Overview of time synchronization in TIA Portal and WinCC V7.

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<td>29</td>
</tr>
</tbody>
</table>
1 Introduction

Why time synchronization is needed

If no time deviations are allowed within a system, clock synchronization is required.

Application examples:

- The UTC is used in the SIMATIC controller to execute correct time alarms or to count operating hours.
- The HMI also requires a unique time stamp without time deviations for alarm functions and messages.
- Message protocols are created on the HMI for events in the SIMATIC controller. The same time base must be used here. This is ensured by regular time synchronization.

Required knowledge

Basic knowledge of the TIA Portal and WinCC V7 is required.

Note

Basics are taught in the SITRAIN course “SIMATIC WinCC, System Course.”

- SIMATIC WinCC, Systemkurs (de)
- SIMATIC WinCC, System Course (en)
- SIMATIC WinCC maschinennah im TIA Portal (de)
- SIMATIC WinCC on the machine level in the TIA Portal (en)
- SIMATIC WinCC SCADA im TIA Portal (de)
- SIMATIC WinCC SCADA in the TIA Portal (en)
2 Time types

System time

2 Time types

Introduction

This section deals with
• System time
• Daylight saving time and
• UTC

• Local time is calculated based on system time, summer and winter time changeover, and the time zone set.
• The system time of the CPU corresponds to the UTC time.
• Only the system time is used for communication within the system.

Further information on the time types can be found in section 3 of the FAQ "How to synchronize the HMI Basic Panel time with an S7-1200 PLC?":

2.1 System time

The system time is the internal clock of a computer. The operating system installed on the computer passes the system time on to the software, e.g. WinCC Runtime.

For more information on system time (local computer time), see the following FAQs:

<table>
<thead>
<tr>
<th>FAQs</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>How can the local computer time or the coordinated world time be read, displayed or set in WinCC Runtime Professional?</td>
<td><a href="https://support.industry.siemens.com/cs/ww/en/view/59558655">https://support.industry.siemens.com/cs/ww/en/view/59558655</a></td>
</tr>
<tr>
<td>How can the current local time (daylight saving or winter time) be calculated in the S7-300/400 CPU and used as system time on the panel?</td>
<td><a href="https://support.industry.siemens.com/cs/ww/en/view/19324378">https://support.industry.siemens.com/cs/ww/en/view/19324378</a></td>
</tr>
<tr>
<td>How can a time specification (date and time) of the local computer time be converted into the coordinated world time (UTC)?</td>
<td><a href="https://support.industry.siemens.com/cs/ww/en/view/24201113">https://support.industry.siemens.com/cs/ww/en/view/24201113</a></td>
</tr>
<tr>
<td>Which settings do you have to make under Windows 7 in order to change the system time of the PC via WinCC flexible Runtime/WinCC Runtime Advanced?</td>
<td><a href="https://support.industry.siemens.com/cs/ww/en/view/59203176">https://support.industry.siemens.com/cs/ww/en/view/59203176</a></td>
</tr>
</tbody>
</table>
2.2 Daylight saving time

Daylight saving time is the time presented in the summer months as compared to normal time (also: standard time or zone time). The difference is usually one hour.

Note
The use of daylight saving time is not recommended in the automation environment. Daylight saving time should only be displayed on the HMI so that the operator can orient himself.

CAUTION
Time deviations possible when using daylight saving time
If daylight saving time is used on the HMI, it may only be used as a time slave during time synchronization. Otherwise, time deviations will occur in the entire system.

Further information on daylight saving time can be found in the FAQ "How do you implement an automatic switchover between daylight saving and winter time with SIMATIC HMI Comfort Panels and TIA Portal?" 

2.3 UTC

Universal Coordinated Time, UTC for short, is also known as world time. The UTC corresponds to GMT (Greenwich Mean Time) without daylight saving time change.

Note
There are two GMTs:
- GMT with daylight saving (Dublin, Edinburgh, Lisbon, London)
- GMT without daylight saving time changeover (Casablanca, Monrovia), corresponds to UTC

Reasons for the UTC
The UTC is used in the SIMATIC control, as there are no time deviations permitted as with the time changeover. In case of time deviations, depending on the project planning, e.g. the time alarms could no longer be executed correctly or the operating hours counter could no longer count correctly.

