

CMS Tracker FED

CMS Tracker System Meeting

Test

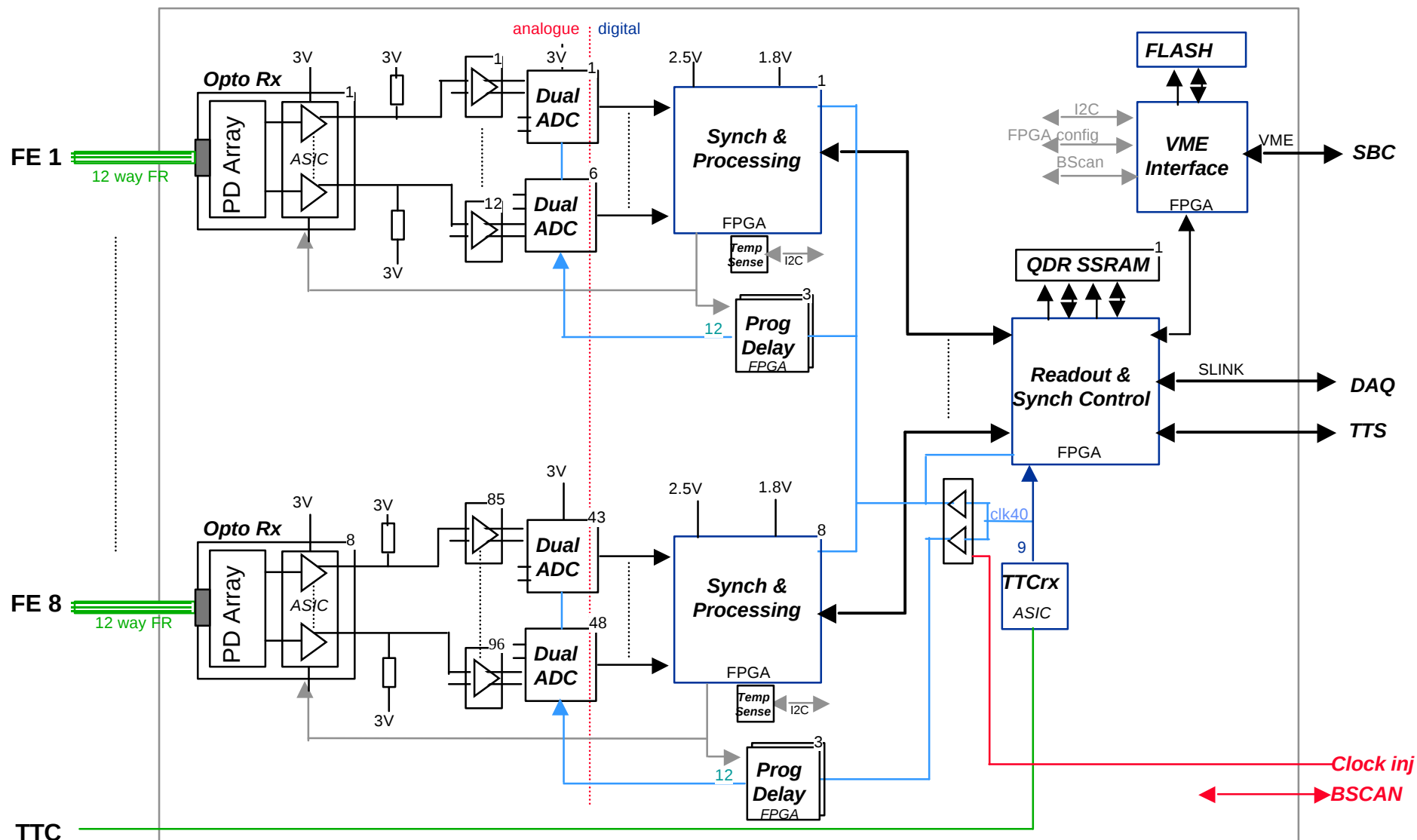
Rob Halsall et al

30 July 2001

CERN

CMS Tracker FED Test

96 ADC Module

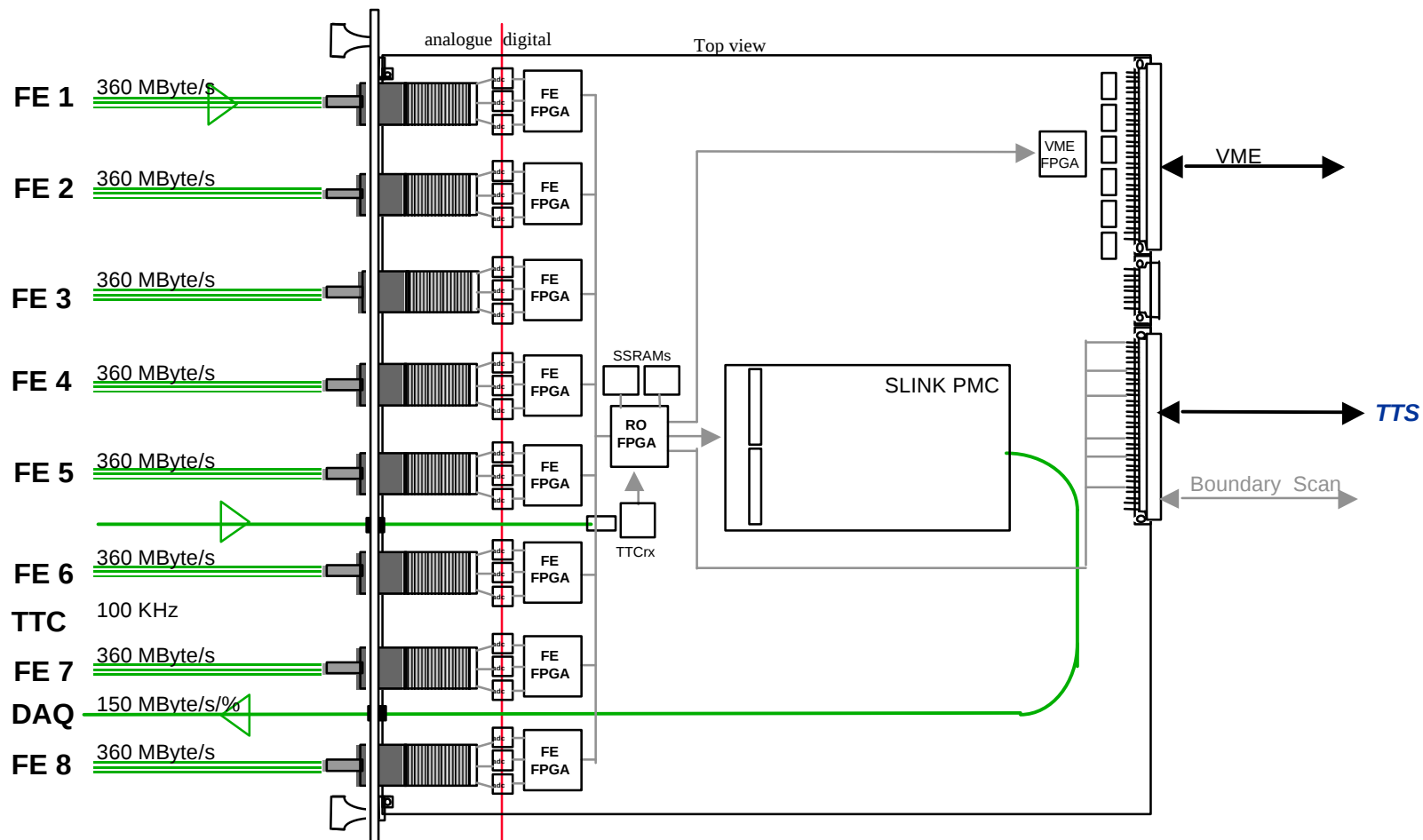




CMS Tracker FED System Overview

Board Layout Reference

