SCAMPI Workshop

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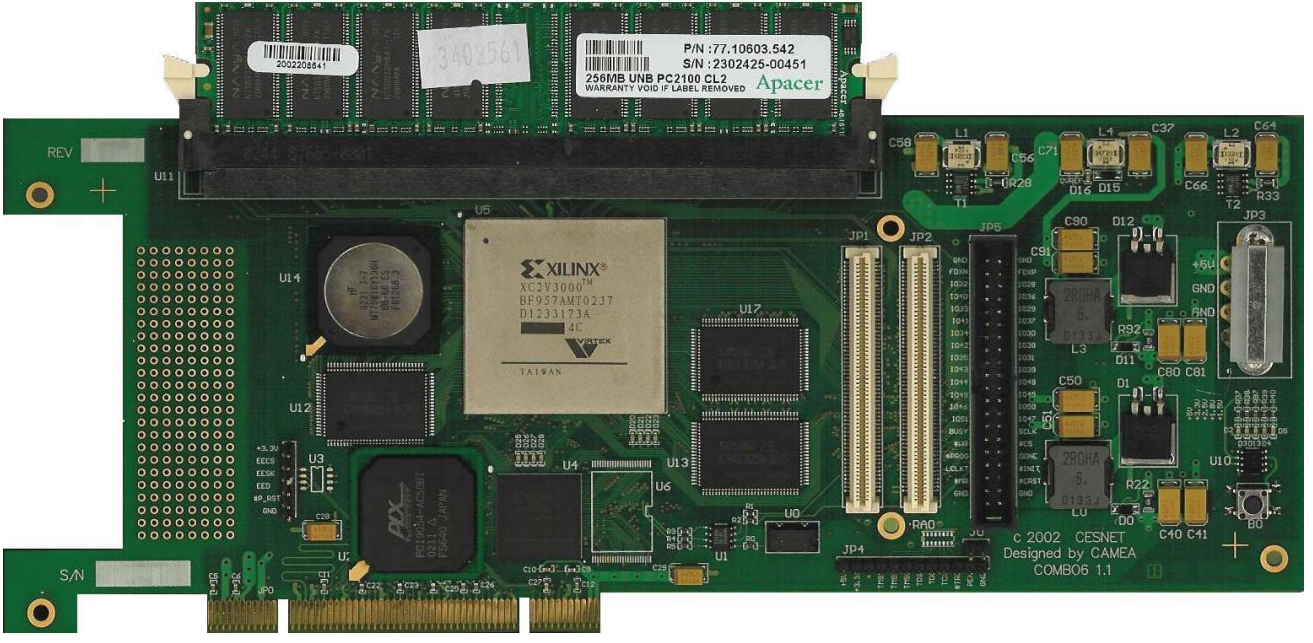
Why Programmable Hardware

- Today's computers are not able to process traffic monitoring at wire speeds
  - PCI bus throughput
  - interrupt latency
  - slow disk access
- ... hardware acceleration
- ASICs are not flexible enough
  - do not follow changing conditions of the Internet
- ... *programmable* hardware acceleration

Scampi Hardware

- Based on COMBO family developed by CESNET and Masaryk University
- More information can be found at `http://www.liberouter.org/hardware.html`

COMBO6


P/N :77.10603.542
S/N :2302425-00451
256MB UNB PC2100 CL2
WARRANTY VOID IF LABEL REMOVED
Apacer
XILINX
XC2V3000
TAIWAN
REV
S/N
c 2002 CESNET
Designed by CAMEA
COMBO6 1.1

COMBO6

Combination of programmable hardware and standard integrated circuits

- XILINX FPGA (VIRTEX II 3000-6000)
- CAM, 3xSRAM, DDRAM, EEPROM
- PLX, power supply
- Exchangeable interface cards
- Test/extension connector

Status—fully operational

COMBO6X

New design of COMBO6

- 2xXILINX II PRO, 3xPower PC—processors inside FPGA can bring new ideas in network monitoring
- Using of FPGA and PCI core instead of PLX chip—speed of PCI bus goes up at least to 4Gb/s. With PCI-X core could go up 8Gb/s
- 3xSRAM, 1xCAM,1xDRAM
- The COMBO6X with FPGA and PCI core will be ready for redesign to Express PCI in end of 2004

