# 第 XXXII 部

# Asian Internet Interconnection Initiatives

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# Asian Internet Interconnection Initiatives

## 第 1 章 Introduction

Our project called Asian Internet Interconnection Initiatives, or AI$^3$ (*ei-tripl-ai*) in short, has been established in 1995, in order to work for the Internet development in Asian region. When we started this project, we set some assumptions on what is required to accelerate the deployment process of the Internet: (1) a testbed network as a live demonstration and also as a technical showcase of the Internet technology is required because it always can persuade many people of the potential and possibility for the power of the Internet, (2) research for adapting and localizing the Internet to the region should be conducted simultaneously with the deployment, because the Internet is aiming to be an infrastructure for our society, and (3) human resource development locally in the region is vital for rapid deployment of the Internet because the human resource development process can reproduce more evangelists, supporters and participants for the Internet deployment.

With these assumptions, the AI$^3$ project decided to start as a research consortium of leading research groups in universities in Asia. Because universities are in charge of human resource development, less restricted to have a testbed network, and a base of research activities, we expect we can find out there many researchers who are working actively on the Internet technologies.

We're operating the Internet infrastructure on satellite system (Fig. 1.1). It performs our communication platform for our researches and activities. In our 10 years activities, AI$^3$ testbed network has been built to connect 16 universities in 10 countries in this region and still expanding. This network has been working on 24/7 basis and

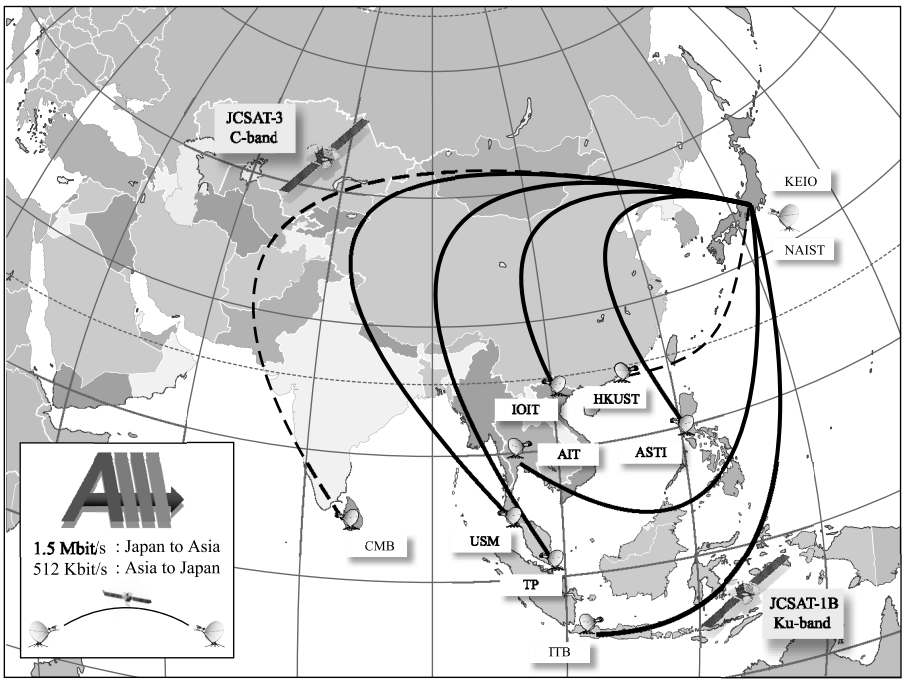



**Fig. 1.1.** The AI$^3$ testbed network

turned to be its communication infrastructure for members of this AI$^3$ project.

In this report, we mention our activity in this year with our partners using AI$^3$ network. In 2nd chap., we describe activity report from partners. It includes short introduction of them and their research topics.

## 第 2 章　Report from partners

We have research partners in Asian region. In this chapter, we report some characteristic acts on the partners.

### 2.1 NAIST, Japan

#### 2.1.1 Introduction

NAIST is an institute university in Japan. NAIST and SFC are AI$^3$ sites located in Japan and operate our network and have some experiments on our network. It plays some important roles such as providing DNS and WEB services. Currently, We have missed satellite link on NAIST from Apr, 2004 because of termination of using satellite link on Ku-band which means frequency of the satellite link.

#### 2.1.2 Operations

NAIST provides Web, DNS, Mail and Mailing List services for AI$^3$ network. Besides, we provide many functions for informing our project and sharing information each other as well as maintaining our network.

1. DNS server
   We provide AI$^3$ primary DNS system. It contains many records not only for Japanese sites but also for foreign partner's. Therefore many partners refer it as their DNS server.
2. WEB server
   The web server is named www.AI3.net. It is used for to inform our results and to share the operator's information. For example, We can check whether NAIST network system is going well or not on our Multi Router Traffic Grapher page.
3. Mail server (and Mailing List service)
   We have mail and Mailing List server. We can easily share various of information about our activity such as operational topics, progress of our projects and so on.

#### 2.1.3 Research Topic

One research topics is now proceeding in NAIST. It is about worm traffic detection on AI$^3$ network for support operation. We are defining some indexes which describe characteristics of traffic, such as scattering of access destination, homogeneity of traffic flows and so on. We would detect and cut such malicious traffic out with our detecting system. Currently we are going to define benchmark indexes more and check how it works for finding worm traffic. This research is proceeding. The progress will be reported later.