96 ADC Channels



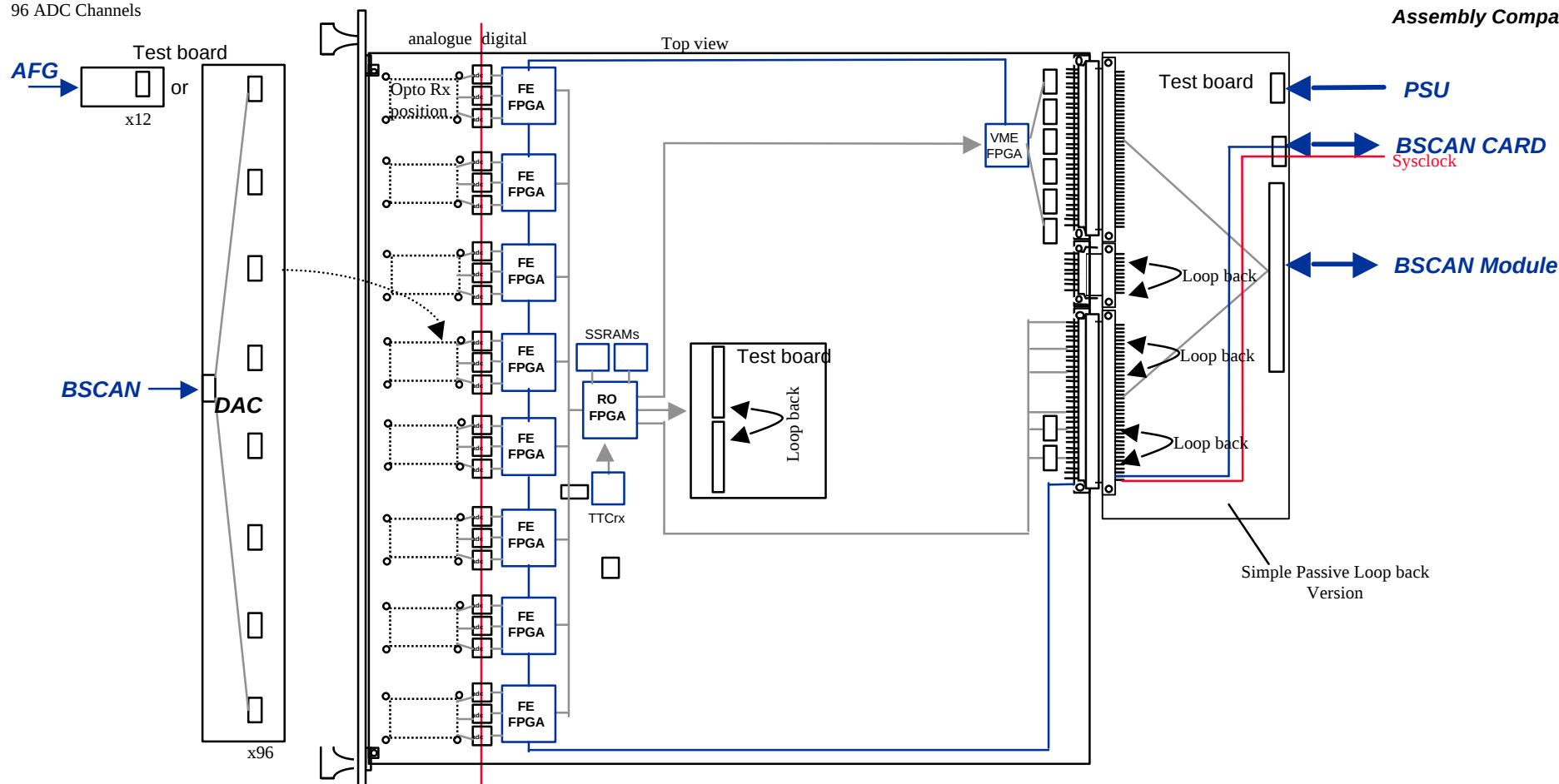


CMS Tracker FED Test

Post Assembly 1

96 ADC Channels

Assembly Company



- Boundary Scan Test digital devices
- Boundary Scan Test Modules for I/O

- Analogue Scan I/O via Test Modules
- 'Bed of Nails' ATE test for Analogue?
