



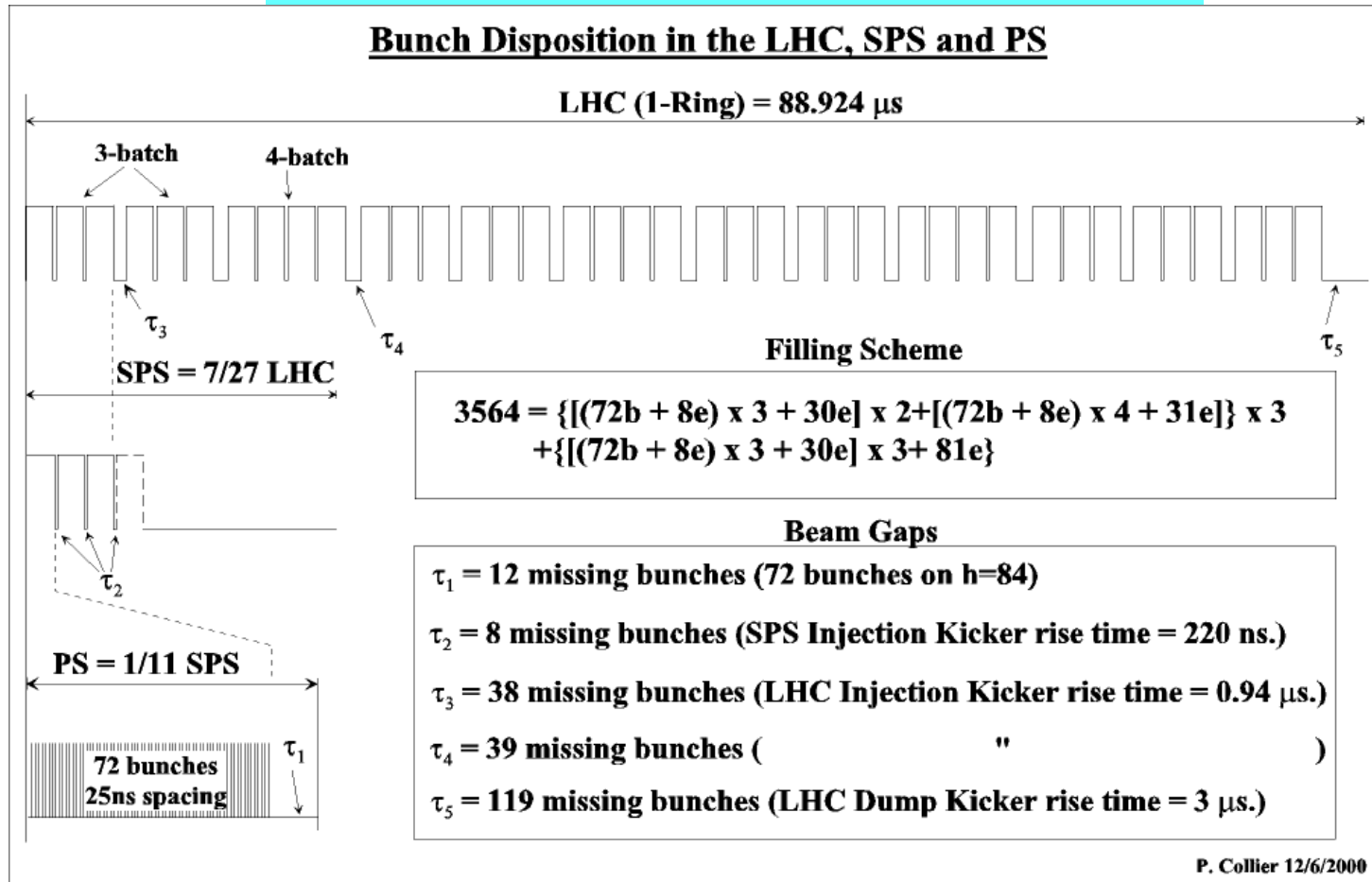
# TIMING, TRIGGER and CONTROL WORKSHOP

Friday, 29 June 2001

## TTC in SL Division

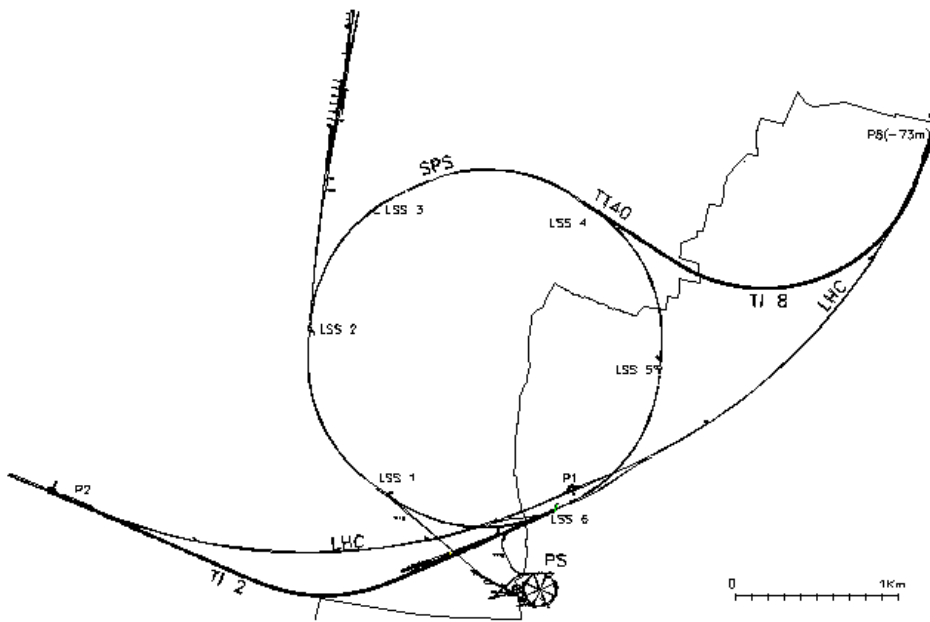
- System overview
- Topology
- Component requirements
- Planning

# • System overview



The LHC filling time will be 4.3min per ring (SPS supercycle 21.6s with 4 PS cycles of 3.6s).

- System overview



Injectors & Transfer lines



LHC rings

# • System overview

## 3 BST Systems are required

- 1 for SPS & transfer lines

Bunch Clock :  $40 \text{ MHz} = 200 \text{ MHz} / 5$

Turn Clock :  $44 \text{ KHz} = 200 \text{ MHz} / 924$

> THE 40 MHz WILL VARY DURING THE ACCELERATION ( Proton):  
from 40.05300 MHz at 26 GeV to 40.07888 MHz at 450 GeV. (+ 26 KHz)

- 1 for each LHC Ring: Ring 1 & Ring 2

Injection: Bunch Clock :  $40 \text{ MHz} = 200 \text{ MHz} / 5$

Turn Clock :  $11 \text{ KHz} = 200 \text{ MHz} / 17820$

Ramping : Bunch Clock :  $40 \text{ MHz} = 400 \text{ MHz} / 10$

& Collision Turn Clock :  $11 \text{ KHz} = 400 \text{ MHz} / 35640$

> THE 40 MHz WILL VARY DURING THE ACCELERATION ( Proton):  
from 40.07888 MHz at 450 GeV. to 40.0790 at 7 TeV (+ 120 Hz)

