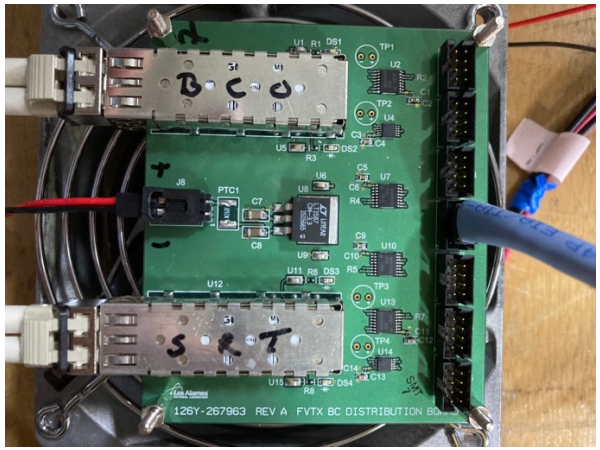
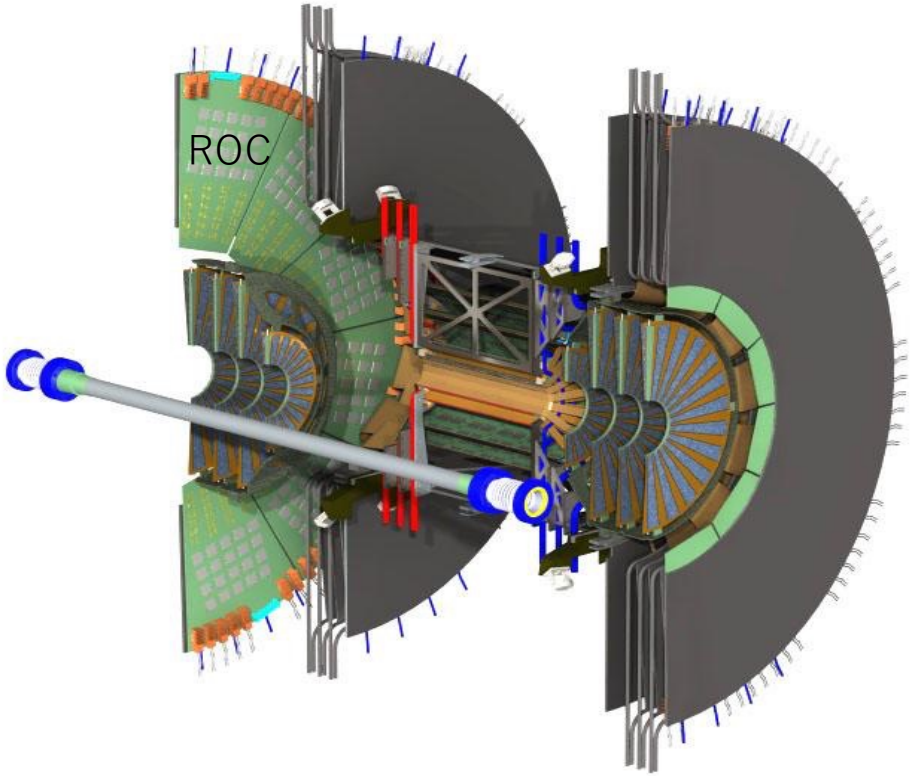
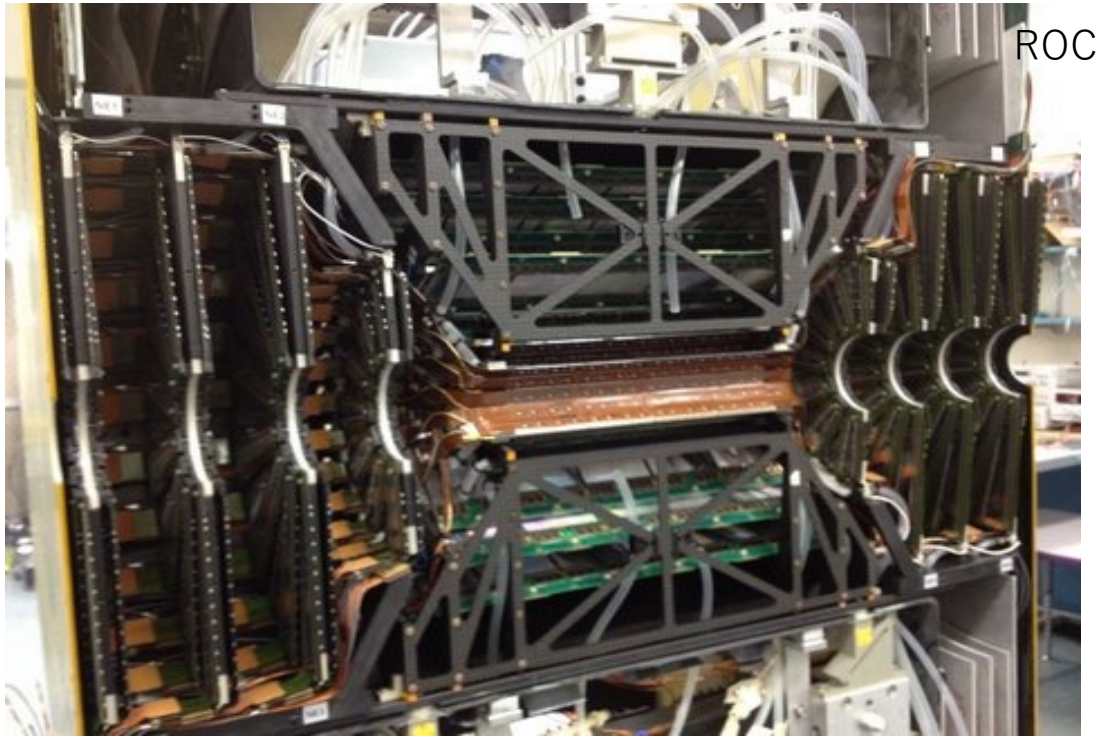
A Proposal for INTT Beam Clock Distribution System

