

# TTC NEWS

January 2006

- Production status
- Maintenance and support
- Upgrade: follow-up
- AOB

# PRODUCTION STATUS [closing the books 1]

- PH/ESS has coordinated the production of: TTCex, TTCtx, TTCvx, TTXvi, TTCrq and TTCoc
- For each type of module the experiments have made an advance payment based on a speculative price
- The real cost of the equipment is now known and PH/ESS will reimburse the excess money (almost completely)
- If all agree PH/ESS will keep CHF25.000 for future expenses such as
  - Spare components to repair modules
  - Shipping and insurance fees
  - Purchase of special equipment
  - Etc.

# PRODUCTION STATUS [closing the books 2]

<b>ALICE</b>	TTCoc	TTCrq	TTCtx	TTCex	TOTAL
Paid to PH/ESS	93400	31680	4800	107800	237680
Spent by PH/ESS	57413	17265	2738	81103	158520
To be reimbursed	<b>31442</b>	<b>12595</b>	<b>1801</b>	<b>23325</b>	<b>69163</b>

<b>ATLAS</b>	TTCoc	TTCrq	TTCtx	TTCvx	TTCex	TOTAL
Paid to PH/ESS	14400	134200	12000	14300	126600	287100
Spent by PH/ESS	14133	73137	6846	10808	87102	177893
To be reimbursed	<b>233</b>	<b>53352</b>	<b>4503</b>	<b>3051</b>	<b>34510</b>	<b>95650</b>

# PRODUCTION STATUS [closing the books 3]

<b>CMS</b>	<b>TTCrq</b>	<b>TTCvx</b>	<b>TTCex</b>	<b>TOTAL</b>
Paid to PH/ESS	18810	7700	79000	105510
Spent by PH/ESS	10251	5820	55222	71293
To be reimbursed	<b>7478</b>	<b>1643</b>	<b>20775</b>	<b>29896</b>

<b>LCHb</b>	<b>TTCoc</b>	<b>TTCrq</b>	<b>TTCtx</b>	<b>TTCvx</b>	<b>TOTAL</b>
Paid to PH/ESS	151800	30910	60000	11000	253710
Spent by PH/ESS	95924	16845	37492	8314	158576
To be reimbursed	<b>48820</b>	<b>12288</b>	<b>19665</b>	<b>2347</b>	<b>83121</b>

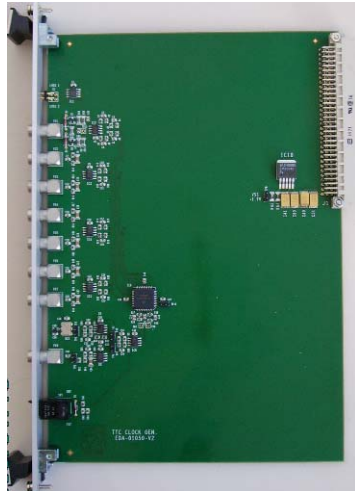
# PRODUCTION STATUS [closing the books 4]

<b>Accelerator</b>	<b>TTCoc</b>	<b>TTCrq</b>	<b>TTCtx</b>	<b>TTCvx</b>	<b>TOTAL</b>
<b>Paid to PH/ESS</b>	1800	46200	16800	6600	71400
<b>Spent by PH/ESS</b>	1767	25178	9585	4988	41518
<b>To be reimbursed</b>	<b>29</b>	<b>18367</b>	<b>6304</b>	<b>1408</b>	<b>26109</b>

# PRODUCTION STATUS [summary]

MODULES	PRODUCED	YIELD	AVAILABLE	AVERAGE PRICE (CHF)
TTCvi	196		3 (POOL)	1900
TTCvx	53		0 (POOL)	830
TTCex	186	99% (9 repaired)	14	1400
TTCtx	42	100% (2 repaired)	5	1510
TTC Clock Gen	7		2	500
TTCrq	2399	96%	68	60
TTCoc16MM	18		0	880
TTCoc32MM	6		0	1600
TTCoc16SM	16		0	690
TTCoc32SM	123		0	1080
TTCrm			100	

