



# Database involvement in Timing

*Ronny Billen*



Accelerators and Beams Department  
Controls Group  
Data Management Section

Timing Review – 29 February 2008

## Some timing stuff already covered by DM

- ★ Controls Configuration data for PLS<sup>◇</sup> i.e. the original implemented concepts, currently in the database
- ★ **PLS Configurations** for {PLS-machine, TGM<sup>◇</sup>-network}
  - ⇒ PLS-machine: CPS, PSB, SPS, LHC,...
  - ⇒ TGM-networks: LIC<sup>◇</sup>, CTF, LHC
  - ⇒ Configuration data: coupling, transmission, injector/client
- ★ **PLS Groups** for each PLS Configuration
  - ⇒ PLS Group: PARTY, CYCLE, USER, DEST,...
  - ⇒ Group meta-data: type, min/max values, size, treatment
- ★ **PLS Lines** for each PLS Group
  - ⇒ PLS Line: e.g. NOBEAM, PROTON, PB58 for PARTY
- ★ This is *meta-data*, definitions, for **timing telegrams**
- ★ PLS data model re-factored in 2007 with AB-CO-HT

Extra information  
what is being  
played, historically  
distributed by the  
timing system

PLS - Program Line Sequencer  
TGM - anagram of MTG  
LIC - LHC Injector Chain



# PLS Configuration Browser



CONTROLS CONFIGURATION DATABASE

[Home](#) [News](#) [History Log](#) [Data Browser](#) [Data Editor](#) [Print](#)

[DATA BROWSER HOME](#) [DEVICES](#) [DEVICE CLASSES](#) [HARDWARE](#) [CONSOLE](#) **TIMING** [ALARMS](#) [LIBRARIES](#) [RBAC BROWSER](#)

PLS Telegrams **Timing Classes**

■ PLS Configuration | [Telegram Groups](#) | [Telegram Lines](#)

Pls Machine

TGM Network

*Publicly available!*

## PLS Configuration

1 - 1

Coupling	Prio	Operation	Variation	Transmission	Parameter	Comments	List Inject	List Client	Groups	Lines	PPM group
STRONG	30	Y	N	EVERY_CYCLE	-P 5011	BOOSTER machine	-	CPS	<a href="#">groups</a>	<a href="#">lines</a>	USER

## Telegram Groups

Ppm Group USER

1 - 30

Seq	Group	P/N	Type	Size	Min	Max	Default	Treatment	Description
1	USER	P	EXCLUSIVE	24	1	24	24	OPERATOR	User of the PSB beam
2	PARTY	P	EXCLUSIVE	8	1	4	1	OPERATOR	Partical type
3	DEST	P	EXCLUSIVE	8	1	4	2	AUTO	PSB beam destination
4	LIN2D	P	EXCLUSIVE	8	1	2	1	OPTION	Linac II destination
5	BATCH	P	VALUE	16	0	16	0	AUTO	SPS batch for LHC filling
6	MISC	P	BITPATTERN	16	0	1	0	OPERATOR	Misceleanous lines

## Group lines

Seq	Group	P/N	Type	Size	Min	Max	Default	Treatment	Lineno	Name	Description
1	USER	P	EXCLUSIVE	24	1	24	24	OPERATOR	1	AD	Anti-proton decelerator
									2	NORMGPS	ISOLDE standard beam General Purpose Spectrometer
									3	NORMHRS	ISOLDE High Resolution Spectrometer
									4	LHC25B	LHC 25ns nominal physics beam

R. Billen



# PLS Configuration Editor



Controls Configuration Editor

rbillen applications:  Go

[Logout](#) [Help](#)

[Portal](#) [News](#) [History Log](#) [Data Browser](#) [CC Editor](#)

## CCE Timing Application

[Home](#) [PLS](#) [Power Cycles](#)

[PLS Machines](#) | [TGM Networks](#) | [PLS Configurations](#)

### Information

No messages currently.