RIKEN/RBRC
Itaru Nakagawa



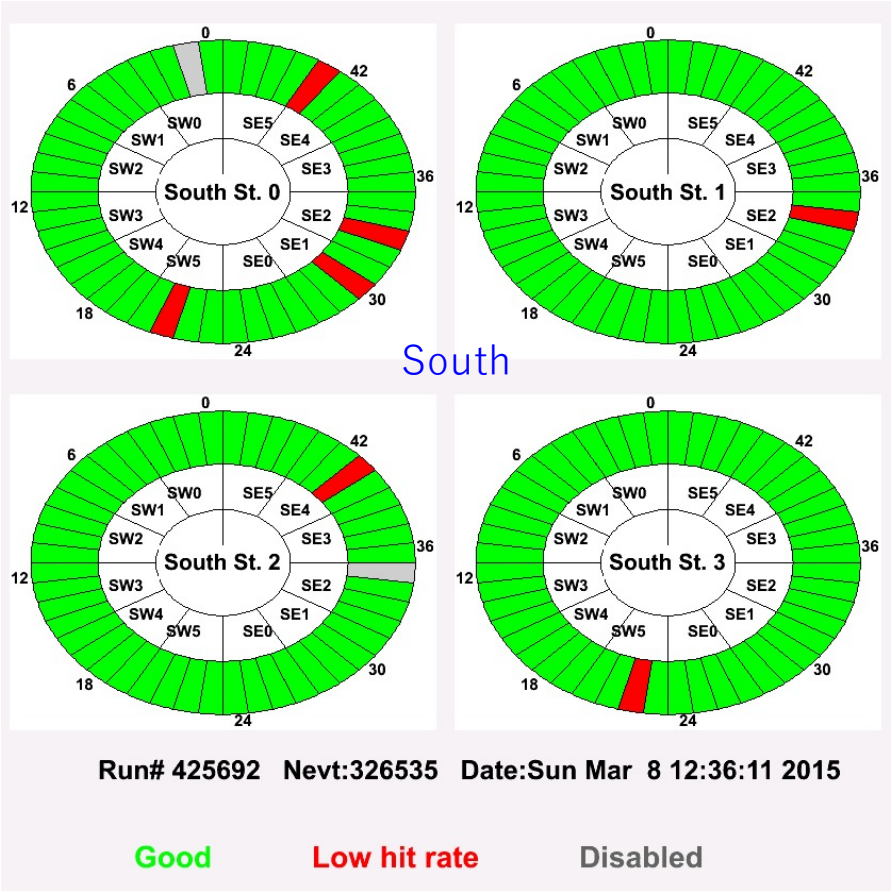




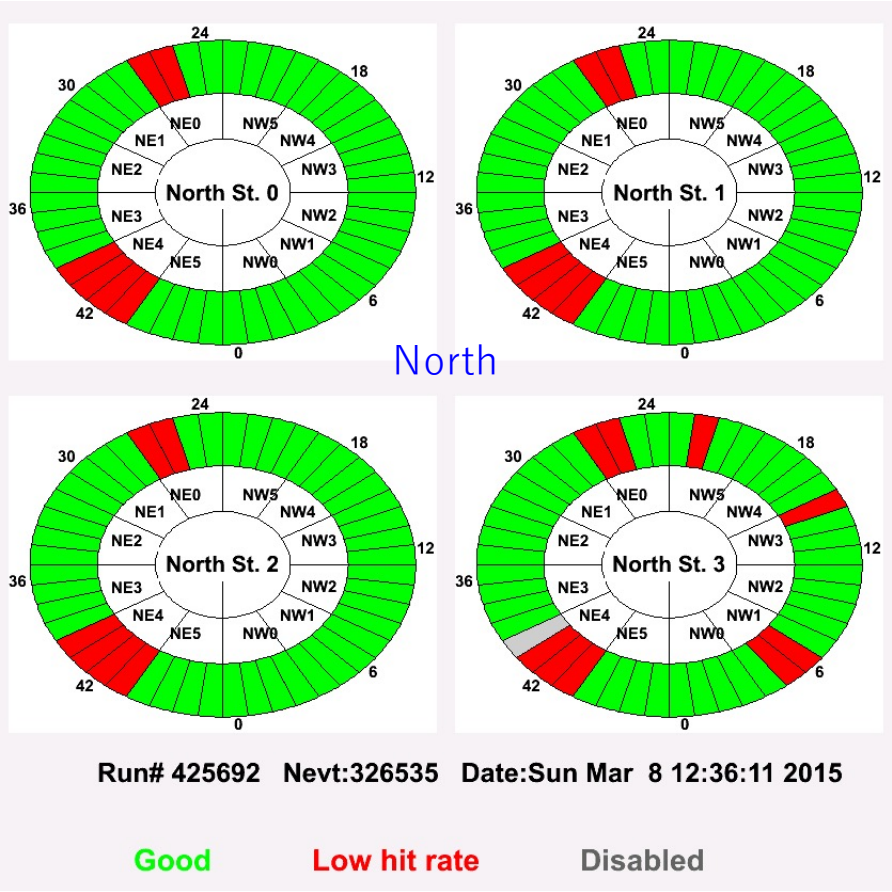
FVTX Packet Drop Issue

FVTX Packet Drop Off Issue

PHENIX Run15 FVTX Online Monitor



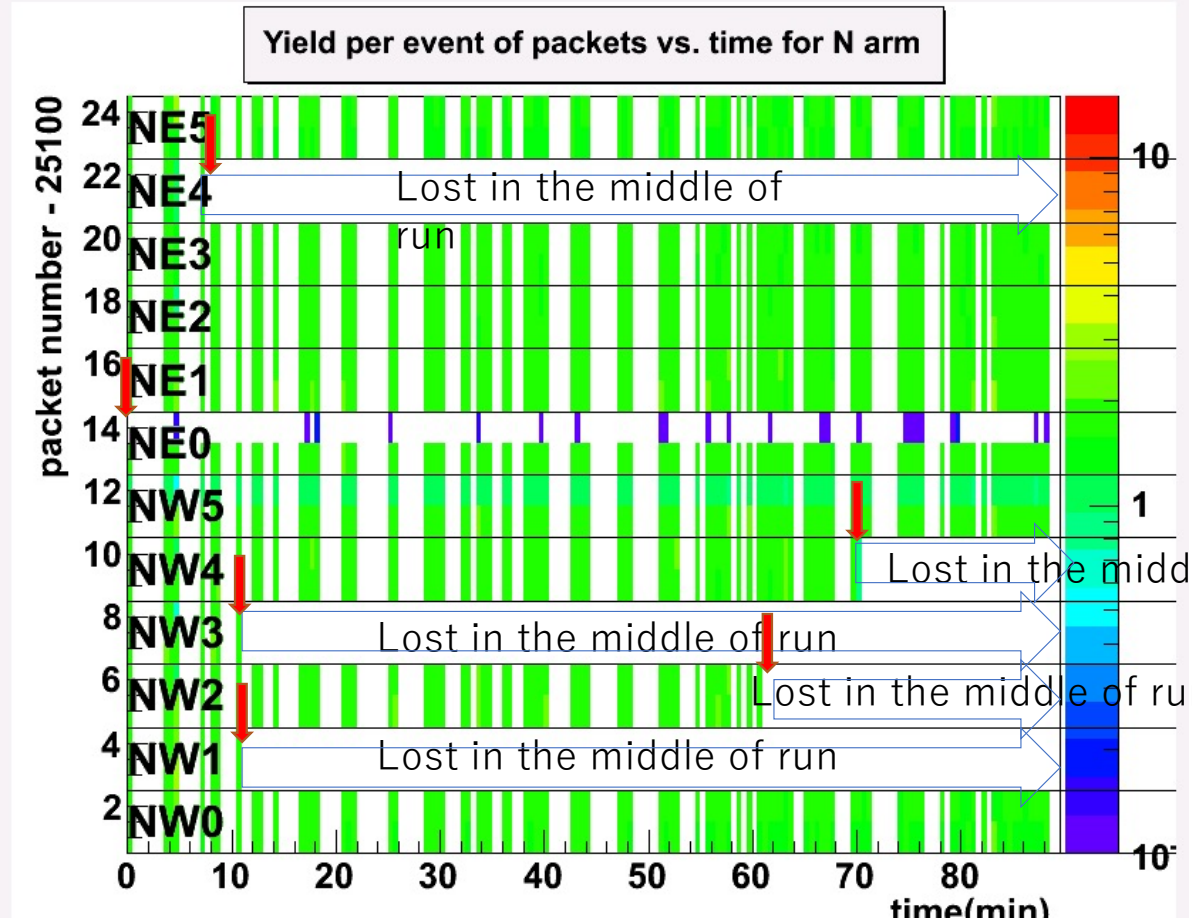
South



North

Non negligible fraction of the acceptance are suffered from ”low rate” issue

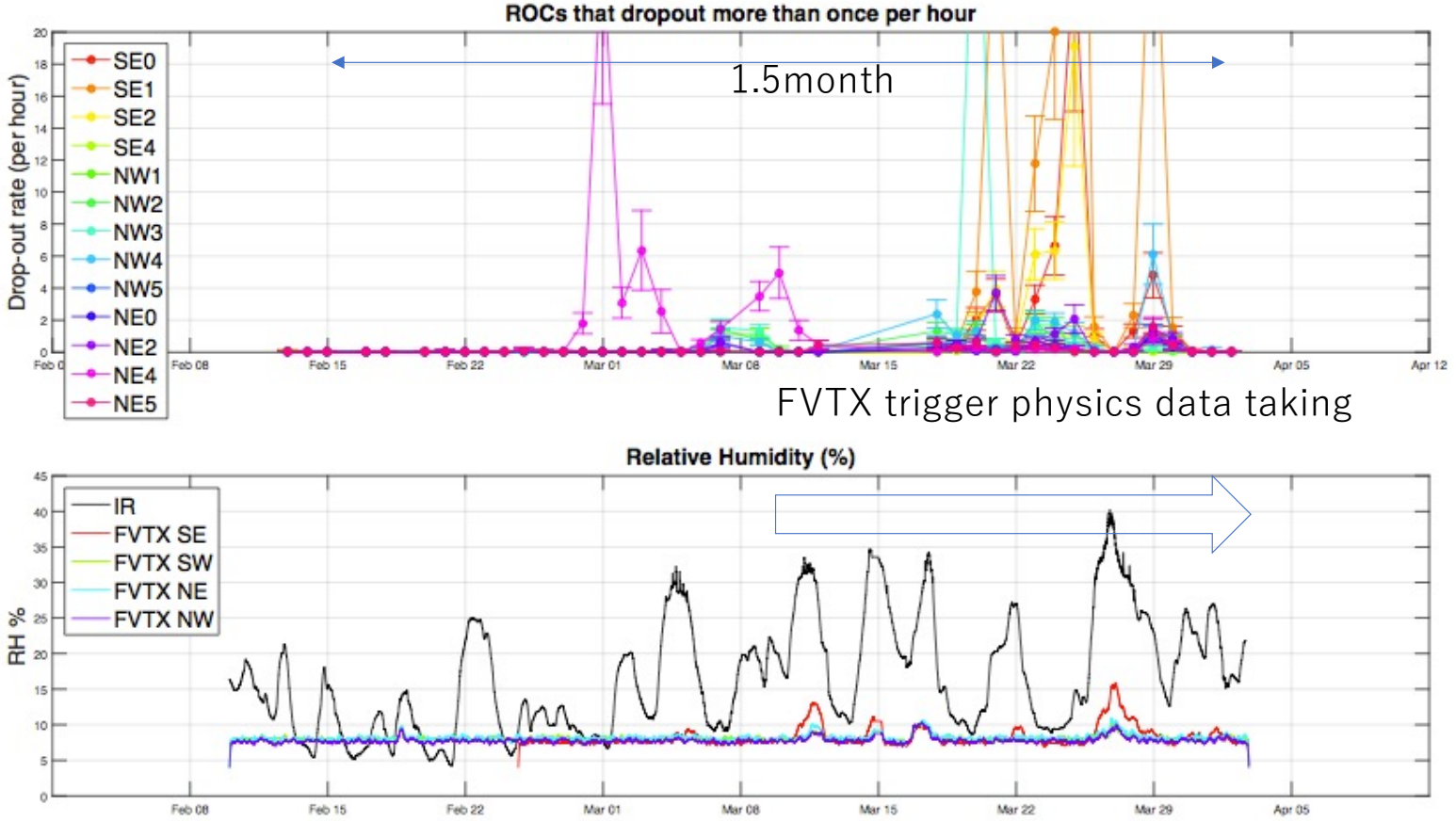
Packet Drop Off History in a give run



PHENIX's typical 1 run ends in 90 minutes.

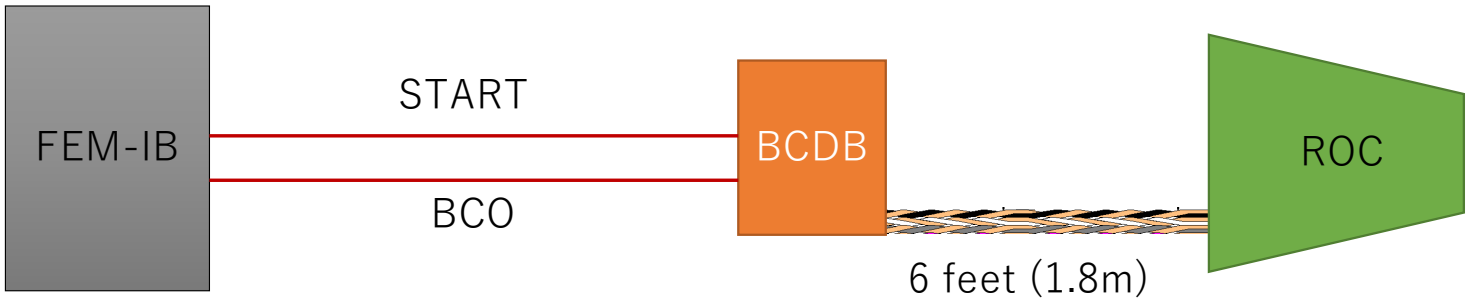