In WinCC Runtime, messages and archive values can be displayed in local time or in UTC time, depending on the configuration in CS. In order to have a unique time stamp for alarm functions and messages, a time deviation must also be avoided in the HMI. Therefore the UTC is used.

Note
During time synchronization, a time telegram is sent by the master, e.g. WinCC server or SICLOCK. This time telegram consists of the UTC time and a correction factor in half hours (e.g. 10:00 + 4*1/2 for 12:00 summer time in Germany and 10:00 UTC).
2 Time types

UTC

<table>
<thead>
<tr>
<th>CAUTION</th>
<th>Time deviations also possible when using UTC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To avoid time deviations, you must deactivate the summer time setting in the UTC parameters.</td>
</tr>
</tbody>
</table>

Further information on world time can be found in the FAQ “How can a time specification (date and time) of the local computer time be converted into the coordinated world time (UTC)?”

3 Functions in the toolbar

3.1 Time functions

Reading the time (without system function)
Via the display of a CPU S7-1500. To do this, navigate to "Settings > Date & Time > General" on the CPU display.

Set time (without system function)
Via the TIA Portal. To do this, connect online to the SIMATIC controller. Then navigate via the project navigation to the entry "Online & Diagnosis" of the CPU and open the register "Functions > Set time".

Example:
- At the CPU clock, the coordinated world time (UTC) is set for the module time.
- The Central European Time Zone (local time) is set in the TIA Portal. The TIA portal obtains the time from the operating system.

Result:
- According to the example, one hour is added to the time to be set in the TIA Portal, in the entry "Online & Diagnosis".
- Another hour is added because the settings in the TIA portal are based on daylight saving time.
- The calculated local time of the module is displayed in 12 hours.
3.2 Data types

For the system functions registration explained in section 3.3 the following data types are used:

Data type "DT" (DATE_AND_TIME, only S7-300, S7-400)

The data type DT (DATE_AND_TIME) has a length of 8 bytes and stores date and time information in BCD format.

Table 3-1

<table>
<thead>
<tr>
<th>Length (Byte)</th>
<th>Format</th>
<th>Value range</th>
<th>Example of value input</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Date and time</td>
<td>Min.: DT#1990-01-01-00:00:00.000</td>
<td>DT#2008-10-25-08:12:34.567</td>
</tr>
<tr>
<td></td>
<td>(Year-Month-Day-Hour:Minute:Second:Millisecond)</td>
<td>Max.: DT#2089-12-31-23:59:59.999</td>
<td>DATE_AND_TIME#2008-10-25-08:12:34.567</td>
</tr>
</tbody>
</table>

Table 3-2

<table>
<thead>
<tr>
<th>Byte</th>
<th>Contents</th>
<th>Value range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Year</td>
<td>0 to 99 (Years 1990 to 2089) BCD#90 = 1990</td>
</tr>
<tr>
<td></td>
<td></td>
<td>...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BCD#0 = 2000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BCD#89 = 2089</td>
</tr>
<tr>
<td>1</td>
<td>Month</td>
<td>BCD#1 to BCD#12</td>
</tr>
<tr>
<td>2</td>
<td>Tag</td>
<td>BCD#1 to BCD#31</td>
</tr>
<tr>
<td>3</td>
<td>Hour</td>
<td>BCD#0 to BCD#23</td>
</tr>
<tr>
<td>4</td>
<td>Minute</td>
<td>BCD#0 to BCD#59</td>
</tr>
<tr>
<td>5</td>
<td>Second</td>
<td>BCD#0 to BCD#59</td>
</tr>
<tr>
<td>6</td>
<td>The two most significant digits of MSEC</td>
<td>BCD#0 to BCD#999</td>
</tr>
<tr>
<td>7 (4MSB) 1</td>
<td>The least significant digit of MSEC</td>
<td>BCD#0 to BCD#9</td>
</tr>
<tr>
<td>7 (4LSB) 2</td>
<td>Day of the week</td>
<td>BCD#1 to BCD#7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BCD#1 = Sunday</td>
</tr>
<tr>
<td></td>
<td></td>
<td>...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BCD#7 = Saturday</td>
</tr>
</tbody>
</table>

1) MSB: Most Significant Bit
2) LSB: Least significant bit
3) Fixed-point number
Data types

**Data type "DTL" (only S7-1200, S7-1500)**

An operand of data type DTL has a length of 12 bytes and stores date and time information in a predefined structure.