[Search PLS Configurations](#)

### PLS Configurations

[Create](#) [Duplicate](#) [Deep Clone](#) to:  [Delete](#) [Commit](#) [Rollback](#)

Select	Machine	Network name	Coupling	Priority	Oper.	Var.	Transmission	Parameters	Description	Injectors	Clients	ID
<input checked="" type="radio"/>	PSB	RUN07.LIC	Strong	30	Yes	No	Every Cycle	-P 5011	BOOSTER machine		CPS	111

### Groups

[Create](#) [Duplicate](#) [Deep Clone](#) [Delete](#) [Commit](#) [Rollback](#) PPM Group  [Previous](#) 1-5 of 26 [Next 5](#)

Select	Group	Type	Size	Min	Max	Def.	Treatment	Chang.	Description	Add
<input checked="" type="radio"/>	USER	EXCLUSIVE	24	1	24	24	OPERATOR	No	User of the PSB beam	<a href="#">Add</a>
<input type="radio"/>	SPCON	BITPATTERN	16	0	65535	0	RUNTIME	No	Specific conditions	<a href="#">Add</a>
<input type="radio"/>	SEQID	VALUE	16	0	65535	0	AUTO	No	Identification of a sequence	<a href="#">Add</a>
<input type="radio"/>	SCTAG	VALUE	16	0	65535	0	RUNTIME	No	Super-Cycle Instance Tag and Level	<a href="#">Add</a>
<input type="radio"/>	SCNUM	VALUE	16	0	65535	0	RUNTIME	No	Super cycle number incremented each s	<a href="#">Add</a>

### Telegram

[Delete](#) [Previous](#) 1-5 of 30 [Next 5](#)

Select	No.	Group	Pres./Next
<input checked="" type="radio"/>	1	USER	Present
<input type="radio"/>	2	PARTY	Present
<input type="radio"/>	3	DEST	Present
<input type="radio"/>	4	LIN2D	Present
<input type="radio"/>	5	BATCH	Present

[Hide Group Lines](#)

### Group Lines

[Create](#) [Duplicate](#) [Delete](#) [Commit](#) [Rollback](#) [Previous](#) 1-5 of 24 [Next 5](#)