> The 2 RF signals will not be phase locked during injection phase or MDs








KEY

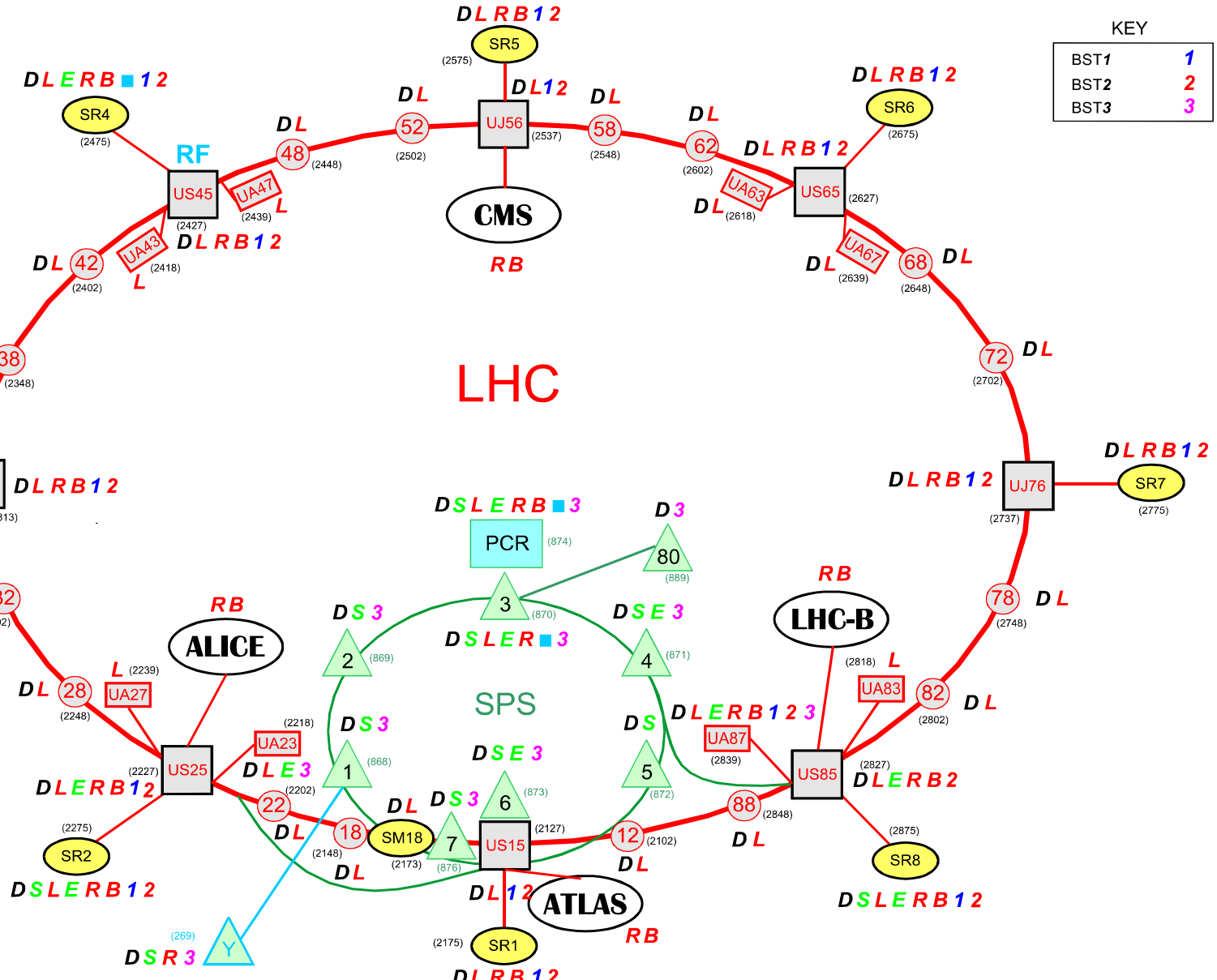
Date	<b>D</b>
1mS SPS Events	<b>S</b>
1mS LHC Events	<b>L</b>
SPS Fast Extraction	<b>E</b>
11.2 Khz LHC REV	<b>R</b>
40.08 Mhz LHC Bunch	<b>B</b>
10 Mhz	<b>■</b>

