SCAMPI Workshop

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03.05.2003 – Amsterdam
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
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
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
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 Computer

FIFO

UH FIFO

LUP

SAU

PCK

DRAM

/dev/null

HOST
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