

Windows Time Service Tools and Settings

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The Windows Time service (W32Time) synchronizes the date and time for all computers managed by Active Directory Domain Services (AD DS). This article covers the various tools and settings used to manage W32Time.

By default, a computer that's joined to a domain synchronizes time through a domain hierarchy of time sources. However, sometimes a computer is manually configured to synchronize from a specific time source, perhaps because it was formerly not joined to a domain. In this case, you can reconfigure the computer to begin automatically sourcing its time from the domain hierarchy.

Most domain-joined computers have a time client type of Net Time 5 Directory Service (NT5DS), which means that they synchronize time from the domain hierarchy. An exception is the domain controller, which functions as the primary domain controller (PDC) emulator operations master for the root forest domain. The PDC emulator operations master in turn is configured to synchronize time with an external time source.

You can achieve down to one-millisecond time accuracy in your domain. For more information, see [Support boundary for high-accuracy time](#) and [Accurate Time for Windows Server 2016](#).

W32Time follows the Network Time Protocol (NTP) specification, which requires the use of User Datagram Protocol (UDP) port 123 for all time synchronization. Whenever the computer synchronizes its clock or provides time to another computer, it happens over UDP port 123. W32Time reserves this port as the destination port.

Note

- NTP servers typically listen on UDP port 123 for requests and respond from the same port, which is also true for the built-in W32Time NTP server.
- You can enable or disable the built-in W32Time NTP client and NTP server independently. Both share UDP port 123 for their functions.
- The built-in W32Time NTP client can only use UDP 123 as the source port.
- If your computer has multiple network adapters (it's multi-homed), you can't enable W32Time based on a network adapter.

You can use the `w32tm` command to configure W32Time settings and diagnose computer time problems. The `w32tm` command is the preferred command-line tool for configuring, monitoring, and troubleshooting W32Time. Membership in the local Administrators group is required to run this tool locally, and membership in the Domain Admins group is required to run this tool remotely.

To use `w32tm`, take the following steps:

1. Select **Start**, and then enter **cmd**. Right-click **Command Prompt**, and then select **Run as administrator**.
2. At the command prompt, enter **w32tm** followed by the applicable parameters.

| Parameter | Description |
|---|--|
| <p><code>/?</code></p> <p><code>/config [/computer:<target>] [/update] [/manualpeerlist:<peers>] [/syncfromflags:<source>] [/LocalClockDispersion:<seconds>] [/reliable:(YES NO)] [/largephaseoffset:<milliseconds>]</code></p> | <p>Displays the <code>w32tm</code> command-line help.</p> <p>/computer:<target>: Adjusts the configuration of <target>. If not specified, the default target is the local computer.</p> <p>/update: Notifies W32Time that the configuration is changing, causing the changes to take effect.</p> <p>/manualpeerlist:<peers>: Sets the manual peer list to <peers>, which is a space-delimited list of Domain Name System (DNS) or IP addresses. When you specify multiple peers, this option must be enclosed in quotation marks.</p> <p>/syncfromflags:<source>: Sets the sources that the NTP client should synchronize from. The <source> value should be a comma-separated list of the following keywords (not case sensitive):</p> <ul style="list-style-type: none"> • MANUAL: Include peers from the manual peer list. • DOMHIER: Synchronize from a domain controller (DC) in the domain hierarchy. <p>/LocalClockDispersion:<seconds>: Configures the accuracy of the internal clock that W32Time uses when it can't acquire time from its configured sources.</p> <p>/reliable:(YES NO): Sets whether this computer is a reliable time source. This setting is only meaningful on domain controllers.</p> <ul style="list-style-type: none"> • YES: This computer is a reliable time service. • NO: This computer isn't a reliable time service. <p>/largephaseoffset:<milliseconds>: Sets the time difference between local and network time that W32Time considers a spike.</p> |
| <p><code>/debug {/disable {/enable /file:<name> /size:/<bytes> /entries:<value> [/truncate]}}</code></p> | <p>Enables or disables the local computer W32Time private log.</p> <p>/disable: Disables the private log.</p> <p>/enable: Enables the private log.</p> <ul style="list-style-type: none"> • file:<name>: Specifies the absolute file name. • size:<bytes>: Specifies the maximum size for circular logging. • entries:<value>: Contains a list of flags, specified by number and separated by commas, that specifies the types of information that should be logged. Valid values are 0 to 300. A range of |