### Table 3-3

<table>
<thead>
<tr>
<th>Length (Byte)</th>
<th>Format</th>
<th>Value range</th>
<th>Example of value input</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Date and time (year-month-day-hour:minute:second.nanosecond)</td>
<td>Min.: DTL#1970-01-01-00:00:00:0</td>
<td>DTL#2008-12-16-20:30:20.250</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max.: DTL#2262-04-11-23:47:16.854775807</td>
<td></td>
</tr>
</tbody>
</table>

**Note**

The structure of the data type DTL consists of several components, each of which can have a different data type and value range. The data type of a specified value must match the data type of the respective component.

### Table 3-4

<table>
<thead>
<tr>
<th>Byte</th>
<th>Components</th>
<th>Data type</th>
<th>Value range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Year</td>
<td>UINT</td>
<td>1970 to 2262</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Month</td>
<td>USINT</td>
<td>1 to 12</td>
</tr>
<tr>
<td>3</td>
<td>Tag</td>
<td>USINT</td>
<td>1 to 31</td>
</tr>
<tr>
<td>4</td>
<td>Day of the week</td>
<td>USINT</td>
<td>1 (Sunday) to 7 (Saturday)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The day of the week is not taken into account when entering values.</td>
</tr>
<tr>
<td>5</td>
<td>Hour</td>
<td>USINT</td>
<td>0 to 23</td>
</tr>
<tr>
<td>6</td>
<td>Minute</td>
<td>USINT</td>
<td>0 to 59</td>
</tr>
<tr>
<td>7</td>
<td>Second</td>
<td>USINT</td>
<td>0 to 59</td>
</tr>
<tr>
<td>8</td>
<td>Nanosecond</td>
<td>UDINT</td>
<td>0 to 999999999</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3 Functions in the toolbar

Data types

**Data type "LDT" (DATE_AND_LTIME, only S7-1500)**

The data type LDT (DATE_AND_LTIME) has a length of 8 bytes and stores date and time in nanoseconds since 01.01.1970 0:0.

<table>
<thead>
<tr>
<th>Length (Byte)</th>
<th>Format</th>
<th>Value range</th>
<th>Example of value input</th>
</tr>
</thead>
</table>
| 8            | Date and time (year-month-day-hour:minute:second.nanosecond) | Min.: LDT#1970-01-01-00:00:00.000000000  
                |                                | Max.: LDT#2262-04-11-23:47:16.854775807 | LDT#2008-10-25-08:12:34.567 |
|              | Hexadecimal numbers           | 16#0 to 16#7FFF_FFFF_FFFF_FFFF        | 16#7FFF                  |

For more information on the "DT" and "DTL" data types, see the FAQ "How to enter, read, and process the date and time for the CPU Units in STEP 7 (TIA Portal)?":

3.3 System functions

The functions for processing data types DT and DTL are different in STEP 7 V5.x and in the TIA Portal.

- In STEP 7 (TIA Portal), you can find these instructions in the "Extended instructions" palette and in the "Date and time" folder.
- For STEP 7 V5.x you need the IEC standard functions which are contained in the "Standard Library" of STEP 7.

Set time: "WR_SYS_T"

With the instruction "WR_SYS_T" you set the date and time of the CPU clock. You specify the date and time in the input parameter IN. The value must be within the following range:

- DT: Min. DT#1990-01-01-0:0:0, max. DT#2089-12-31-23:59:59.999
- LDT: Min. LDT#1970-01-01-0:0:0.000000000, max. LDT#2200-12-31 23:59.999
- DTL: Min. DTL#1970-01-01-00:00:00.0, max. DTL#2200-12-31 23:59.999

You can use the output parameter RET_VAL to query whether errors occurred during the execution of the statement.

