Application Note

Z-Wave Time and Date Basics

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REVISION RECORD				
Doc. Rev	**Date**	**By**	**Pages affected**	**Brief description of changes**
1	20150108	ABR	ALL	First revision
2	20170602	NOBRIOT	ALL	Refactored the text and figures Included the Clock Command Class Clarified how time servers work with S2
3	20180305	BBR	All	Added Silicon Labs template

Recommended reading:

- Z-Wave Association Basics
- Z-Wave Battery Support Basics

Z-WAVE TIME AND DATE BASICS

Z-Wave enables a variety of monitoring and control applications. Certain applications require nodes to share the current local time and/or date. Date and time information can be exchanged in a Z-Wave network using the following Command Classes:

- Clock Command Class
- Time Command Class

The Clock Command Class permits a supporting node to be set and read back its current time. A clock supporting node is aware of the current weekday, hour and minute. This Command Class is intended for supporting nodes running with schedules, requiring basic time information. A controller should set the Clock of a supporting node during node commissioning.

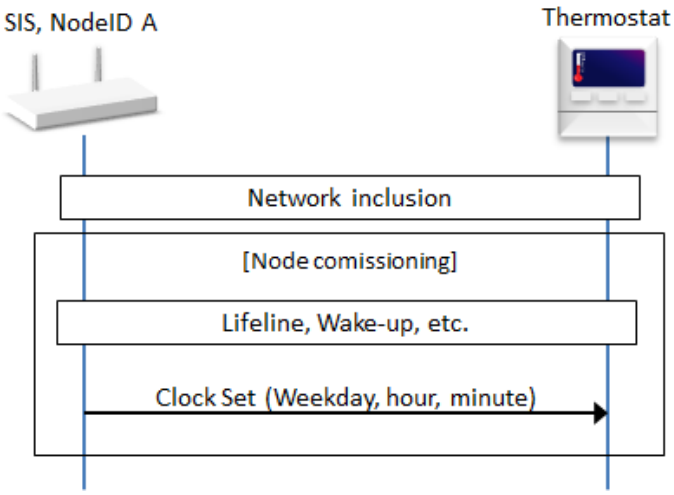


Figure 1, SIS configuring the Clock Command Class

A node having clock drift may issue regulars unsolicited Clock Report via its Lifeline Association Group in order to report its current time to a controlling node. The controlling node should set the correct time back if a deviation is observed (2 minutes or more).

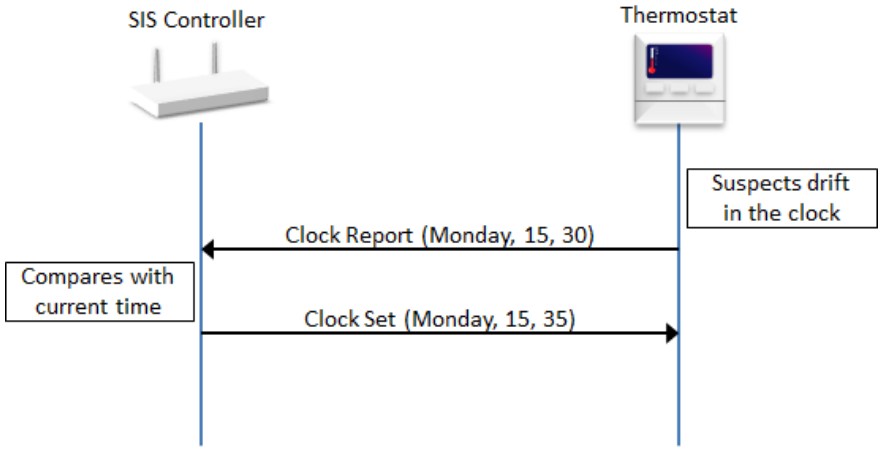


Figure 2, Clock supporting node requesting for update

The Time Command Class is used to request the current date and time from a local time server. Nodes may request the current time for the simple purpose of showing the local time on a display or the time information may be used to control local operations.