# PRODUCTION STATUS ['new' designs]



TTC Clock Gen  
EDA-01050-V2  
(40.078MHz clock in ECL, NIM and LVDS)



TTCrq tester  
EDA-00975-V1  
Mounted on the IC tester (PH/MIC).  
Used to test 2200 TTCrq in 4 different configurations

- Production status
- **Maintenance and support**
- Upgrade: follow-up
- AOB




# SUPPORT AND MAINTENANCE [1]

## Supported modules

The table below lists the types of TTC modules supported:

Name	Description / Remarks
TTCvi	TTC VMEbus interface module
TTCrm	TTCrx mezzanine evaluation board
TTCrq	New design of TTCrm with QPLL
TTCvx	Low-power VMEbus LED transmitter module
TTCex	Primary TTC Laser transmitter
TTCtx	Secondary TTC Laser transmitter
TTCmx	Primary TTC Laser transmitter for use in TTCmi
TTCmi	TTC machine interface
TTCoc	optical tree couplers (1:16 and 1:32)


<http://ess.web.cern.ch/ESS/TTCsupport/index.htm>

Item No.	Rent	Class	Function	Type	Description	Manuf.	Monthly Fee (CHF)	Used	Avail.	Support Class
1	<a href="#">0235</a>	 VME	INTERFACE	TTC VI/2	TTC VMEBUS INTERFACE	EFACEC	42	<a href="#">15</a>	3	FULL

## Definition of the support

The table below specifies which services are available for the individual types of TTC modules.

Name	Production	Test	Repair	Technical support	Electronics Pool
TTCvi	Yes	Yes	Yes	Yes	Yes (check availability)
TTCrm	Yes	Yes	Yes	Yes	No
TTCrq	Yes	Yes	Yes	Yes	No
TTCvx	No	Yes	Yes	Yes	Yes (check availability)
TTCtx	Yes	Yes	Yes	Yes	No
TTCex	Yes	Yes	Yes	Yes	No
TTCmx	No	Yes	Yes	Yes	No
TTCmi	No	Yes	Yes	Yes	No
TTCoc	Yes	Yes	Yes	Yes	No

Item No.	Rent	Class	Function	Type	Description	Manuf.	Monthly Fee (CHF)	Used	Avail.	Support Class
1	<a href="#">0237</a>	 VME	INTERFACE	TTC VX	TTC LED TRANSMITTER MODULE	CERN	20	<a href="#">13</a>	0*	FULL

## Definition of the sub-services

<b>Production</b>	Defines if modules of this type can be (re)produced if required
<b>Test</b>	Defines if modules of this type can be tested by PH-ESS
<b>Repair</b>	Defines if modules of this type can be repaired
<b>Technical support</b>	Defines if an engineer exists who could answer detailed technical questions or fix problems with the design of modules of this type
<b>Electronics Pool</b>	Defines if modules of this type can be rented from the CERN Electronics Pool. This service will in any case be limited to short duration rents and the number of modules available will be small

## Repairs and spares

The repair of broken TTC modules will be carried out on a best effort basis. We do not guarantee that all modules can be repaired. The time required to repair a module depends on our workload, the type of the problem and the availability of spare components.

No ready-to-use spares will be provided by PH-ESS for any of the TTC modules. We recommend that the experiments equip themselves with at least 10% spares.