Note

Only data type DTL is available for the S7-1200.

Information on the local time zone or summer time cannot be transmitted with the instruction "WR_SYS_T".

Example:

- If the normally open contact ("execute") delivers the signal state "TRUE", the instruction "WR_SYS_T" is executed.

Result:

- The module time of the CPU clock is overwritten with the time to be set ("inputTIME").
- The output parameter RET_VAL ("returnValueT") indicates that the processing ran without errors.
Further information on the system function "WR_SYS_T" can be found in the FAQ "How can you enter, read and process the date and time for the CPU Units in STEP 7 (TIA Portal)":

Reading the time: "RD_SYS_T"

With the instruction "RD_SYS_T" you read out the current date and time of the CPU clock. The read out data are output at the output parameter "OUT" of the instruction "RD_SYS_T" in the format DT, LDT or DTL.

At output RET_VAL, you can query whether errors occurred during execution of the statement.

Note

Only data type DTL is available for the S7-1200.
Information on the local time zone or summer time cannot be transmitted with the instruction "RD_SYS_T".

Example:

You read out the assembly time of the CPU clock as follows.

Result:

- The assembly time of the CPU clock is read out and displayed at the output parameter OUT ("outputTIME").
- The output parameter RET_VAL ("returnValue") indicates that the processing ran without errors.

Further information on the "RD_SYS_T" function can be found in the "Documentation" (section 5.2 and section 5.3) of the FAQ "Time synchronization between an HMI operator interface and a SIMATIC PLC":
Further information on the function "RD_SYS_T" can also be found in the FAQ "How can you enter, read and process the date and time for the CPU modules in STEP 7 (TIA Portal)?":

Read local time: "RD_LOC_T"

With the instruction you read out the current local time from the CPU clock and output it at output OUT. For the output of the local time the information about the time zone as well as the beginning of the daylight saving and winter time, which you have set during the configuration of the CPU clock, are used.

At output RET_VAL, you can query whether errors occurred during execution of the statement.

Example:

You read out the local time of the CPU clock as follows.

Result:

- The local time of the CPU clock is read and displayed at the output parameter OUT ("outputLocTIME").
- The output parameter RET_VAL ("returnValue") indicates that the processing ran without errors.

Further information on the "RD_LOC_T" function can be found in the FAQ "How do you implement an automatic switchover between daylight saving and winter time with SIMATIC HMI Comfort Panels and TIA Portal?"

Write local time: "WR_LOC_T"

With the instruction "WR_LOC_T" you set date and time of the CPU clock. You enter the date and time as local time in the input parameter LOCTIME.

The value must be within the following range:
- **DT**: Min. DT#1990-01-01-00:00:00, max. DT#2089-12-31-23:59:59.999
- **LDT**: Min. LDT#1970-01-01-00:00:00.000000000, max. LDT#2200-12-31 23:59.999
- **DTL**: Min. DTL#1970-01-01-00:00:00.0, max. DTL#2200-12-31 23:59.999

You can use the output parameter RET_VAL to query whether errors occurred during the execution of the statement.

**Example:**

You set the local time of the CPU clock as follows.

**Result:**
- The new local time ("inputLocTIME") is taken over by the CPU.
- The output parameter RET_VAL ("returnValueT") indicates that the processing ran without errors.
Setting a time zone: "SET_TIMEZONE"

Use the "SET_TIMEZONE" instruction to set the parameters for the local time zone and the daylight saving and winter time changeover.

The settings that you make with the instruction "SET_TIMEZONE" correspond to the settings for the time in the properties of the CPU. To execute the "SET_TIMEZONE" instruction, store the corresponding parameters in the "TimeTransformationRule" system data type.

Example:

You set the time zone of the CPU clock as follows.