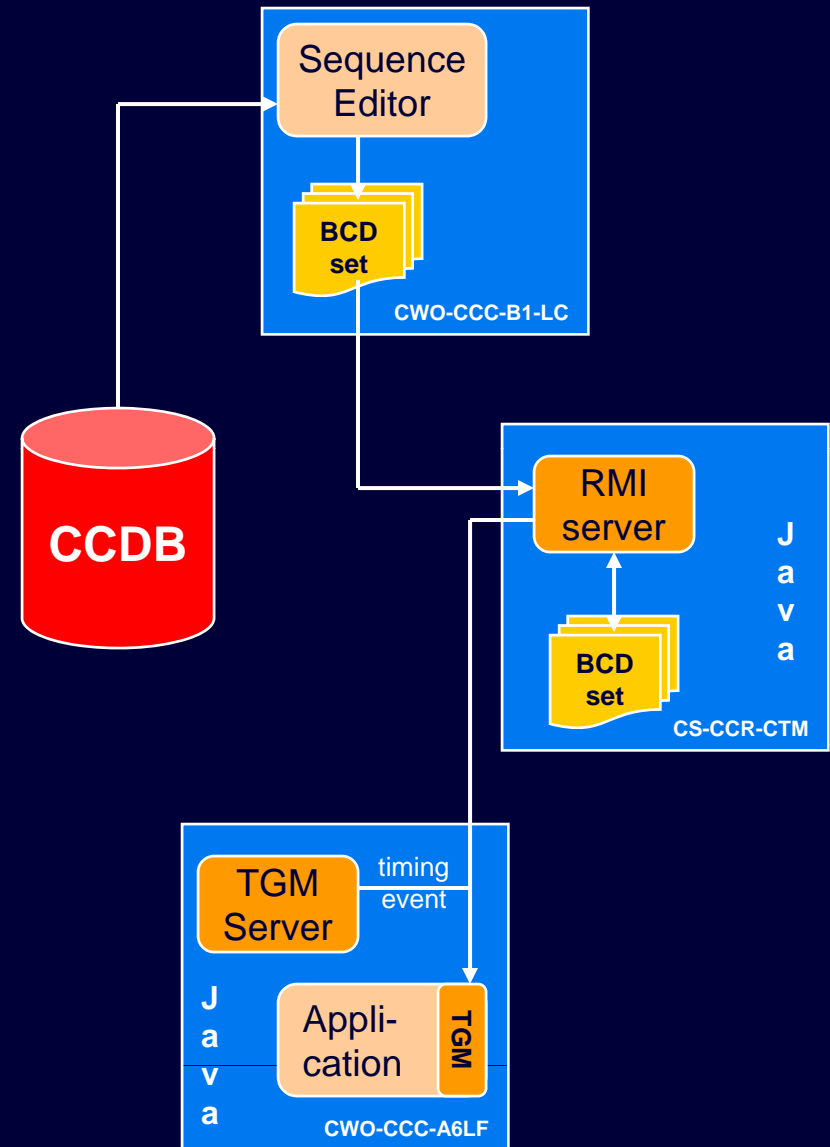
Select	Line no.	Line name	Description
<input checked="" type="radio"/>	1	AD	Anti-proton decelerator
<input type="radio"/>	2	NORMGPS	ISOLDE standard beam General Purpose Spectrometer
<input type="radio"/>	3	NORMHRS	ISOLDE High Resolution Spectrometer
<input type="radio"/>	4	LHC25B	LHC 25ns nominal physics beam
<input type="radio"/>	5	EASTA	East hall area-A

*Expert use only!*

R. Billen

# The current real-time telegram information

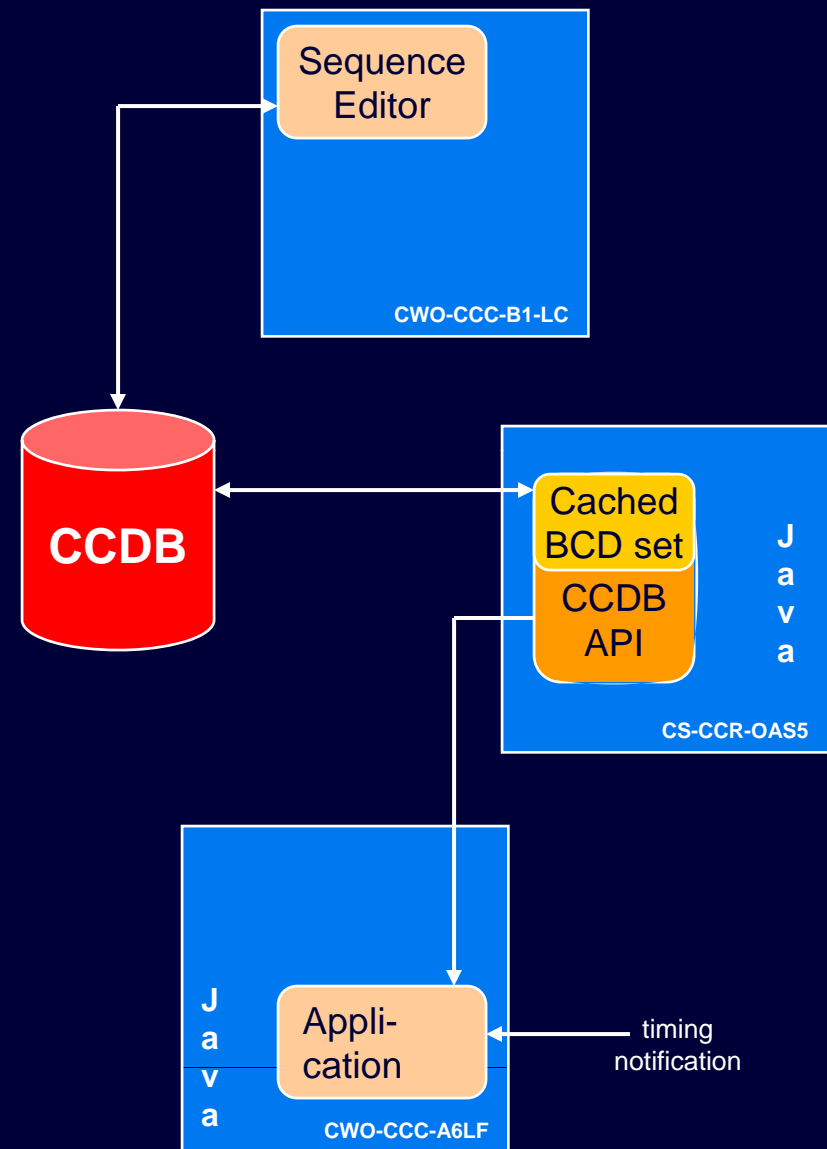
- ★ Preparation of BCD<sup>?</sup> with Sequence Editor, by CCC operator, based on the existing meta-data
  - ★ Resulting telegrams are stored in serialized Java objects over RMI<sup>?</sup> on the CBCM<sup>?</sup> server CS-CCR-CTM
  - ★ Java applications running on workstations can get the actual (and historic) BCD data via the included TGM library
  - ★ Current BCD data is re-actualized by the Java TGM-server, triggered by timing events, on the concerned workstation
- ✓ This will continue to exist during 2008