# SUPPORT AND MAINTENANCE [2]

		PRESENT SPARES	PRESENT MAINTENANCE
POOL MODULES	TTCvi	18 modules at the POOL Almost all of them are rented	2 years guaranty, Per Gallno will retire in a few years,
	TTCvx	13 modules at the POOL ALL of them are rented	Per Gallno will retire in a few years,
OTHERS	TTCex	14 spares	Components in the cupboard to repair broken modules
	TTCtx	5 spares	Components in the cupboard to repair broken modules
	TTCrq	70 spares	~40 broken boards probably recoverable ~60 broken boards used as a stock of components
	TTCoc	0	NO
OBSOLETE	TTCrm	0	NO
	TTCmi	0	NO

- In 2006, ESS will have to:
  - o Transfer Per's knowledge (and system tests) for TTCvi and TTCvx
  - o Identify & train a technician to ensure the reparation of the various types of boards
  - o Build some spare modules (~10 TTCvi, 10 TTCvx, 10 TTCoc)
  - o Build system tests
  - o Purchase critical components

...to guarantee the maintenance service during the next 10 years

- Production status
- Maintenance and support
- Upgrade: follow-up
  - Receiver Crate & Modules
  - Installation
  - Milestones
- AOB

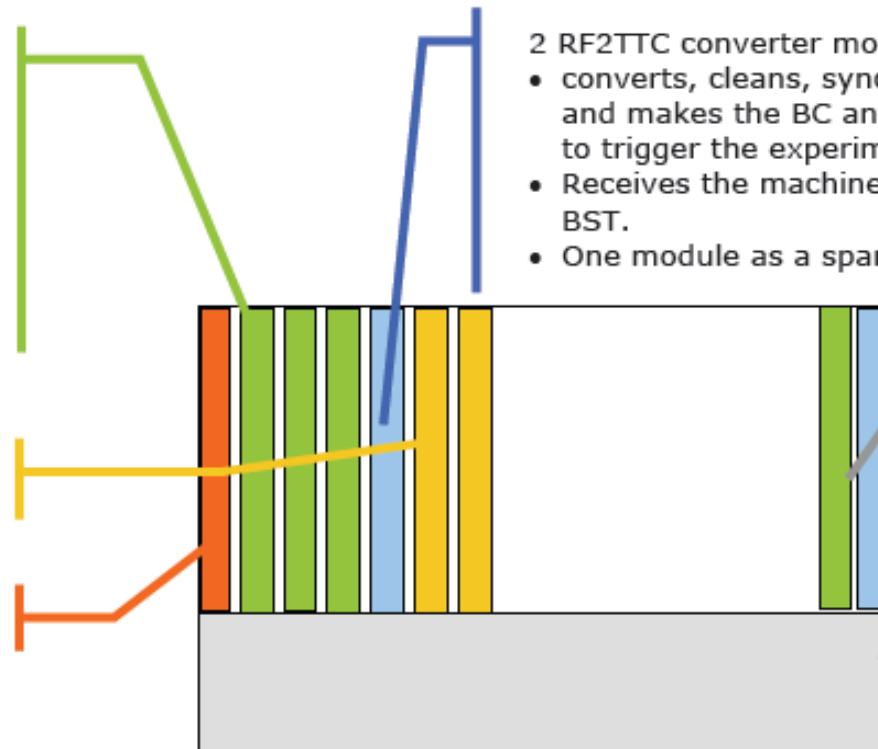
<http://ttc-upgrade.web.cern.ch/ttc-upgrade/>

# RECEIVER CRATE [Overview]

- 2 to 4 AB/RF receiver modules (each one equipped with 2 optical receivers)
- 1 to 3 main
- One as a hot spare

