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SUBJECT

Impact of TTP-Controller Deactivation Constraints (D-CHIP-AN-10-002) [2] on TTP middleware implementations.

DESCRIPTION

An incorrect Protocol State might be indicated in the Protocol State register when the TTP-Controller AS8202NF [1] is turned off by the host application SW [2].

FUNCTIONAL IMPACT

A consistent read access to the register of the status area of a TTP-Controller AS8202NF [1] is ensured via the *Status Area Concurrency Control Field* register. During synchronized operation, a consistent read of the status area register is only possible if the Status Area Concurrency Control Field holds an even value.

When the issue described in D-CHIP-AN-10-002 (incorrect Protocol State might be indicated in the Protocol State register when the TTP-Controller AS8202NF [1] is turned off) occurs, the following state of things, all three at the same time, is possible:

- Status Area Concurrency Control Field is odd (indicating an update in progress)
- Protocol State register is ACTIVE, PASSIVE, or COLDSTART (indicating the TTP-Controller state)
- The TTP-Controller AS8202NF is turned off, the *Controller On* flag is in “OFF” state (0x0000)

The normal procedure is to wait for the Status Area Concurrency Control Field to become even again, and then retry to execute the read operation.

To determine if the TTP-Controller AS8202NF is operational and a read retry is reasonable, the Protocol State register is used. However, due to the issue described in D-CHIP-AN-10-002, an interleaved indication in the Protocol State register may lead to the wrong decision to initiate a “wait and retry” operation: As the TTP-Controller AS8202NF is already turned off, the Status Area Concurrency Control Field does not change anymore, hence successive read retries lead to an infinite loop.

ANALYSIS

Code inspection of TTTech software libraries was performed (classified later in sections as “Affected Components” and “Non-Affected Components”). No unhandled states were identified inside the libraries that can trigger the indicated behavior. However, software interfacing with a

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TTP-Driver needs to comply with the recommendations made in section "Necessary Modification" to avoid a state that is described in "Functional Impact".

AFFECTED COMPONENTS

TTP-Driver:

- TTP-Driver-MPC555-Diab44b-3.326.178 [3]
- TTP-Driver-MPC5554-CEI-3.326.178 [4]

NON-AFFECTED COMPONENTS

TTP-OS:

- 2006-01-19 TTP-OS-C167 Code 4.4.175 [5]
- 2005-06-22 TTP-OS-MPC555 Code 4.4.170 [6]
- 2005-06-22 TTP-OS-MPC8260 Code 4.4.170 [7]

Loading Library Host:

- 2008-09-03 LoadLib Host Code 2.0.44 [8]

TTP-TD-Com Layer:

- TTP-TD-COM_Layer-0B-5.326.78 [9]

TTP HWCOM [10]

TTP Network Interface [11]

NECESSARY MODIFICATION

The application using the TTP-Driver shall check if the TTP-Controller AS8202NF is in "ON" (0xFFFF) state before calling:

- tt_ttp_get_c_state
- tt_ttp_get_clock_corr
- tt_ttp_get_membership

All activities regarding this application note are tracked in the TTTech internal bug tracking system with the references *issue55931*, *issue55592*, and *issue55593*.

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- [11] TTTech Computertechnik AG, TTP Network Interface - Hardware Configuration Index (D-115-G-10-007), Revision 1.2.1-59303, 2013-07-12.