



Controls & LLRF Working Group: Tuesday Session (29 May 07)

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Outline

- Agenda for the afternoon
- Goals for the week
- Brief review of Controls conceptual design in RDR
- The EDR described (part 1)
- Beginning point for R&D goals list



GDE Management's goals for this week...

- To review current status of global ILC R&D and future plans, including S-task force findings both for BCD-related & ACD items, and activities in and around test facilities (existing and proposed).
- Identify and prioritize critical engineering milestones for EDR phase (cost driven), including integration (and relationship to) the critical R&D milestones.
- To promote and improve collaboration between groups working on ILC related R&D:
 - **To encourage a broader participation from active groups around the world**
 - **To attract new researchers to the field.**
- To define the scope of the EDR and consolidate EDR planning:
 - **Review project WBS and 'Work Package' structure.**
 - **Refine proposed schedule, milestones, deliverables etc.**
 - **Begin process of WP allocation.**



Goals for this group

- Improve our collective understanding of work ongoing or planned in the three regions, especially on beam facilities.
- Begin to define work required during EDR phase on Controls and LLRF. Align ongoing and planned work, identify any areas where additional work is needed.
- Begin to establish a global R&D program for Controls & LLRF
 - **Develop an 'official' list of global R&D goals, begin defining the path...**
 - **What resources are available for R&D and design phase? How do we coordinate on a global level?**



To create this week...

- A draft 'official' list of R&D goals and milestones.
- A draft list of work packages for global R&D program.
- A draft list of prototypes to be tested at beam facilities, and where they would be tested.
- A draft list of work packages for design phase of EDR.
- A draft table of ATCA & uTCA instrumentation electronics boards being developed, showing their ATCA features.



Logistics

- Goal is to provide forum for working sessions and discussions, not primarily presentation sessions.
- Presentations are aimed at stimulating discussion.
- Rely on work being done by members of the group between the formal sessions.
- Will attempt to make open time-slots for short presentations. Requests should be made to Kay Rehlich.



EDR (draft from EDR Task Force)

- Primary goal of GDE activities in the Engineering Design Phase of the ILC project will be to advance (i) the technology, (ii) the design and (iii) the construction plans for ILC, to the point where approval for construction can be sought.
- In ~2010, an Engineering Design Report (EDR) will be produced: the EDR will explain the capabilities of the technology at that time, will detail the design of the machine and the construction plans, and will present an updated value estimate.
- The purpose of the EDR will be to facilitate:
 - **Formal international negotiations at government level on (a) siting, (b) funding, (c) organization and (d) ILC project execution**
 - **Preparations for construction on a timescale consistent with the start of construction in ~2012.**
- Preparations for construction will include the production of final engineering designs of critical components, procurement, and (once the site is chosen) site preparation.



“Successful EDR requires...” (1)

- *Basic R&D is needed to demonstrate that all major accelerator components can be engineered to meet the ILC performance specifications.*
- *R&D is needed into alternative solutions that will mitigate remaining technical risks. Any proposal to adopt an alternative solution as a new baseline must include costs information and a plan for the necessary technical development.*
- *An overall design must be produced, with sufficient completeness and detail to allow machine construction to start within 3 years, given project approval and funding.*
- *Where several options exist for high-technology components needed in large quantities, a selection between the options must be made to allow focused industrialization efforts.*
- *Comprehensive value-engineering exercise must be conducted, aimed at reducing cost and achieving design consistency.*