Status—in design phase

COMBO-4MTX

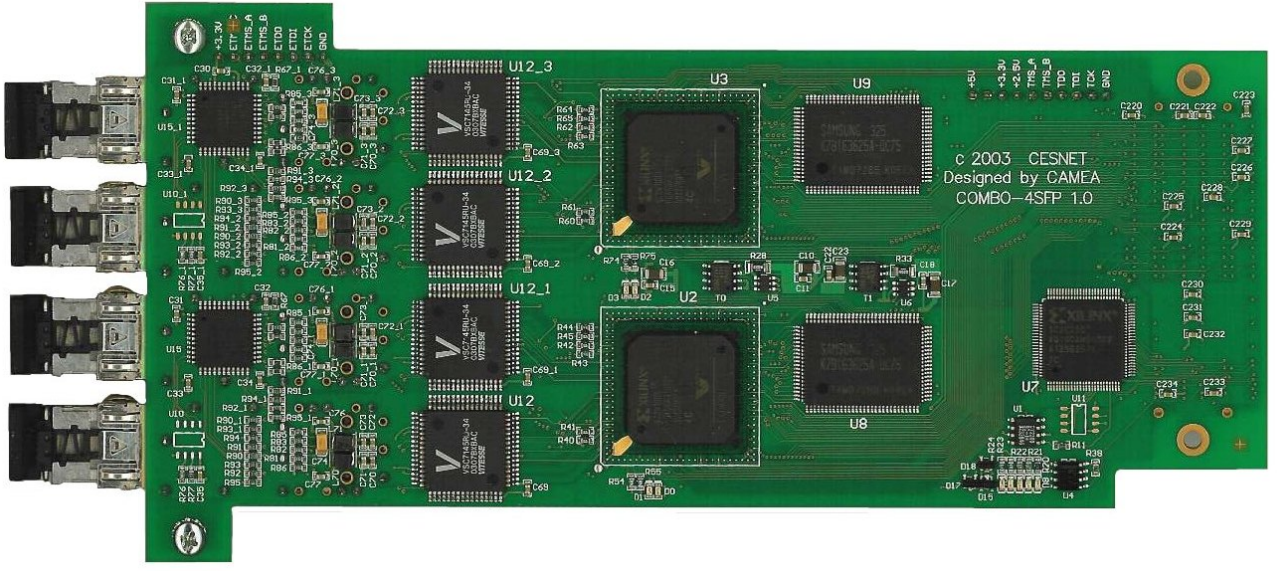
COMBO-4MTX

Interface card with 4x1Gb/s copper ports

- 2xXILINX FPGA (VIRTEX II 1000-3000)
- 2xSRAM, EEPROM
- 4x1Gb ports

Status—fully operational

COMBO-4SFP


U12_3
U12_2
U12_1
U12
U3
U9
U2
U8
U7
c 2003 CESNET
Designed by CAMEA
COMBO-4SFP 1.0