Optional fanouts

Crate Controller



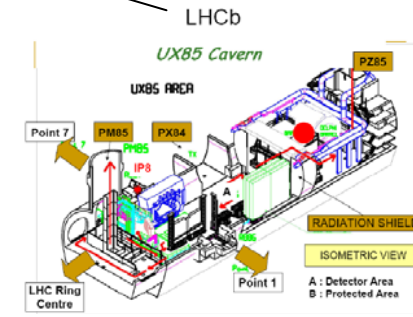
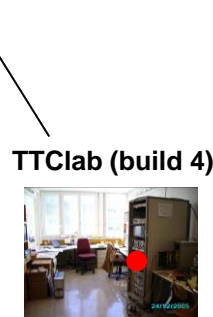
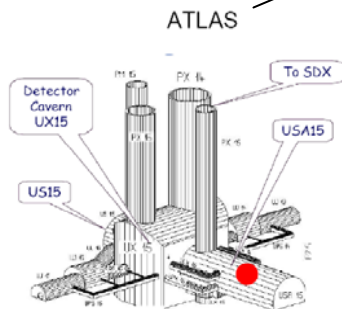
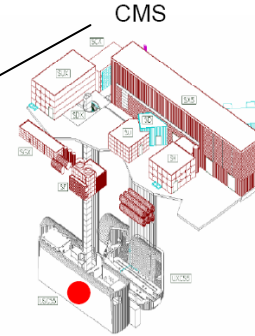
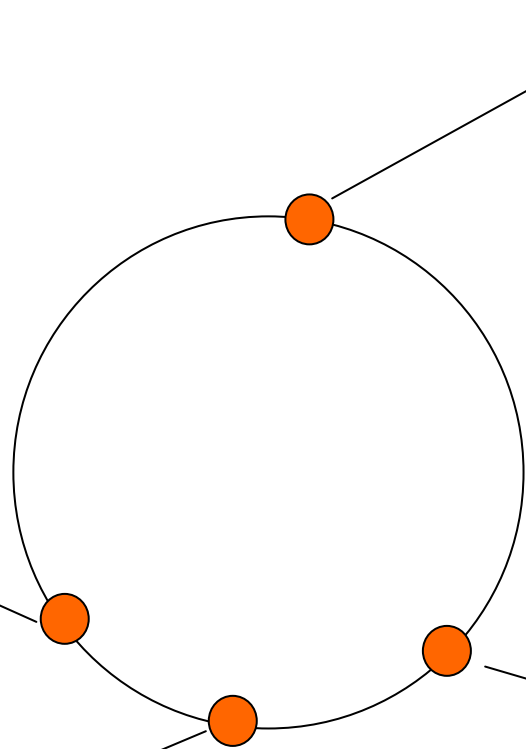
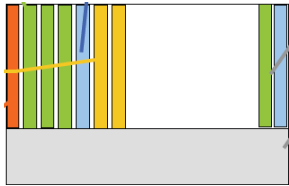
2 RF2TTC converter modules:

- converts, cleans, synchronizes, selects and makes the BC and Orbit available to trigger the experiments.
- Receives the machine events from the BST.
- One module as a spare.

Spares

VME 6U crate  
with a  
standard  
VME64x  
backplane

# RECEIVER CRATE [Installation]



# RECEIVER CRATE [Crates & Controllers]

## ■ Ordered

### ○ ATLAS, CMS, LHCb:

- 1 LHC standard 6U VME crate per experiment
- Power supply type OP06.0710 (+3.3V/100A, +5V/100A, +-12V/10A, 48V/12A)

### ○ ALICE:

- 1 ALICE Trigger standard 6U VME crate (water cooled)
- Power supply type 0P17.0711 (+5V/100A, +/-12V/10A)

=> Use only +5V and +-12V for the modules

## ■ Crate Controllers

### ○ ALICE, ATLAS:

- Standard VP110 or VP315/317 from CCT

### ○ CMS (to be confirmed):

- CAEN PCI-controller card A2818 + V2718 VME-PCI optical bridge

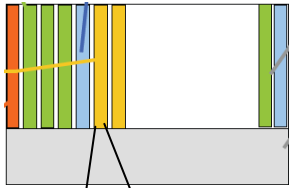
### ○ LHCb (to be confirmed):

- CAEN V1718 VME-USB bridge

=> Not ordered yet

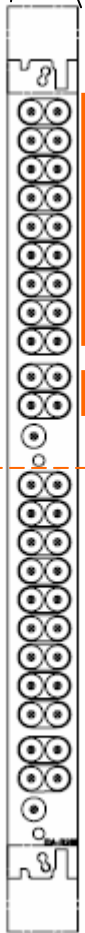
=> The software will be provided only for the standard controllers

