Example

```
/* Stop the previously created and started SNMP Agent “my_agent.”   */
status =  nx_snmp_agent_stop(&my_agent);

/* If status is NX_SUCCESS the SNMP Agent “my_agent” has been stopped.  */
```

nx_snmp_agent_trap_send

Send SNMPv1 trap *(IPv4 only)*

Prototype

```
UINT nx_snmp_agent_trap_send(NX_SNMP_AGENT *agent_ptr,
                             ULONG ip_address, UCHAR *enterprise,
                             UINT trap_type, UINT trap_code,
                             ULONG elapsed_time,
                             NX_SNMP_TRAP_OBJECT *object_list_ptr);
```

Description

This service sends an SNMP trap to the SNMP Manager at the specified IPv4 address. The preferred method for sending an SNMP trap in NetX Duo is to use the *nxd_snmp_agent_trap_send* service. *nx_snmp_agent_trap_send* is included in NetX Duo to support existing NetX SNMP Agent applications.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
ip_address	IPv4 address of the SNMP Manager.
enterprise	Enterprise object ID string (sysObectID).
trap_type	Type of trap requested, as follows: NX_SNMP_TRAP_COLDSTART (0) NX_SNMP_TRAP_WARMSTART (1) NX_SNMP_TRAP_LINKDOWN (2) NX_SNMP_TRAP_LINKUP (3) NX_SNMP_TRAP_AUTHENTICATE_FAILURE (4) NX_SNMP_TRAP_EGPNEIGHBORLOSS (5)
trap_code	Specific trap code.
elapsed_time	Time system has been up (sysUpTime).
object_list_ptr	Array of objects and their associated values to be included in the SNMP trap. The list is NX_NULL terminated.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP trap send.
NX_SNMP_ERROR	(0x100)	Error sending SNMP trap.
NX_NOT_ENABLED	(0x14)	SNMPv1 not enabled.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Threads

Example

```
NX_SNMP_TRAP_OBJECT trap_list[5];

ULONG dest_ip_address = IP_ADDRESS(1,2,3,4);

/* Build list of objects to supply in the trap.  */
trap_list[0].nx_snmp_object_string_ptr =  "1.3.6.1.2.1.2.2.1.1.0";
trap_list[0].nx_snmp_object_data.nx_snmp_object_data_type =  NX_SNMP_INTEGER;
trap_list[0].nx_snmp_object_data.nx_snmp_object_data_msw =   counter;
trap_list[1].nx_snmp_object_string_ptr =  "1.3.6.1.2.1.1.3.0";
trap_list[1].nx_snmp_object_data.nx_snmp_object_data_type =  NX_SNMP_TIME_TICS;
trap_list[1].nx_snmp_object_data.nx_snmp_object_data_msw =   tx_time_get();
trap_list[2].nx_snmp_object_string_ptr =  NX_NULL; /* Terminate list!  */

/* Send trap to SNMP manager at 193.2.2.61.  */
status =  nx_snmp_agent_trap_send(&my_agent,dest_ip_address,
                                  "1.3.6.7.7.7", NX_SNMP_TRAP_LINKUP, counter++,
                                   tx_time_get(), trap_list);

/* If status is NX_SUCCESS the SNMP trap has been sent.  */
```

nxd_snmp_agent_trap_send

Send SNMPv1 trap *(IPv4 and IPv6)*

Prototype

```
UINT nxd_snmp_agent_trap_send(NX_SNMP_AGENT *agent_ptr,
            ULONG ip_address, UCHAR *enterprise, UINT trap_type,
            UINT trap_code, ULONG elapsed_time,
            NX_SNMP_TRAP_OBJECT *object_list_ptr);
```

Description

This service sends an SNMP trap to the SNMP Manager at the specified IP address. The equivalent method for sending an SNMP trap in NetX is the *nxd_snmp_agent_trap_send* service. .

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
ip_address	IPv4 or IPv6 address of the SNMP Manager.
enterprise	Enterprise object ID string (sysObectID).
trap_type	Type of trap requested, as follows: NX_SNMP_TRAP_COLDSTART (0) NX_SNMP_TRAP_WARMSTART (1) NX_SNMP_TRAP_LINKDOWN (2) NX_SNMP_TRAP_LINKUP (3) NX_SNMP_TRAP_AUTHENTICATE_FAILURE (4) NX_SNMP_TRAP_EGPNEIGHBORLOSS (5)
trap_code	Specific trap code.
elapsed_time	Time system has been up (sysUpTime).
object_list_ptr	Array of objects and their associated values to be included in the SNMP trap. The list is NX_NULL terminated.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP trap send.
NX_SNMP_ERROR	(0x100)	Error sending SNMP trap.

NX_NOT_ENABLED	(0x14)	SNMPv1 not enabled.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Threads

Example

```
NX_SNMP_TRAP_OBJECT trap_list[5];

NXD_ADDRESS dest_ip_address;

    dest_ip_address.nxd_ip_version = NX_IP_VERSION_V6 ;
    dest_ip_address.nxd_ip_address.v6[0] = 0x20010db8;
    dest_ip_address.nxd_ip_address.v6[1] = 0xf101;
    dest_ip_address.nxd_ip_address.v6[2] = 0x00000000;
    dest_ip_address.nxd_ip_address.v6[3] = 0x00000101;

/* Build list of objects to supply in the trap.  */
trap_list[0].nx_snmp_object_string_ptr =  "1.3.6.1.2.1.2.2.1.1.0";
trap_list[0].nx_snmp_object_data.nx_snmp_object_data_type =  NX_SNMP_INTEGER;
trap_list[0].nx_snmp_object_data.nx_snmp_object_data_msw =   counter;
trap_list[1].nx_snmp_object_string_ptr =  "1.3.6.1.2.1.1.3.0";
trap_list[1].nx_snmp_object_data.nx_snmp_object_data_type =  NX_SNMP_TIME_TICS;
trap_list[1].nx_snmp_object_data.nx_snmp_object_data_msw =   tx_time_get();
trap_list[2].nx_snmp_object_string_ptr =  NX_NULL; /* Terminate list!  */

/* Send trap to SNMP manager at 193.2.2.61.  */
status =  nxd_snmp_agent_trap_send(&my_agent,&dest_ip_address,
              "1.3.6.7.7.7", NX_SNMP_TRAP_LINKUP, counter++, tx_time_get(),
              trap_list);

/* If status is NX_SUCCESS the SNMP trap has been sent.  */
```

nx_snmp_agent_trapv2_send

Send SNMPv2 trap (IPv4 only)