Result:

- The time zone of the CPU clock is overwritten with the time zone to be set ("TimeZone").
- The output parameter STATUS ("statusTime") indicates that the processing ran without errors.
4 Functions in HMI

4.1 Area pointer

Further information on the subject of range pointers can be found in the "Documentation" (section 3.2) of the FAQ "Time synchronization between an HMI operator interface and a SIMATIC PLC":

Area pointer: "Date/time"

Table 4-1

<table>
<thead>
<tr>
<th>Data word</th>
<th>Most significant byte</th>
<th>Least significant byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>n+0</td>
<td>Reserved</td>
<td>Hour (0 to 23)</td>
</tr>
<tr>
<td>n+1</td>
<td>Minute (0 to 59)</td>
<td>Second (0 to 59)</td>
</tr>
<tr>
<td>n+2</td>
<td>Reserved</td>
<td>Reserved</td>
</tr>
<tr>
<td>n+3</td>
<td>Reserved</td>
<td>Weekday (1-7, 1=Sunday)</td>
</tr>
<tr>
<td>n+4</td>
<td>Day (1 to 31)</td>
<td>Month (1 to 12)</td>
</tr>
<tr>
<td>n+5</td>
<td>Year (80 to 99/0 to 29)</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

This area pointer is used to transfer the date and time from the operating device to the controller.

- The controller writes the control task "41" or "40" to the task tray.
- When the control job is evaluated, the operator interface writes the current date and time into the data area that is configured in the area pointer.
- All entries are coded in BCD format.
- If several connections are configured in a project, the area pointer must be activated for each configured connection.

Note

If you have configured the range pointer "Date/Time", you cannot use the range pointer "Date/Time PLC".
Area pointer "Date/Time PLC"

Table 4-2

<table>
<thead>
<tr>
<th>Data word</th>
<th>Most significant byte</th>
<th>Least significant byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>n+0</td>
<td>Year (80 to 99/0 to 29)</td>
<td>Month (1 to 12)</td>
</tr>
<tr>
<td>n+1</td>
<td>Day (1 to 31)</td>
<td>Hour (0 to 23)</td>
</tr>
<tr>
<td>n+2</td>
<td>Minute (0 to 59)</td>
<td>Second (0 to 59)</td>
</tr>
<tr>
<td>n+3</td>
<td>Reserved</td>
<td>Reserved</td>
</tr>
<tr>
<td>n+4</td>
<td>Reserved</td>
<td>Reserved</td>
</tr>
<tr>
<td>n+5</td>
<td>Reserved</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

This area pointer is used to transfer the date and time from the controller to the operating device. You use this area pointer when the controller is master for the time.

The following applies here:
- The controller loads the data area of the area pointer.
- The operator interface reads the data cyclically over the projected acquisition cycle and synchronizes itself.
- All entries are coded in BCD format.
- "Date/Time PLC" is a global area pointer and can only be configured once in a project.

**Note**
- If you have configured the area pointer "Date/Time PLC", you cannot use the area pointer "Date/Time".
- "Date/Time PLC" is a global area pointer and can only be configured once in a project.
4 Functions in HMI

4.2 Script functions

4.2.1 C functions

WinCC V7 and WinCC Professional provide you with C functions with which you can operate the time.

SetSystemTime

Use the C function "SetSystemTime" to set the Greenwich time.

SetLocalTime

Use the C function "SetLocalTime" to set the local computer time.

Example - Set time using Word variables:

```c
#pragma code("kernel32.dll")
VOID SetLocalTime(SYSTEMTIME *lpst);
#pragma code();
SYSTEMTIME MyTime;
MyTime.wYear=GetTagWord("varname");
MyTime.wMonth=GetTagWord("varname");
MyTime.wDayOfWeek=GetTagWord("varname");
MyTime.wDay=GetTagWord("varname");
MyTime.wHour=GetTagWord("varname");
MyTime.wMinute=GetTagWord("varname");
MyTime.wSecond=GetTagWord("varname");
MyTime.wMilliseconds=GetTagWord("varname");
SetLocalTime(&MyTime);
```

GetSystemTime

With the C function "GetSystemTime" you can read the Greenwich time.

GetLocalTime

With the C function "GetLocalTime" you can read the local computer time.