KEY

BST1	<b>1</b>
BST2	<b>2</b>
BST3	<b>3</b>

LOCATION

	PS BUILDING
	LHC SURFACE
	LHC PIT
	LHC ALCOVE
	LHC GALLERY
	SPS SURFACE
	CONTROL ROOM



29 June 2001

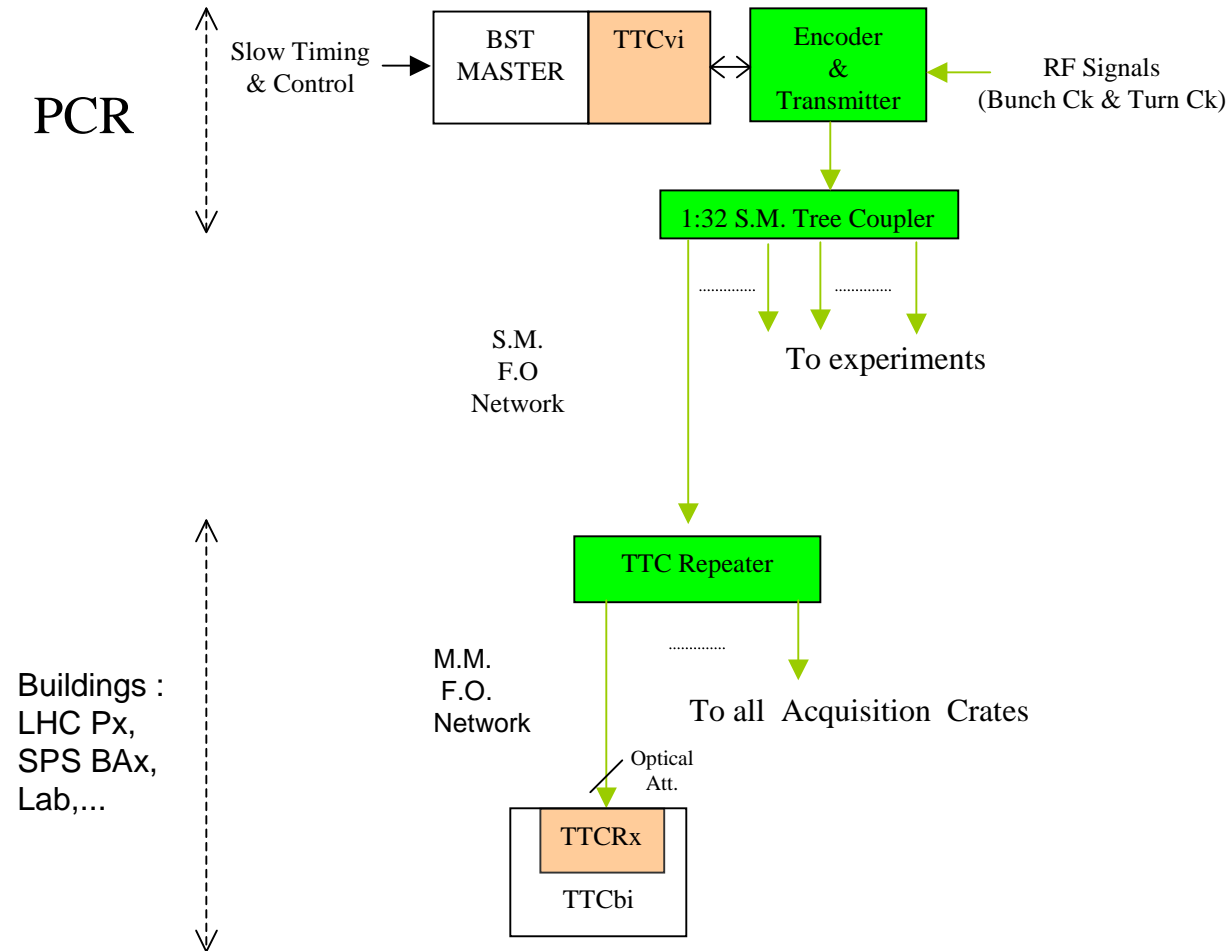
LHC TIMING REQUIREMENTS  
 TTC WORKSHOP : TTC in SL  
 Division J.J. Savioz SL/BI

JB RIBES - 03/04/2001

lhc2

# • Topology

Same structure for the 3 BST systems.