Prototype

```
UINT nx_snmp_agent_trapv2_send(NX_SNMP_AGENT *agent_ptr,
            NXD_ADDRESS *ip_address, UCHAR *community, UINT trap_type,
            ULONG elapsed_time, NX_SNMP_TRAP_OBJECT *object_list_ptr);
```

Description

This service sends an SNMPv2 trap to the SNMP Manager at the specified IPv4 address. The preferred method for sending an SNMP trap in NetX Duo is to use the *nxd_snmp_agent_trapv2_send* service. *nx_snmp_agent_trapv2_send* is included in NetX Duo to support existing NetX SNMP Agent applications.

Input Parameters

agent_ptr Pointer to SNMP Agent control block.

ip_address IPv4 address of the SNMP Manager.

community Community name (username).

trap_type Type of trap requested. The standard events are:

NX_SNMP_TRAP_COLDSTART (0)
NX_SNMP_TRAP_WARMSTART (1)
NX_SNMP_TRAP_LINKDOWN (2)
NX_SNMP_TRAP_LINKUP (3)
NX_SNMP_TRAP_AUTHENTICATE_FAILURE (4)
NX_SNMP_TRAP_EGPNEIGHBORLOSS (5)

For proprietary data:

NX_SNMP_TRAP_CUSTOM (0xFFFFFFFF)
(defined in *nxd_snmp.h*)

elapsed_time Time system has been up (sysUpTime).

object_list_ptr Array of objects and their associated values to be included in the SNMP trap. The list is NX_NULL terminated.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP trap send.
NX_SNMP_ERROR	(0x100)	Error sending SNMP trap.
NX_NOT_ENABLED	(0x14)	SNMPv2 not enabled.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Threads

Example

```
NX_SNMP_TRAP_OBJECT trap_list[5];
ULONG  dest_ip_address = IP_ADDRESS(1,2,3,4);

/* Build an empty object list, since it is not needed for the
   NX_SNMP_TRAP_COLDSTART trap.  */
trap_list[0].nx_snmp_object_string_ptr =  NX_NULL;

/* Send trap to SNMP manager at 193.2.2.61.  */
Status =  nx_snmp_agent_trapv2_send(&my_agent,dest_ip_address, "public",
               NX_SNMP_TRAP_COLDSTART, tx_time_get(), trap_list);

/* If status is NX_SUCCESS the SNMP trap has been sent.  */
```

nx_snmp_agent_trapv2_oid_send

Send SNMPv2 trap specifying OID directly

Prototype

```
UINT nx_snmp_agent_trapv2_oid_send(NX_SNMP_AGENT *agent_ptr,
                                   ULONG ip_address, UCHAR *community,
                                   UCHAR *oid, ULONG elapsed_time,
                                   NX_SNMP_TRAP_OBJECT
                                            *object_list_ptr);
```

Description

This service sends an SNMPv2 trap to the SNMP Manager at the specified IP address (IPv4 only) and allows the caller to specify the OID directly. The preferred method for sending an SNMP trap with specified OID in NetX Duo is to use the *nxd_snmp_agent_trapv2_oid_send* service. *nx_snmp_agent_trapv2_oid_ send* is included in NetX Duo to support existing NetX SNMP Agent applications.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
ip_address	IP address of SNMP Manager.
community	Community name (username).
oid	Pointer to buffer containing OID.
elapsed_time	Time system has been up (sysUpTime).
object_list_ptr	Array of objects and their associated values to be included in the SNMP trap. The list is NX_NULL terminated.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP trap send.
NX_SNMP_ERROR	(0x100)	Error sending SNMP trap.
NX_PTR_ERROR	(0x16)	Invalid SNMP Agent or parameter pointer.
NX_IP_ADDRESS_ERROR	(0x21)	Invalid destination IP address.
NX_OPTION_ERROR	(0x0a)	Invalid parameter.

Allowed From

Threads

Example

```
NX_SNMP_TRAP_OBJECT trap_list[5];

/* Build an empty object list */
trap_list[0].nx_snmp_object_string_ptr =  NX_NULL;

/* Send trap to SNMP manager at 193.2.2.61.  */
Status =  nx_snmp_agent_trapv2_oid_send(&my_agent, IP_ADDRESS(193,2,2,61),
                                        "public", (UCHAR *)"0.9.9.9.9.9.9.9.9",
                                         tx_time_get(), trap_list);

/* If status is NX_SUCCESS the SNMP trap has been sent.  */
```

nxd_snmp_agent_trapv2_send

Send SNMPv2 trap (IPv4 and IPv6)

Prototype

```
UINT nxd_snmp_agent_trapv2_send(NX_SNMP_AGENT *agent_ptr,
                                NXD_ADDRESS *ip_address,
                                UCHAR *community, UINT trap_type,
                                ULONG elapsed_time,
                                NX_SNMP_TRAP_OBJECT *object_list_ptr);
```

Description

This service sends an SNMP V2 trap to the SNMP Manager at the specified IP address.