# MODULE DESIGN [BC & Orbit fanout]



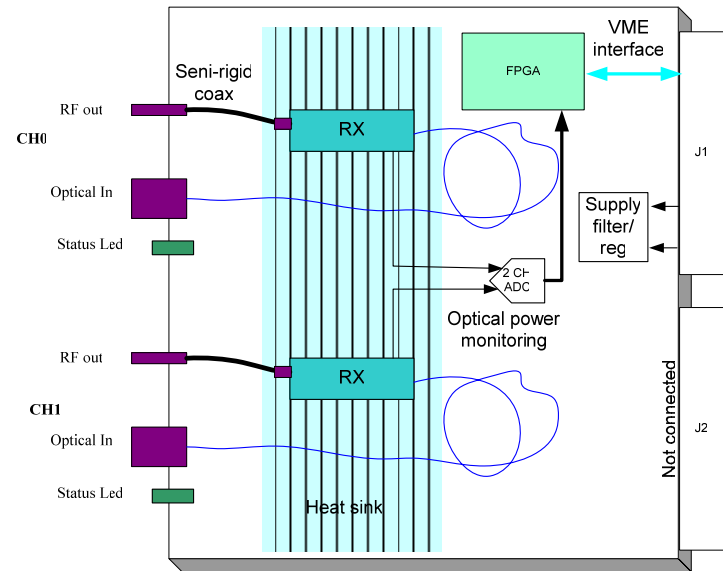
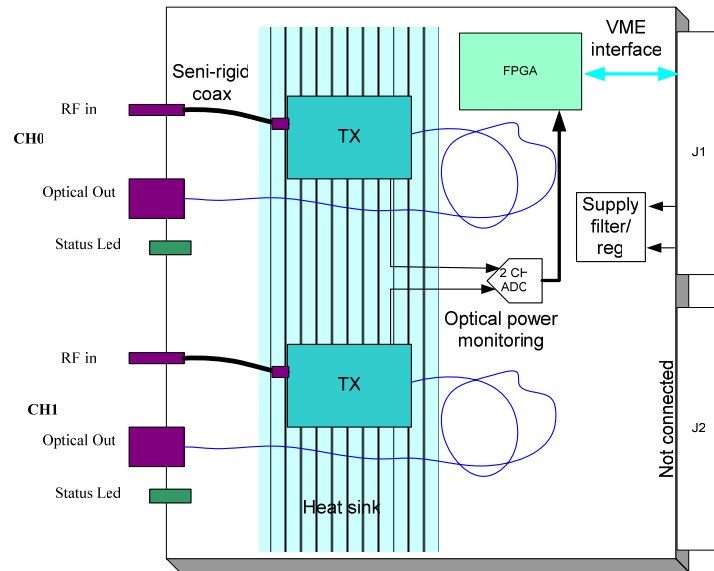
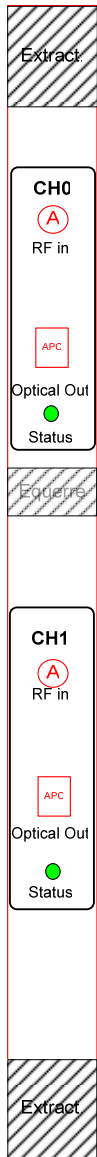
- Designed by PH/MIC (C. Sigaud)
  - Dual 1:18 ECL fanout
  - 4 NIM outputs per input (ALICE requirement)
  - 1 status led per input (presence of clock / orbit).
  - Maximum density
  - The 2 dual modules can be daisy chained.