- 'Flying Probe' test for Analogue?

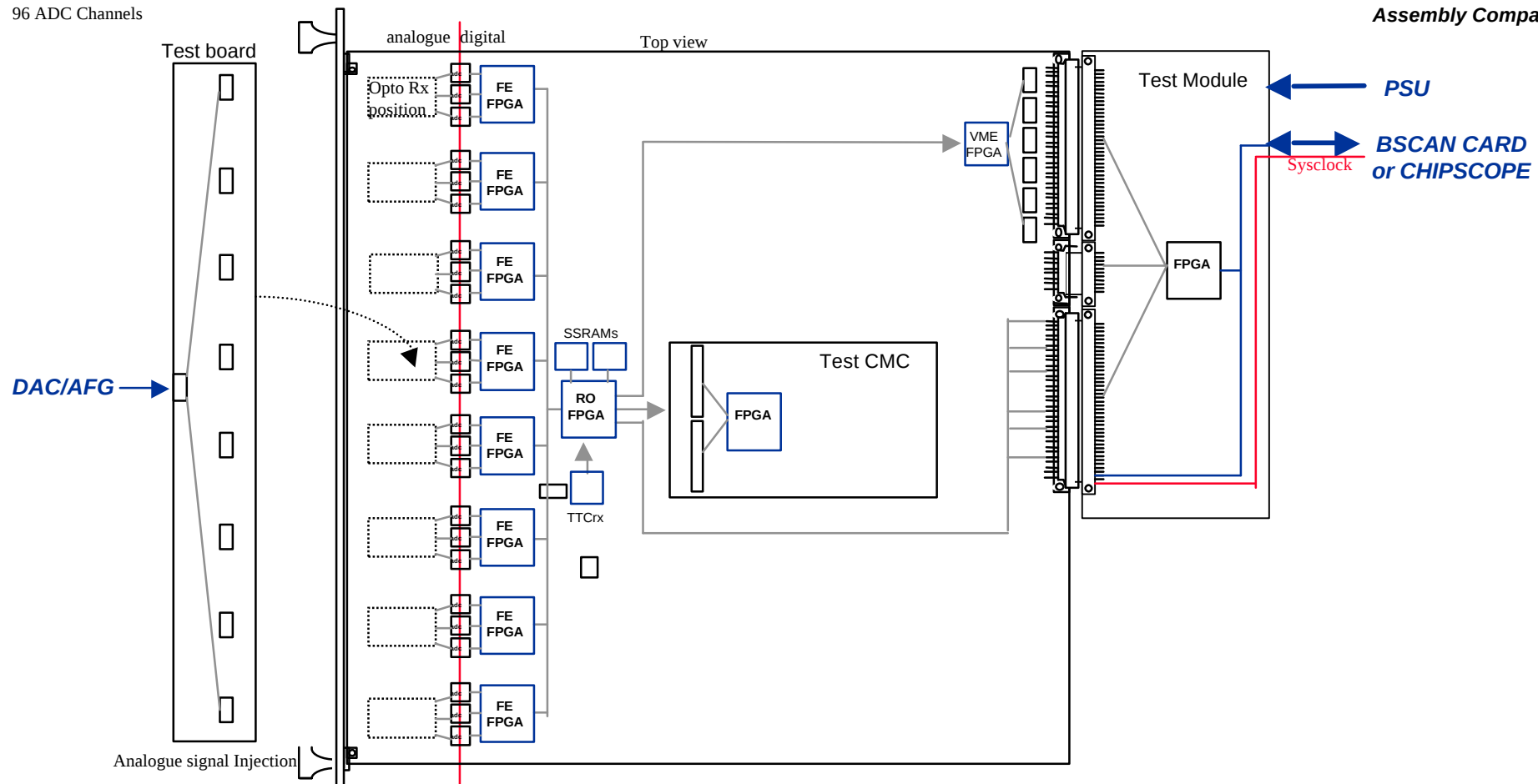


CMS Tracker FED Test

Post Assembly 1+

96 ADC Channels

Assembly Company



- **Boundary Scan digital devices**
- **'Bed of Nails' ATE test for Analogue**
- **'Flying Probe' ATE test for Analogue**