Time servers support the Time Command Class non-securely (as well as at every granted S2 Classes), allowing for any node in the network to request the time information using the highest common granted Security Class with the time server.

Figure 3 shows a thermostat which requests time and date information from a central controller that acts as a local time server.

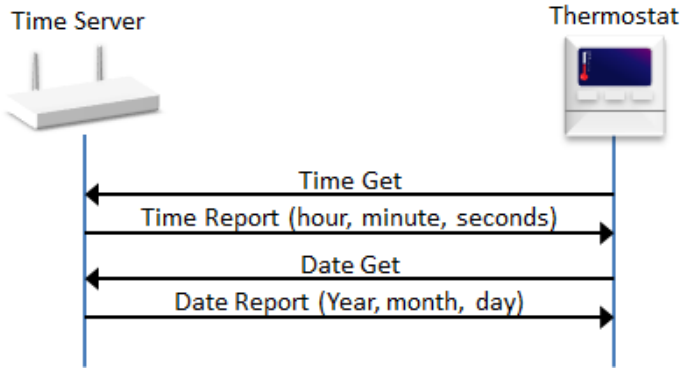


Figure 3, Reading the time from a time server

The thermostat is battery powered and sleeps most of the time. It implements an inexpensive clock circuit with a significant clock drift. For example, by requesting the time every 2 hours, the thermostat always knows the local time within a few of seconds; which is sufficient for heating control.

The time server implements a precision clock circuit to keep track of local time and date or can alternatively kept synchronized from another source (e.g. NTP server).

If the thermostat has a reliable clock, it can also request the Daylight Saving Time (DST) to update the time automatically during DST. Alternatively the thermostat can request the time to the local time server regularly (e.g. every day) to keep synchronized.

Schedules can be pushed to the thermostat from a control panel. Local schedules allow the thermostat to change target temperatures at any random time without having to receive instructions from the control panel. This way, the thermostat can limit communication to the control panel. Keeping the radio in sleep mode saves battery power.

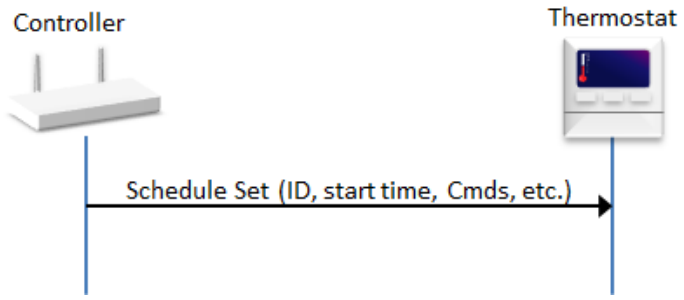


Figure 4, Schedule Command Class relying on synchronized clock

When using the Time Command Class, the thermostat needs to know the identity of the time server. Two strategies can be used for slave nodes:

- Have a dedicated Association Group issuing Time Get, Date Get Commands and expect a controller to associate a local time server to this association group during commissioning.
- Request the NIF to the Lifeline destination or Wake-Up destination NodeID and look for Time Command Class support

Figure 5 shows how an association is created from the SIS to a time server during commissioning.