Schematics done, layout on-going.  
First prototypes are foreseen end of February



# MODULE DESIGN [AB Rx/Tx]

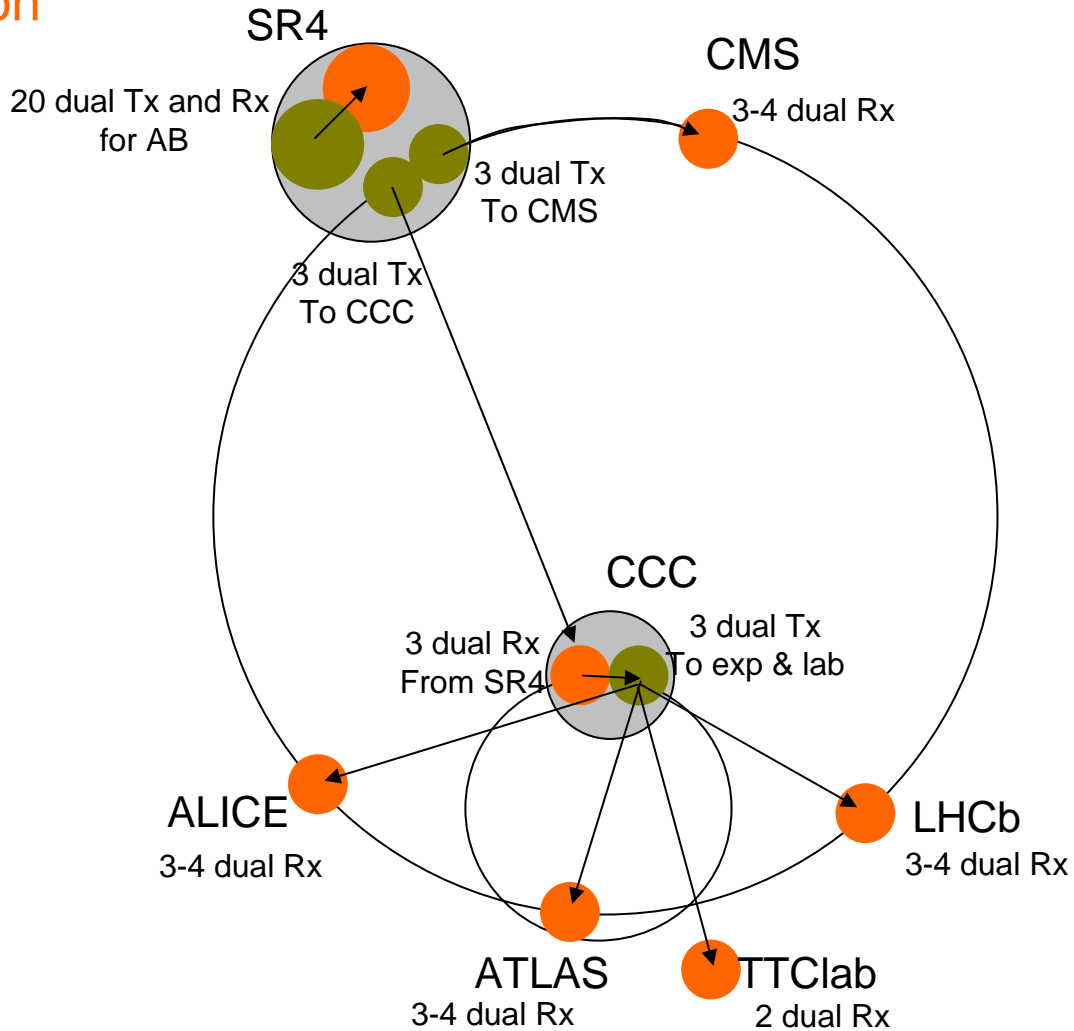
- Specification written by AB/RF
- Design and prototype of both Tx and Rx made by PH/ESS (Student arriving in February)
- Very simple principle
- VME interface to read the status of the optical components, (source provided by AB/RF)
- DIP server will be used to allow an external access to these status