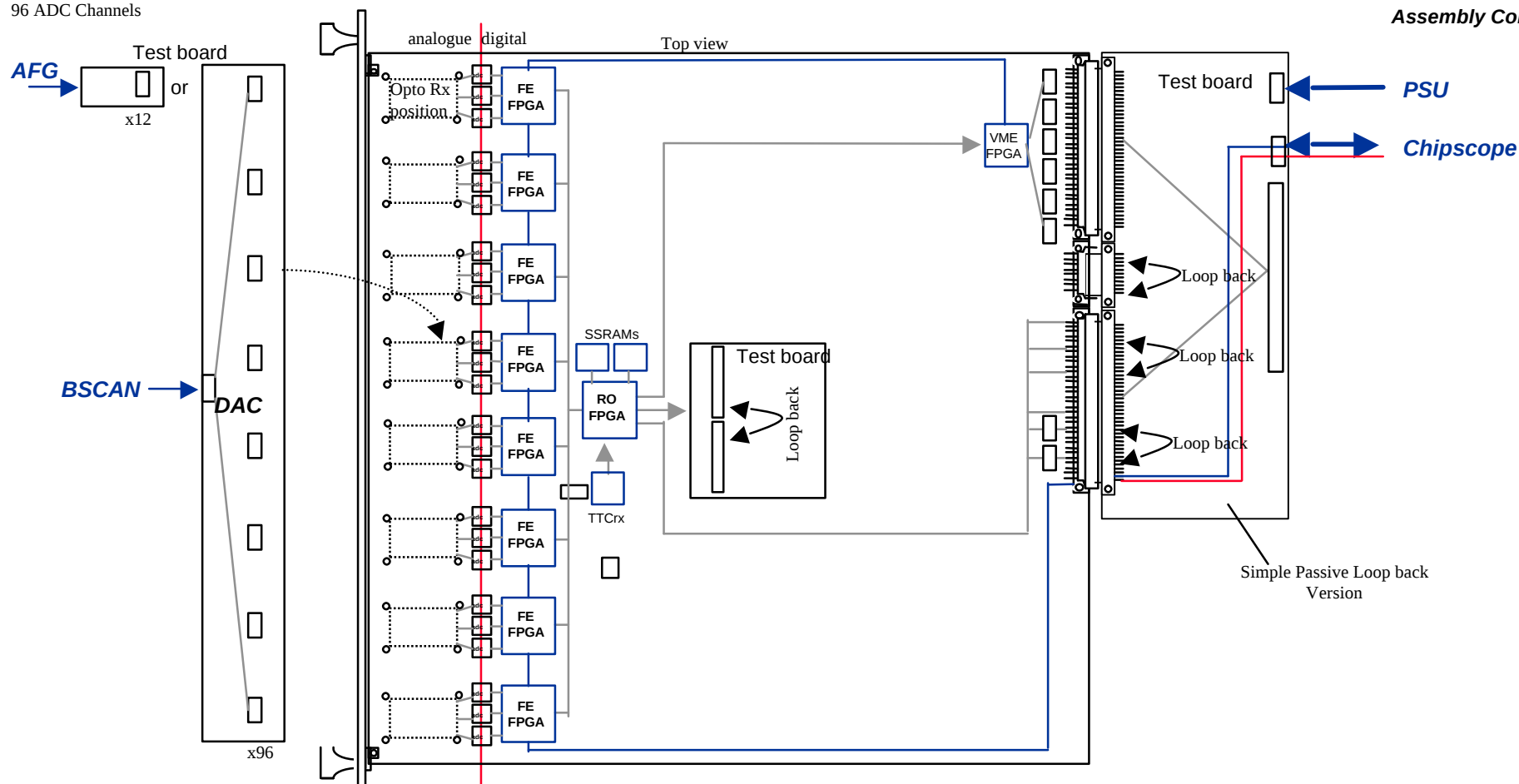
- **Boundary Scan Test Modules for connectors with digital signals**
- **CHIPSCOPE JTAG Readout...**



