IBM

System i

Networking
Simple Network Time Protocol

Version 5 Release 4

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> **Note**
>
> Before using this information and the product it supports, read the information in "Notices," on page 11.

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Simple Network Time Protocol

Simple Network Time Protocol (SNTP) is a time-maintenance application that you can use to synchronize hardware in a network.

You can use the i5/OS® operating system as an SNTP server, SNTP client, or both. You can specify an amount of time that clients can vary from the time provided by a time server and allow for adjustments to keep the clocks synchronized. This function is particularly important in the use of network authentication service.

SNTP is a tool that you can use as part of your time management strategy.

> **Related concepts**
> Network authentication service
> Time management

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SNTP concepts

Simple Network Time Protocol (SNTP) is used to keep device clocks synchronized. By using timestamps that are kept synchronized, SNTP is useful for tracking processes and for interactions between systems.

i5/OS SNTP is based on Request for Comments (RFC) 2030. You can view RFC 2030 by searching for the number with the RFC index search engine located on the RFC editor Web site.

Before working with SNTP, you need to be familiar with the concepts of SNTP client and SNTP server.

> **Related concepts**
> Time
> Daylight saving time

Date and time system value: Time zone

Time adjustment

Date and time system value: Time adjustment

Related information

⮕ RFC index search engine

⮕ RFC editor Web site

SNTP client

When Simple Network Time Protocol (SNTP) is configured as a client, the i5/OS operating system
retrieves a time value from an external time source.

You can specify from which sources (up to three) to retrieve the time value. This external time value is
compared to the system time. If the system time value does not match the external time source, a time
adjustment begins. The system time is adjusted until the required time value is reached.

You can configure the i5/OS operating system as the SNTP client to poll a Network Time Protocol (NTP)
or an SNTP server to find the time. The SNTP client updates the system clock. Most applications use the
system clock as their time source. By updating the system clock, applications reflect the synchronized
time obtained from the time server.

From the time server list, the first server that can provide valid time service is selected. When the
selected time server fails, a new time server is selected. The time server should be selected based on the
minimum network response time delay at the location where the system is installed.

A list of public time servers is maintained on the Internet. To locate a time server, you can use a search
engine with a query of NTP servers.

You can run the SNTP client and the SNTP server concurrently on your system. Then, you can obtain
time from an outside source and serve that time to the clients in your network.

> **Related concepts**
>
> "Scenario: Synchronizing clocks with i5/OS" on page 3
> This scenario demonstrates how to use the i5/OS operating system as both an SNTP server and an
> SNTP client to synchronize clocks in your network.
>
> **Related tasks**
>
> "Configuring SNTP" on page 7
> You can work with Simple Network Time Protocol (SNTP) settings from iSeries™ Navigator or by
> using the Change SNTP Attributes (CHGNTPA) command on the character-based interface.
>
> **Related information**
>
> ⮕ NTP: The Network Time Protocol
>
> ⮕ Public NTP Time Servers

SNTP server

When you configure the i5/OS operating system as an SNTP server, your system acts as a time server for
other devices.

Other SNTP clients check time by polling your SNTP server. If a client's time values do not match the
SNTP server time, a time adjustment begins. The client's system time is adjusted until the required time
value is reached. This is useful for maintaining time within a network.

In Figure 1, System A is configured as the SNTP server. In this situation, the Coordinated Universal Time (UTC) is retrieved from System A rather than being synchronized with an external time source. This internal time value is sent to all SNTP client systems (System B and Client A) that are connected to System A.
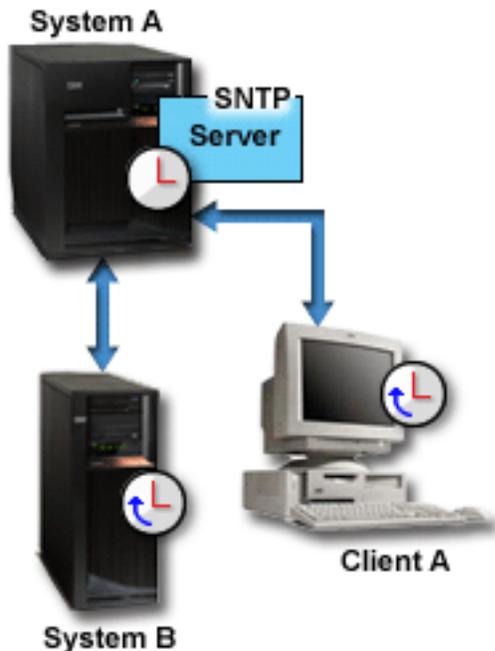