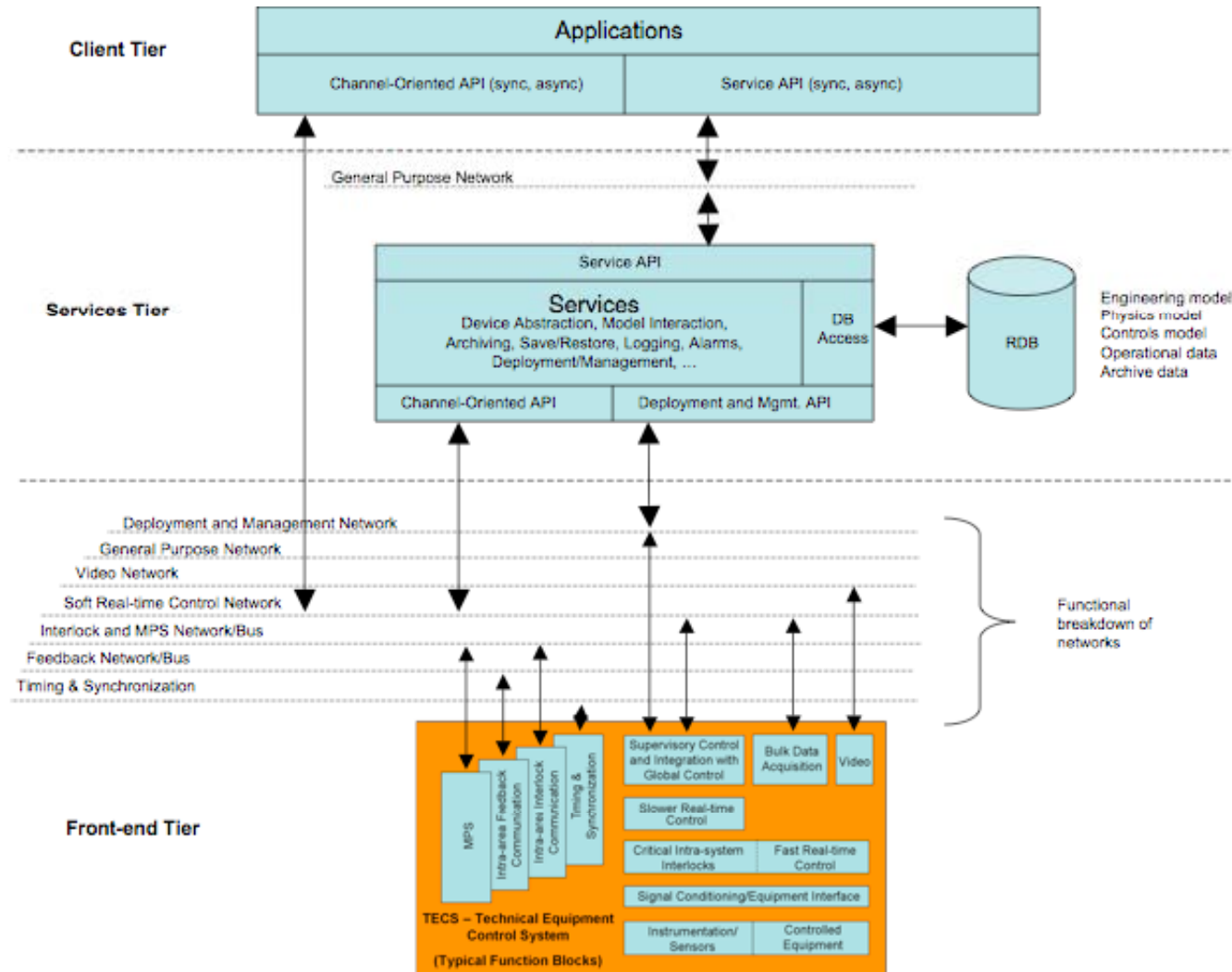


“Successful EDR requires...” (2)

- A complete value cost estimate for the machine must be provided, including a funding profile consistent with the project schedule. (Site-specific details will not be decided on the timescale of the EDR, and may be excluded or handled separately from other items in the value cost estimate).
- A project execution plan must be produced, including a realistic schedule. The project plan must include plans for industrialization of high-volume components in each of the participating regions.
- *Designs must be produced for facilities shared between different “area systems”, and for site-specific infrastructure.* The designs must include the level of detail needed for regions to estimate the cost to host the machine, taking into account local impact, infrastructure needs, and surface and underground footprints.
- Regions will require information to evaluate project technical and financial risks in support of a bid to host the machine. All necessary information must be provided.