| Parameter | Description |
|---|---|
| | <p>numbers is valid, as are single numbers, such as 0-100,103,106. A value of 0-300 is for logging all information.</p> <p>/truncate: Truncates the file if it exists.</p> |
| <p>/dumpreg [/subkey:<key>] [/computer:<target>]</p> | <p>Displays the values associated with a given registry key.</p> <p>The default key is HKLM\System\CurrentControlSet\Services\W32Time (the root key for W32Time).</p> <p>/subkey:<key>: Displays the values associated with subkey <key> of the default key.</p> <p>/computer:<target>: Queries registry settings for computer <target>.</p> |
| <p>/monitor [/domain:<domain name>] [/computers:<name>[, <name>[,<name>...]]] [/threads:<num>]</p> | <p>Monitors W32Time.</p> <p>/domain: Specifies which domain to monitor. If no domain name is given, and the /domain and /computers options aren't specified, the default domain is used. This option can be used more than once.</p> <p>/computers: Monitors the given list of computers. Computer names are separated by commas, with no spaces. If a name is prefixed with an asterisk (*), the computer is treated as a PDC. This option can be used more than once.</p> <p>/threads: Specifies the number of computers to analyze simultaneously. The default value is 3. The allowed range is 1-50.</p> |
| <p>/ntpte <NTP time epoch></p> | <p>Converts an NTP time (measured in 2^{-32}-second intervals starting from 0h 1-Jan 1900) into a readable format.</p> |
| <p>/ntte <NT time epoch></p> | <p>Converts a Windows NT system time (measured in 10^{-7}-second intervals starting from 0h 1-Jan 1601) into a readable format.</p> |
| <p>/query [/computer:<target>] {/source /configuration /peers /status} [/verbose]</p> | <p>Displays the computer's W32Time information.</p> <p>/computer:<target>: Queries the information of <target>. If not specified, the default value is the local computer.</p> <p>/source: Displays the time source.</p> |

| Parameter | Description |
|---|---|
| | <p>/configuration: Displays the runtime configuration and the source of the settings. In verbose mode, this parameter also displays the undefined or unused settings.</p> <p>/peers: Displays a list of peers and their status.</p> <p>/status: Displays the W32Time status.</p> <p>/verbose: Turns on verbose mode to display more information.</p> |
| /register | Registers W32Time to run as a service and adds its default configuration information to the registry. |
| /resync [/computer:<computer>] [/nowait] [/rediscover] [/soft] | <p>Tells a computer that it should resynchronize its clock as soon as possible, throwing out all accumulated error statistics. The NTP client requires UDP 123 as the source port.</p> <p>/computer:<computer>: Specifies the computer that should resynchronize. If no computer is specified, the local computer resynchronizes.</p> <p>/nowait: Doesn't wait for resynchronization to occur. Instead, it returns immediately. If this option isn't present, the command waits for resynchronization to finish before returning.</p> <p>/rediscover: Redetects the network configuration, rediscovers network sources, and then resynchronizes.</p> <p>/soft: Resynchronizes by using existing error statistics. This option is used for compatibility purposes.</p> |
| /stripchart /computer:<target> [/period:<refresh>] [/dataonly] [/samples:<count>] [/rdtsc] | <p>Displays a strip chart of the offset between this computer and another computer. The NTP client uses an ephemeral UDP source port to communicate to the server to prevent conflicts with the built-in NTP client.</p> <p>/computer:<target>: Specifies the computer to measure the offset against.</p> <p>/period:<refresh>: Specifies the time between samples, in seconds. The default value is 2.</p> <p>/dataonly: Displays the data only, without graphics.</p> |

| Parameter | Description |
|--------------------|--|
| | <p>/samples:<count>: Collects <count> samples, and then stops. If not specified, samples are collected until Ctrl+C is selected.</p> <p>/rdtsc: For each sample, prints comma-separated values along with the headers RdtscStart, RdtscEnd, FileTime, RoundtripDelay, and NtpOffset instead of the text graphic.</p> <ul style="list-style-type: none"> • RdtscStart: The Read Time Stamp Counter (RDTSC) value collected just before the NTP request is generated. • RdtscEnd: The RDTSC value collected just after the NTP response is received and processed. • FileTime: The local <code>FILETIME</code> value used in the NTP request. • RoundtripDelay: The time elapsed in seconds between generating the NTP request and processing the received NTP response, computed as per NTP roundtrip computations. • NTPOffset: The time offset in seconds between the local computer and the NTP server, computed as per NTP offset computations. |
| /tz | Displays the current time zone settings. |
| /unregister | Unregisters W32Time and removes all its configuration information from the registry. |

