Meeting Notes from Controls Global Group Telecon 4/27/06

Agenda
- Miscellaneous items
- Standard Packaging for Front-End Electronics

Roll-call:
SLAC: Ray Larsen, Bob Downing (remotely)
FNAL: Patty McBride, Vince Pavlicek, Sharon Lackey, Erik Gottshalk, Brian Chase
ANL: Carwardine (from FNAL), Claude Sauders, Frank Lenkszus
KEK: Shin Michizono

MEETING NOTES:

Miscellaneous Items

Refer to the Controls meeting page on Indico for presentation slides:
http://ilcagenda.cern.ch/categoryDisplay.py?categId=50

Carwardine reported that options are being considered for a new timeslot for the weekly Controls teleconferences in order to avoid conflicting with a Fermilab ILCTA meeting that has been moved to Thursday mornings and to provide a more convenient time for colleagues in Asia to participate with the meetings.

The list of open action items from last week's telecon with the linac group was discussed (see Indico site).

When considering power requirements, we need to identify our need for UPS power and for emergency backup power (Downing)

The issue of pre-assembly and test was discussed. It was the common opinion that we should be planning to do as much pre-assembly and testing as possible on the surface. This would increase the cost of manufacture, but be much less costly overall, and would result in much higher reliability than doing much of the installation and testing in the service tunnels.

Similarly, we should baseline pre-manufactured and pre-terminated cables, rather than doing the termination work in the tunnels.

Item 3 on the list of open items (Stepper motor package) prompted much discussion. We need someone to think through the best approach to providing cost-effective stepper motor package and installation. A few items discussed include:

- Motor drives need to be in a separate penetration - maybe with power.

- Motors should have zero standby power since they do not move often.
- There are needs for high precision motors in the BDS (50 nm steps!), but 3-stub tuners for the RF waveguides don't need the same precision.

Ray and Brian indicated there are people at SLAC and Fermilab, respectively that could be asked to provide input. It was agreed that a separate meeting should be held on this topic.

Bob Downing has started collecting control system requirements for the linac.

Standard Packaging

Vince presented slides that summarize the work done so far by him and Frank on developing standard packaging for the RDR costing exercise (see Indico).

It was re-iterated that this does not necessarily address all technical requirements in all cases, but that it is intended to be sufficient to cost the control system at the +/-30% level without having to consider a large number of technical solutions.

The packaging baseline is for ATCA only, using either 5-slot or 13-slot crates. ATCA offers many appealing features over VME/VXI, especially in the context of high availability, but has some unknowns that have to be resolved because it has not been used in accelerator applications. In particular, its suitability for LLRF and precision analog instrumentation applications must be studied.

MicroTCA was discounted for this exercise because of the limitation that cabling can only come from the front of the crate.

Cabling issues could also drive the selection of an AMC mezzanine card implementation vs a full-size ATCA card implementation. The other factor will be circuit board area.

There was some discussion about what is meant by a ‘mid-level’ or ‘concentrator’ crate. This may be an implementation detail rather than a true hierarchical decision. Vince viewed it as a data acquisition concentrator, not as a network switch (which are needed, but would be viewed as part of the computing/network infrastructure not the controls hierarchy).

Following discussion, it was concluded that there were really only two signal bandwidths that we need to consider with regard to cabling and digitization:

1. Full bandwidth LLRF and instrumentation signals (many MHz)
2. “Audio band” monitoring/control.

Everything else would be transported as already-digitized signals on networks or other digital backbones.

There was much discussion about cabling and interfacing to the ATCA relay rack. It was finally concluded (at least for the costing baseline) that there would be five generalized models for cabling:

1. LLRF cables (one cable for each signal, either heliax or coax cables)
2. Stepper motors
3. Cryomodule instrumentation/monitoring cables (multi-conductor cables to reduce cable plant)
4. "Audio band" monitoring/control cables, with twisted pair multi-conductor cables.
5. "Audio band" monitoring/control cables, with twisted pair single-pair cables.

All models would require some kind of transition between the incoming plant cables and the ATCA crate. We could cost those by applying some overhead factor to the overall cost.

The choice between option 4 and option 5 would be based on the geographical layout of the remote equipment.

Brian noted that the latest LLRF cable count would require approximately 10-5 sq-in of penetration for ½" heliax and about 5 sq-in for ¼" heliax

There was some discussion about the need to include labor costs in the standard packaging costing model. Ray discussed five factors that should be, and are described on page 42 of Ray's presentation entitled "ILC Cost Model": https://docdb.fnal.gov/ILC-private/DocDB/ShowDocument?docid=173

Page 42 has been uploaded as a pdf to Indico.

Shin raised the question of whether we could distribute 48v DC to the relay racks that is needed by ATCA. This should be given further consideration, especially within the relay racks themselves, where common supplies could be used for up to three ATCA crates in a single relay rack.

Brian expressed concern about generalizing the design too much when it comes to the LLRF electronics, since doing so could make it even more difficult to meet the already stringent LLRF performance requirements.

We should do a sanity check by doing cost per channel.

The baseline date for the RDR costing exercise is January 2006. For ATCA, since it is currently a new standard, we need to develop a projected future cost based on volume and industry acceptance, and then back-calculate a cost for January 2006. Erik has posted an inflation/deflation costing spreadsheet (developed by Mark Bowden for BTeV) to docdb: http://docdb.fnal.gov/ILC-public/DocDB/ShowDocument?docid=271

We also understand we have to provide 50% confidence costing for each item, with low and high estimates ("three-point estimate") to give assessment of risk. Costing contingency will be done at the project level, so cannot be included in our cost estimates.

Action Items

Claude will update his damping ring/BDS devices/packaging spreadsheet based on the packaging information provided by Vince & Frank, and will use it to generate a template for other areas.

Carwardine will follow up with John Noonan about the point of contact for vacuum systems in the linac. [Follow up: Carwardine has emailed a request for information to the contact point, who is Paulo Michelato paolo.michelato@mi.infn.it]

Vince & Frank will continue to develop the standard packaging.

Bob Downing will review the list of interface boards and compare costs with those developed for BTeV.