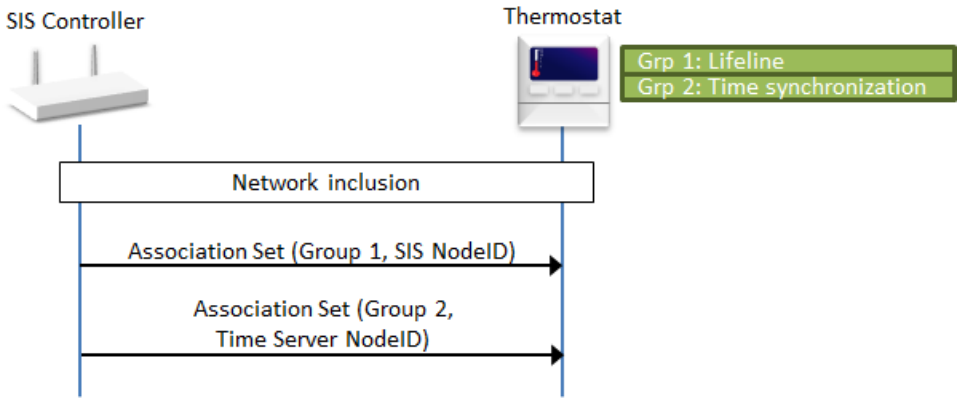


Figure 5, Controller configuring the time synchronization association group

Controllers performing commissioning or node interviews should automatically associate such time synchronization groups to a local time server. If no NodeID is set in Association Group 2, a node should probe for Time Command Class support. An example is given in Figure 6.

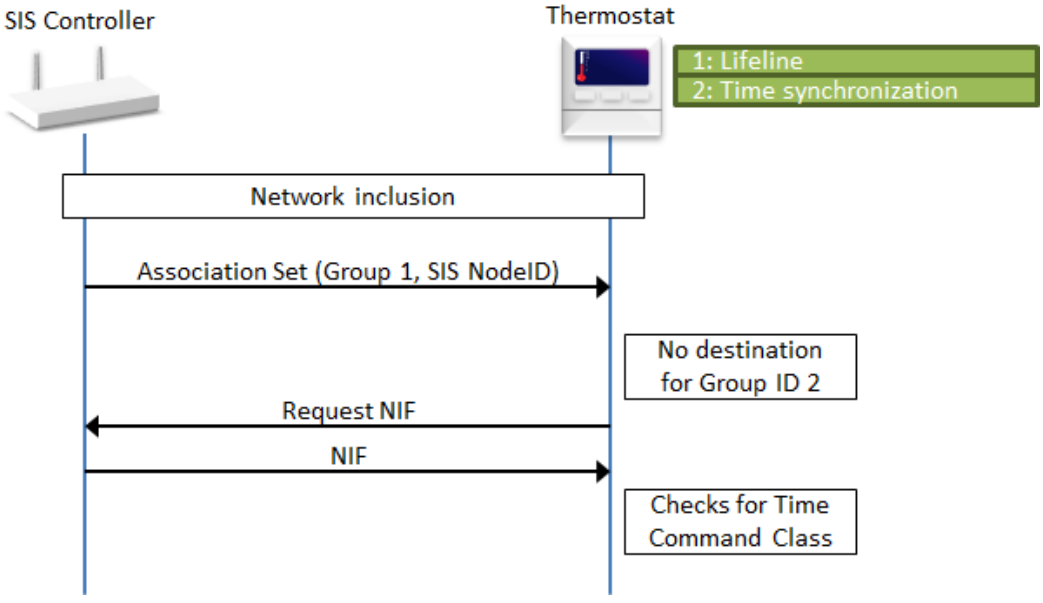


Figure 6, Thermostat probing the for Time Command Class

The time servers are usually gateways or controllers retrieving their time and date information from an internet time server which returns UTC time.

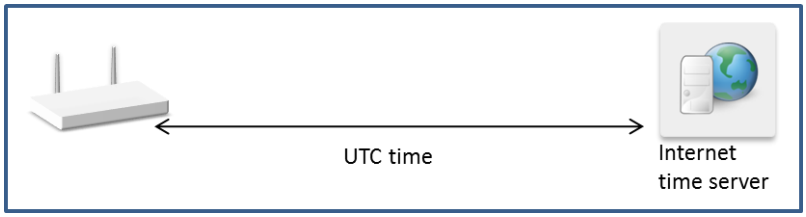


Figure 7, Gateway fetching the time from an external source

The gateway needs to know its local time zone in order to report local time to requesting nodes. The user chooses the local region from a gateway web page or the region is configured remotely. The gateway automatically determines the actual time zone offset and daylight savings offset from the configured local region.
If a local region is not configured, the local time zone and daylight saving offsets is not available. Local time is then identical to UTC time, i.e. Local time = UTC+0.

Alternatively, controllers having access to the Time Zone Offset (TZO) and Daylight Saving Time (DST) information should use the Time Offset Set Command from the Time Command Class to push this information to time servers supporting the Time Command Class.

