DT Muon Sorter

1xBarrel Sorter
In: max 24 tracks from 12 Wedge Sorters
Out: 4 “best” tracks

12xWedge Sorter
In: max 12 tracks from 6 $\phi$ Track-Finder of a wedge
Out: 2 “best” tracks
Wedge Sorter: test and production

WS board already had a hw integration test with PHTFs and ETTF in Vienna setup @ CERN (March05)

✓ 3 PHTFs + WS: sorting @ 40 MHz **OK**
✓ 1 PHTF + ETTF + WS: sorting @ 40 MHz **OK**

Design validated

Full production (12 boards + 6 spares) finished !!
(All boards fully tested with dynamic patterns with our test jig: all boards **OK** with full functionality)
Barrel Sorter main features

- Ghost busting, sort 4 out of 24, 3 BX overall latency
- VME slave to tune clock phases and access main chip algorithm conf reg
  - Ghost buster block tuning
  - Quality filtering of muon candidates
  - Input masking
- Trigger output on LEMO (NIM/TTL/ECL through jumpers)
  - Configurable trigger condition
    - Quality/Pt thresholds, pattern matching, etc.
  - Internal triggering of spy registers (with directVME A24D16 readout)
- Last but not least: firmware can be eventually updated (ie new trigger conditions) very easily thanks to good FPGA fitting capability
Barrel Sorter: test and production

Full test setup based on Pattern Units and bidirectional LVDS-TTL adapters

Production (1 board + 2 spares) finished !!!
(All boards fully tested with dynamic patterns with our test jig: all boards OK with full functionality)
WS – BS transmission test

Pattern Units

VME Crate

BS

ETTF Adapter

SCSI cables

WS

PHTF Adapter

"PHTF Adapter"
"ETTF Adapter"
TTL → GTL+

GTL+

1 x Wedge Sorter

1 x Barrel Sorter

LVDS

LVDS

LVDS → TTL

TTL

Pattern Unit

Pattern Unit

A.Montanari - INFN Bologna

5th DT MTCC Workshop, Madrid, 28-Oct-2005
Software

✓ VME R/W accesses are used to set any option of WS/BS boards
  ✓ Synchronization (WS, BS)
  ✓ Ghost busting (WS, BS)
  ✓ Track masking (WS, BS)
  ✓ Board status (WS, BS)
  ✓ Trigger condition setting (BS)
  ✓ Trigger spy data readout (BS)

✓ Software tools have been developed as a “big” C++ class while setting up the test jig ...
  ...but different VME interface & OS wrt CMS official ones

✓ Next step: software integration with DTTF
Summary

✓ WS boards: production done, stand-alone tested: 12 + 6 spares
  ✓ Needed in cosmic challenge: 2 (already at CERN)
✓ BS boards: production done, stand-alone tested: 1 + 2 spares
  ✓ Needed in cosmic challenge: 1 (already at CERN)
✓ DTTF-WS connection tested at CERN
✓ WS-BS connection tested in Bologna
✓ ..we are ready to integrate hardware in 904...(week of 7th November)

Important for Cosmic Challenge:

✓ BS can output a trigger signal based on configurable settings (quality, geom, etc)
✓ BS is provided with a spy data pipe that can be readout directly by VME

To do:

✓ Software tools have to be integrated with DTTF software ..