§1. Data Transfer and Direct Data Acquisition from GAMMA 10/PDX to LHD Virtual Laboratory via SNET

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We started to exhibit the total collection data in GAMAM10 on Plasma Research Center, University of Tsukuba with the collaboration of LABCOM group since 2008. In GAMMA 10, the base data acquisition is performed by using a CAMAC system by using Windows PC. These data is collected on the Soralis10 data server system with 4TB RAID system. In addition, we have many stand alone PC data collection systems for many diagnostics. We constructed the Linux (CentOS) data collection server system with 24TB RAID, in order to collect total collection data in GAMMA 10, such as CAMAC collection data and many other diagnostic data. We connected the NIFS LABCOM/X system under the new framework of "Fusion Virtual Laboratory" where users can access the data equivalently regardless of their whereabouts. Such the activity is named "SNET", which is based on a closed VPN on Japanese academic internet backbone SINET3 and covers multiple experimental remote devises. In Fig. 1, we show the SNET formation between GAMMA 10 local network and NIFS server segment.

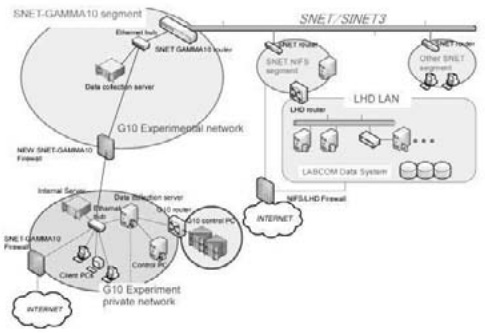

Fig. 1. SNET formation between GAMMA 10 local network and NIFS server segment.

From FY 2010, we started **P**otential control and **D**ivertor simulator e**X**periments (PDX). New diagnostics for divertor experiments are started such as end divertor calorimeter (nb-cm), end divertor spectrometers (nb-usb1 and bp-ssv), and end divertor probe (bp-epv). Moreover, we added the visible spectroscopy in the west plug region (sp-usb3). Three radial positions' Thomson scattering data were stably collected (Thomson-osc1, 2, 3). We send the GAMMA 10 total collection data from the GAMMA 10 data collection server to the NIFS LABCOM/X system. The total shot number of GAMMA 10/PDX plasma shot was about 3500 and the experimental days are 62 days in FY 2013. In Table 1, we show the total transfer data names and sizes. Total file size of transfer data is about 1.1 TB/year. In FY 2012, the total file size of transfer data was about 2.3 TB/year. The reason of the decrease of the data size is decrease of the nb-hs-camera data size.

The essential information of experiment operation, the sequence timings and the shot number, are given by the GAMMA10 experiment control system through the hard wires and the http network communication, respectively.

In addition to share the already acquired data, remote DAQ nodes were installed at GAMMA10/PDX to measure eight channels of end plate potential measurements, eight channels of microwave interferometer signals in the central cell plasma and the eight channels of end divertor probe signals in end region.

Diagnostics	data name	Size [kB]
GNBP	bp-epv	1,498,008
	bp-ssv	585,776
	bpcc	10,258,812
	bpcc2	10,242,268
SX	elx-mcpcc	4,158,536
ICRF	rf-eprobe	19,287,044
	rf-mach2probe	1,493,360
	rf-machprobe	11,168,976
	rf-mprobe	110,315,820
	rf-other	17,743,712
	rf-probe	7,848,412
	rf-ref	55,326,520
Thomson	Thomson-osc1	98,214,628
	Thomson-osc2	4,952,224
	Thomson-osc3	4,854,540
Spectroscopy	sp-ct100c	16,919,544
	sp-usb1	441,576
	sp-usb2	445,440
	sp-usb3	104,024
NBI	nb-cm	8,010,000
	nb-hs-camera2	360,000,000
	nb-hs-camera3	237,000,000
	nb-usb1	298,400
PRC	g10-camac	70,216,000
	Total size	1,051,383,620

Table. 1. Total transfer files.