Figure 1. SNTP as a server

In addition to using the SNTP server to synchronize clocks in the network, you can concurrently run your system as an SNTP client to obtain time from an outside time source. For an example, see "Scenario: Synchronizing clocks with i5/OS."

Related tasks

"Configuring SNTP" on page 7
You can work with Simple Network Time Protocol (SNTP) settings from iSeries Navigator or by using the Change SNTP Attributes (CHGNTPA) command on the character-based interface.

Scenario: Synchronizing clocks with i5/OS

This scenario demonstrates how to use the i5/OS operating system as both an SNTP server and an SNTP client to synchronize clocks in your network.

Situation

As an administrator of your company's network, you must maintain both your system and network clients. Timestamps are critical to your transactions. You need to maintain synchronization in the network.

Objectives

In this scenario, YourCo, Inc. wants to use the SNTP client on the i5/OS operating system to receive time from an outside Network Time Protocol (NTP) server. To maintain the time within your network, you

need to use your system as an SNTP server. In addition to configuring the SNTP client and server on your system, you need to configure your firewall to allow the SNTP client to obtain the time from an external NTP server.

The objectives of this scenario are as follows:
- To synchronize your system with an outside NTP server.
- To make your system function as an SNTP server for clients within your network.

Details

The following figure shows the solution environment for this scenario.
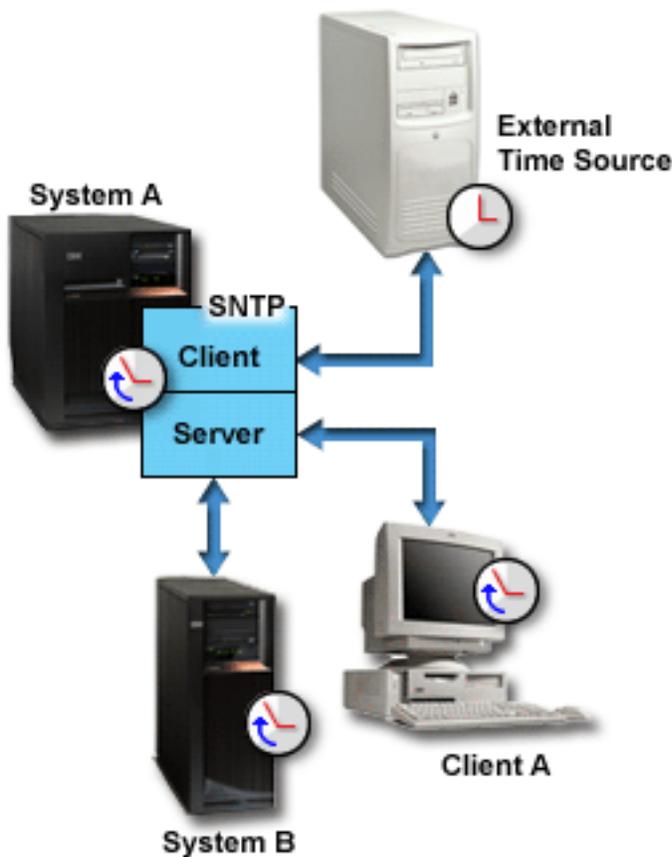
Figure 2. SNTP as a client and a server

In Figure 2, System A functions as an SNTP client and server. As an SNTP client, System A retrieves a time value from an external time source that you specify. The SNTP application synchronizes System A's Coordinated Universal Time (UTC) with the time value from the external time source. As an SNTP server, System A sends the time value to all SNTP client systems (System B and Client A) that are connected to System A.