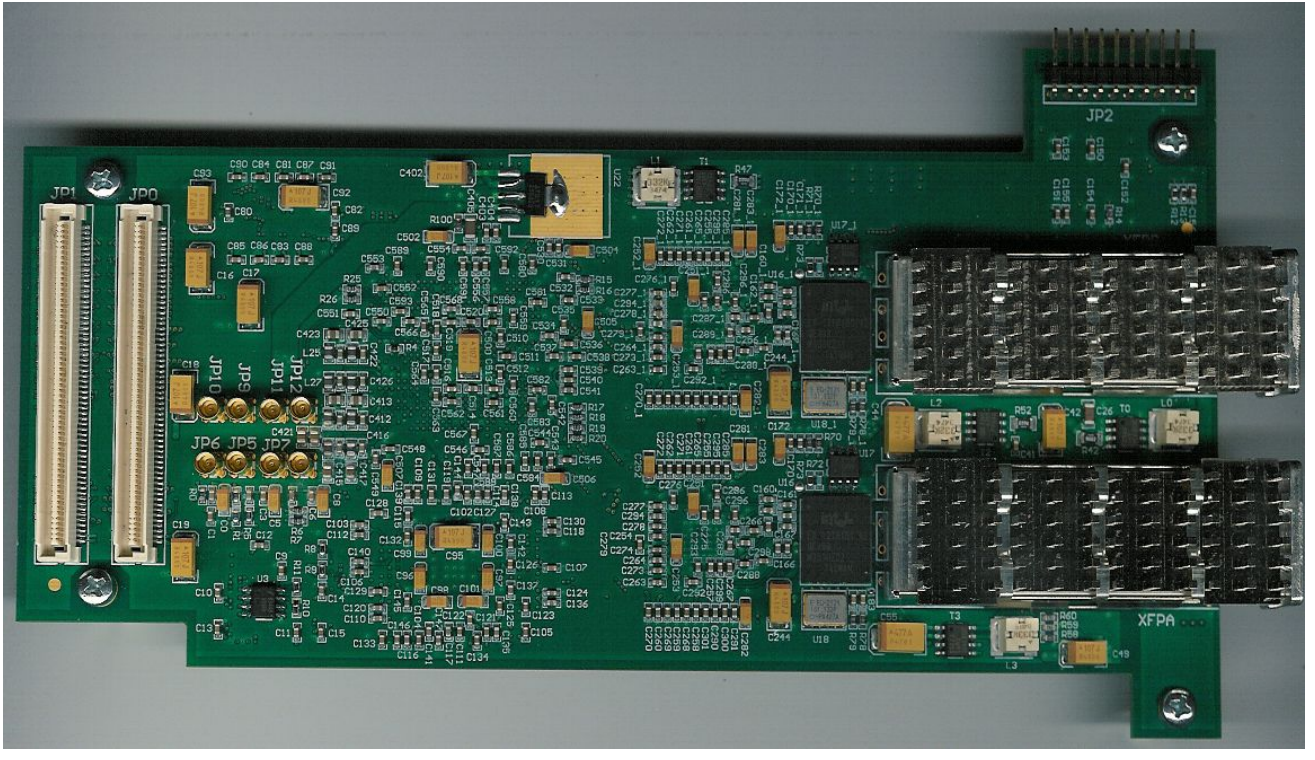
COMBO-4SFP

Interface card with 4x1Gb/s optical ports

- 2xXILINX FPGA (VIRTEX II 1000-3000)
- 2xSRAM, 3xEEPROM
- 4x1Gb ports in SFP cages (hot swap)
- hw supports four speeds—1GbE, Infiniband, Fiber channel, OC48

Status—fully operational

COMBO-2XFP



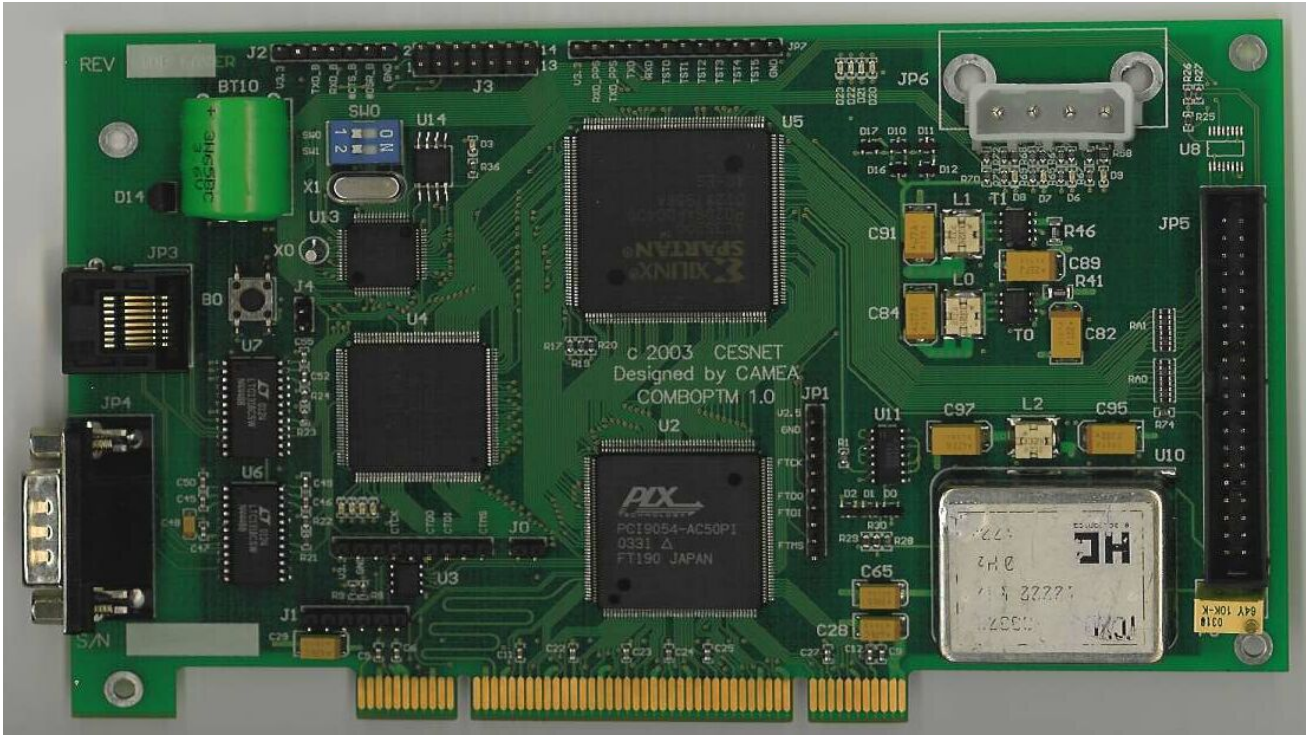
COMBO-2XFP

Interface card with 2x10Gb/s optical ports

- 1xXILINX FPGA (VIRTEX II PRO XC2VP20), Power PC inside
- 1xSRAM, 1xCAM, 3xEEPROM
- 2x10Gb ports in XFP cages (hot swap)