CMS Tracker FED Test Chipscope

96 ADC Channels

Assembly Company



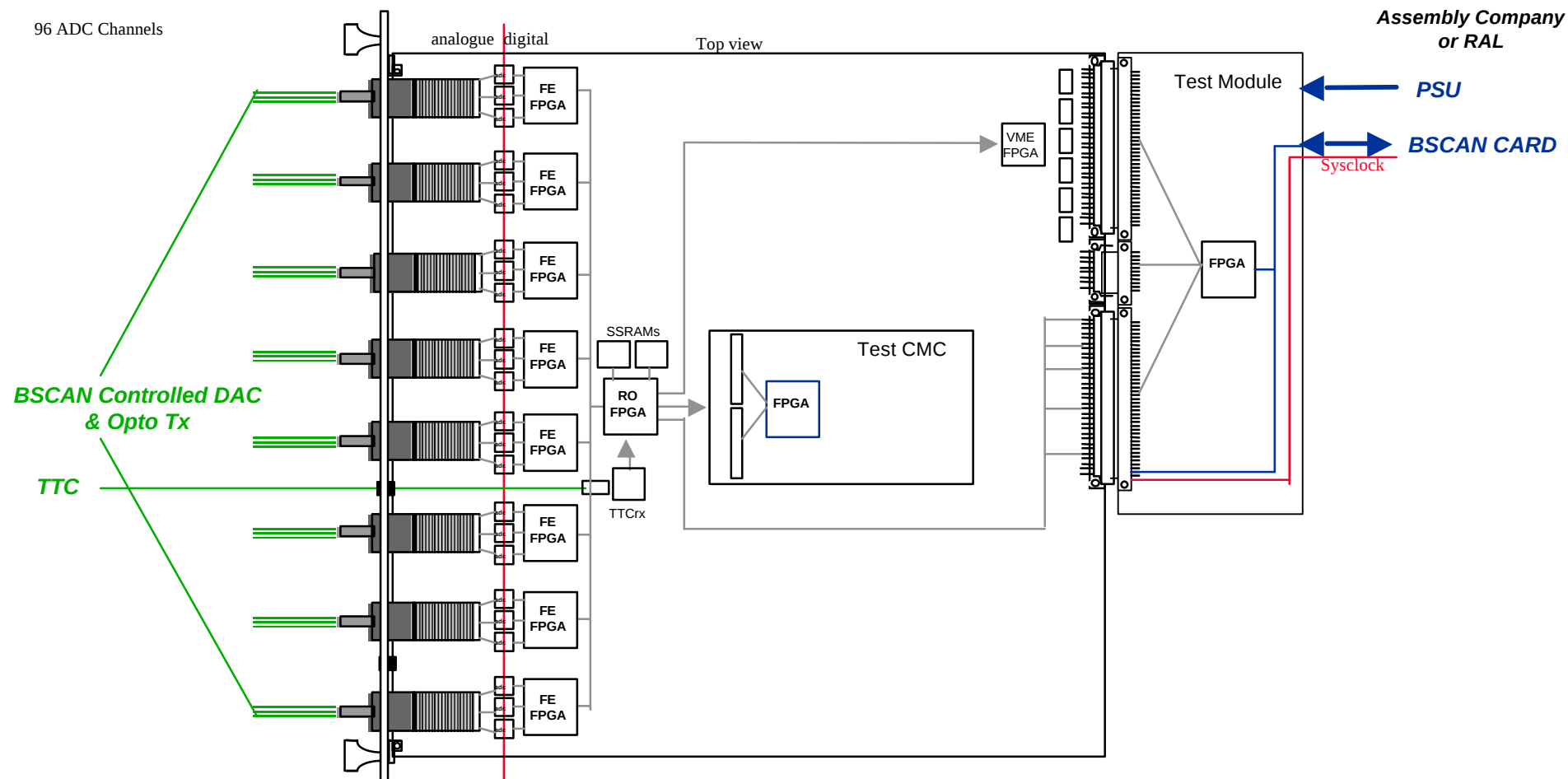
- **Chipscope**
Logic Analyser per ADC embedded in FPGA
Effectively 'Scope Mode' with JTAG Readout

- *Little design effort required*
- *Early readout of ADC data*
- *No VME Interface required*



CMS Tracker FED Test

Post Assembly 2



- **Single DAC Opto Tx fanned out 96 way**
Boundary Scan controlled...

- **Simple DC scan test of ADC bits**
Too complicated?

