Advanced LIGO Engineering Change Request (ECR)

ECR Title: Splitting the ISC Models

DCC No: E1500041-v1

Date: January 20, 2015

Requester: Daniel Sigg

Impacted Subsystem(s): ISC, ALS

Description of Proposed Change(s):

1. Split iscex/y into iscex/y and alsex/ey. The transmission readouts (ASC quads and LSC PD) would go into isc and the rest would stay in ALS. (There still would be the tidal related LSC stuff in the als model). This can be done transparent, ie. no channel name would change.

2. Rearrange lsc and omc models, so that OMC length/AS port RF length, DARM/CARM, ETM output matrix would be part of the OMC model. All other LSC stuff and maybe the OMC ASC would stay/move to the LSC model. This cannot be done transparent, ie. channel names related to input/output matrices would change.

3. Ask for a "AHEAD" field for the IPC transmitters. The AHEAD field would effectively result in a delay. All IPC transmissions between corner and end which are not time critical (say tidal, ALS stuff from the end) would acquire a cycle delay. So, the transmission would be on time, even if the model runs at 50us (like the SUS).

This doesn't replace the need for faster hardware, but will give us a bit more head room in the near term.

Reason for Change(s): I am not comfortable with the current IPC error rates at LHO. Even at 28us processing time for an end station model we seem to be marginal. Looks to me that we need to be below 25us in average to be save. Even with this the true safety margin seems somewhat uncertain. In the corner we seem to be better off. The lsc runs at 35us average and this produces a few errors. Maybe we have to go to 30us and be safe. However, the current DARM loop has a total delay of 200us. Some of it caused by handing off from the OMC model to the LSC and then the SUS. LLO is the same here.

Estimated Cost: none

Schedule Impact Estimate: minimal for testing during installation

Nature of Change (check all that apply):

- ☐ Safety
- ☒ Correct Software
- ☐ Correct Documentation
- ☐ Improve Hardware
- ☐ 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: _____
- ☒ Essential by date/event: O1_____
- ☐ 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.):

none, since we have no documentation of the code.

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