Status—in activation phase

COMBO-PTM


c 2003 CESNET
Designed by CAMEA
COMBOPTM 1.0
PCI9054-AC50PI
0331 Δ
FT190 JAPAN

COMBO-PTM

Precise Time Module

- XILINX FPGA (Spartan 3)—90nm technology
- MCU—Texas Instruments MSP430FI49IPM
- Precise crystal
- Connector for GPS (PPM, data)
- Connector to COMBO6

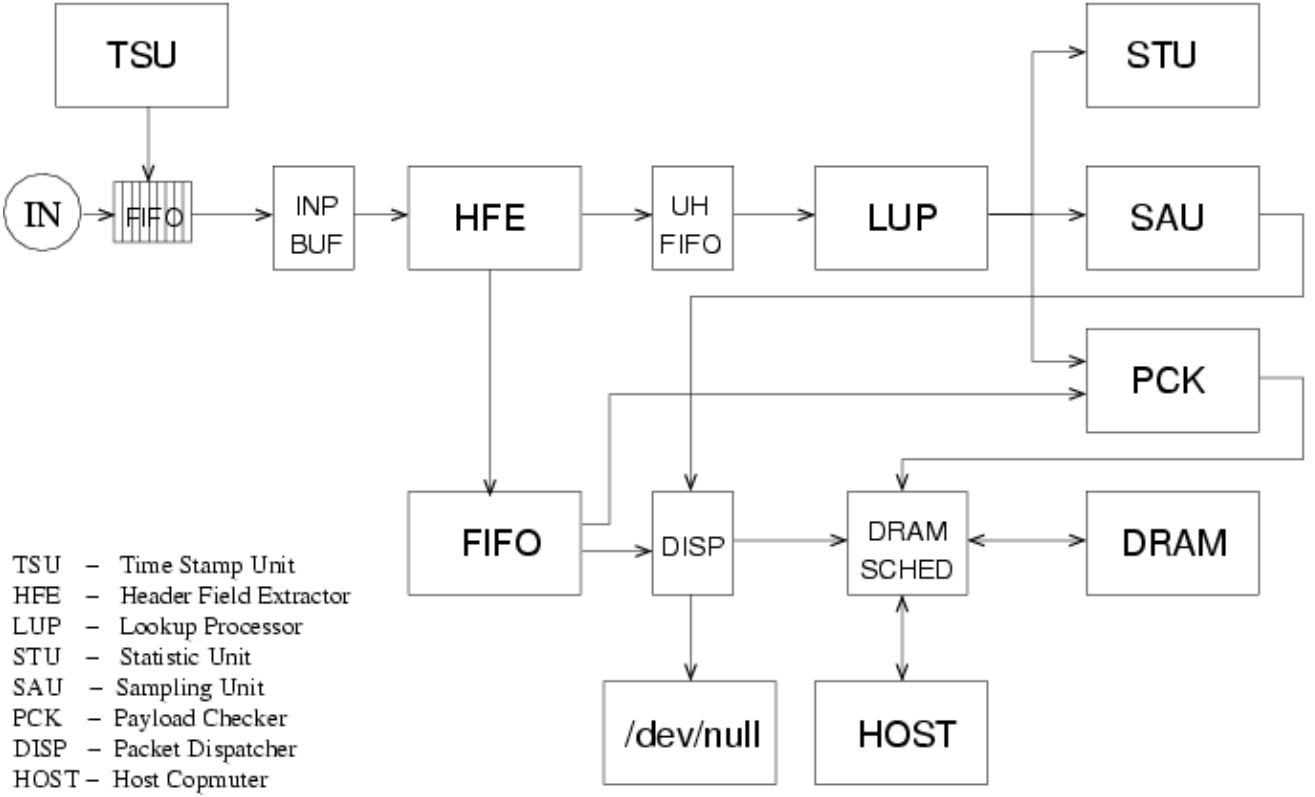
Status—in activation phase

SCAMPI Adapters

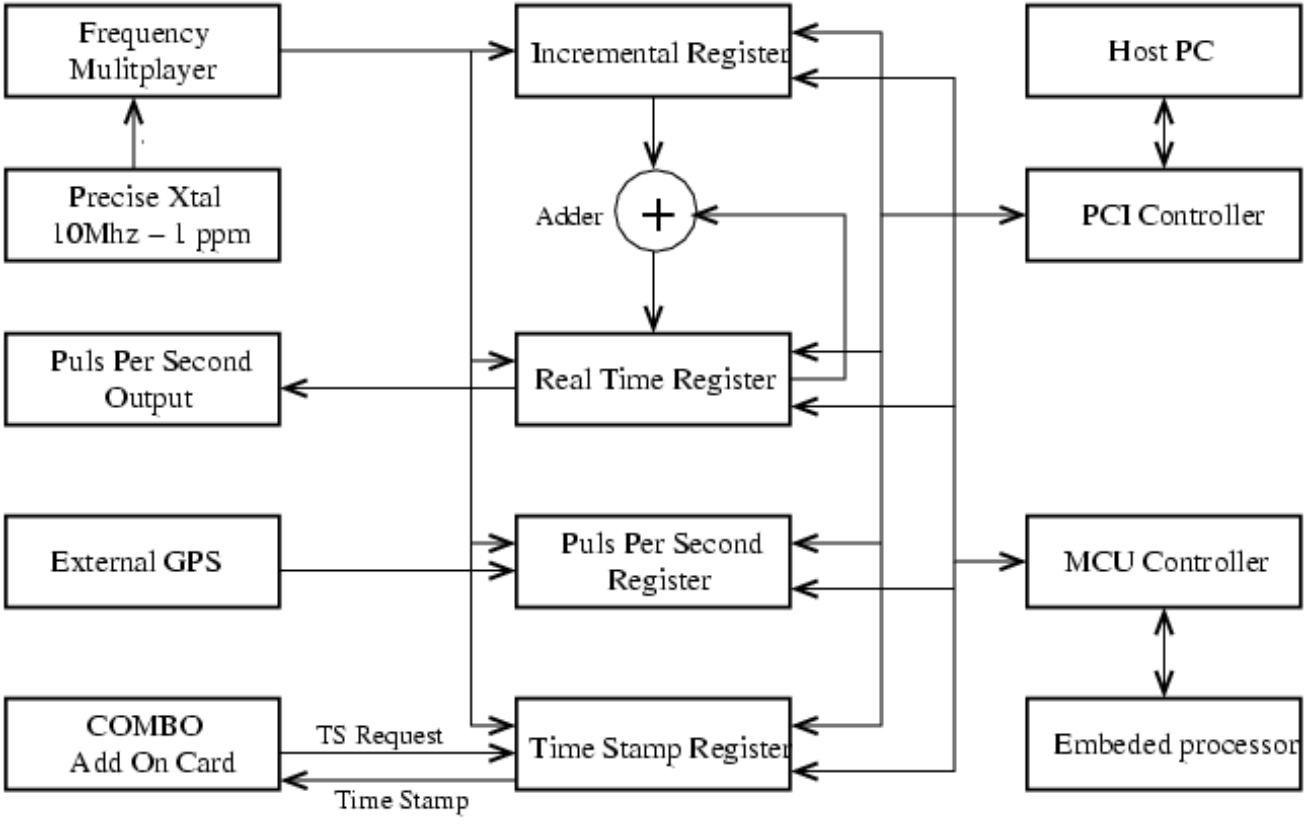
- SCAMPI-4MTX → COMBO6, COMBO-4MTX, COMBO-PTM
- SCAMPI-4SFP → COMBO6, COMBO-4SFP, COMBO-PTM, 4xSFP transceiver
- SCAMPI-2XFP → COMBO6X, COMBO-2XFP, COMBO-PTM, 2xXFP transceiver
- Any combination of COMBO6, COMBO6X with, COMBO-4MTX, COMBO-4SFP, COMBO-2XFP is available

SCAMPI FIRMWARE

- Modular design
- VHDL-standard development approach with simulation
- Nanoprocessors instead of FSMs
- Prototyping firmware blocks in SW
- Hardware/software co-design



TSU – Time Stamp Unit
HFE – Header Field Extractor
LUP – Lookup Processor
STU – Statistic Unit
SAU – Sampling Unit
PCK – Payload Checker
DISP – Packet Dispatcher
HOST – Host Copmuter



Time Stamp Firmware

SCAMPI SOFTWARE

- Linux driver
- Mapi for COMBO6
- Software simulator of COMBO6 on top of commodity card
- Comfort development environment for nanoprograms (nsim)
- Comboctl—loader and comfort debugging