Some packets stops sending data in the middle of run. Once this occurs, the packet won't be recovered until the electronics are reset in the beginning of run routine.

Investigation of packet drop out

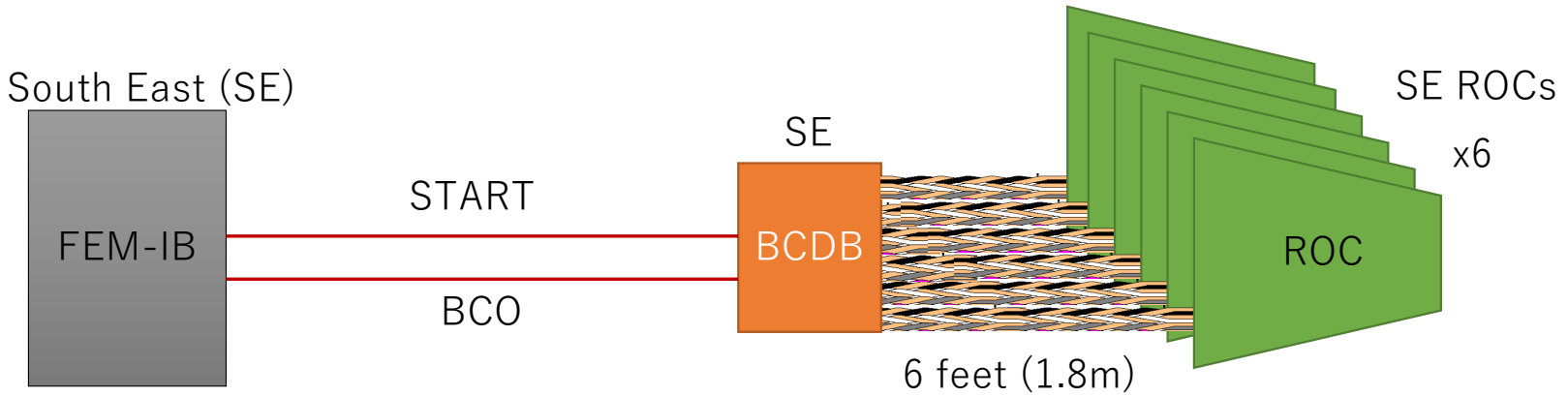


FVTX group tried to correlate with the humidity, but it wasn't too conclusive. They were not able to observe the smoking gun, but their latest understanding of the cause is a glitch in receiving beam clock (BCLK) signals in ROC.