Input Parameters

agent_ptr Pointer to SNMP Agent control block.

ip_address IP (IPv4 or IPv6) address of the SNMP Manager.

community Community name (username).

trap_type Type of trap requested. The standard events are:

NX_SNMP_TRAP_COLDSTART (0)
NX_SNMP_TRAP_WARMSTART (1)
NX_SNMP_TRAP_LINKDOWN (2)
NX_SNMP_TRAP_LINKUP (3)
NX_SNMP_TRAP_AUTHENTICATE_FAILURE (4)
NX_SNMP_TRAP_EGPNEIGHBORLOSS (5)

For proprietary data:

NX_SNMP_TRAP_CUSTOM (0xFFFFFFFF)
(defined in *nxd_snmp.h*)

elapsed_time Time system has been up (sysUpTime).

object_list_ptr Array of objects and their associated values to be included in the SNMP trap. The list is NX_NULL terminated.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP trap send.
NX_SNMP_ERROR	(0x100)	Error sending SNMP trap.
NX_NOT_ENABLED	(0x14)	SNMPv2 not enabled.
NX_SNMP_INVALID_IP_PROTOCOL_ERROR	(0x104)	Unsupported IP version
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Threads

Example

```
NX_SNMP_TRAP_OBJECT trap_list[5];
NXD_ADDRESS dest_ip_address;

    dest_ip_address.nxd_ip_version = NX_IP_VERSION_V6 ;
    dest_ip_address.nxd_ip_address.v6[0] = 0x20010db8;
    dest_ip_address.nxd_ip_address.v6[1] = 0xf101;
    dest_ip_address.nxd_ip_address.v6[2] = 0x00000000;
    dest_ip_address.nxd_ip_address.v6[3] = 0x00000101;

/* Build an empty object list, since it is not needed for the
   NX_SNMP_TRAP_COLDSTART trap.  */
trap_list[0].nx_snmp_object_string_ptr =  NX_NULL;

/* Send a standard event trap to SNMP manager at 193.2.2.61.  */
Status =  nxd_snmp_agent_trapv2_send(&my_agent,&dest_ip_address, "public",
                                     NX_SNMP_TRAP_COLDSTART, tx_time_get(),
                                     trap_list);

/* If status is NX_SUCCESS the SNMP trap has been sent.  */
```

nxd_snmp_agent_trapv2_oid_send

Send SNMPv2 trap specifying OID directly

Prototype

```
UINT nxd_snmp_agent_trapv2_oid_send(NX_SNMP_AGENT *agent_ptr,
                                    NXD_ADDRESS *ip_address,
                                    UCHAR *community,
                                    UCHAR *oid, ULONG elapsed_time,
                                    NX_SNMP_TRAP_OBJECT
                                    *object_list_ptr);
```

Description

This service sends an SNMP v2 trap to the SNMP Manager at the specified IP address (IPv4/IPv6) and allows the caller to specify the OID directly.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
ip_address	IP address of SNMP Manager (IPv4/IPv6).
community	Community name (username).
oid	Pointer to buffer containing OID.
elapsed_time	Time system has been up (sysUpTime).
object_list_ptr	Array of objects and their associated values to be included in the SNMP trap. The list is NX_NULL terminated.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP trap send.
NX_SNMP_ERROR	(0x100)	Error sending SNMP trap.
NX_PTR_ERROR	(0x16)	Invalid SNMP Agent or parameter pointer.
NX_IP_ADDRESS_ERROR	(0x21)	Invalid destination IP address.
NX_OPTION_ERROR	(0x0a)	Invalid parameter.

Allowed From

Example

```
NX_SNMP_TRAP_OBJECT trap_list[5];
NXD_ADDRESS         address;


/* Build an empty object list */
trap_list[0].nx_snmp_object_string_ptr =  NX_NULL;

address.nxd_ip_version = NX_IP_VERSION_V4;
address.nxd_ip_address.v4 = IP_ADDRESS(193,2,2,61)

/* Send trap to SNMP manager at 193.2.2.61.  */
Status =  nxd_snmp_agent_trapv2_oid_send(&my_agent, &address,
                                         "public", (UCHAR *)"0.9.9.9.9.9.9.9.9",
                                         tx_time_get(), trap_list);

/* If status is NX_SUCCESS the SNMP trap has been sent.  */
```

nx_snmp_agent_trapv3_send

Send SNMPv3 trap (IPv4 only)

Prototype

```
UINT nx_snmp_agent_trapv3_send(NX_SNMP_AGENT *agent_ptr,
            ULONG ip_address, UCHAR *username, UINT trap_type,
            ULONG elapsed_time, NX_SNMP_TRAP_OBJECT *object_list_ptr);
```

Description

This service sends an SNMPv3 trap to the SNMP Manager at the specified IPv4 address. The preferred method for sending an SNMP trap in NetX Duo is to use the *nxd_snmp_agent_trapv3_send* service. *nx_snmp_agent_trapv3_send* is included in NetX Duo to support existing NetX SNMP Agent applications.

Input Parameters

agent_ptr Pointer to SNMP Agent control block.

ip_address IPv4 address of the SNMP Manager.

username Community name (username).

trap_type Type of trap requested. The standard events are:

NX_SNMP_TRAP_COLDSTART (0)
NX_SNMP_TRAP_WARMSTART (1)
NX_SNMP_TRAP_LINKDOWN (2)
NX_SNMP_TRAP_LINKUP (3)
NX_SNMP_TRAP_AUTHENTICATE_FAILURE (4)
NX_SNMP_TRAP_EGPNEIGHBORLOSS (5)

For proprietary data:

NX_SNMP_TRAP_CUSTOM (0xFFFFFFFF)
(defined in *nxd_snmp.h*)

elapsed_time Time system has been up (sysUpTime).

object_list_ptr Array of objects and their associated values to be included in the SNMP trap. The list is NX_NULL terminated.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP trap send.
NX_SNMP_ERROR	(0x100)	Error sending SNMP trap.
NX_NOT_ENABLED	(0x14)	SNMPv3 not enabled.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
NX_SNMP_TRAP_OBJECT trap_list[5];
ULONG dest_ip_address = IP_ADDRESS(1,2,3,4);