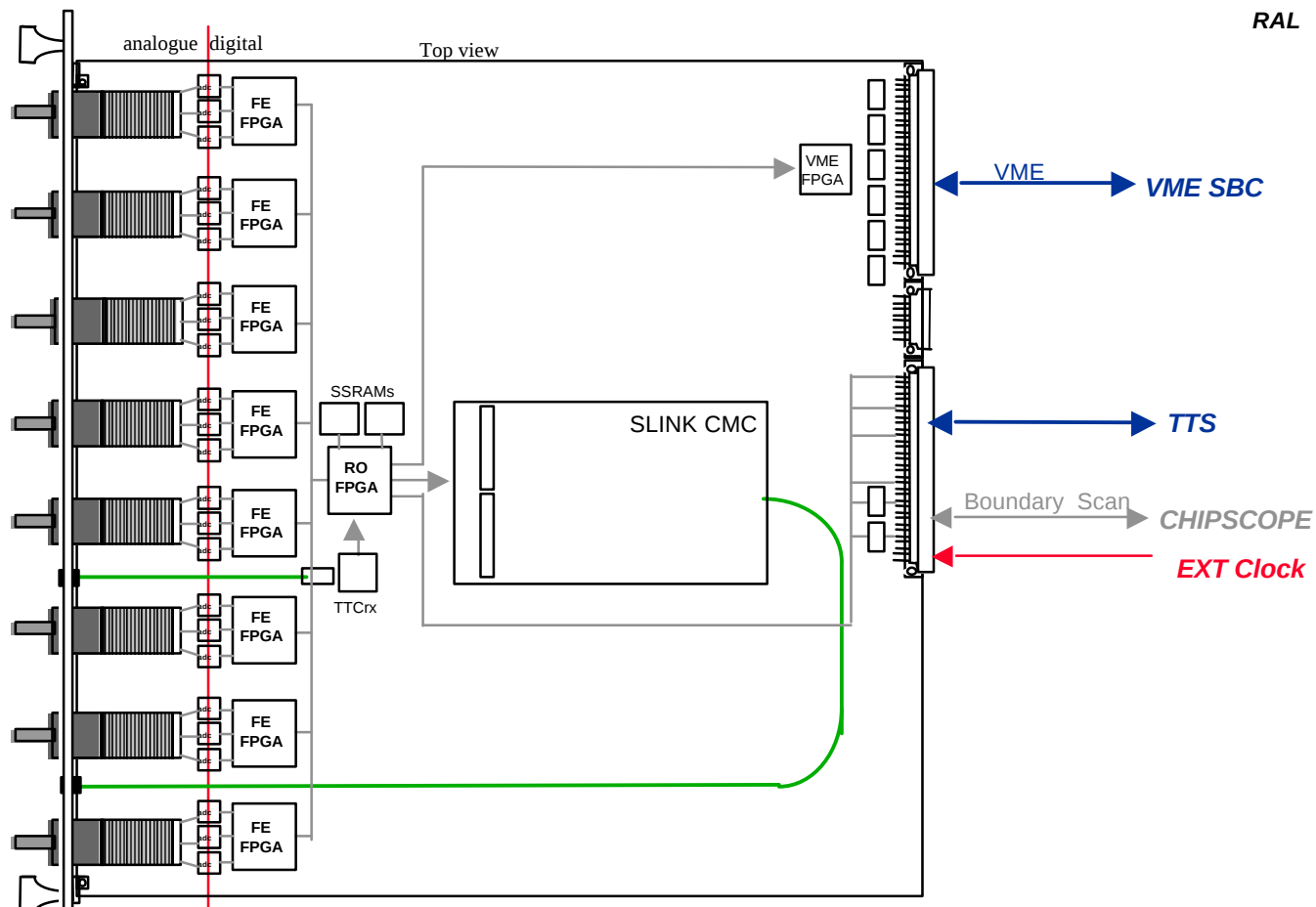


CMS Tracker FED Test

Internal tests via VME

96 ADC Channels

RAL



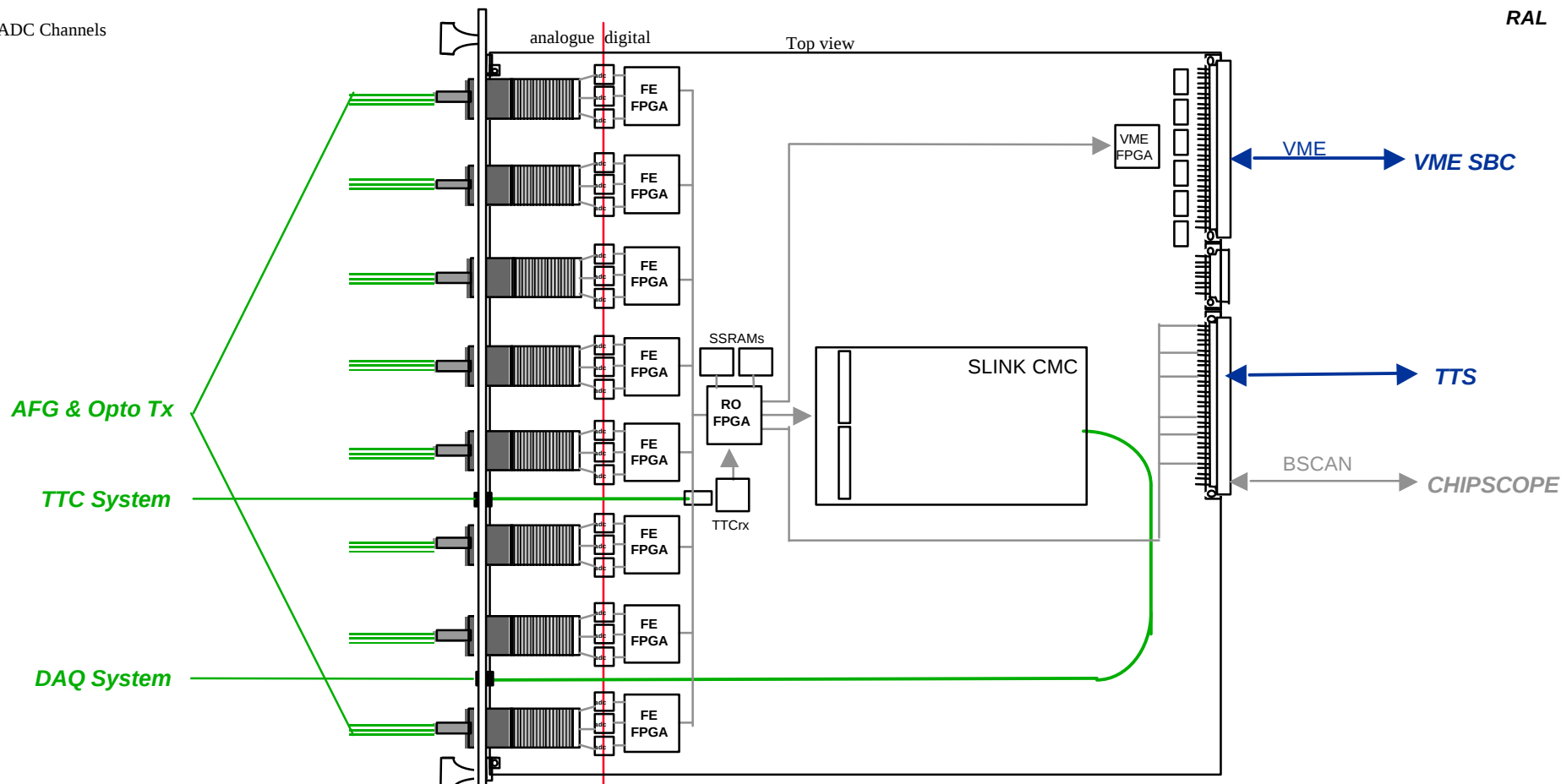


CMS Tracker FED Test

Performance/Soak