Prerequisites and assumptions

This scenario depends on the following prerequisites and assumptions:
- System A (systemA.yourco.com) is running i5/OS V5R3, or later.
- System B (systemB.yourco.com) is running i5/OS V5R3, or later.

- System B (systemB.yourco.com) and Client A are running SNTP clients.
- You have a time management strategy.
- You have already set the time zone system value.
- You want to use SNTP as the time-maintenance application on your system.

Configuration steps

To configure the YourCo, Inc. network to use SNTP, complete the following tasks.

> **Related concepts**
> "SNTP client" on page 2
> When Simple Network Time Protocol (SNTP) is configured as a client, the i5/OS operating system retrieves a time value from an external time source.
>
> **Related tasks**
> Setting the time zone (QTIMZON) system value

Configuring System A as an SNTP client and server

To configure the YourCo, Inc. network to use Simple Network Time Protocol (SNTP), you need to configure System A as an SNTP client and server.

To configure System A, follow these steps:

1. From iSeries Navigator, expand **System A** → **Network** → **Servers** → **TCP/IP**.
2. Right-click **SNTP** and select **Properties**.
3. Click the following tabs to set the parameters:
   a. On the **General** tab, select **Client** and **Server** to start SNTP when TCP/IP starts.
   b. On the **Client** tab, specify the following values:
      - Time servers: `timesrvr1.external.com`
      - Poll interval: 60 minutes
      - Minimum adjustment: 20 milliseconds
      - Maximum adjustment: 20 minutes
      - Adjustment threshold: Maximum adjustment
      - Activity logging: Only when adjusting the system clock
   c. On the **Server** tab, select the following choices:
      - For Server activity logging, select **Only when an error status is returned by the server**.
      - Select **Server must be synchronized before valid time is served** to specify that you want your system to act as a client to obtain time from another source before serving time to other clients.

Configuring your firewall to allow SNTP traffic

For this scenario, you are running a firewall on System A. To allow SNTP traffic, you must configure the firewall to allow the passing of UDP packets on port 123.

Refer to your firewall documentation for steps to complete this task.

Configuring the SNTP client on other systems in the network

After your SNTP server runs, you must configure the other systems in the network to use System A as an SNTP server. For this scenario, you need to configure the SNTP client on System B.

You might need to refer to other system documentation to configure clients in your network.

To configure the SNTP client on System B, follow these steps:

1. From iSeries Navigator, expand **System B** → **Network** → **Servers** → **TCP/IP**.
2. Right-click **SNTP** and select **Properties**.
3. Click the following tabs to set the parameters:
   a. On the **General** tab, click **Client** to start the SNTP client when TCP/IP starts.
   b. On the **Client** tab, specify the following values:
      - Time servers: `systemA.yourco.com`
      - Poll interval: 60 minutes
      - Minimum adjustment: 20 milliseconds
      - Maximum adjustment: 20 minutes
      - Adjustment threshold: Maximum adjustment
      - Activity logging: Only when adjusting the system clock

Specifying SNTP as your time maintenance application

After you have configured the SNTP server and client, you need to verify the time adjustment (QTIMADJ) system value to ensure that Simple Network Time Protocol (SNTP) can operate as the time maintenance application on your system.

If another application is listed, you must take action to ensure that multiple time applications do not conflict when setting the time.

The time adjustment system value serves only as an identifier. The system does not enforce the software specified; it only identifies the software to be used. This time adjustment system value should be maintained by the time adjustment software and is intended to prevent having multiple time adjustment applications conflict with each other. The system does not verify this value; nor does it verify whether this software is performing time adjustments.