To set a client computer to point to two different time servers, one named `ntpserver.contoso.com` and another named `clock.adatum.com`, run the following command:

```
w32tm /config /manualpeerlist:"ntpserver.contoso.com clock.adatum.com" /syncfromflags:manual /update
```

Suppose you have a client computer that currently synchronizes time by using a manually specified computer. To configure the client computer to synchronize time automatically from the Active Directory domain hierarchy, run the following command:

```
w32tm /config /syncfromflags:domhier /update

net stop w32time

net start w32time
```

To check a client configuration from a Windows-based client computer that has a host name of `contosoW1`, run the following command:

```
w32tm /query /computer:contosoW1 /configuration
```

The output of this command lists W32Time configuration parameters that are set for the client.

Since Windows Server 2016, improvements to the [time synchronization algorithms](#) support alignment with Request for Comments (RFC) specifications. Therefore, if you want to set the local time client to point to multiple peers, we recommend that you prepare three or more time servers.

If you have only two time servers, you should specify the **NtpServer UseAsFallbackOnly** flag (0x2) to deprioritize one of them. For example, if you want to prioritize `ntpserver.contoso.com` over `clock.adatum.com`, run the following command:

```
w32tm /config /manualpeerlist:"ntpserver.contoso.com,0x8 clock.adatum.com,0x2" /syncfromflags:manual /update
```

Also, you can run the following command and read the value of **NtpServer** in the output:

```
reg query HKLM\SYSTEM\CurrentControlSet\Services\W32Time\Parameters
```

In order for `w32tm` to reset a computer clock, it first checks the offset **CurrentTimeOffset**, also known as **Phase Offset**, between the current time and the computer clock time to determine whether the offset is less than the **MaxAllowedPhaseOffset** value.

- **CurrentTimeOffset** ≤ **MaxAllowedPhaseOffset** : Adjust the computer clock gradually by using the clock rate.
- **CurrentTimeOffset** > **MaxAllowedPhaseOffset** : Set the computer clock immediately.

To adjust the computer clock by using the clock rate, `w32tm` then calculates a **PhaseCorrection** value. This algorithm varies depending on the version of Windows:

- Windows Server 2016 and later versions:

$$\text{PhaseCorrection_raw} = (\text{CurrentTimeOffset}) \div (16 \times \text{PhaseCorrectRate} \times \text{pollIntervalInSeconds})$$

$$\text{MaximumCorrection} = (\text{CurrentTimeOffset}) \div (\text{UpdateInterval} \div 100)$$

$$\text{PhaseCorrection} = \min(\text{PhaseCorrection_raw}, \text{MaximumCorrection})$$

- Windows Server 2012 R2 and earlier versions:

$$\text{PhaseCorrection} = (\text{CurrentTimeOffset}) \div (\text{PhaseCorrectRate} \times \text{UpdateInterval})$$

All versions of Windows use the same final equation to check **PhaseCorrection** :

$$\text{PhaseCorrection} \leq \text{SystemClockRate} \div 2$$

Note

The following operating systems apply cumulative updates from KB5006744 onward, so they use the formula for Windows Server 2016 and later versions:

- Windows Server 2025
- Windows Server 2022
- Windows Server 2019 version 1809
- Windows 11
- Windows 10 version 1809

In these equations, `PhaseCorrectRate` , `UpdateInterval` , `MaxAllowedPhaseOffset` , and `SystemClockRate` are measured in units of clock ticks. On Windows systems, one millisecond equals 10,000 clock ticks.

You can configure the `MaxAllowedPhaseOffset` value in the registry. However, the registry parameter is measured in seconds instead of clock ticks.

To see the `SystemClockRate` and `pollIntervalInSeconds` values (measured in seconds), open a Command Prompt window and then run the following command: `w32tm /query /status /verbose` . This command produces output that resembles the following lines:

```
Leap Indicator: 0(no warning)
Stratum: 1 (primary reference - syncd by radio clock)
Precision: -23 (119.209ns per tick)
Root Delay: 0.0003538s
Root Dispersion: 0.0100002s
ReferenceId: 0x00000000 (unspecified)
Last Successful Sync Time: 5/23/2023 7:51:39 PM
Source: VM IC Time Synchronization Provider
Poll Interval: 6 (64s)

Phase Offset: -0.0000013s
ClockRate: 0.0156250s
State Machine: 2 (Sync)
Time Source Flags: 3 (Authenticated Hardware )
Server Role: 0 (None)
Last Sync Error: 0 (The command completed successfully.)
Time since Last Good Sync Time: 15.7344985s
```

In the output, the poll interval is listed in clock ticks and in seconds. The equations use the value measured in seconds (the value in parentheses).