RAL

96 ADC Channels



- **Level of Analogue testing?**
crosstalk, performance...

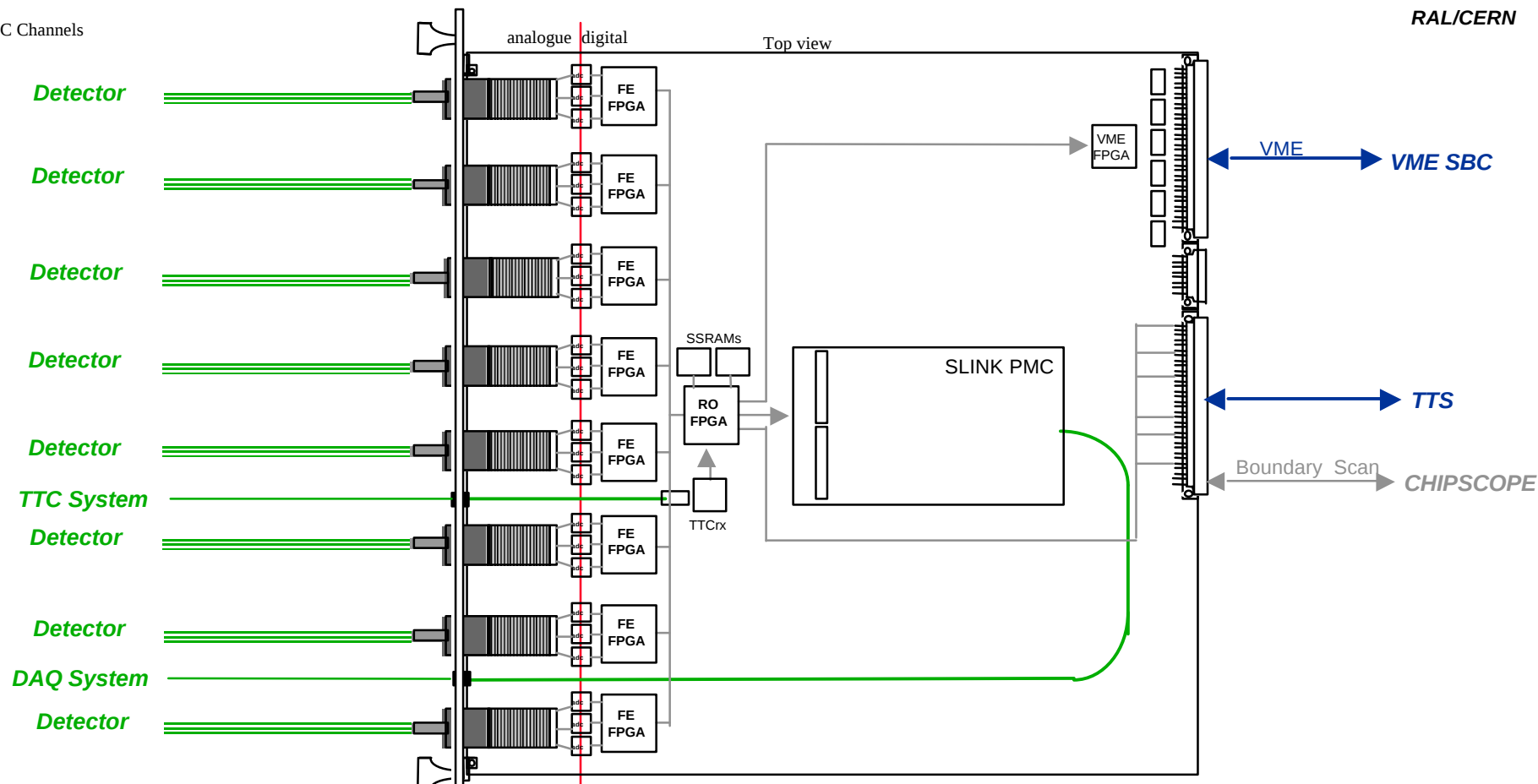
- **CHIPSOCPE**
FPGA Embedded Logic Analysers readout via Boundary Scan