/* Build an empty object list, since it is not needed for the
   NX_SNMP_TRAP_COLDSTART trap.  */
trap_list[0].nx_snmp_object_string_ptr =  NX_NULL;

/* Send trap to SNMP manager at 193.2.2.61.  */
Status =  nx_snmp_agent_trapv3_send(&my_agent, dest_ip_address, "public",
              NX_SNMP_TRAP_COLDSTART, tx_time_get(), trap_list);

/* If status is NX_SUCCESS the SNMP trap has been sent.  */
```

nx_snmp_agent_trapv3_oid_send

Send SNMPv3 trap specifying OID directly

Prototype

```
UINT nx_snmp_agent_trapv3_oid_send(NX_SNMP_AGENT *agent_ptr,
                                   ULONG ip_address, UCHAR *username,
                                   UCHAR *oid, ULONG elapsed_time,
                                   NX_SNMP_TRAP_OBJECT
                                   *object_list_ptr);
```

Description

This service sends an SNMPv3 trap to the SNMP Manager at the specified IP address (IPv4 only) and allows the caller to specify the OID directly. The preferred method for sending an SNMP trap with specified OID in NetX Duo is to use the *nxd_snmp_agent_trapv3_oid_send* service. *nx_snmp_agent_trapv3_oid_ send* is included in NetX Duo to support existing NetX SNMP Agent applications.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
ip_address	IP address of SNMP Manager.
username	Community name (username).
oid	Pointer to buffer containing OID.
elapsed_time	Time system has been up (sysUpTime).
object_list_ptr	Array of objects and their associated values to be included in the SNMP trap. The list is NX_NULL terminated.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP trap send.
NX_SNMP_ERROR	(0x100)	Error sending SNMP trap.
NX_PTR_ERROR	(0x16)	Invalid SNMP Agent or parameter pointer.
NX_IP_ADDRESS_ERROR	(0x21)	Invalid destination IP address.
NX_OPTION_ERROR	(0x0a)	Invalid parameter.

Allowed From

Threads

Example

```
NX_SNMP_TRAP_OBJECT trap_list[5];

/* Build an empty object list */
trap_list[0].nx_snmp_object_string_ptr =  NX_NULL;

/* Send trap to SNMP manager at 193.2.2.61.  */
Status =  nx_snmp_agent_trapv3_oid_send(&my_agent, IP_ADDRESS(193,2,2,61),
                                        "public", (UCHAR *)"0.9.9.9.9.9.9.9.9",
                                         tx_time_get(), trap_list);

/* If status is NX_SUCCESS the SNMP trap has been sent.  */
```

nxd_snmp_agent_trapv3_send

Send SNMPv3 trap (IPv4 and IPv6)

Prototype

```
UINT nxd_snmp_agent_trapv3_send(NX_SNMP_AGENT *agent_ptr,
                                NXD_ADDRESS *ip_address,
                                UCHAR *username, UINT trap_type,
                                ULONG elapsed_time,
                                NX_SNMP_TRAP_OBJECT *object_list_ptr);
```

Description

This service sends an SNMP trap to the SNMP Manager at the specified IP address. This trap is basically the same as the SNMP v2 trap, except the trap message format is contained in the SNMP v3 PDU.

Input Parameters

agent_ptr Pointer to SNMP Agent control block.

ip_address IP (IPv4 or IPv6) address of the SNMP Manager.

username Community name (username).

trap_type Type of trap requested. The standard events are:

NX_SNMP_TRAP_COLDSTART (0)
NX_SNMP_TRAP_WARMSTART (1)
NX_SNMP_TRAP_LINKDOWN (2)
NX_SNMP_TRAP_LINKUP (3)
NX_SNMP_TRAP_AUTHENTICATE_FAILURE (4)
NX_SNMP_TRAP_EGPNEIGHBORLOSS (5)

For proprietary data:

NX_SNMP_TRAP_CUSTOM (0xFFFFFFFF)
(defined in *nxd_snmp.h*)

elapsed_time Time system has been up (sysUpTime).

object_list_ptr Array of objects and their associated values to be included in the SNMP trap. The list is NX_NULL terminated.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP trap send.
NX_SNMP_ERROR	(0x100)	Error sending SNMP trap.
NX_NOT_ENABLED	(0x14)	SNMPv3 not enabled.
NX_SNMP_INVALID_IP_PROTOCOL_ERROR	(0x104)	Unsupported IP version
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Threads

Example

```
NX_SNMP_TRAP_OBJECT trap_list[5];
NXD_ADDRESS dest_ip_address;

    dest_ip_address.nxd_ip_version = NX_IP_VERSION_V6 ;
    dest_ip_address.nxd_ip_address.v6[0] = 0x20010db8;
    dest_ip_address.nxd_ip_address.v6[1] = 0xf101;
    dest_ip_address.nxd_ip_address.v6[2] = 0x00000000;
    dest_ip_address.nxd_ip_address.v6[3] = 0x00000101;

/* Build an empty object list, since it is not needed for the
   NX_SNMP_TRAP_COLDSTART trap.  */
trap_list[0].nx_snmp_object_string_ptr =  NX_NULL;

/* Send trap to SNMP manager at 193.2.2.61.  */
Status =  nxd_snmp_agent_trapv3_send(&my_agent, &dest_ip_address, "public",
                                     NX_SNMP_TRAP_COLDSTART, tx_time_get(),
                                     trap_list);

/* If status is NX_SUCCESS the SNMP trap has been sent.  */
```

nxd_snmp_agent_trapv3_oid_send

Send SNMPv3 trap specifying OID directly

Prototype