The output lists the clock rate in seconds. To calculate the `SystemClockRate` value in clock ticks, use the following formula:

$$(\text{value in clock ticks}) = (\text{value in seconds}) \times 1,000 \times 10,000$$

This formula uses the following conversion factors:

- One second equals 1,000 milliseconds.
- One millisecond equals 10,000 clock ticks on a Windows system, as described in [DateTime.Ticks Property](#).

For example:

- If `SystemClockRate` is 0.0156250 seconds, the value that the equation produces is 156,250 clock ticks.
- By extension, five minutes becomes $5 \times 60 \times 1000 \times 10000 = 3,000,000,000$ clock ticks.

The following examples show how to apply the phase correction calculations for Windows Server 2012 R2 and earlier versions.

If your computer clock time is 11:05 and the actual current time is 11:09, `w32tm` uses the following values:

- `PhaseCorrectRate` = 1
- `UpdateInterval` = 30,000 clock ticks
- `SystemClockRate` = 156,000 clock ticks
- `MaxAllowedPhaseOffset` = 10 min = 600 seconds = $600 \times 1,000 \times 10,000 = 6,000,000,000$ clock ticks
- `CurrentTimeOffset` = 4 min = $4 \times 60 \times 1,000 \times 10,000 = 2,400,000,000$ clock ticks

To reset the clock, `w32tm` checks the following condition:

Is `CurrentTimeOffset` \leq `MaxAllowedPhaseOffset` ?

In this case, the condition has the following values, so it evaluates to true:

$$2,400,000,000 \leq 6,000,000,000$$

Next, `w32tm` checks the following condition:

Is $(\text{CurrentTimeOffset}) \div (\text{PhaseCorrectRate} \times \text{UpdateInterval}) \leq \text{SystemClockRate} \div 2$?

In this case, the condition has the following values:

$$2,400,000,000 \div (30,000 \times 1) \leq 156,000 \div 2, \text{ or } 80,000 \leq 78,000$$

This condition is false. Therefore, `w32tm` sets the clock back immediately.

Note

In this example, if you want to set the clock back slowly, you also have to adjust the values of `PhaseCorrectRate` or `UpdateInterval` in the registry to make sure that the equation result is true.

If your computer clock time is 11:05 and the actual current time is 11:08, `w32tm` uses the following values:

- `PhaseCorrectRate` = 1
- `UpdateInterval` = 30,000 clock ticks
- `SystemClockRate` = 156,000 clock ticks
- `MaxAllowedPhaseOffset` = 10 min = 600 seconds = $600 \times 1,000 \times 10,000 = 6,000,000,000$ clock ticks
- `CurrentTimeOffset` = 3 mins = $3 \times 60 \times 1,000 \times 10,000 = 1,800,000,000$ clock ticks

To reset the clock, `w32tm` checks the following condition:

Is `CurrentTimeOffset` \leq `MaxAllowedPhaseOffset` ?

In this case, the condition has the following values, so it evaluates to true:

$$1,800,000,000 \leq 6,000,000,000$$

Next, `w32tm` checks the following condition:

Is $(\text{CurrentTimeOffset}) \div (\text{PhaseCorrectRate} \times \text{UpdateInterval}) \leq \text{SystemClockRate} \div 2$?

In this case, the condition has the following values:

$$(1,800,000,000) \div (1 \times 30,000) \leq 156,000 \div 2, \text{ or } 60,000 \leq 78,000$$

This condition is true. The clock is set back slowly.

W32Time stores several configuration properties as registry entries. You can use Group Policy Objects (GPOs) in Local Group Policy Editor to configure most of this information. For example, you can use GPOs to configure a computer to be an NTP server or NTP client, configure the time synchronization mechanism, or configure a computer to be a reliable time source. You can also apply Group Policy settings for W32Time to domain controllers.