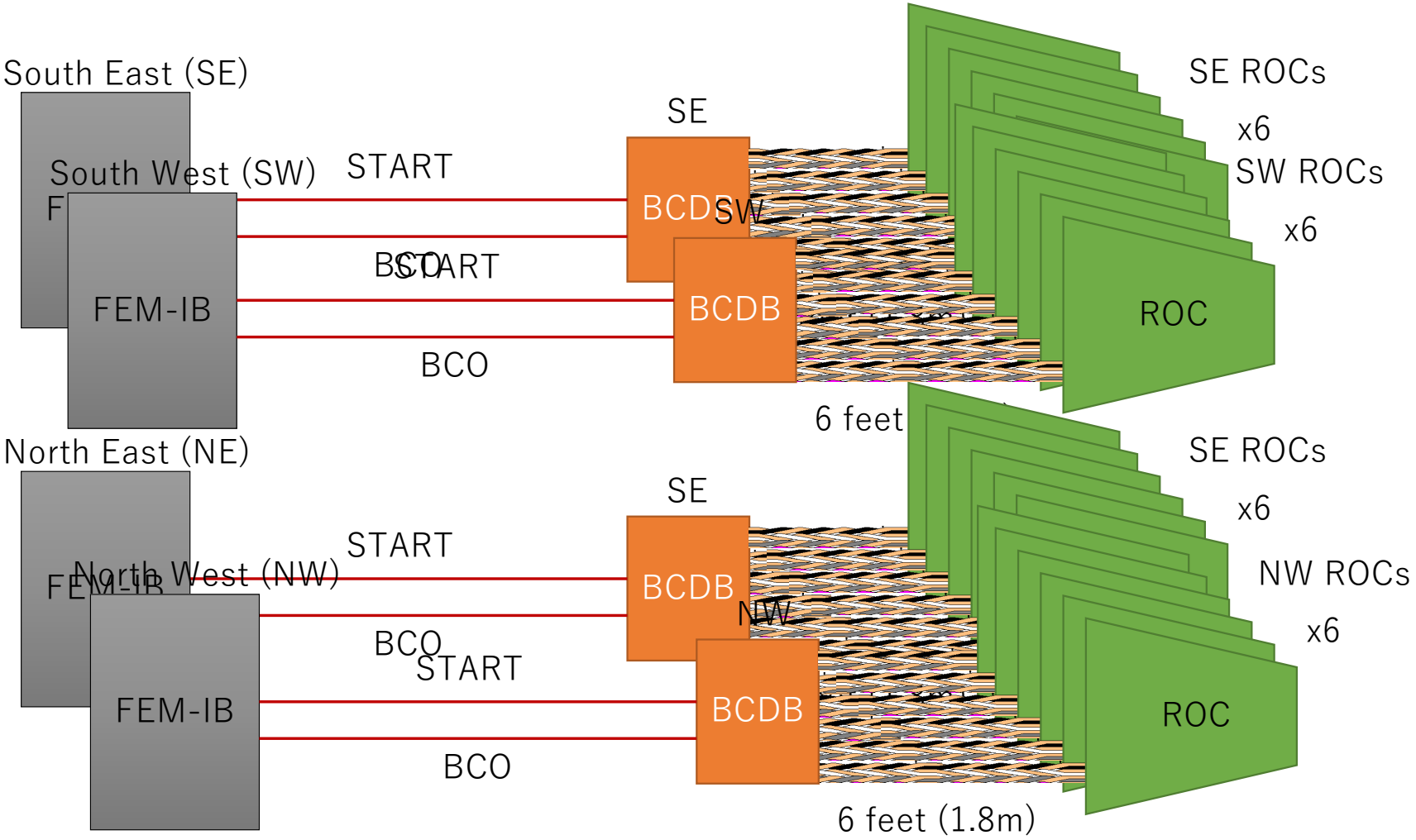
FVTTX Beam Clock Distribution Configuration