```
UINT nxd_snmp_agent_trapv3_oid_send(NX_SNMP_AGENT *agent_ptr,
                                    NXD_ADDRESS *ip_address,
                                    UCHAR *username,
                                    UCHAR *oid, ULONG elapsed_time,
                                    NX_SNMP_TRAP_OBJECT
                                            *object_list_ptr);
```

Description

This service sends an SNMPv3 trap to the SNMP Manager at the specified IP address (IPv4/IPv6) and allows the caller to specify the OID directly.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block.
ip_address	Pointer to IP address of SNMP Manager.
username	Username (community name).
oid	Pointer to buffer containing OID.
elapsed_time	Time system has been up (sysUpTime).
object_list_ptr	Array of objects and their associated values to be included in the SNMP trap. The list is NX_NULL terminated.

Return Values

NX_SUCCESS	(0x00)	Successful SNMP trap send.
NX_SNMP_ERROR	(0x100)	Error sending SNMP trap.
NX_PTR_ERROR	(0x16)	Invalid SNMP Agent or parameter pointer.
NX_IP_ADDRESS_ERROR	(0x21)	Invalid destination IP address.

Allowed From

Threads

Example

```
NXD_ADDRESS         ip_address;
NX_SNMP_TRAP_OBJECT trap_list[5];

/* Build an empty object list */
trap_list[0].nx_snmp_object_string_ptr =  NX_NULL;

ip_address.nxd_ip_version = NX_IP_VERSION_V4;
ip_address.nxd_ip_address.v4 = IP_ADDRESS(193,2,2,61);

/* Send trap to SNMP manager at 193.2.2.61.  */
Status =  nxd_snmp_agent_trapv3_oid_send(&my_agent, &ip_address,
                                         "public", (UCHAR *)"0.9.9.9.9.9.9.9.9",
                                          tx_time_get(), trap_list);

/* If status is NX_SUCCESS the SNMP trap has been sent.  */
```

nx_snmp_agent_v3_context_boots_set

Set the number of reboots (if SNMPv3 enabled)

Prototype

```
UINT nx_snmp_agent_v3_context_boots_set(NX_SNMP_AGENT *agent_ptr,
                                        UINT boots);
```

Description

This service sets the number of reboots recorded by the SNMP agent. This service is only available if SNMPv3 is enabled for the SNMP agent because boot count is only used in the SNMPv3 protocol.

Input Parameters

agent_ptr	Pointer to SNMP Agent control block
boots	The value to set SNMP Agent boot count to

Return Values

NX_SUCCESS	(0x00)	Successfully set boot count
NX_SNMP_ERROR	(0x100)	Error setting boot count
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
UINT my_boots = 4;

if (my_agent.nx_snmp_agent_v3_enabled == NX_TRUE)
{
    status = nx_snmp_agent_v3_context_boots_set(&my_agent, my_boots);
}

/* If status is NX_SUCCESS the SNMP boot count is set.  */
```

nx_snmp_object_compare

Compare two objects

Prototype

```
UINT nx_snmp_object_compare(UCHAR *object, UCHAR *reference_object);
```

Description

This service compares the supplied object ID with the reference object ID. Both object IDs are in the ASCII SMI notation, e.g., both object must start with the ASCII string “1.3.6”.

Input Parameters

object	Pointer to object ID.
reference_object	Pointer to the reference object ID.

Return Values

NX_SUCCESS	(0x00)	The object matches the reference object.
NX_SNMP_NEXT_ENTRY	(0x101)	The object is less than the reference object.
NX_SNMP_ERROR	(0x100)	The object is greater than the reference object.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
/* Compare “requested_object” with the sysDescr object ID of
   "1.3.6.1.2.1.1.1.0".  */
Status =  nx_snmp_object_compare(requested_object, "1.3.6.1.2.1.1.1.0");

/* If status is NX_SUCCESS, requested_object is the sysDescr object.
   Otherwise, if status is NX_SNMP_NEXT_ENTRY, the requested object is
   less than the sysDescr. If status is NX_SNMP_ERROR, the object is
   greater than sysDescr. */
```

nx_snmp_object_copy

Copy an object

Prototype

```
UINT nx_snmp_object_copy(UCHAR *source_object_name,
                         UCHAR *destination_object_name);
```

Description

This service copies the source object in ASCII SIM notation to the destination object.

Input Parameters

source_object_name	Pointer to source object ID.
destination_object_name	Pointer to destination object ID.

Return Values

size	Number of bytes copied to destination name. If error, zero is returned.

Allowed From

Initialization, Threads

Example

```
/* Copy “my_object” to “my_new_object”.  */
size =  nx_snmp_object_copy(my_object, my_new_object);

/* Size contains the number of bytes copied. */
```

nx_snmp_object_counter_get

Get counter object

Prototype

```
UINT  nx_snmp_object_counter_get(VOID *source_ptr,
                                 NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service retrieves the counter object at the address specified by the source pointer and places it in the NetX object data structure. This routine is typically called from the GET or GETNEXT application callback routine.

Input Parameters

source_ptr	Pointer to counter source.
object_data	Pointer to destination object structure.

Return Values

NX_SUCCESS	(0x00)	The counter object has be successfully retrieved.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
/* Get the ifInOctets (1.3.6.1.2.1.2.2.1.10.0) MIB-2 object.  */
status =  nx_snmp_object_counter_get(&ifInOctets, my_object);

/* If status is NX_SUCCESS, the ifInOctets object has been
   retrieved and is ready to be returned. */
```

nx_snmp_object_counter_set

Set counter object

Prototype

```
UINT  nx_snmp_object_counter_set(VOID *destination_ptr,
                                 NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service sets the counter at the address specified by the destination pointer with the counter value in the NetX object data structure. This routine is typically called from the SET application callback routine.

Input Parameters

destination_ptr	Pointer to counter destination.
object_data	Pointer to counter source object structure.

Return Values

NX_SUCCESS	(0x00)	The counter object has be successfully set.
NX_SNMP_ERROR_WRONGTYPE	(0x07)	Invalid object type.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
/* Set the ifInOctets (1.3.6.1.2.1.2.2.1.10.0) MIB-2 object with
   the counter object value contained in my_object.  */
status =  nx_snmp_object_counter_set(&ifInOctets, my_object);

/* If status is NX_SUCCESS, the ifInOctets object has been
   set. */
```

nx_snmp_object_counter64_get

Get 64-bit counter object

Prototype

```
UINT  nx_snmp_object_counter64_get(VOID *source_ptr,
                                   NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service retrieves the 64-bit counter object at the address specified by the source pointer and places it in the NetX object data structure. This routine is typically called from the GET or GETNEXT application callback routine.