# MODULE DESIGN [AB Rx/Tx]

## Installation



	AB	PH
Rx	40	36
Tx	40	6

⇒ A lot of Tx/Rx to buy in 2006

# MODULE DESIGN [AB Rx/Tx]

- Optical Components:



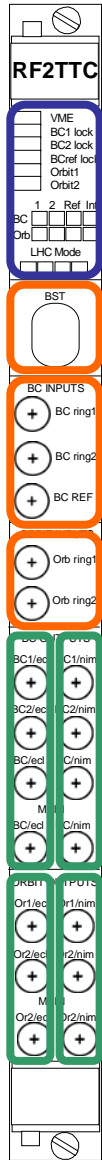
Tx. ~3200€

Rx. ~2000€

	To be ordered in 2006	Already ordered
PH	141 kCHF	
AB	236 kCHF	82 kCHF
TOTAL	377 kCHF	459 kCHF TOTAL

=> Finance Committee (or something like this) ... next 15 March (too late), and then 21 June. To be prepared by PH/ESS before the 21 April.

# MODULE DESIGN [RF2TTC interface 1]



- VME 6U module
- 1 slot if possible
- Inputs (mandatory)
  - 3 BC inputs (SMA or Lemo) (RF signals)
  - 2 Orbit inputs (RF signals)
  - 1 Optical input for the BST signals
- Outputs (can be discussed)
  - 4 ECL BC outputs (BC1, BC2, BCref, MainBC)
  - 4 NIM copies
  - 3 ECL Orbit outputs (Orb1, Orb2, MainOrb)
  - 3 NIM copies
- Status leds

