

MI States and BPMS

- History and definition of MI States
- How MI States are used in the LLRF system
- IG - User interface to LLRF
- How a BPM system might use states and IG

History and definition of MI States

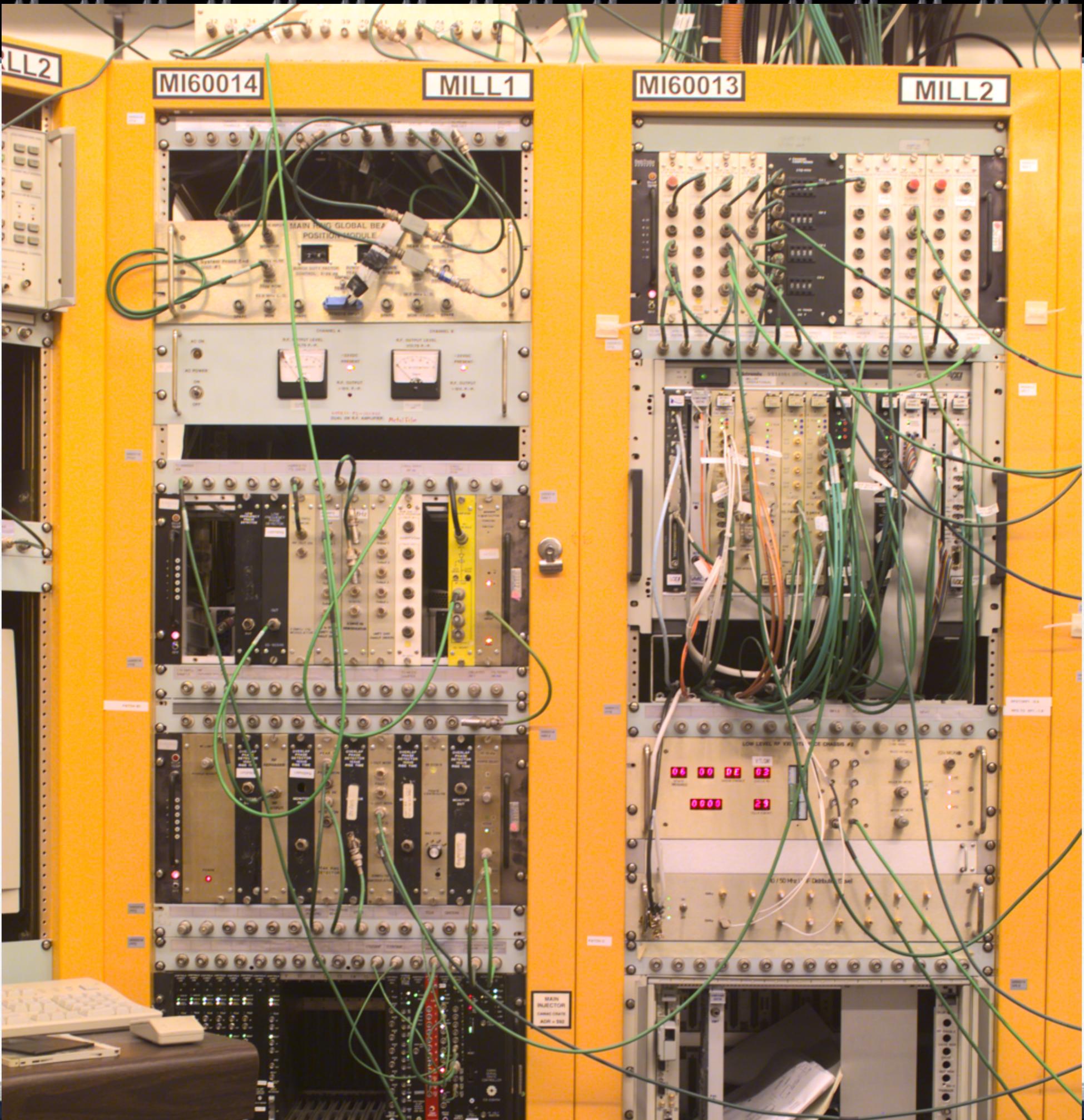
- TCLK provides cycle start time to distributed systems along with Main Injector cycle identification
- RunII needs more than the 8 MI reset events supported by TCLK
- MDAQ was proposed as a vehicle to support additional cycle types. MDAQ is distributed to most of the same locations as TCLK and is synchronous with it
- "Start time" and ramp identification are still provided by TCLK