Input Parameters

source_ptr	Pointer to counter source.
object_data	Pointer to destination object structure.

Return Values

NX_SUCCESS	(0x00)	The counter object has be successfully retrieved.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Get the value of my_64_bit_counter and place it into my_object
   for return.  */
status =  nx_snmp_object_counter64_get(&my_64_bit_counter, my_object);

/* If status is NX_SUCCESS, the my_64_bit_counter object has been
   retrieved and is ready to be returned. */
```

nx_snmp_object_counter64_set

Set 64-bit counter object

Prototype

```
UINT  nx_snmp_object_counter64_set(VOID *destination_ptr,
                                   NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service sets the 64-bit counter at the address specified by the destination pointer with the counter value in the NetX object data structure. This routine is typically called from the SET application callback routine.

Input Parameters

destination_ptr	Pointer to counter destination.
object_data	Pointer to counter source object structure.

Return Values

NX_SUCCESS	(0x00)	The counter object has be successfully set.
NX_SNMP_ERROR_WRONGTYPE	(0x07)	Invalid object type.
NX_PTR_ERROR	(0x07)	Invalid input pointer.

Allowed From

Initialization, Threads

Example

```
/* Set the value of my_64_bit_counter with the value in my_object.  */
status =  nx_snmp_object_counter64_set(&my_64_bit_counter, my_object);

/* If status is NX_SUCCESS, the my_64_bit_counter object has been
   set. */
```

nx_snmp_object_end_of_mib

Set end-of-mib value

Prototype

```
UINT  nx_snmp_object_end_of_mib(VOID *not_used_ptr,
                                NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service creates an object signaling the end of the MIB and is typically called from the GET or GETNEXT application callback routine.

Input Parameters

not_used_ptr	Pointer not used – should be NX_NULL.
object_data	Pointer to destination object structure.

Return Values

NX_SUCCESS	(0x00)	The end-of-mib object has be successfully built.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Place an end-of-mib value in my_object.  */
status =  nx_snmp_object_end_of_mib(NX_NULL, my_object);

/* If status is NX_SUCCESS, the my_object is now an end-of-mib object. */
```

nx_snmp_object_gauge_get

Get gauge object

Prototype

```
UINT  nx_snmp_object_gauge_get(VOID *source_ptr,
                               NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service retrieves the gauge object at the address specified by the source pointer and places it in the NetX object data structure. This routine is typically called from the GET or GETNEXT application callback routine.

Input Parameters

source_ptr	Pointer to gauge source.
object_data	Pointer to destination object structure.

Return Values

NX_SUCCESS	(0x00)	The gauge object has be successfully retrieved.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Get the value of ifSpeed (1.3.6.1.2.1.2.2.1.5.0) and place it in my_object
   for return.  */
status =  nx_snmp_object_gauge_get(&ifSpeed, my_object);

/* If status is NX_SUCCESS, the my_object now contains the ifSpeed gauge value. */
```

nx_snmp_object_gauge_set

Set gauge object

Prototype

```
UINT  nx_snmp_object_gauge_set(VOID *destination_ptr,
                               NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service sets the gauge at the address specified by the destination pointer with the gauge value in the NetX object data structure. This routine is typically called from the SET application callback routine.

Input Parameters

destination_ptr	Pointer to gauge destination.
object_data	Pointer to gauge source object structure.

Return Values

NX_SUCCESS	(0x00)	The gauge object has be successfully set.
NX_SNMP_ERROR_WRONGTYPE	(0x07)	Invalid object type.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Set the value of “my_gauge” from the gauge value in my_object.  */
status =  nx_snmp_object_gauge_set(&my_gauge, my_object);

/* If status is NX_SUCCESS, the my_gauge now contains the new gauge value. */
```

nx_snmp_object_id_get

Get object id

Prototype

```
UINT  nx_snmp_object_id_get(VOID *source_ptr,
                            NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service retrieves the object ID (in ASCII SIM notation) at the address specified by the source pointer and places it in the NetX object data structure. This routine is typically called from the GET or GETNEXT application callback routine.

Input Parameters

source_ptr	Pointer to object ID source.
object_data	Pointer to destination object structure.

Return Values

NX_SUCCESS	(0x00)	The object ID has be successfully retrieved.
NX_SNMP_ERROR	(0x100)	Invalid length of object
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Get the value of sysObjectID(1.3.6.1.2.1.1.2.0) and place it in my_object
   for return.  */
status =  nx_snmp_object_id_get(&sysObjectID, my_object);

/* If status is NX_SUCCESS, the my_object now contains the sysObjectID value. */
```

nx_snmp_object_id_set

Set object id

Prototype

```
UINT  nx_snmp_object_id_set(VOID *destination_ptr,
                            NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service sets the object ID (in ASCII SIM notation) at the address specified by the destination pointer with the object ID in the NetX object data structure. This routine is typically called from the SET application callback routine.

Input Parameters

destination_ptr	Pointer to object ID destination.
object_data	Pointer to object structure.

Return Values

NX_SUCCESS	(0x00)	The object ID has been successfully set.
NX_SNMP_ERROR_WRONGTYPE	(0x07)	Invalid object type.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Set the string “my_object_id” with the object ID value contained
   in my_object.  */
status =  nx_snmp_object_id_set(my_object_id, my_object);

/* If status is NX_SUCCESS, the my_object_id now contains the object ID value. */
```