Example - Read time and file in Word variables:

```c
#pragma code("kernel32.dll")
VOID GetLocalTime(SYSTEMTIME *lpst);
#pragma code();
SYSTEMTIME MyTime;
GetLocalTime(&MyTime);
SetTagWord("varname",MyTime.wYear);
SetTagWord("varname",MyTime.wMonth);
SetTagWord("varname",MyTime.wDayOfWeek);
SetTagWord("varname",MyTime.wDay);
SetTagWord("varname",MyTime.wHour);
SetTagWord("varname",MyTime.wMinute);
SetTagWord("varname",MyTime.wSecond);
```
4 Functions in HMI

4.2.2 VB functions

WinCC V7, WinCC Professional, WinCC Advanced and Comfort provide VB functions with which you can operate the time.

**Time**

The Time function returns the local computer time (without date):

```
Dim MyTime
MyTime = Time ' MyTime contains the current system time.
```

**Date**

The date function returns the local date:

```
Dim MyDate
MyDate = Date ' MyDate contains the current system date.
```

**Now**

The Now function returns the local computer time (date and time):

```
Dim MyVar
MyVar = Now ' MyVar contains the current date and time.
```

**Windows Management Instrumentation (WMI)**

The Windows Management Instrumentation (WMI) provides access to all system parameters. The WMI obtains information and manages system parameters. With VBS you can read out or set the local computer time, or the coordinated world time (UTC), or the time zone of the computer.

For more information on WMI functionality, please refer to the FAQ "How to convert a time (date and time) of the local computer time into Coordinated World Time (UTC)?":

5 Synchronization types

Introduction

Time synchronization is of great importance in industrial plants. For example, these tasks can only be performed meaningfully with a reliable and identical date and time stamp for all components involved:

- Data recording and data storage
- Alarms
- Shift protocols
- Energy data management

Setting the time

Time setting is the conventional way of reducing time differences between the operator station and the control system to a minimum. When setting the time, however, telegram run times and processing times of scripts and functions cause a delay which causes the times in the HMI and PLC to differ.

The advantage of time setting is its universal usability, e.g. for devices, assemblies and bus topologies that do not support synchronization methods.

Time synchronization

The advantage of time synchronization is its accuracy, which also takes into account delays during transmission.

In addition, the implementation is less time-consuming than setting the time, since no further scripts and functions are required.

However, all participants (e.g. control unit and controller) must support the method used for time synchronization.

This section introduces the following synchronization methods:

- NTP
- SIMATIC procedure
- TIA procedure
5.1 NTP

The Network Time Protocol (NTP) is a standard for synchronizing clocks in computer systems over packet-based communication networks. NTP uses the connectionless transport protocol UDP.

It is designed to provide reliable timing over variable packet networks.

More information about NTP time synchronization can be found in the following FAQs:

Table 5-1

<table>
<thead>
<tr>
<th>FAQs</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time synchronization (date and time) between WinCC Runtime Professional and an S7 controller (documentation, section 6)</td>
<td><a href="https://support.industry.siemens.com/cs/ww/en/view/67518641">https://support.industry.siemens.com/cs/ww/en/view/67518641</a></td>
</tr>
<tr>
<td>Which SIMATIC S7-300/S7-400 components support the NTP time telegram for synchronizing the system time and how do I activate this type of time synchronization?</td>
<td><a href="https://support.industry.siemens.com/cs/ww/en/view/17990844">https://support.industry.siemens.com/cs/ww/en/view/17990844</a></td>
</tr>
</tbody>
</table>
5.2 SIMATIC procedure

This procedure is mostly used in process automation together with ISO transport services. The SIMATIC procedure achieves an accuracy of +/- 10ms between the communication processor (CP) and the synchronized CPU at a resolution of +/- 1ms.

Since the SIMATIC procedure is based on SNAP services (i.e. ISO Layer 2 service) and works with MAC addresses, it can only be used with local Ethernet networks. This procedure does not work with IP networks via IP routers, i.e. with configured IP subnets.

Further information about SIMATIC time synchronization can be found in the FAQ “How is the SIMATIC S7-300 configured as time master or time slave for time synchronization via Industrial Ethernet with the SIMATIC procedure?”:

5.3 TIA procedure

If an S7-1200 or S7-1500 controller is selected as communication partner in the WinCC Engineering System, one of the following options can be selected under the connection settings under "HMI time synchronization mode".