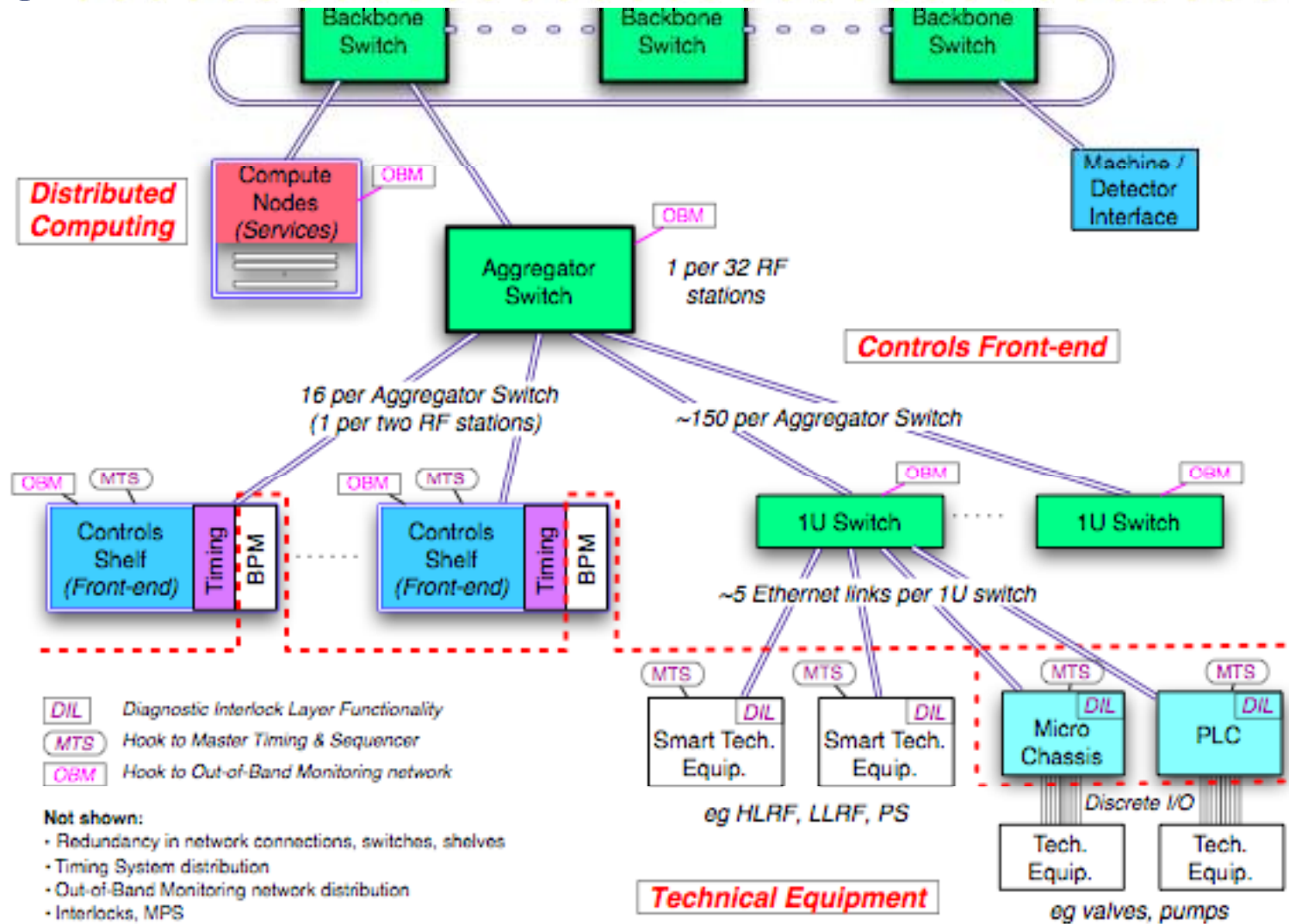


Controls Functional Diagram from RDR





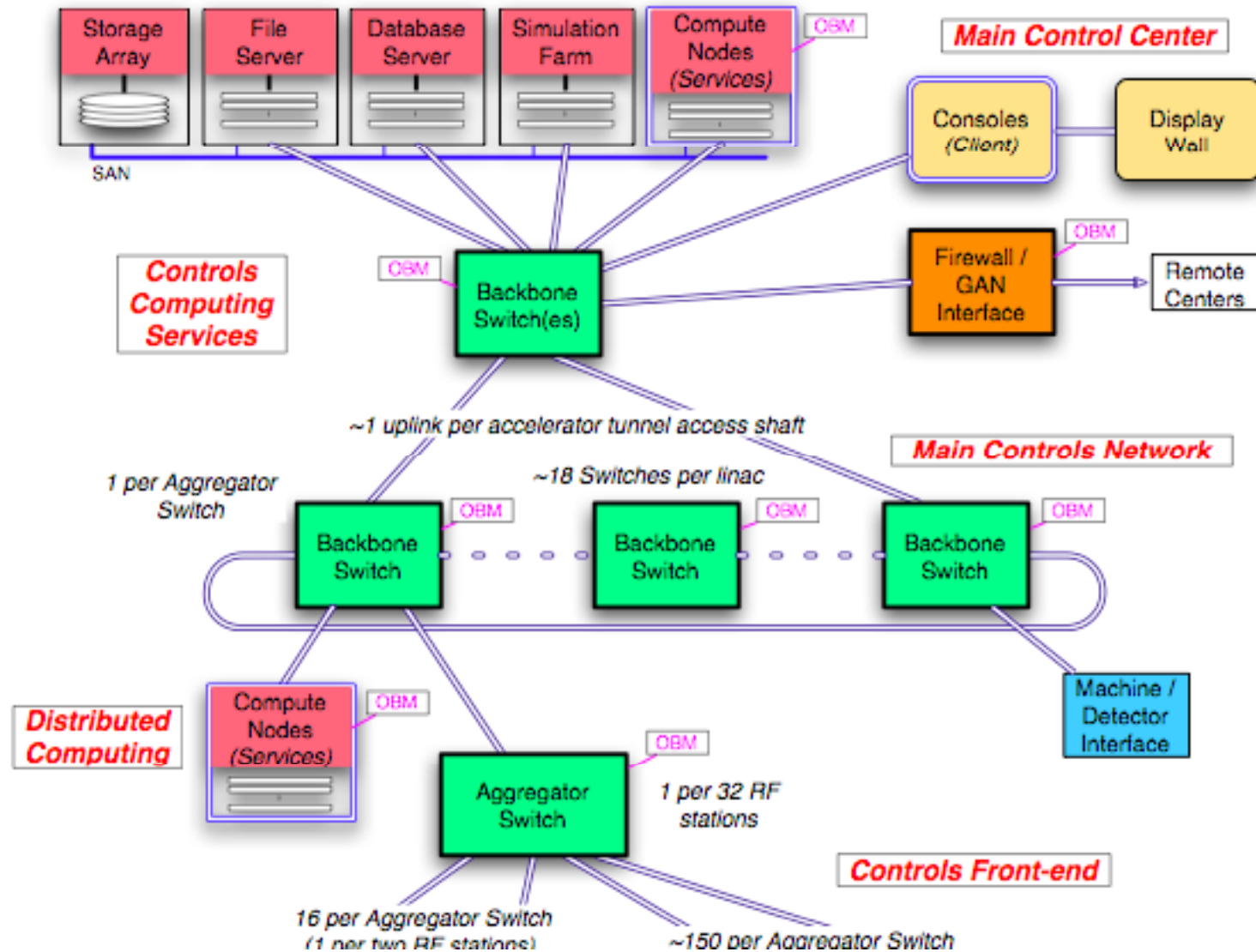
Controls Architecture from RDR...(1)



JAC / 1.23.07



Controls Architecture from RDR...(2)





LLRF Block Diagram from RDR

QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.



LLRF Control Diagram from RDR

QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.



Starting point for R&D Goals

List...

- Meet LLRF goals from R&D Board S2 Task Force
- Gain experience using ATCA + uTCA as a platform for ILC front-end electronics applications
 - **Performance as Instrumentation platform.**
 - **Integration with Control system.**
 - **High Availability features.**
- High Availability integrated control system implementation
 - **Integrated hardware and software environments**
 - **Gain experience with tools & techniques.**
 - **Be able to make value based judgments of cost vs benefit of implementation for different applications.**
- Control System as a tool for implementing HA at system level
 - **Integrated Diagnostic tools to detect and pre-empt impending failures in technical equipment**
 - **Managing redundancy at Technical System level.**



Starting point for R&D Goals list...(2)

- Questions to answer
 - **Is this the right list of R&D goals?**
 - **Are there items missing on R&D goals list?**
- Descriptions of goals should address two contrary views...
 - **Shouldn't make technology decision so early (ATCA)**
 - **Does the Control System really have to be HA?**



Electronic Systems in general...

- There is benefit in making this effort a focal point for low-level electronic systems in general (not just Controls, LLRF)
 - **Significant overlap with other 'electronics' technical groups (PS, HLRF, Instrumentation, ...)**
 - **Common lessons to be learnt, opportunity for testing integrated systems (HA, ATCA,...)**
- Should initiate contact with technical groups...



-- stop here for now --



Starting point for R&D Work Package List

- (Americas Region Team WPs for FY08/09)



To be done between now and Thursday's session

- Assess top-level R&D Goals:
 - **Local groups work on 'starting point' between now and Thursday session: Fermi/Argonne + DESY**
 - **Consolidate at start of Thursday session.**



Agenda for Thursday & Friday...

- Thursday
 - **Summary of Tues Controls session**
 - **Summary of GDE plenary session (what did we learn about EDR)**
 - **Consolidate local groups' work on R&D goals list.**
 - **Meeting wth EDR Task Force representative (4-5pm)**
 - **GAN/GDN discussion proposed for 5pm**

- Friday
 - **HA Control system software discussion**
 - Claude
 - **Begin EDR task list**