BCD - Beam Coordination Diagram  
 RMI - Remote Method Invocation  
 CBCM - Central Beam and Cycle manager

# Proposed evolution of the real-time information

- ★ The data in the BCD set are the *currently playing* objects of those already in the CCDB
- ★ Extend the database model to hold this data for *semi-on-line* usage
- ★ Three-tier architecture where **cached data** on an Application Server is available on-line
- ★ Application gets **notified** on BCD set change, **fetches** the new data *only* when necessary
- ★ Data communication via **API**
- ☞ This approach is quite *different* than the standard **publish-and-subscribe** in our Java environment
- ☞ **Availability** requirements are pushed to the database and application server







## Requirements to be satisfied

- ★ Sequence editing is not *actively deployed* until explicitly *confirmed* in the database and available for *propagation*
- ★ Every time a BCD is deployed, it is tagged as a new *version*
- ★ Possibility to retrieve *preceding versions* of the BCD by the applications
- ★ The API to the CCDB, provided by AB/CO/DM will be the *only interface* for most applications
  - ⇒ Applications will not depend on the TGM package any more
  - ⇒ AB/CO/HT expert applications may continue using it
- ★ This API covers a sub-domain of the future 3-tier deployed **Java Directory Services**
- ★ **Availability, performance, scalability, reliability** to be ensured
  - ⇒ Depending on correct API usage by the client applications
  - ⇒ Not to forget scheduled interventions e.g. security patches



## Work to do

### ★ AB/CO/DM

- ⇒ Capture detailed requirements and functionality from timing experts
- ⇒ Extend current CCDB PLS schema
- ⇒ Develop Java API with appropriate methods
- ⇒ Deploy API (on dedicated application server)
- ⇒ Adapt PLS data browser, possibly data editor

### ★ AB/CO/HT

- ⇒ Provide domain knowledge
- ⇒ Test, feedback, iterate

### ★ Workload - timeline

- ⇒ Always more work than originally estimated
- ⇒ Milestones to be proposed by the client
- ⇒ Implementation of new ideas will inevitably require more study