- None: Time synchronization is not used.
- Master: The operating device sets the time. If several operator interfaces are used, one operator interface is configured as "master" and all other operator interfaces as "slave".
- Slave: The SPS sets the time.

No further project planning steps are required for this type of time synchronization.

Figure 5-3

Further information on the subject of HMI time synchronization can be found in the "Documentation" (section 3.1 and section 5.1) of the FAQ "Time synchronization between an HMI operator interface and a SIMATIC PLC":

## 6 Further information and program examples

The following table gives you a selection guide to find your relevant contributions with consideration of the HMI system and the controller.

<table>
<thead>
<tr>
<th></th>
<th>Basic Panels</th>
<th>Comfort Panels</th>
<th>RT Advanced</th>
<th>RT Professional</th>
<th>WinCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>S7-300:</td>
<td>69864408</td>
<td>69864408</td>
<td>69864408</td>
<td>67518641</td>
<td>7802886</td>
</tr>
<tr>
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<td>69864408</td>
<td>67518641</td>
<td>7802886</td>
</tr>
<tr>
<td>S7-1200</td>
<td>69864408</td>
<td>69864408</td>
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<td>67518641</td>
<td>-</td>
</tr>
<tr>
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</tr>
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<td></td>
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<td></td>
<td></td>
<td>24202491</td>
</tr>
</tbody>
</table>
Further links on time synchronization

The links mentioned in this white paper are sufficient to deal with the topic of time synchronization in the environment of WinCC and TIA Portal. Further, special cases are highlighted in the following FAQs:

Table 7-1

<table>
<thead>
<tr>
<th>FAQs</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>How can the time of an S7 controller be set from WinCC?</td>
<td><a href="https://support.industry.siemens.com/cs/ww/en/view/7802886">https://support.industry.siemens.com/cs/ww/en/view/7802886</a></td>
</tr>
<tr>
<td>How can the local computer time or the coordinated world time be read, displayed or set at WinCC runtime?</td>
<td><a href="https://support.industry.siemens.com/cs/ww/en/view/24202491">https://support.industry.siemens.com/cs/ww/en/view/24202491</a></td>
</tr>
</tbody>
</table>
8 Appendix

8.1 Service and Support

Industry Online Support
Do you have any questions or need assistance?
Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.
The Industry Online Support is the central address for information about our products, solutions and services.
Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks:
support.industry.siemens.com

Technical Support
The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts. Please send queries to Technical Support via Web form:
www.siemens.com/industry/supportrequest

SITRAIN – Training for Industry
We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that’s tailored to the customer’s specific needs.
For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page:
www.siemens.com/sitrain

Note
Basics are taught in the following SITRAIN courses.

- SIMATIC WinCC, Systemkurs (de)
- SIMATIC WinCC, System Course (en)
- SIMATIC WinCC maschinenah im TIA Portal (de)
- SIMATIC WinCC on the machine level in the TIA Portal (en)
- SIMATIC WinCC SCADA im TIA Portal (de)
- SIMATIC WinCC SCADA in the TIA Portal (en)

Topics for troubleshooting and diagnostics are taught, among many other topics, in the course "SIMATIC WinCC, Advanced Course."

- SIMATIC WinCC, advanced course (de)
- SIMATIC WinCC, advanced course (en)
Service offer

Our range of services includes the following:

- Plant data services
- Spare parts services
- Repair services
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog web page:

support.industry.siemens.com/cs/sc

Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for Apple iOS, Android and Windows Phone:

support.industry.siemens.com/cs/ww/en/sc/2067

8.2 Links and Literature

Table 8-1

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
</tr>
</thead>
</table>
| 1\1 | Siemens Industry Online Support  
https://support.industry.siemens.com |
| 2\2 | Link to the article page of the application example  
| 3\3 |

8.3 Change documentation

Table 8-2

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1.0</td>
<td>03/2019</td>
<td>First version</td>
</tr>
</tbody>
</table>