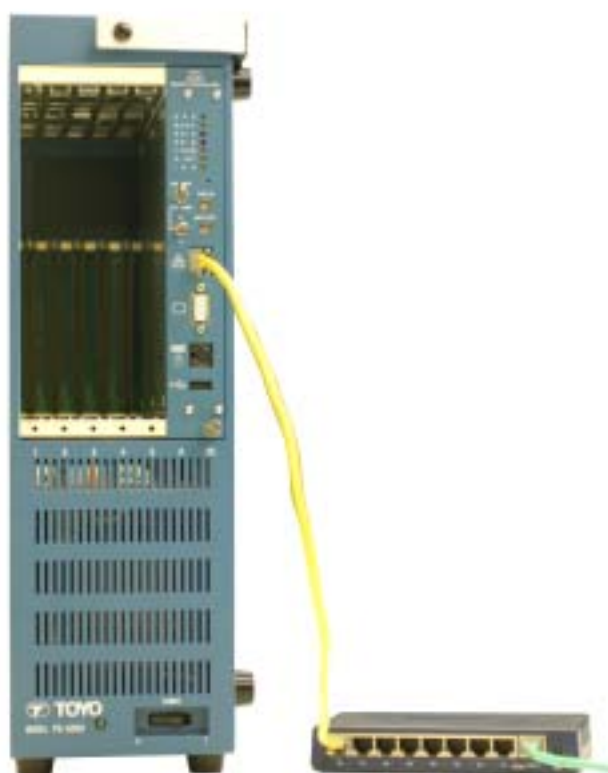# TOYO Corporation

Network Crate Controller
Model CC/NET

Embedded Linux® computer

Pipeline architecture

Surpass speed of
CAMAC standard limitation

Remote data acquisition and
control via Ethernet

Features

High Performance, Low Power, Transmeta Crusoe Embedded SBC with Linux®

Pipeline architecture

Maximum transfer speed surpass CAMAC standard limitation

Communicate with external computer via 10/100Mbps Ethernet

Event trigger input execute 1st CAMAC command in FIFO within 400ns

LAM interrupt

Overview

Model CC/NET can execute CAMAC cycles by 6 times faster than current crate controller such as our CC/7700. CC/NET includes a Transmeta Crusoe embedded SBC as local intelligence and user can do data acquisition and control by stand-alone. CC/NET aim to renew traditional CAMAC data acquisition system that conserves many CAMAC modules and performance of the system became to comparable to current measure and control systems.

CC/NET uses a PC/104+ extension interface for making it easy to follow up advancing CPU architecture.

You can connect CC/NET to other system via Ethernet and operate independent data acquisition and control application. Pipeline architecture is adopted as CAMAC control logic for achieving limited speed of CAMAC standard. In case of traditional CAMAC crate controller, application software writes N.A.F code to I/O register and set go bit to execute CAMAC Dataway cycle.

After the CAMAC cycle, CC/NET will wait active of "DONE" bit for completion of the CAMAC cycle, then readout data from data I/O register and terminate a CAMAC cycle. If application program includes only single CAMAC function code or sub-address depend CAMAC function, you can use crate controller DMA mode for high-speed transfer. However if application program include inconsistent CAMAC function, there were no way to speed up. But now, CC/NET's pipeline architecture accepts such inconsistent CAMAC function and executes them at CAMAC full speed. You can write CAMAC function (N, A, F, data) you need to a command frame and multiple frames are send to I/O register (Tx) of CC/NET at once. Multiple frames sent from CPU are automatically executing one by one with full speed. And reply frame are echo back to other I/O register (Rx). CPU send command frame to Tx, in other side CPU get reply frame including DATA, Q and X response. Above sequence is performed by I/O mode and DMA mode. In DMA mode you can enjoy CAMAC full speed execution.
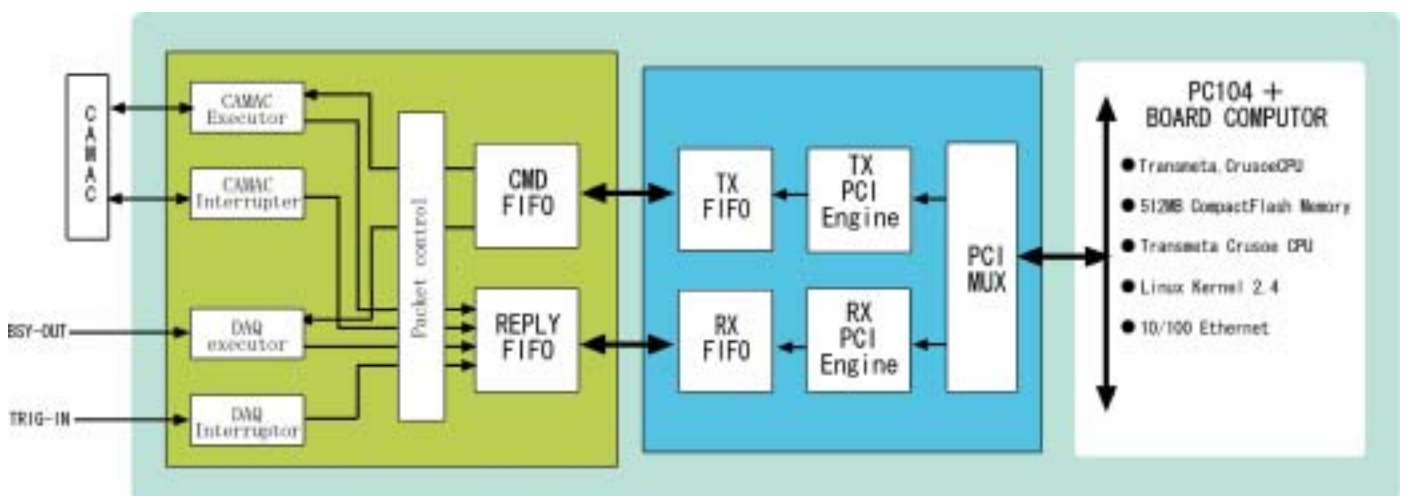
Software of CC/NET