Windows stores W32Time policy information in the Local Group Policy Editor under **Computer Configuration\Administrative Templates\System\Windows Time Service**. It stores configuration information that the policies define in the Windows registry, and then uses those registry entries to configure the registry entries specific to W32Time. As a result, the values defined by Group Policy overwrite any preexisting values in the W32Time section of the registry. Some of the preset GPO settings differ from the corresponding default W32Time registry entries.

The following table lists the policies that you can configure for W32Time and registry subkey equivalents that those policies affect.

| Group Policy | Registry locations ^{1, 2} |
|---|---|
| Global Configuration Settings | W32Time W32Time\Config W32Time\Parameters |
| Time Providers\Configure Windows NTP Client | W32Time\TimeProviders\NtpClient |
| Time Providers\Enable Windows NTP Client | W32Time\TimeProviders\NtpClient |
| Time Providers\Enable Windows NTP Server | W32Time\TimeProviders\NtpServer |

¹ Subkey: `HKLM\SOFTWARE\Policies\Microsoft`

² Subkey: `HKLM\SYSTEM\CurrentControlSet\Services\W32Time`

Note

When you remove a Group Policy setting, Windows removes the corresponding entry from the policy area of the registry.

The following table lists default values for the **Global Configuration Settings** when they're enabled:

| Group Policy setting | Default value |
|-------------------------------|----------------------|
| AnnounceFlags | 10 |
| ChainDisable | 0 |
| ChainEntryTimeout | 16 |
| ChainLoggingRate | 30 |
| ChainMaxEntries | 128 |
| ChainMaxHostEntries | 4 |
| ClockAdjustmentAuditLimit | 800 |
| ClockHoldoverPeriod | 7,800 |
| EventLogFlags | 2 |
| FrequencyCorrectRate | 4 |
| HoldPeriod | 5 |
| LargePhaseOffset | 50,000,000 |
| LocalClockDispersion | 10 |
| MaxAllowedPhaseOffset | 300 |
| MaxNegPhaseCorrection | 172,800 (48 hours) |
| MaxPollInterval | 10 |
| MaxPosPhaseCorrection | 172,800 (48 hours) |
| MinPollInterval | 6 |
| PhaseCorrectRate | 1 |
| PollAdjustFactor | 5 |
| RequireSecureTimeSyncRequests | 0 |
| SpikeWatchPeriod | 900 |

| Group Policy setting | Default value |
|----------------------|----------------|
| UpdateInterval | 100 (1 second) |
| UtilizeSslTimeData | 1 |

The following table lists the default Windows NTP client settings that are contained in **Computer Configuration\Administrative Templates\System\Windows Time Service\Time Providers\Configure Windows NTP Client**.

| Group Policy setting | Default value |
|----------------------------|--|
| NtpServer | time.windows.com , 0x9 |
| Type | NT5DS: Used for domain-joined computers NTP: Used for non-domain-joined computers |
| CrossSiteSyncFlags | 2 |
| ResolvePeerBackoffMinutes | 15 |
| ResolvePeerBackoffMaxTimes | 7 |
| SpecialPollInterval | 1024 |
| EventLogFlags | 0 |

Note

If you use Group Policy to set the `NtpServer` value as part of the **Configure Windows NTP Client** policy and apply it to a domain member, W32Time doesn't use the `NtpServer` registry value. To view your NTP configuration, open Command Prompt and run the following command: `w32tm /query /configuration` .

W32Time stores information under the following registry paths:

```
HKLM\SYSTEM\CurrentControlSet\Services\W32Time
HKLM\SYSTEM\CurrentControlSet\Services\W32Time\Config
HKLM\SYSTEM\CurrentControlSet\Services\W32Time\Parameters
HKLM\SYSTEM\CurrentControlSet\Services\W32Time\TimeProviders\NtpClient
HKLM\SYSTEM\CurrentControlSet\Services\W32Time\TimeProviders\NtpServer
```

Warning

This information is provided as a reference for use in troubleshooting and validation. Windows registry keys are used by W32Time to store critical information. Don't change these values. Modifications to the registry aren't validated by the registry editor or by Windows before they're applied. If the registry contains invalid values, Windows might experience unrecoverable errors.

Some of the parameters in the registry are measured in clock ticks and some are measured in seconds. To convert between the two units, see the explanation earlier in [Configure a computer clock reset](#).

In the following table, *All versions* refers to all supported versions of Windows and Windows Server.