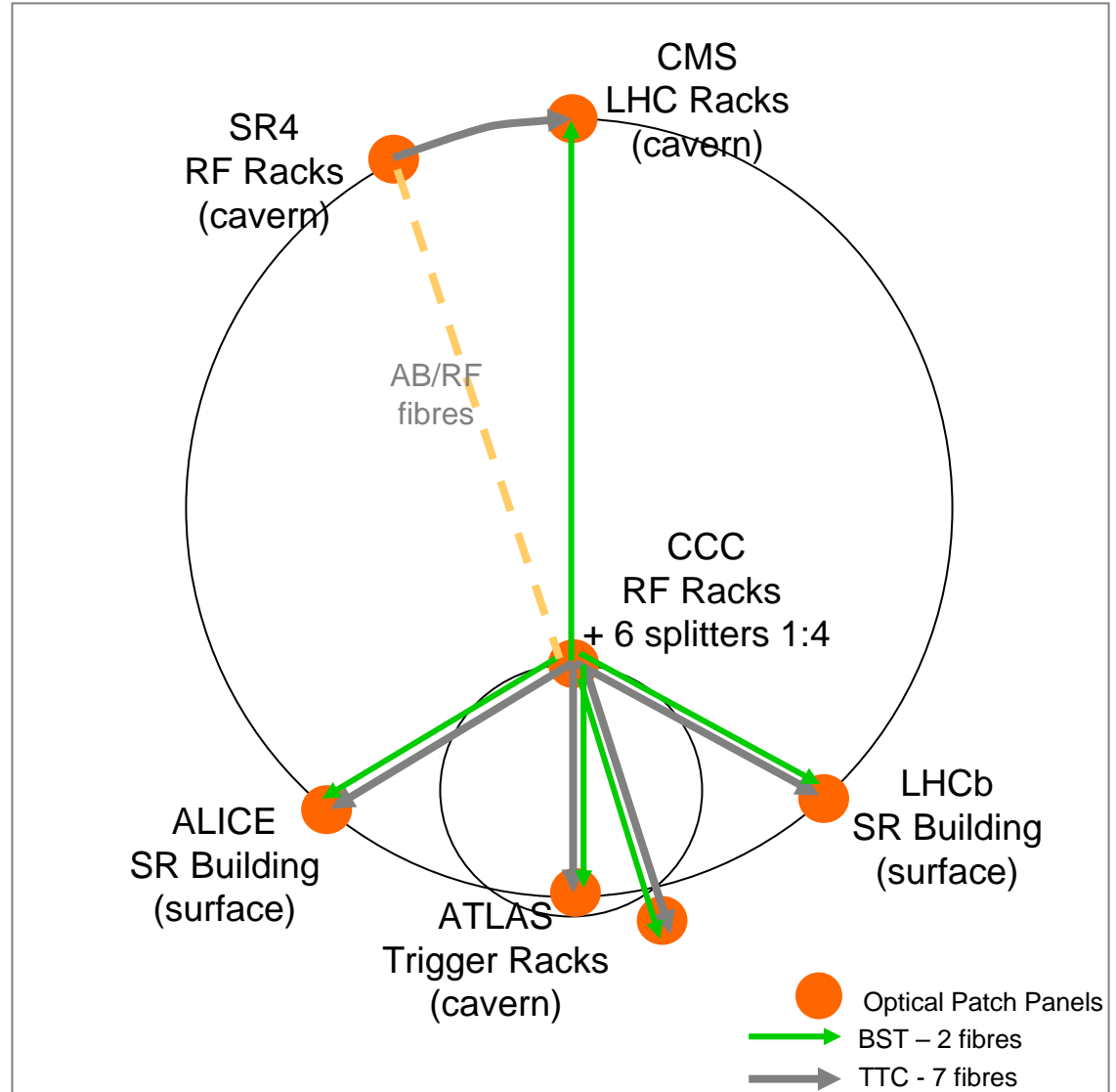


- A few features (which can be discussed)
  - BC signals:
    - Phase adjustment of 500ps steps (delay25) and QPLL on each output,
    - For each BC path, selection between internal clock and external input from RF Rx module
    - Global selection for the MAIN BC output, between BC1, BC2, BCref and BCint
    - Automatic switching mode for the Main BC selection (using the LHC mode transmitted by the BST)
  - Orbit signals:
    - Phase adjustment for synchronisation with the Main BC.
    - Pulse width adjustment
    - Switch between internal counter and Frev input from the RF Rx module
    - Reference voltage adjustment (DAC) for the Orbit comparator
  - Internal clock tuning (if the QPLL is used, it is possible to slightly tune the frequency)
- Design (cadence project), weekly updated, available on the cae-cluster:  
[Dsy-srv4\sspriet\TTC\TTCsystem\TTCUpgrade\RF2TTC](#)

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# INSTALLATION [fibres]

- Request done to TS/EL for TTC and BST end of December
- Optical patch panels with E2000 connectors
- Single mode fibres
- ALICE & LHCb: request done to the SR building
- ATLAS & CMS: request done to the cavern
- Links SR4-CCC are requested by AB/RF







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# MILESTONES [2006]

February 2006-January 2007: technical student (Angel Monera) to work full time for the TTC





January 06	Modules design			
February		RD12 installation in the CCC		RF Optical Components purchasing. Finance committee 21 June.
March			Design review of the receiver crate	
April	Prototypes production	Firmware and software writing. DIP server installation.		
May				
June	System tests, prototypes validation/modification, test beam preparation,			Components ordering for production
July				
August			Final review of the receiver crate	
September			25ns structured Test Beam	Modules production
October				
November				
December				Modules tests
January 07			RF sector test	

Request for funds



- Production status
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- **AOB**

# AOB [optical instruments]

	<p>Photon-counting OTDR</p>	<p>1 at the Electronics Pool. A second is being ordered.</p>
	<p>Optical Power Meter</p>	<p>5 at the Electronics Pool</p>
	<p>Optical probe</p>	<p>1 in the TTC lab (ESS property)</p>
	<p>Fiberscope</p>	<p>Being studied by the Electronics Pool</p>

- Next meeting: review in March
- Web site:

<http://ttc-upgrade.web.cern.ch>

[All what has been presented here (and more...) are available there (and are updated!)]