To set the time adjustment (QTIMADJ) system value to use SNTP for time management, follow these steps:

1. From iSeries Navigator, expand **System A** → **Configuration and Service** → **System Values**.
2. In the right pane, right-click **Date and Time** and click **Properties**.
3. On the Date and Time System Values page, click the **Time** tab.
4. In the **Time maintenance application** field, verify that the value is either `*NONE` or `QIBM_OS400_SNTP`.

   Note: If the system value is set to `*NONE`, SNTP will automatically change the value to `QIBM_OS400_SNTP` when the client is started. If another application is listed, you must take action to ensure that multiple time applications do not conflict when setting the time.

5. Click **OK** to save your changes.
6. Repeat these steps for System B.

Starting SNTP manually

To enable the Simple Network Time Protocol (SNTP) application that you have configured, you need to start SNTP manually. After you change its configuration, you also need to start SNTP manually.

Note: If you are making changes to an existing SNTP server configuration, you must first stop the SNTP server before you can restart it. For information about how to stop SNTP, see Method 1: Stopping the current SNTP session.

Because System A is both an SNTP server and an SNTP client, the starting process for System A is different from the process for other systems in the network.

To start SNTP, follow these steps:

1. Start SNTP on System A, which has already been configured as an SNTP client and server.
    a. From iSeries Navigator, expand **System A** → **Network** → **Servers** → **TCP/IP**.
    b. Right-click **SNTP** and click **Start** → **All**.
2. Start SNTP on clients on other systems in the network.
    a. From iSeries Navigator, expand **System B** → **Network** → **Servers** → **TCP/IP**.
    b. Right-click **SNTP** and click **Start** → **Client**.

Configuring SNTP

You can work with Simple Network Time Protocol (SNTP) settings from iSeries Navigator or by using the Change SNTP Attributes (CHGNTPA) command on the character-based interface.

SNTP can be used to adjust system time. Because most applications use the system time, those applications obtain accurate time from the system clock.

The options that you see in iSeries Navigator depend on what version of the i5/OS operating system you are running on your system and what version of iSeries Access for Windows® you are using. From iSeries Navigator, click **Help** or press F1 for help that describes the procedures for your version.

To work with SNTP, follow these steps:
1. From iSeries Navigator, expand *your system* → **Network** → **Servers** → **TCP/IP**.
2. Right-click **SNTP** and select **Properties**. Click the following tabs to set the parameters:

Select this tab	Then do this
General	Specify whether to start SNTP when TCP/IP starts. You can set this preference for the server and the client separately.
Client	Specify up to three time servers that the client can poll. Also specify the poll interval, adjustment preferences, and logging preference.
Server	Specify your logging preference. By default, the SNTP server will serve the system time when you start it. You might want to select **Server must be synchronized before valid time is served** to specify that you want your system to act as a client to obtain time from another source before serving time to other clients.

Note: If you are using the SNTP client through a firewall, the firewall configuration might need to be updated to allow the passing of UDP packets on port 123.

Related concepts

"SNTP client" on page 2
When Simple Network Time Protocol (SNTP) is configured as a client, the i5/OS operating system retrieves a time value from an external time source.

"SNTP server" on page 2
When you configure the i5/OS operating system as an SNTP server, your system acts as a time server for other devices.

Troubleshooting SNTP

You have various options to solve problems related to Simple Network Time Protocol (SNTP). Here are some common problems that your system might encounter when you adjust time using SNTP.

The following list identifies problems you might encounter and provides a way to recover:

- **I want to contact an SNTP server through a firewall**

  If you are using the SNTP client through a firewall, the firewall configuration might need to be updated to allow the passing of User Datagram Protocol (UDP) packets on port 123.

- **Server does not serve time to clients**

  If you have selected **Server must be synchronized before valid time is served** on the Server page of SNTP properties, you must have the system configured as an SNTP client connected to an active time server before the server can respond to client polls.

- **I want to stop SNTP**

  If SNTP is not making correct time adjustments or if you want to start a new time adjustment, you need to ensure that SNTP is stopped properly.

Logging SNTP activity can help you identify problems with the server or client.