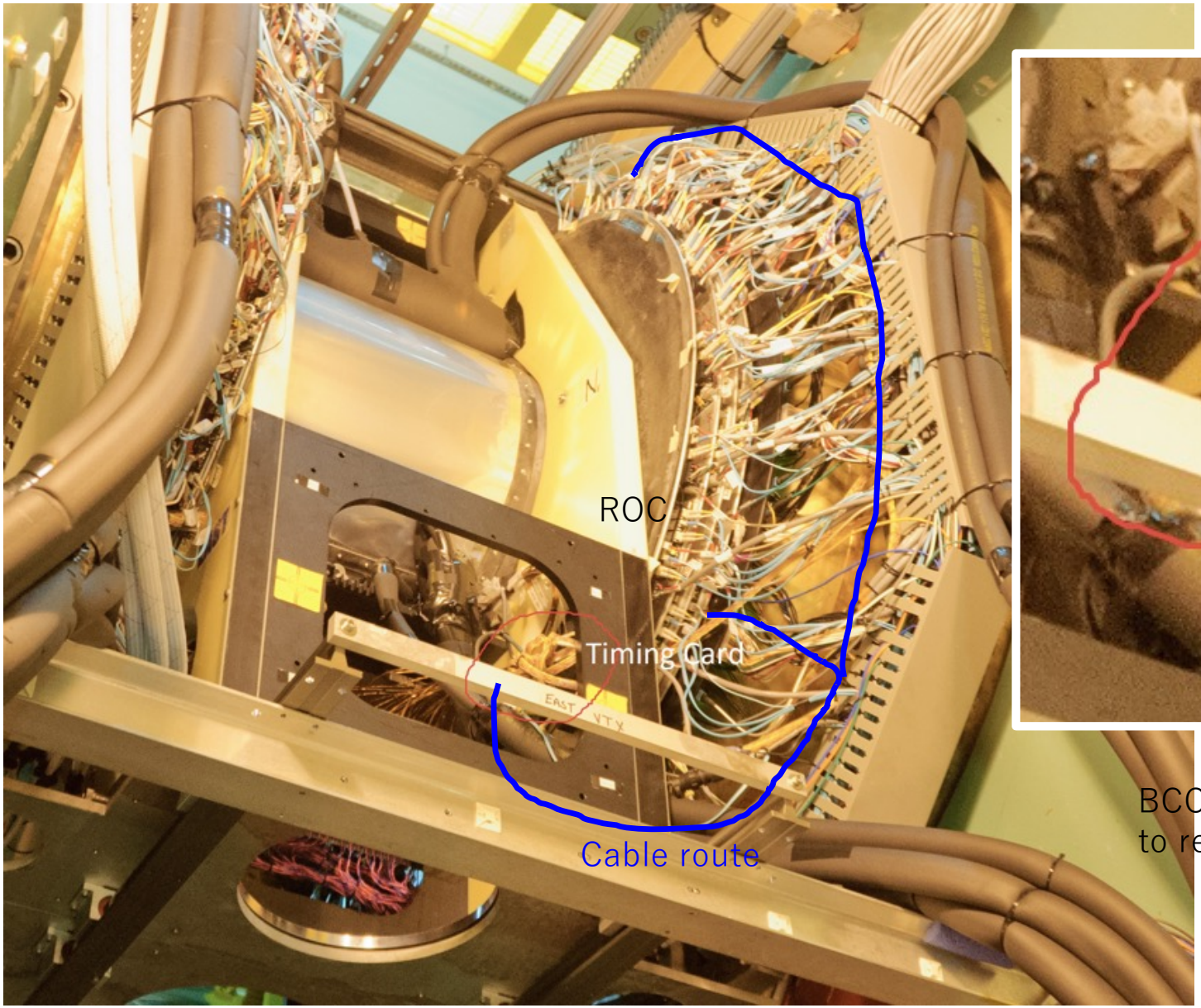


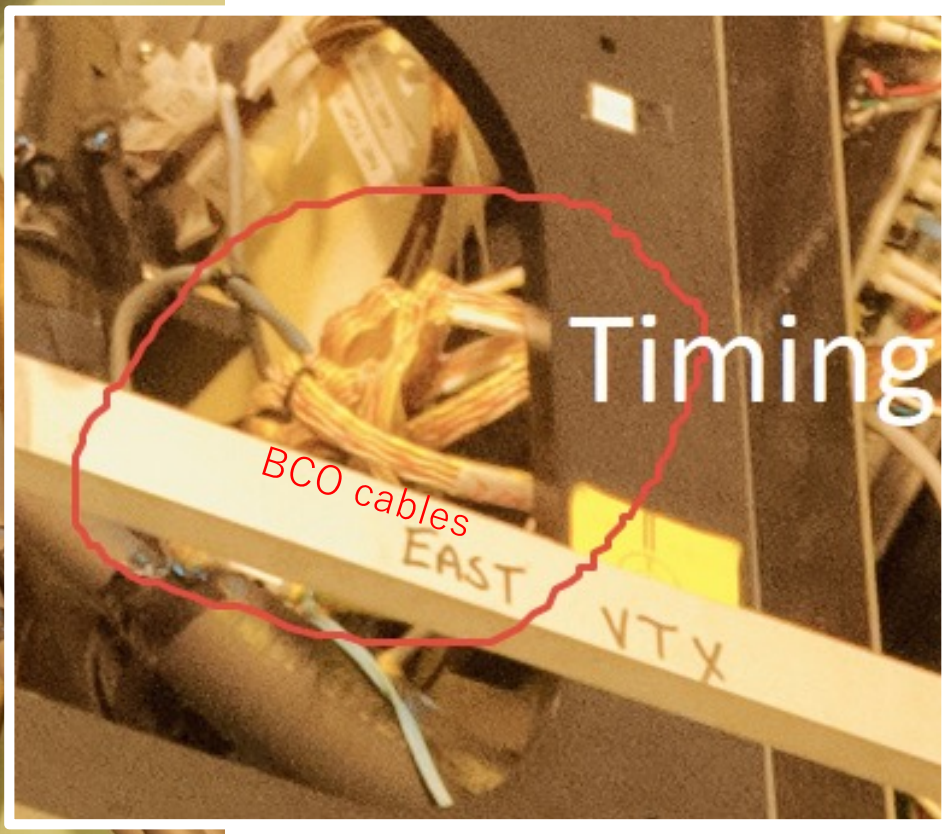
FVTTX Beam Clock Distribution Configuration



FVTTX Beam Clock Distribution Configuration





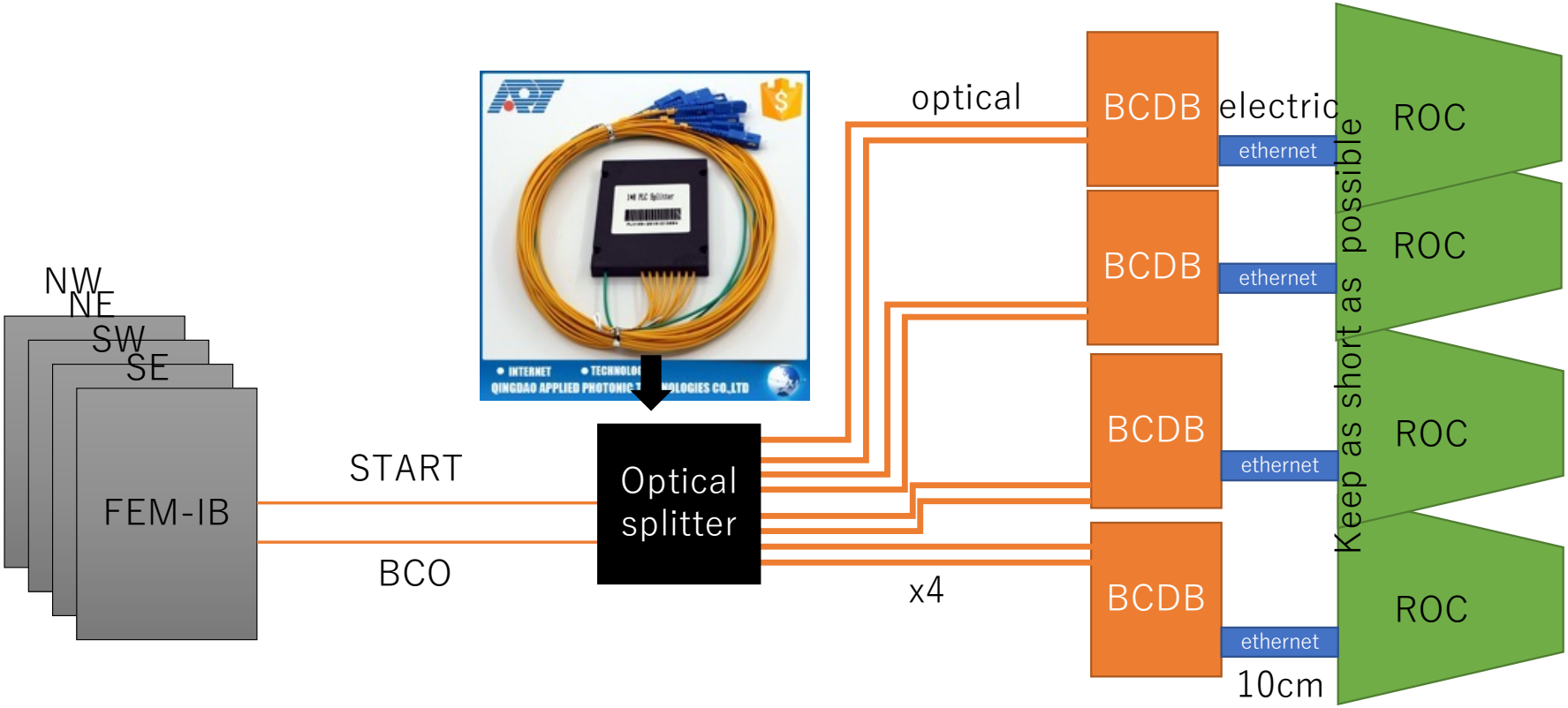


BCO cables ended up with 1.8 *meter* long to reach the ROC board on the far end

Summary for packet drop off issue

- FVTX suffered from the packet drop issue throughout their operation every year.
- May or not may not be correlated with humidity.
- The current suspect is the long and unshielded BCO cable supplied to ROC, but FVTX crews were not able to observe the smoking gun.
- It is highly possible the INTT will be suffered from the same issue if we don't make any action for this since we use exactly the same RO system from FPHX to ROC as FVTX.

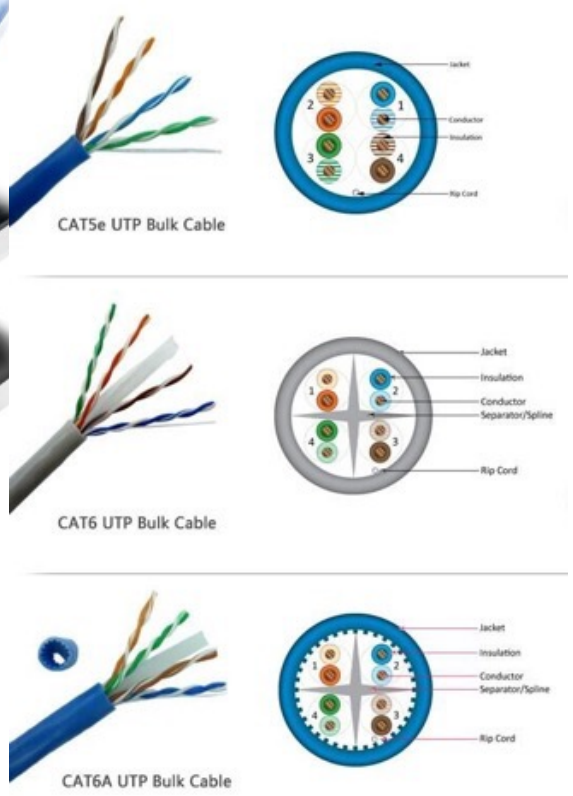
Proposed Beam Clock Distribution Config.