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MDAT and TLG

- MDAT frame ??, 16 bits, present for 2, 720 Hz periods before and after the MI reset TCLK event
- Support for 2^8 cycle types with 8 concurrent ramp types
- "States" name comes from the devices in the States front end. Not to be confused with states in a state machine definition. States are defined on D88
- The Time Line Generator (TLG) generates the MDAT data concurrent with the TCLK frames

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LL2

MI60014

MILL1

MI60013

MILL2

MAIN RING GLOBAL BEAM POSITION MODULE

CHANNEL A
CHANNEL B

MAIN INJECTOR COMMANDER

MAIN INJECTOR COMMANDER

MAIN INJECTOR COMMANDER

MAIN INJECTOR COMMANDER

LOW LEVEL RF VOLTAGE MONITOR #1

LOW LEVEL RF VOLTAGE MONITOR #1

MAIN INJECTOR COMMANDER



How MI States are Used

- On an "OR" of MI reset events ($T=0$), read the MDAT frame and switch on data
- A MI reset requires a zero difference momentum program across transition
- No history is assumed at a start
- While no "END" of a cycle is clearly defined (a source of trouble), LLRF uses #26 - end of beam for the start of cleanup

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16 - LLRF Primary Application

- 16 is the human interface to MI LLRF
- There is a sequence table and required data associated with each state
- The sequence table is programmable with high level messages, triggered by events or delays
- Beam attributes are defined here; Species, azimuth location, RF structure and other parameters

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PB:I6 LLRF VXI CONTROL

I6 VXI LLRF Novice Mode (most restrictive) 13-JUN-05 10:07:43 Pgm_Tools

SEQUENCE TABLE VIEWER CURVES ARRAYS REQUIRED DATA

Sequence Table View

HrdwrID: [MILLRF] *Send To Hardware *Refresh [Global Warning]
 MI State: [5 pbar stacking with slip stacking + Numi multi-batch] Current state: 5

ROW	TYPE	SIGNAL	MESSAGE	DATUM1	DATUM2	DATUM3	DATUM4
0	Event	AnyReset	EnergyStepToFset	52811400			
1	Continue		XfrSyncBoosterToMI	0	0	-40	
2	Continue		SetPhisFrontEndAtten	36	22		
3	Continue		XfrSyncMItoBooster	483	80	0	
4	Continue		EnergyArmATC	0	3048000		
5	Continue		QscpUpdate	1000			
6	Continue		Scope Trigger 1				
7	Continue		V588Apg(t)Curve	All On		.0014	
8	Delay	0.0330000035	StartSlipStackCurves	6			
9	Continue		SetLogReports	Minimum			
10	Delay	0.0450000465	RFH588StationControl	4 On/14 Off	2	Enable	
11	Continue						
12	Event	BooPInject					
13	Continue		XfrSyncBoosterToMI	24	80	0	
14	Event	BooPInject					
15	Continue		XfrSyncBoosterToMI	122	80	0	
16	Delay	0.1250000000	UpdateSlipReadings				
17	Delay	0.1838850081	SlipStackCoalesce	ENable Qend	-105	72	
18	Continue		RFH588StationControl	All On	1	Enable	
19	Event	BooPInject					
20	Continue		XfrSyncBoosterToMI	208	85	0	
21	Event	BooPInject					
22	Continue		XfrSyncBoosterToMI	294	85	0	
23	Event	BooPInject					
24	Continue		XfrSyncBoosterToMI	380	85	0	
25	Continue	BooPInject					
26	Continue		XfrSyncBoosterToMI	466	85	0	
27	Event	BooPInject					
28	Delay	0.4620000124	EnergyQrpfb	-5	-15000	.08	All DSR
29	Delay	1.1499999762	EnergyQrpfb	-2	-2000	.1	All DSR

Required Data

SEQUENCE : Rece
 SEQUENCE : Requ
 SEQUENCE : Rele
 SEQUENCE : Rece
 SEQUENCE : Requ
 LLRF: initializ
 PGM: Signal hel

BEAM	INJECTOR	TARGET	Qrpfb Curve	LOG Reports	BATCH	V28PGM	h588 Curves
Protons	Booster	Numi	0	Minimum	Full	0	I6 Expert2

States and Instrumentation Control (BPMs)

- Many Time Line modules may share the same time line and the same TCLK reset events. TCLK based BPM control will break
- 16 could (if done carefully!) could provide the BPM systems with needed information about the beam. A single setting location
- An 16-like interface to the BPMs would present an understood and versatile interface