nx_snmp_object_integer_get

Get integer object

Prototype

```
UINT  nx_snmp_object_integer_get(VOID *source_ptr,
                                 NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service retrieves the integer object at the address specified by the source pointer and places it in the NetX object data structure. This routine is typically called from the GET or GETNEXT application callback routine.

Input Parameters

source_ptr	Pointer to integer source.
object_data	Pointer to destination object structure.

Return Values

NX_SUCCESS	(0x00)	The integer object has been successfully retrieved.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Get the value of sysServices (1.3.6.1.2.1.1.7.0) and place it in my_object
   for return.  */
status =  nx_snmp_object_integer_get(&sysServices, my_object);

/* If status is NX_SUCCESS, the my_object now contains the sysServices value. */
```

nx_snmp_object_integer_set

Set integer object

Prototype

```
UINT  nx_snmp_object_integer_set(VOID *destination_ptr,
                                 NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service sets the integer at the address specified by the destination pointer with the integer value in the NetX object data structure. This routine is typically called from the SET application callback routine.

Input Parameters

destination_ptr	Pointer to integer destination.
object_data	Pointer to integer source object structure.

Return Values

NX_SUCCESS	(0x00)	The integer object has been successfully set.
NX_SNMP_ERROR_WRONGTYPE	(0x07)	Invalid object type.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Set the value of ifAdminStatus from the integer value in my_object.  */
status =  nx_snmp_object_integer_set(&ifAdminStatus, my_object);

/* If status is NX_SUCCESS, ifAdnminStatus now contains the new integer value. */
```

nx_snmp_object_ip_address_get

Get IP address object (IPv4 only)

Prototype

```
UINT  nx_snmp_object_ip_address_get(VOID *source_ptr,
                                    NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service retrieves the IP address object at the address specified by the source pointer and places it in the NetX object data structure. This routine is typically called from the GET or GETNEXT application callback routine.

Input Parameters

source_ptr	Pointer to IPv4 address source.
object_data	Pointer to destination object structure.

Return Values

NX_SUCCESS	(0x00)	The IP address object has been successfully retrieved.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Get the value of ipAdEntAddr (1.3.6.1.2.1.4.20.1.1.0) and place it in my_object
   for return.  */
status =  nx_snmp_object_ip_address_get(&ipAdEntAddr, my_object);

/* If status is NX_SUCCESS, the my_object now contains the ipAdEntAddr value. */
```

nx_snmp_object_ipv6_address_get

Get IP address object (IPv6 only)

Prototype

```
UINT  nx_snmp_object_ipv6_address_get(VOID *source_ptr,
                                      NX_SNMP_OBJECT_DATA
                                      *object_data);
```

Description

This service retrieves the IPv6 address object at the address specified by the source pointer and places it in the NetX object data structure. This routine is typically called from the GET or GETNEXT application callback routine.

Input Parameters

source_ptr	Pointer to IPv6 address source.
object_data	Pointer to destination object structure.

Return Values

NX_SUCCESS	(0x00)	The IP address object has been successfully retrieved.
NX_SNMP_ERROR_WRONGTYPE	**(0x07)**	Incorrect input SNMP object code
NX_NOT_ENABLED	(0x14)	IPv6 not enabled
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Get the value of ipAdEntAddr (1.3.6.1.2.1.4.20.1.1.0) and place it in my_object
   for return.  */
status =  nx_snmp_object_ipv6_address_get(&ipAdEntAddr, my_object);

/* If status is NX_SUCCESS, the my_object now contains the ipAdEntAddr value. */
```

nx_snmp_object_ip_address_set

Set IPv4 address object

Prototype

```
UINT  nx_snmp_object_ip_address_set(VOID *destination_ptr,
                                    NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service sets the IPv4 address at the address specified by the destination pointer with the IP address in the NetX object data structure. This routine is typically called from the SET application callback routine.

Input Parameters

destination_ptr	Pointer to IP address to set.
object_data	Pointer to IP address object structure.

Return Values

NX_SUCCESS	(0x00)	The IP address object has been successfully set.
NX_SNMP_ERROR_WRONGTYPE	(0x07)	Invalid object type.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Set the value of atNetworkAddress to the IP address in my_object.  */
status =  nx_snmp_object_ip_address_set(&atNetworkAddress, my_object);

/* If status is NX_SUCCESS, atNetWorkAddress now contains the new IP address. */
```

nx_snmp_object_ipv6_address_set

Set IPv6 address object

Prototype

```
UINT  nx_snmp_object_ipv6_address_set(VOID *destination_ptr,
                                      NX_SNMP_OBJECT_DATA
                                      *object_data);
```

Description

This service sets the IPv6 address at the address specified by the destination pointer with the IP address in the NetX object data structure. This routine is typically called from the SET application callback routine.

Input Parameters

destination_ptr	Pointer to IP address to set.
object_data	Pointer to IP address object structure.

Return Values

NX_SUCCESS	(0x00)	The IPv6 address has been successfully set.
NX_SNMP_ERROR_WRONGTYPE	(0x07)	Invalid object type.
NX_NOT_ENABLED	(0x14)	IPv6 not enabled
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Set the value of atNetworkAddress to the IP address in my_object.  */
status =  nx_snmp_object_ipv6_address_set(&atNetworkAddress, my_object);

/* If status is NX_SUCCESS, atNetWorkAddress now contains the new IP address. */
```

nx_snmp_object_no_instance

Set no-instance object

Prototype

```
UINT  nx_snmp_object_no_instance(VOID *not_used_ptr,
                                 NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service creates an object signaling that there was no instance of the specified object and is typically called from the GET or GETNEXT application callback routine.

Input Parameters

not_used_ptr	Pointer not used – should be NX_NULL.
object_data	Pointer to destination object structure.

Return Values

NX_SUCCESS	(0x00)	The no-instance object has been successfully built.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Place no-instance value in my_object.  */
status =  nx_snmp_object_no_instance(NX_NULL, my_object);

/* If status is NX_SUCCESS, the my_object is now a no-instance object. */
```

nx_snmp_object_not_found

Set not-found object

Prototype

```
UINT  nx_snmp_object_not_found(VOID *not_used_ptr,
                               NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service creates an object signaling the object was not found and is typically called from the GET or GETNEXT application callback routine.

Input Parameters

not_used_ptr	Pointer not used – should be NX_NULL.
object_data	Pointer to destination object structure.

Return Values

NX_SUCCESS	(0x00)	The not-found object has been successfully built.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Place not-found value in my_object.  */
status =  nx_snmp_object_not_found(NX_NULL, my_object);

/* If status is NX_SUCCESS, the my_object is now a not-found object. */
```

nx_snmp_object_octet_string_get

Get octet string object

Prototype

```
UINT  nx_snmp_object_octet_string_get(VOID *source_ptr,
                                      NX_SNMP_OBJECT_DATA *object_data,
                                      UINT length);
```

