

Advanced LIGO Engineering Change Request (ECR)

ECR Title: Monitoring of the EtherCAT field bus

DCC No: E1500401-v1

Date: 10/1/2015

Requester: Daniel Sigg, Impacted Subsystem(s): SCM
Patrick Thomas

Description of Proposed Change(s): We proposes to add monitoring software to the TwinCAT system running on PLC1 which monitors the master bus device (i.e., the Ethernet interface). The following monitors would be added:

- A monitor for the working counters which check that each EtherCAT frame has successfully completed its round-trip though all addressed terminals.
- A status monitor indicating, if the master device is up and running.
- A status monitor indicating a link error (i.e., a cable got unhooked).
- A status monitor indicating, if one of the terminals is not in OP mode.
- A status monitor indicating, if the number of active terminals is different from the configuration (unexpected hardware change).
- A status monitor indicating a timing error.
- A status monitor indicating, if frames were lost.
- Statistics counters monitoring the EtherCAT frames.

Reason for Change(s): Currently, it is possible that part or all of the terminals connected through the EtherCAT bus are not operational without a clear error indication. We already have code to monitor each PLC and each task within a PLC, but we do not monitor the hardware bus itself.

Estimated Cost: none

Schedule Impact Estimate: small.

Nature of Change (check all that apply):

- Safety
- Correct Hardware
- Correct Documentation

- Improve Diagnostics
- Improve/Clarify Documentation
- Change Interface
- Change Requirement

Importance:

- Desirable for ease of use, maintenance, safety
- Desirable for improved performance, reliability
- Essential for performance, reliability
- Essential for function
- Essential for safety

Urgency:

- No urgency
- Desirable by date/event: during O1
- Essential by date/event: _____
- Immediately (ASAP)

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Impacted Hardware (select all that apply):

- Repair/Modify. List part & SNs: _____
- Scrap & Replace. List part & SNs: _____
- Installed units? List IFO, part & SNs: _____
- Future units to be built

Impacted Documentation (list all dwgs, design reports, test reports, specifications, etc.):
E1300780-v3

Disposition of the proposed change(s):

The disposition of this proposed engineering change request is to be completed by Systems Engineering and indicated in the “Notes and Changes” metadata field in the DCC entry for this ECR. The typical dispositions are as follows:

- **Additional Information Required**: in which case the additional information requested is defined. The ECR requester then re-submits the ECR with the new information using the same DCC number for the ECR but with the next version number.
- **Rejected**: in which case the reason(s) for the rejection are to be given
- **Approved**
- **Approved with Caveat(s)**: in which case the caveat(s) are listed
- **TRB**: the ECR is referred to an ad-hoc Technical Review Board for further evaluation and recommendation. It is the System Engineer’s (or designee’s) responsibility to organize the TRB. The System Engineer (or designee) then makes a technical decision based on the TRB’s recommendation. Links to the TRB’s documentation (charge, memos, final report, etc.) are to be added to the “Related Documents” field for this ECR.
- **CCB**: a change request for approval of additional funds or schedule impact is to be submitted to the Configuration Control Board. Links to the CCB’s documentation (CR, etc.) are to be added to the “Related Documents” field for this ECR.

Concurrence by Project Management:

Acknowledgement/acceptance/approval of the disposition is to be indicated by the electronic “signature” feature in the DCC entry for this ECR, by one the following personnel:

- Systems Scientist
- Systems Engineer
- Deputy Systems Engineer