- [Config](#)
- [Parameters](#)
- [NtpClient](#)
- [NtpServer](#)

| Registry entry | Versions | Description |
|----------------------------------|--|---|
| AnnounceFlags | All versions | <p>Controls whether this computer is marked as a reliable time server. A computer isn't marked as reliable unless it's also marked as a time server.</p> <ul style="list-style-type: none"> • 0x00: Not time server • 0x01: Always time server • 0x02: Automatic time server • 0x04: Always-reliable time server • 0x08: Automatic reliable time server <p>The default value for domain members is 10. The default value for stand-alone clients and servers is 10.</p> |
| ClockAdjustmentAuditLimit | Windows Server 2016 version 1709 and later versions; Windows 10 version 1709 and later versions | Specifies the smallest local clock adjustments that can be logged to the W32Time event log on the target computer. The default value is 800 parts per million (ppm). |
| ClockHoldoverPeriod | Windows Server 2016 version 1709 and later versions; Windows 10 version 1709 and later versions | Indicates the maximum number of seconds a system clock can nominally hold its accuracy without synchronizing with a time source. If this period of time passes without W32Time obtaining new samples from any of its input providers, W32Time initiates a rediscovery of time sources. The default value is 7,800 seconds. |
| EventLogFlags | All versions | Controls which events the time service logs. |

| Registry entry | Versions | Description |
|------------------------------|--------------|--|
| | | <ul style="list-style-type: none"> • 0x1: Time jump • 0x2: Source change <p>The default value on domain members is 2. The default value on stand-alone clients and servers is 2.</p> |
| FrequencyCorrectRate | All versions | <p>Controls the rate at which the clock is corrected. If this value is too small, the clock is unstable and overcorrects. If the value is too large, the clock takes a long time to synchronize. The default value on domain members is 4. The default value on stand-alone clients and servers is 4.</p> <p>Zero isn't a valid value for the FrequencyCorrectRate registry entry.</p> |
| HoldPeriod | All versions | <p>Controls the period of time for which spike detection is disabled in order to bring the local clock into synchronization quickly. A spike is a time sample indicating that time is off several seconds, and is received after good time samples return consistently. The default value on domain members is 5. The default value on stand-alone clients and servers is 5.</p> |
| LargePhaseOffset | All versions | <p>Specifies that a time offset greater than or equal to this value in 10^{-7} seconds is considered a spike. A network disruption such as a large amount of traffic might cause a spike. A spike is ignored unless it persists for a long period of time. The default value on domain members is 50,000,000. The default value on stand-alone clients and servers is 50,000,000.</p> |
| LocalClockDispersion | All versions | <p>Controls the dispersion (in seconds) that you must assume when the only time source is the built-in CMOS clock. The default value on domain members is 10. The default value on stand-alone clients and servers is 10.</p> |
| MaxAllowedPhaseOffset | All versions | <p>Specifies the maximum offset (in seconds) for which W32Time attempts to adjust the computer clock by using the clock rate. When the offset exceeds this rate, W32Time sets the computer clock directly. The default</p> |

| Registry entry | Versions | Description |
|------------------------------|--------------|--|
| | | value for domain members is 300 . The default value for stand-alone clients and servers is 1 . |
| MaxClockRate | All versions | Maintained by W32Time. It contains reserved data that's used by the Windows operating system, and any changes to this setting can cause unpredictable results. The default value for domain members is 155,860 . The default value for stand-alone clients and servers is 155,860 . |
| MaxNegPhaseCorrection | All versions | <p>Specifies the largest negative time correction, in seconds, that the service makes. If the service determines that a change larger than this value is required, it logs an event instead.</p> <p>The value 0xFFFFFFFF is a special case. This value means that the service always corrects the time.</p> <p>The default value for domain members is 0xFFFFFFFF (hexadecimal). The default value for domain controllers is 172,800 (48 hrs). The default value for stand-alone clients and servers is 54,000 (15 hrs).</p> |
| MaxPollInterval | All versions | Specifies the largest interval, in log base 2 seconds, allowed for the system polling interval. A system must poll according to the scheduled interval. A provider can refuse to produce samples when requested to do so. The default value for domain controllers is 10 . The default value for domain members is 15 . The default value for stand-alone clients and servers is 15 . |
| MaxPosPhaseCorrection | All versions | <p>Specifies the largest positive time correction in seconds that the service makes. If the service determines that a change larger than this value is required, it logs an event instead.</p> <p>The value 0xFFFFFFFF is a special case. This value means that the service always corrects the time.</p> <p>The default value for domain members is 0xFFFFFFFF (hexadecimal). The default value for domain controllers is 172,800 (48 hrs). The default</p> |