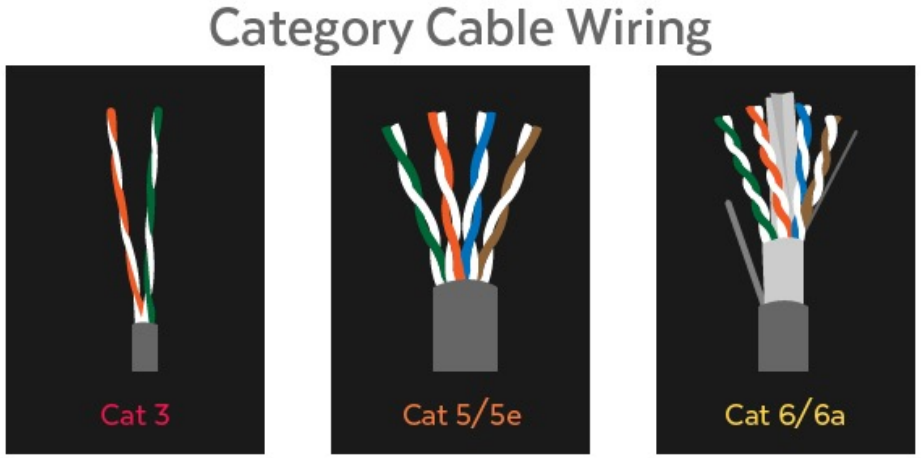


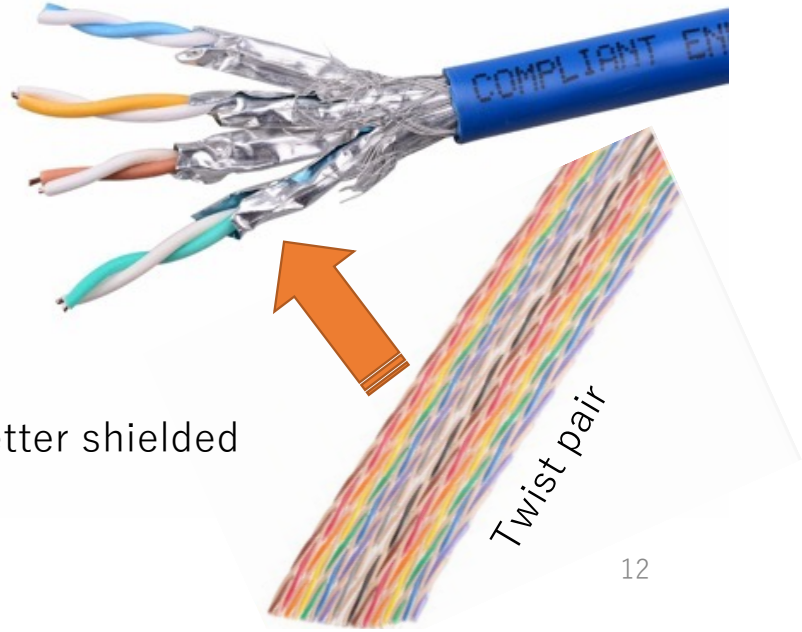
Keep the electric section as short as possible.
Employ high class ethernet cables for the better noise shielding performance

Ethernet Cable Category

Category-8

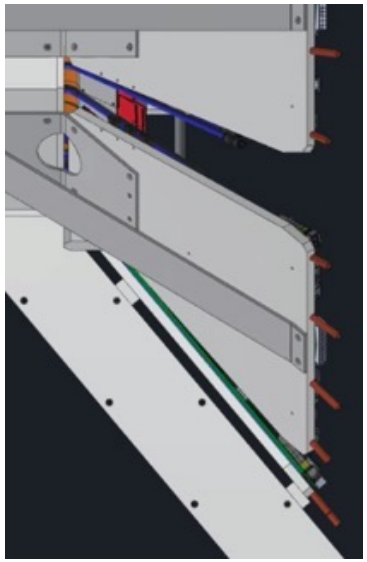




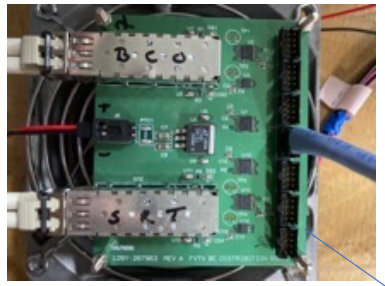


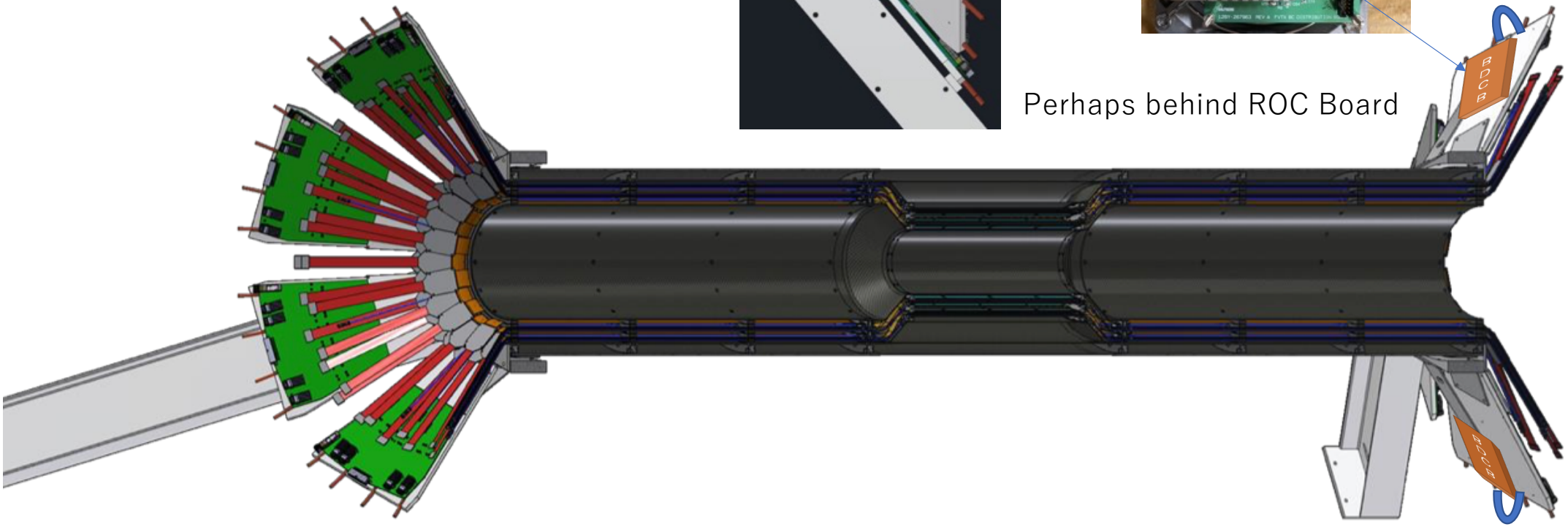
Better shielded

BCDB Location?