Time Servers having no access to a time source can support the Time Parameters Command Class, allowing other time servers to set the current UTC time at the supporting time server.

The following example shows how configuration data and up-to-date time information is pushed as unsolicited commands to the thermostat as part of the inclusion process.

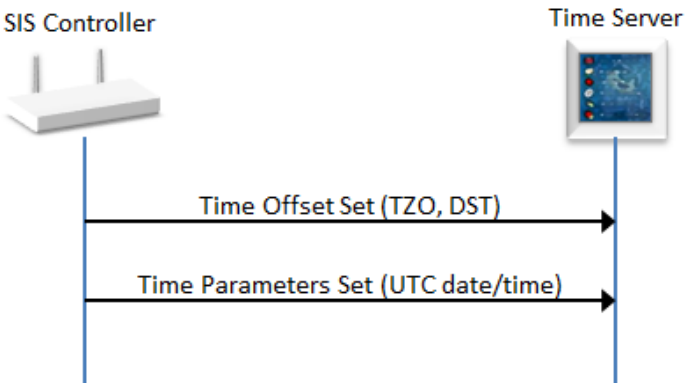


Figure 8, Controller configuring another time server in the network

The example below shows how a control panel may push time information to a local time server, e.g. if the time server does not have access to an internet time server. The Time Parameters Command Class is used for this purpose. Just like an internet time service, the Time Parameters Command Class also operates in the UTC time domain.