Description

This service retrieves the octet string at the address specified by the source pointer and places it in the NetX object data structure. This routine is typically called from the GET or GETNEXT application callback routine.

Input Parameters

source_ptr	Pointer to octet string source.
object_data	Pointer to destination object structure.
length	Number of bytes in octet string.

Return Values

NX_SUCCESS	(0x00)	The octet string object has been successfully retrieved.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Get the value of the 6-byte ifPhysAddress (1.3.6.1.2.1.2.2.1.6.0) and place
   it in my_object for return.  */
status =  nx_snmp_object_octet_string_get(ifPhysAddress, my_object, 6);

/* If status is NX_SUCCESS, the my_object now contains the ifPhysAddress value. */
```

nx_snmp_object_octet_string_set

Set octet string object

Prototype

```
UINT  nx_snmp_object_octet_string_set(VOID *destination_ptr,
                                      NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service sets the octet string at the address specified by the destination pointer with the octet string in the NetX object data structure. This routine is typically called from the SET application callback routine.

Input Parameters

destination_ptr	Pointer to octet string destination.
object_data	Pointer to octet string source object structure.

Return Values

NX_SUCCESS	(0x00)	The octet string object has been successfully set.
NX_SNMP_ERROR_WRONGTYPE	(0x07)	Invalid object type.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Set the value of sysContact (1.3.6.1.2.1.1.4.0) from the
   octet string in my_object.  */
status =  nx_snmp_object_octet_string_set(sysContact, my_object);

/* If status is NX_SUCCESS, sysContact now contains the new octet string. */
```

nx_snmp_object_string_get

Get ASCII string object

Prototype

```
UINT  nx_snmp_object_string_get(VOID *source_ptr,
                                NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service retrieves the ASCII string at the address specified by the source pointer and places it in the NetX object data structure. This routine is typically called from the GET or GETNEXT application callback routine.

Input Parameters

source_ptr	Pointer to ASCII string source.
object_data	Pointer to destination object structure.

Return Values

NX_SUCCESS	(0x00)	The ASCII string object has been successfully retrieved.
NX_SNMP_ERROR	(0x100)	String is too big
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Get the value of the sysDescr (1.3.6.1.2.1.1.1.0) and place
   it in my_object for return.  */
status =  nx_snmp_object_string_get(sysDescr, my_object);

/* If status is NX_SUCCESS, the my_object now contains the sysDescr string. */
```

nx_snmp_object_string_set

Set ASCII string object

Prototype

```
UINT  nx_snmp_object_string_set(VOID *destination_ptr,
                                NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service sets the ASCII string at the address specified by the destination pointer with the ASCII string in the NetX object data structure. This routine is typically called from the SET application callback routine.

Input Parameters

destination_ptr	Pointer to ASCII string destination.
object_data	Pointer to ASCII string source object structure.

Return Values

NX_SUCCESS	(0x00)	The ASCII string object has been successfully set.
NX_SNMP_ERROR	(0x100)	String too large.
NX_SNMP_ERROR_BADVALUE	(0x03)	Invalid character in string
NX_SNMP_ERROR_WRONGTYPE	(0x07)	Invalid object type.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Set the value of sysContact (1.3.6.1.2.1.1.4.0) from the
   ASCII string in my_object.  */
status =  nx_snmp_object_string_set(sysContact, my_object);

/* If status is NX_SUCCESS, sysContact now contains the new ASCII string. */
```

nx_snmp_object_timetics_get

Get timetics object

Prototype

```
UINT  nx_snmp_object_timetics_get(VOID *source_ptr,
                                  NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service retrieves the timetics at the address specified by the source pointer and places it in the NetX object data structure. This routine is typically called from the GET or GETNEXT application callback routine.

Input Parameters

source_ptr	Pointer to timetics source.
object_data	Pointer to destination object structure.

Return Values

NX_SUCCESS	(0x00)	The timetics object has been successfully retrieved.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Get the value of the sysUpTime (1.3.6.1.2.1.1.3.0) and place
   it in my_object for return.  */
status =  nx_snmp_object_timetics_get(sysUpTime, my_object);

/* If status is NX_SUCCESS, the my_object now contains the sysUpTime value. */
```

nx_snmp_object_timetics_set

Set timetics object

Prototype

```
UINT  nx_snmp_object_timetics_set(VOID *destination_ptr,
                                  NX_SNMP_OBJECT_DATA *object_data);
```

Description

This service sets the timetics variable at the address specified by the destination pointer with the timetics in the NetX object data structure. This routine is typically called from the SET application callback routine.

Input Parameters

destination_ptr	Pointer to timetics destination.
object_data	Pointer to timetics source object structure.

Return Values

NX_SUCCESS	(0x00)	The timetics object has been successfully set.
NX_SNMP_ERROR_WRONGTYPE	(0x07)	Invalid object type.
NX_PTR_ERROR	(0x07)	Invalid input pointer

Allowed From

Initialization, Threads

Example

```
/* Set the value of “my_time” from the timetics value in my_object.  */
status =  nx_snmp_object_timetics_set(&my_time, my_object);

/* If status is NX_SUCCESS, my_time now contains the new timetics. */
```