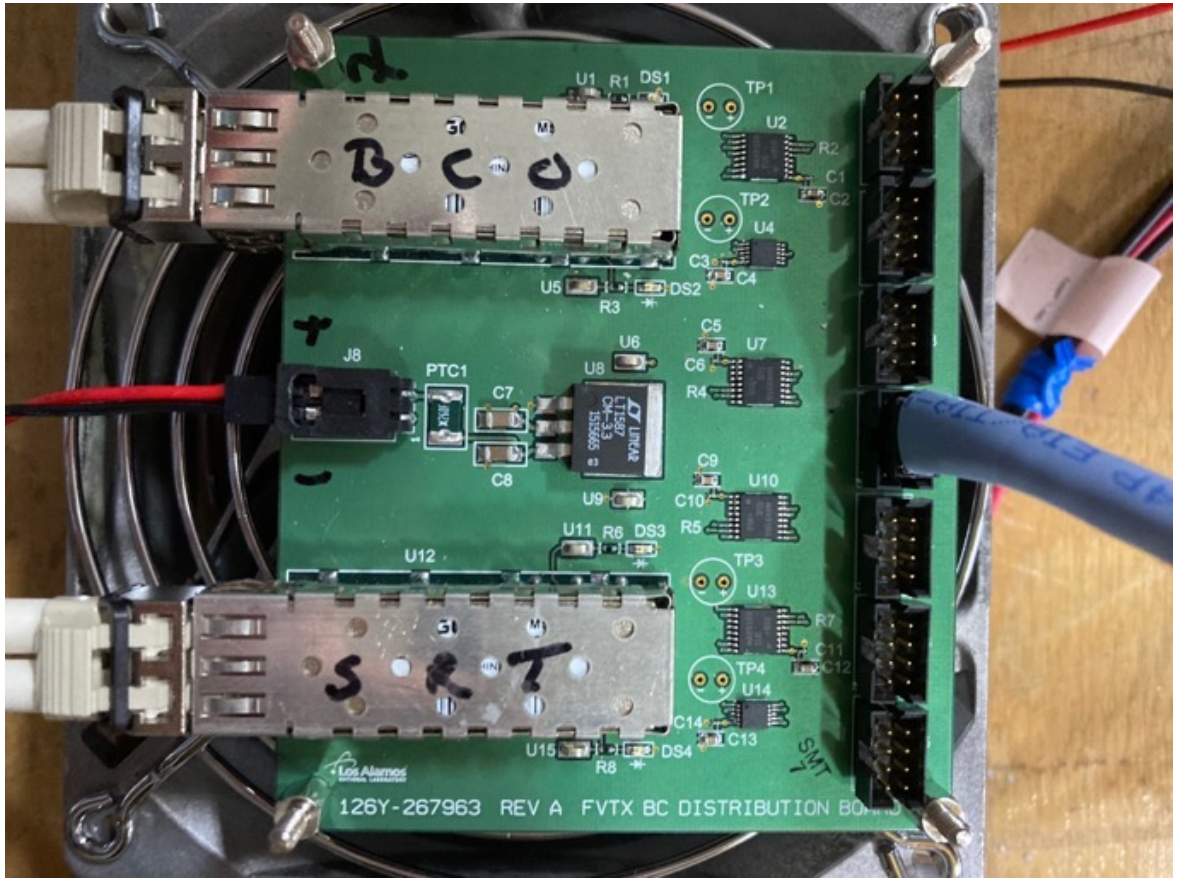
Takashi's Idea





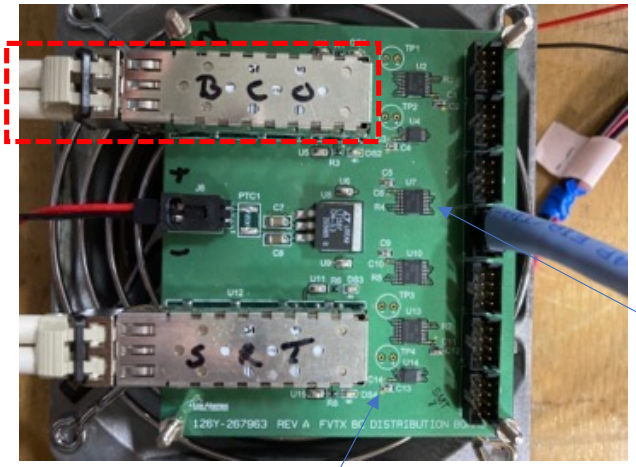
Perhaps behind ROC Board

Beam Clock Distribution Board

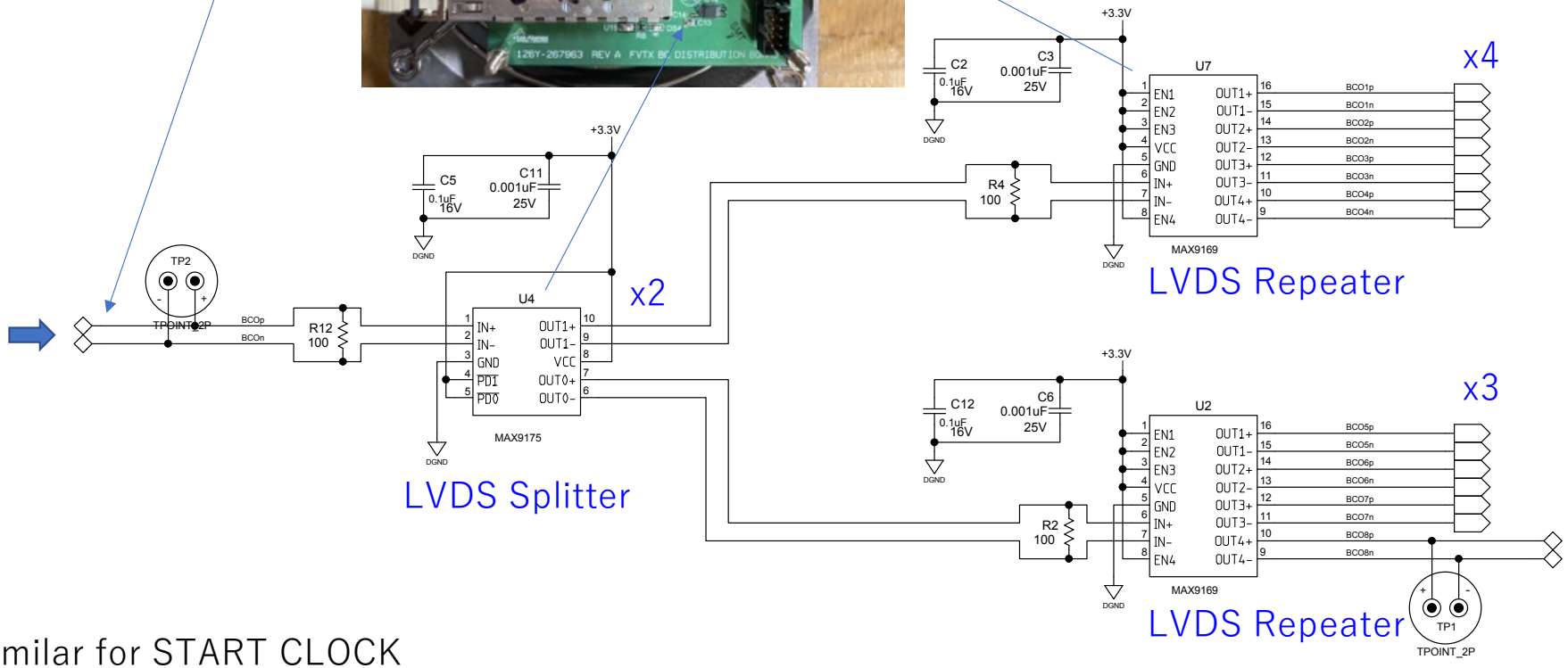


BCLK CABLE FOR REGULAR ROC

BCLB Schematics

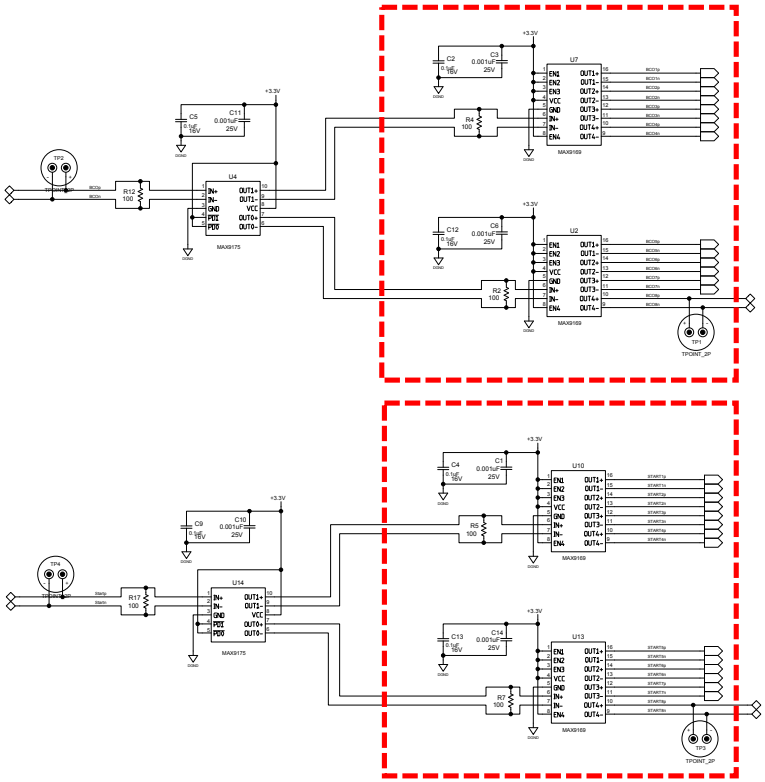


BCO CLCK

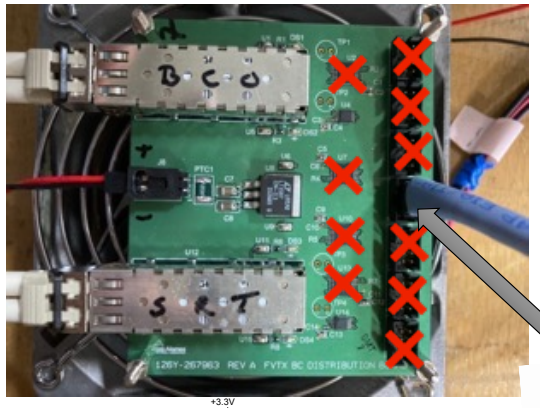


* Similar for START CLOCK

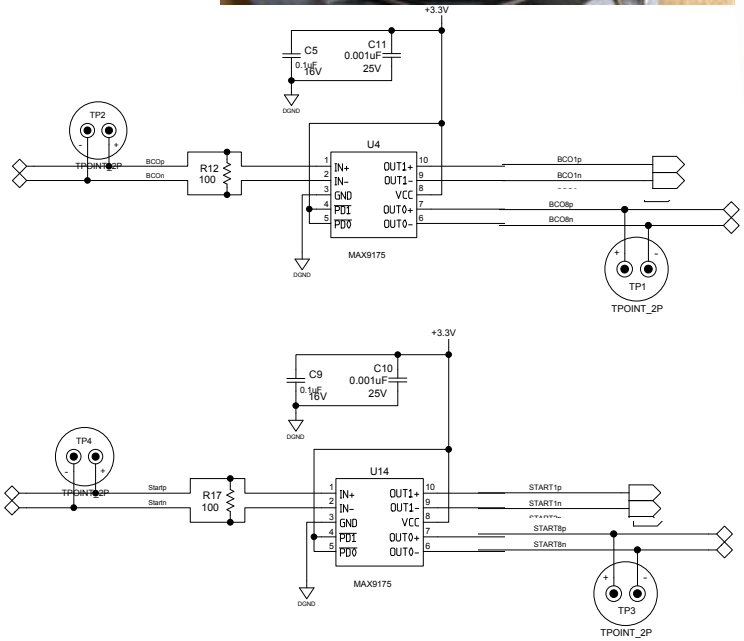
Proposed Modification



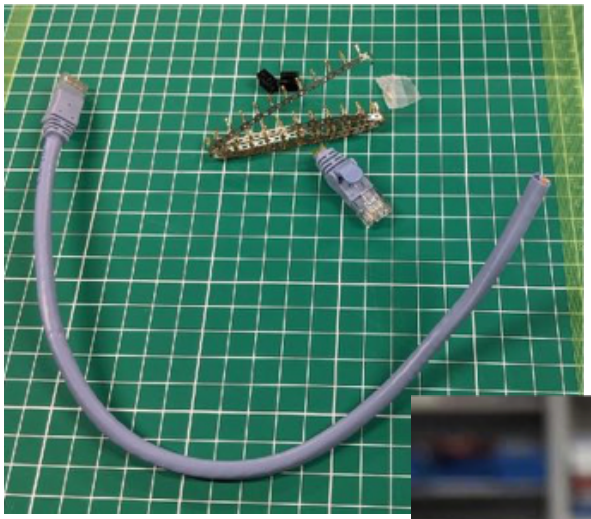
Unnecessary fan outs



Ethernet Connector

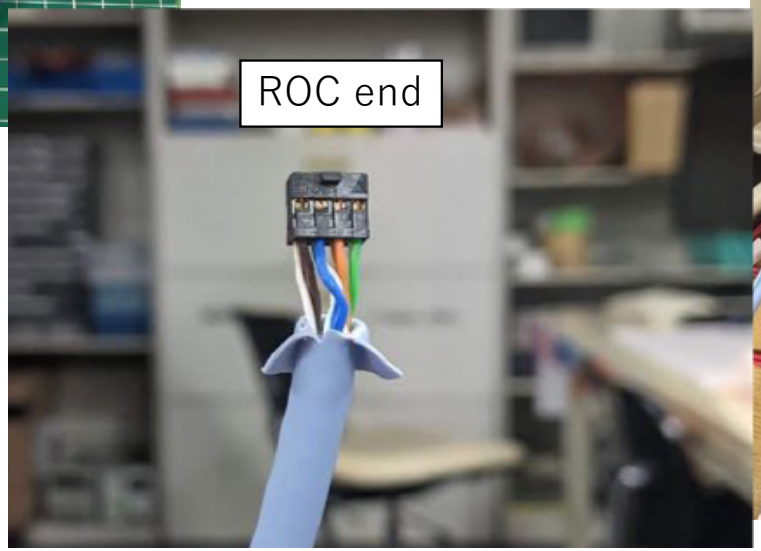


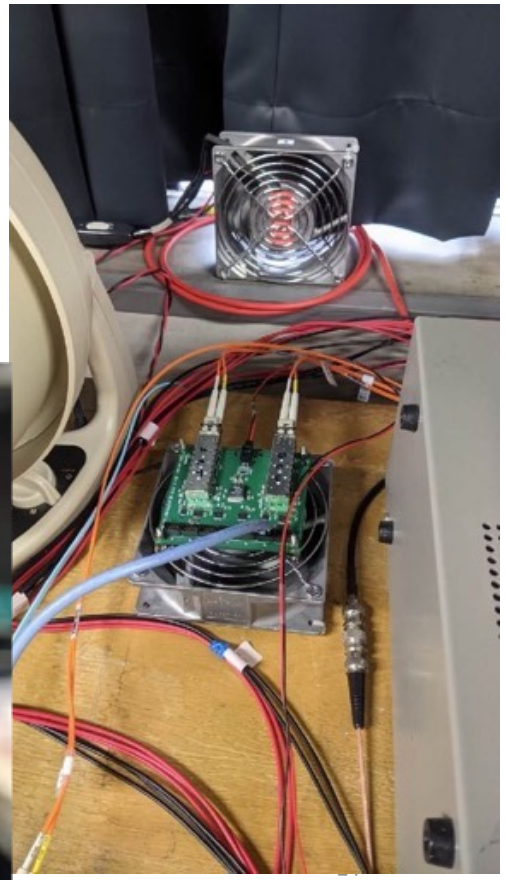
Custom made BCO cable



Courtesy of Genki

No upgrade needed to ROC





Production Cost

- Need 16 BCDBs + Spares ~ 20 BCDBs
- Waiting for a quote from a Japanese Company.

Summary

- As one of the solution for the packet drop off issue, a modification idea to BCLK distribution system is proposed.
- Following the advice from FVTX expert, the electric signal section is to be kept as short as possible ~10cm or so.
- The BCO board is to be thus assigned an independent board per ROC and the optical splitter will be used to deliver input BCO and START signal to each BCO board.
- Employ CAT6 or higher instead of the current twisted pair flat cable.
- Quote is in progress for the independent 20 BCO boards.