| Registry entry | Versions | Description |
|-------------------------|--------------|--|
| | | value for stand-alone clients and servers is 54,000 (15 hrs). |
| MinClockRate | All versions | Maintained by W32Time. It contains reserved data that's used by the Windows operating system, and any changes to this setting can cause unpredictable results. The default value for domain members is 155,860 . The default value for stand-alone clients and servers is 155,860 . |
| MinPollInterval | All versions | Specifies the smallest interval, in log base 2 seconds, allowed for the system polling interval. A system doesn't request samples more frequently than this value. A provider can produce samples at times other than the scheduled interval. The default value for domain controllers is 6 . The default value for domain members is 10 . The default value for stand-alone clients and servers is 10 . |
| PhaseCorrectRate | All versions | Controls the rate at which the phase error is corrected. Specifying a small value corrects the phase error quickly but might cause the clock to become unstable. If the value is too large, it takes a longer time to correct the phase error. The default value on domain members is 1 . The default value on stand-alone clients and servers is 7 . Zero isn't a valid value for the PhaseCorrectRate registry entry. |
| PollAdjustFactor | All versions | Controls the decision to increase or decrease the poll interval for the system. The larger the value, the smaller the amount of error that causes the poll interval to be decreased. The default value on domain members is 5 . The default value on stand-alone clients and servers is 5 . |
| SpikeWatchPeriod | All versions | Specifies the amount of time that a suspicious offset must persist before it's accepted as correct (in seconds). The default value on domain members is |

| Registry entry | Versions | Description |
|----------------------------|---|--|
| | | 900. The default value on stand-alone clients and workstations is 900 . |
| TimeJumpAuditOffset | All versions | Indicates the time jump audit threshold, in seconds. The offset is stored as an unsigned integer. If the time service adjusts the local clock by setting the clock directly, and the time correction is more than this value, the time service logs an audit event. |
| UpdateInterval | All versions | Specifies the interval (in 10ms unit) between phase correction adjustments. A value of 0 has the same effect as 1. The default values are: <ul style="list-style-type: none"> • Domain controllers: 100 • Domain members: 30,000 • Stand-alone clients and servers: 360,000 |
| UtilizeSslTimeData | Windows versions later than Windows 10 build 1511 | Indicates whether W32Time uses multiple SSL timestamps to seed a clock that's grossly inaccurate. A value of 1 indicates multiple SSL timestamps are used. The UtilizeSslTimeData registry value refers to the secure time seeding feature. For more information, see Secure Time Seeding – improving time keeping in Windows . The default out-of-box value for all Windows versions with this feature is 1 except for Windows Server 2025, where the default value is 0 . Domain membership doesn't affect this setting. |

The following registry entries aren't part of the W32Time default configuration, but you can add them to the registry to obtain enhanced logging capabilities. You can modify the information that's logged to the system event log by adjusting the **EventLogFlags** settings in the Group Policy Object Editor. By default, W32Time logs an event every time that it switches to a new time source.

To enable enhanced W32Time logging, add the following registry entries into the `HKLM\SYSTEM\CurrentControlSet\Services\W32Time\Config` path.

| Entry | Versions | Description |
|-----------------------|--------------|---|
| FileLogEntries | All versions | Controls the number of entries created in the W32Time log file. The default value is none , which results in no logs of W32Time activity. Valid values are 0 to 300 . This value doesn't affect the event log entries that W32Time normally creates. |
| FileLogName | All versions | Controls the location and file name of the W32Time log. The default value is blank. It shouldn't be changed unless FileLogEntries is changed. A valid value is a full path and file name that W32Time uses to create the log file. This value doesn't affect the event log entries that W32Time normally creates. |
| FileLogSize | All versions | Controls the circular logging behavior of W32Time log files. When FileLogEntries and FileLogName are defined, this value is also defined. It contains the size in bytes that the log file can reach before it overwrites the oldest log entries with new entries. Use 1,000,000 or a larger value for this setting. This value doesn't affect the event log entries that W32Time normally creates. |

- [RFC 1305 - Network Time Protocol, Version 3](#)
- [RFC 5905 - Network Time Protocol, Version 4](#)

Source: <https://docs.microsoft.com/windows-server/networking/windows-time-service/windows-time-service-tools-and-settings>