> **Related concepts**
>
> Troubleshooting time management
>
> Troubleshooting
>
> Service and support
>
> **Related tasks**
>
> I want to stop Simple Network Time Protocol

Logging SNTP activity

The logging function helps you track activity and identify problems with the SNTP server or client.

Logging is used to create records of the actions of the SNTP client or server. Use logging to help problem analysis, not during normal running situations.

One log file is created each day, with the name in the form QTOT *YYYYMMDD*, where *YYYY* represents the year, *MM* represents the month, and *DD* represents the day.

The coded character set identifier (CCSID) of the file is the default system CCSID. If the system default CCSID is changed when the activity log is in use, the original CCSID of the file is still used. Because the resulting file might become unreadable, you need to stop the SNTP client, rename the activity log, and restart the SNTP client so that a new log is created with the new CCSID.

Logging client activity

To log SNTP client activity, follow these steps:

1. From iSeries Navigator, expand *your system* → **Network** → **Servers** → **TCP/IP**.
2. Right-click **SNTP**, and click **Properties** to open the SNTP Properties pages.
3. Go to the Client page. Select when you want to log SNTP client activity.
4. Click **OK** to save your selection.

The client activity logs are created in the integrated file system directory /QIBM/UserData/OS400/TCPIP/NTP. Here is an example of a client log:

```
SNTP Client Activity Log QTOTNTP/QNTP/097229  08/21/03 12:00:48.502 AM
TCP9136 SNTP Client started.
TCP9146 Using time server TIME.
```

```
TCP9162 08/21/03 12:00:48.548 AM Time remaining for adjustment is 0.000 seconds.
TCP9116 08/21/03 12:00:48.548 AM NTP server UTC time is 08/21/03 5:00:48.196.
TCP9117 08/21/03 12:00:48.548 AM Client clock UTC time is 08/21/03 5:00:48.197.
TCP9120 08/21/03 12:00:48.548 AM Client clock adjusted = 1  (0 = not adjusted, 1 = adjusted)
TCP9146 Using time server TIME.
TCP9162 08/21/03 12:01:48.590 AM Time remaining for adjustment is 0.000 seconds.
TCP9116 08/21/03 12:01:48.590 AM NTP server UTC time is 08/21/03 5:01:48.589.
TCP9117 08/21/03 12:01:48.590 AM Client clock UTC time is 08/21/03 5:01:48.589.
TCP9120 08/21/03 12:01:48.590 AM Client clock adjusted = 1  (0 = not adjusted, 1 = adjusted)
```

Logging server activity

To log SNTP server activity, follow these steps:

1. From iSeries Navigator, expand *your system* → **Network** → **Servers** → **TCP/IP**.
2. Right-click **SNTP**, and click **Properties** to open the SNTP Properties pages.
3. Go to the Server page. Select when you want to log SNTP server activity.
4. Click **OK** to save your selection.

The server activity logs are created in the integrated file system directory /QIBM/UserData/OS400/ TCPIP/NTP/SERVER. Here is an example of a server log:

```
SNTP Server Activity Log QTOTNTP/QNTP/097326  08/21/03 2:46:04.329 PM
TCP9159 SNTP Server started.
TCP9161 08/21/03 2:46:20.828 PM Client 9.5.150.56 Unsynchronized status returned.
TCP9163 08/21/03 2:46:20.854 PM SNTP system client unable to contact server.
TCP9161 08/21/03 2:47:21.181 PM Client 9.5.150.57 Unsynchronized status returned.
TCP9162 08/21/03 2:47:21.195 PM Time remaining for adjustment is .534 seconds.
TCP9160 08/21/03 2:48:21.242 PM Client 9.5.56.158, UTC time returned is 08/21/03 19:48:21.241.
TCP9160 08/21/03 2:48:21.532 PM Client 9.130.69.21.159, UTC time returned is 08/21/03 19:48:21.531.
```

Related tasks

I want to stop Simple Network Time Protocol

Appendix. Notices

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