CC/NET includes a Linux® (Kernel 2.4) optimized for it. CC/NET is delivered with a 512MB CompactFlash™ including a Linux® system, CAMAC device driver, the library and some sample programs. CompactFlash™ has a limitation for numbers of access. CC/NET is designed to reduce times of CompactFlash™ access by RAM drive utility. So user can make his Linux® system with no care for CompactFlash™ limitation.

Detail of software

Linux® system (Kernel 2.4):
 Now, CC/NET uses GNU/Debian Linux® 3.0, and soon, you can choose a different distribution of Linux®.

CAMAC device driver and the library:
 For generating a CAMAC-DAQ command frame by input N, A, F, data, useful library is prepared. To use this library, you open CAMAC and call above library for saving multiple command frames to command buffer. Then call library that execute command frame. For execute command frame, there are some library such as library using DMA, library using PIO.

Please select competent library for your application. Results of the CAMAC execution are saved into the reply frame buffer given as another attribute. Readout library used for calling contents (Data, Q, X) of reply frame is also prepared. There are other libraries used for waiting LAM, waiting TRG interrupt.

Sample program
 (1) Some program for basic function test
 (2) Web server application using JAVA
 (3) Small server/client program for using CAMAC
    library in the CC/NET from remote

Distribution kit

CC/NET mount a 512MB CompactFlash™ including Linux® system as a local disk. If you destroy the disk, you can restore your CC/NET using a restore CD kit included terminal to the CC/NET package.

Specifications

Standard	IEEE583 CAMAC Standard
Maximum Dataway cycle	3MB/s app.　1CAMAC cycle = 1.04us
TRIG Input	FAST NIM　Lemo connector
BUSY Output	FAST NIM　Lemo connector
	(Activated by TRIG in and terminated by software com)

Embedded Computer

CPU	Transmeta Crusoe TM5600-500 Processor
System Memory	320MB
Storage Device	Compact Flash 512MB
Video Output	1024x768 @ 16bpp
Extension Bus	USB 1.1
Network	RJ-45,10/100BASE-T Fast Ethernet compatible port
OS	Linux® (kernel 2.4)

Front panel LED

CPU (G)	CPU running　Blink: Boot, Light: RUN
BUSY (Y)	In CAMAC Dataway cycle
NO-Q (R)	Light on with no Q response at last CAMAC Dataway cycle
NO-X (R)	Light on with no X response at last CAMAC Dataway cycle
L-SUM (Y)	SUM of LAM1　LAM23
E-INT (Y)	Enable of LAM interrupt
INH (Y)	Dataway INHIBIT is in active

Front panel

On-line/Off-line switch	CAMAC Dataway is in offline
C/Z switch	Generate Dataway C/Z
Re-boot (Pin hole)	To Reboot CPU
TRG-IN　LEMO	Input an Event TRIG signal
BSY-OUT　LEMO	CC/NET is in BUSY state after TRIG input
Embedded computer port	
Ethernet connector	RJ-45,10/100Base-T
VIDEO Out	XGA, 1024x768 @ 16bpp
PS/2connector	Mouse and Keyboard
USB connector	USB1.1

Size, Weight	CAMAC, double width, 2kg
Power	+6V 4A,　+24V 2A