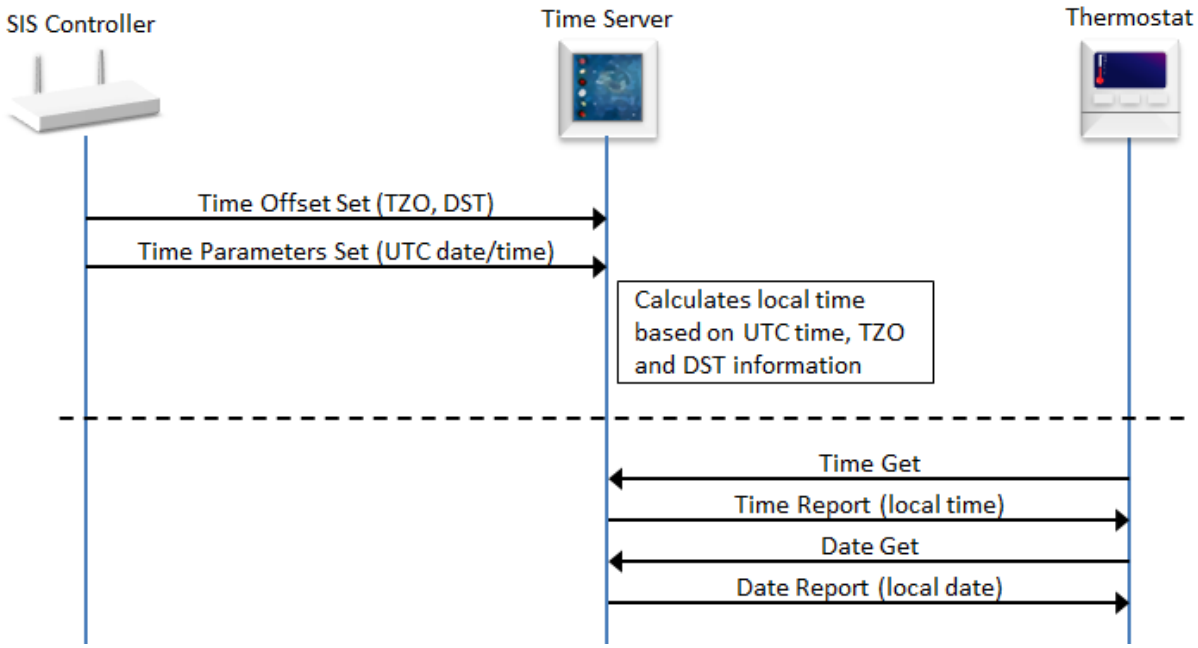
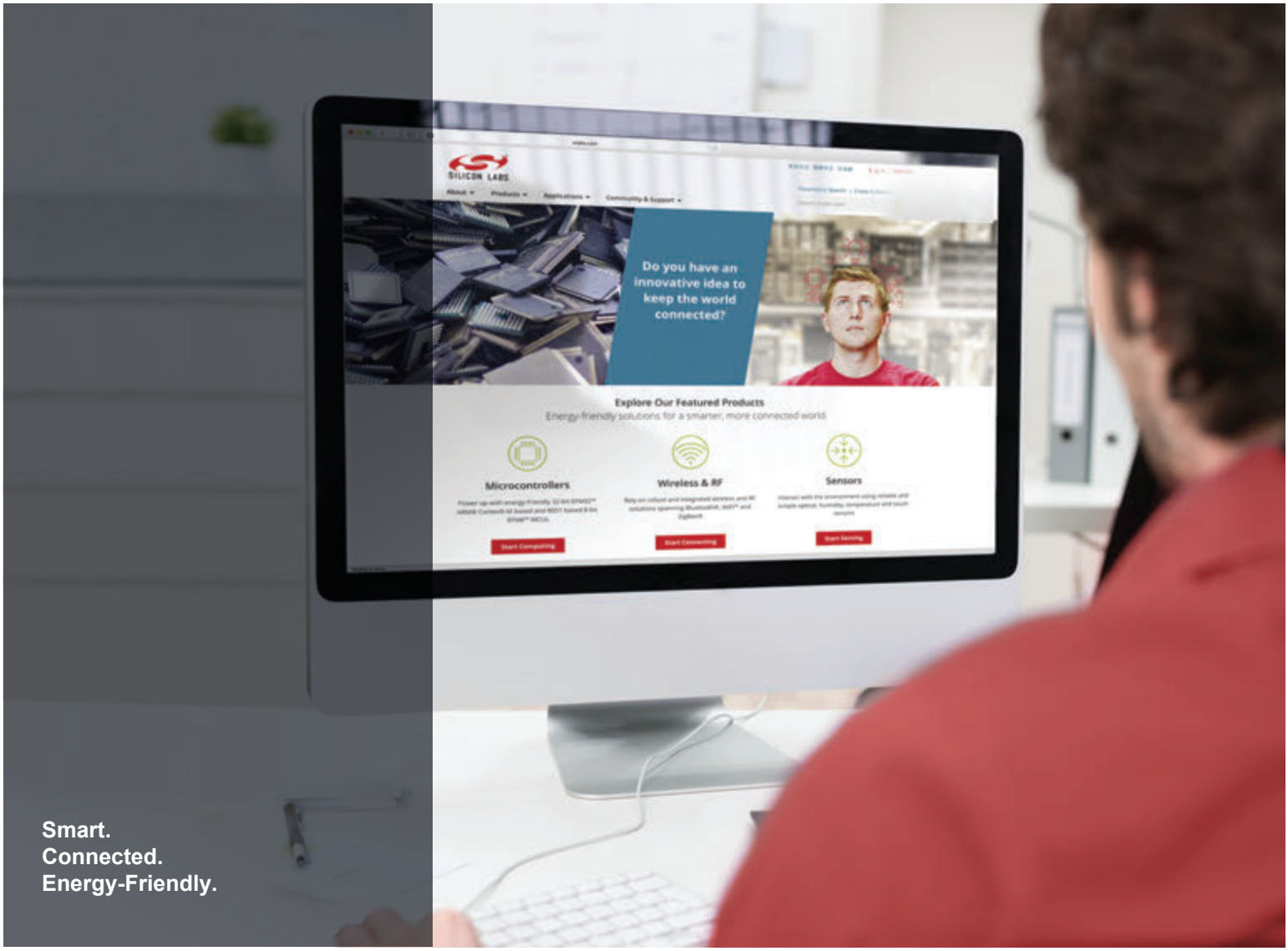


Figure 9, local time server and thermostat



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