29 June 2001

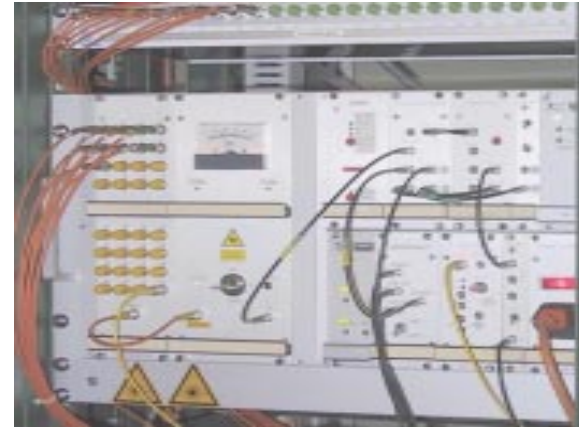
TTC WORKSHOP : TTC in SL  
Division J.J. Savioz SL/BI

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- Topology

Same structure for the 3 BST systems.

Transmitter crate :



Repeater crate :



- Topology

## TTC SL/BI Distribution

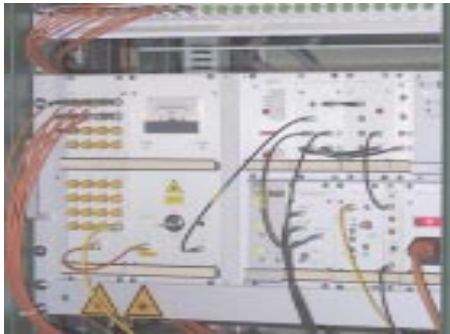
LHC 1, LHC 2, SPS Network connection

Point:	PCR	P1	P2	P3	P4	P5	P6	P7	P8	Ba1	Ba2	Ba3	BA4	Ba5	BA6	BA7	BA8	BAY	866	Total	
LHC1	1	9	14	10	20	13	11	14	12											2	106
LHC 2	1	9	12	10	20	13	11	14	15											2	107
SPS	1		5						3	1	2	2	6	0	2	5	1	2	2	2	32
Total	3	18	31	20	40	26	22	28	30	1	2	2	6	0	2	5	1	2	6	245	
Transmitter	3																				3
Repeater		2	3	2	2	2	2	2	3	1	1	1	1	0	1	1	1	1	3	29	
TTCmx		6	9	6	10	8	6	8	7	1	1	1	1	0	1	1	1	1	3	71	



• Component requirements

*Draft*



*Including Spare parts (x)*

Transmitter Crate : 5 (2)



TTCvi : 5 (2)



Repeater Crate : 40 (11)



TTCmx module : 100 (29)



Receiver TTCbi : 300 (55)



> TTCrx : 600 (300)

## • Planning

- **2000:** First evaluation of requirements
  - > Use TTC : feasibility study
  - > 3 BST needed : LHC ring1 + LHC ring 2 + SPS & Transfer lines
- **2001:** TTCbi Interface study  
BST Master study
  - Use SPS TTC : (F.Rev & 40 MHz) with LHC beam (MDs)
  - > Global evaluation of requirements ( End 2001)
- **2002:** > Commissioning of TTC & BST for SPS
- **2003:** > Everything should be operational for SPS startup > LSS4 extraction test
- **2004:** > Everything should be operational for LHC ring1 > Sector 7 - 8
- **2005:** > Everything should be operational for LHC ring1 & ring2