CMS Tracker FED Test In System

RAL/CERN

96 ADC Channels



- **Detector Module**
Generate input test signals

- **CHIPSCOPE**
FPGA Embedded Logic Analysers readout
via Boundary Scan for commissioning

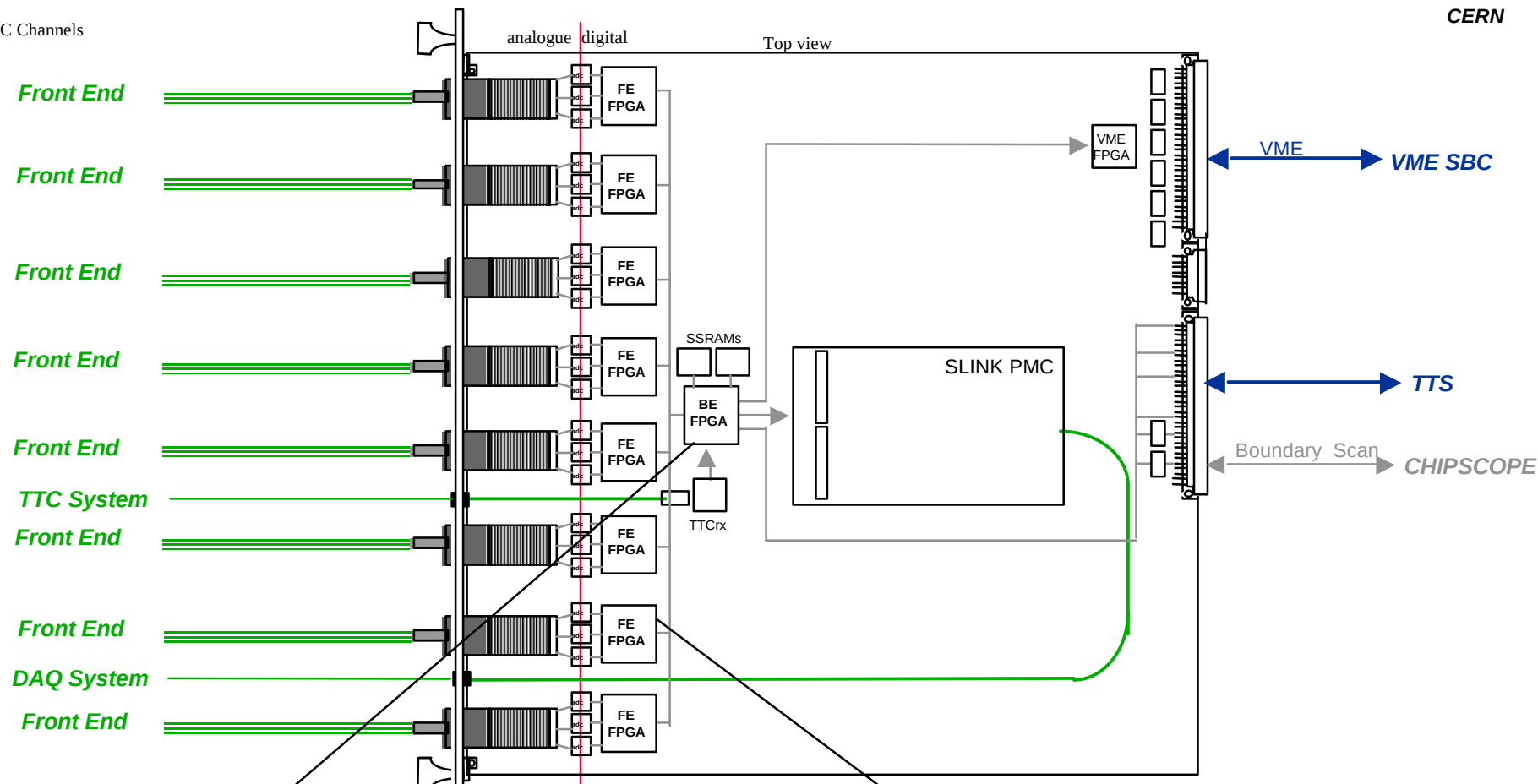


CMS Tracker FED Test

In System - other aspects

CERN

96 ADC Channels



- **BE FPGA -> DAQ & TTS**
Generate input test signals to DAQ & TTS
Fixed Pattern & Random Data Generation

- **FED 'SCOPE' MODE + async Trigger**
Setup timing & calibration
APV diagnostics



CMS Tracker FED Test

Equipment List

- ***JTAG***
Laptop & JTAG Software, USB-JTAG box, JTAG-I/O box, Cables & Connectors
VME I/O Module, Analogue I/O Module, SLINK I/O Module
- ***Analogue Performance Tests***
Arbitrary Function Generator
Analogue I/O Module
Chipscope Kit
- ***Optical Test***
+Electrical-Optical Converter & Fanout
- ***Other Items***
TTC System, Clock Generator
VME SBC, VME-PC Interface
SLINK Modules
Labview, VxWorks....
9U VIPA Crate
Cooled Rack, Cooler