### 2.2 Institut Teknologi Bandung, Indonessia

This report will give some summary of ITB's network activity, which is using AI$^3$'s C Band link Internet connectivity.

#### 2.2.1 General Information and History

Institut Teknologi Bandung (ITB), was founded on March 2, 1959. The present ITB main campus is the site of earlier engineering schools in Indonesia. Although these institutions of higher learning had their own individual characteristics and missions, they left influence on developments leading to the establishment of ITB.

In 1920, Technische Hogeschool (TH) was established in Bandung, which for a short time, in the middle forties, became Kogyo Daigaku. Not long after the birth of the Republic of Indonesia in 1945, the campus housed the Technical Faculty (including a Fine Arts Department) of Universitas Indonesia, with the head office in Jakarta. In the early fifties, Faculty of Mathematics and Natural Sciences, also part of Universitas Indonesia,

was established on the campus.

In 1959, the present lnstitut Teknologi Bandung was founded by the Indonesian government as an institution of higher learning of science, technology, and fine arts, with a mission of education, research, and service to the community.

Government Decree No. 155/2000 pertaining to The Decision on ITB as Legal Enterprise (Badan Hukum) has opened a new path for ITB to become autonomous. The status of autonomy implies a freedom for the institution to manage its own business in an effective and efficient way, and to be fully responsible for the planning and implementation of all program and activity, and the quality control for the attainment of its institutional objective. The institution has also freedom in deciding their measures and taking calculated risks in facing tight competition and intense pressures.

### 2.2.2 Location

Bandung, with a population of approximately one and a half million, lies in the mountainous area of West Java, at an altitude of 770 meters. The ITB main campus, to the north of the town centre, and its other campuses, cover a total area of 770,000 square meters.

### 2.2.3 Address

Office: USDI ITB, CCAR Building 3rd floor
Jl. Tamansari 64 Bandung 40116,
Campus: AI3 ITB, PAU Building 4th floor
Jl. Ganesha 10, Bandung 40132 Indonesia
Tel and Fax +62-22-2500935

### 2.2.4 Operational Aspect

**SMTP Services**

Figure 2.1 depicts the SMTP logic diagram.

Detail specification of ITB SMTP system are listed below:

- Some MX for incoming and outgoing (mx1, mx2, mx4, mx5, mx7).
- Antivirus and Antispam with load balancing (using Vexira, Amavisd-new, and spamassasin).
- Greylisting system. Using postfix-gps software which has been implemented in our MX. The greylisting is applied for incoming traffic

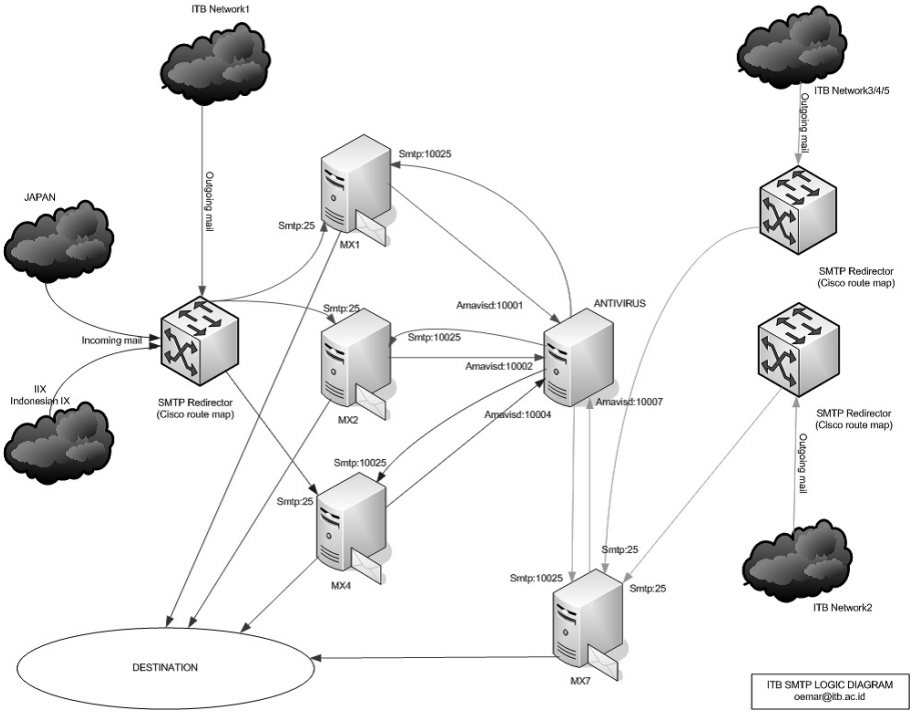
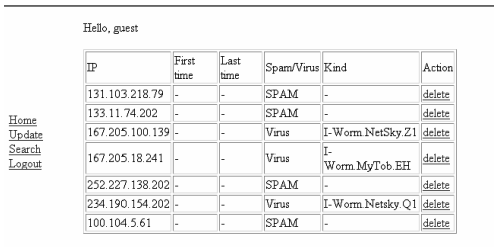



**Fig. 2.1.** Mail Schema

from the outside of ITB's network.

- RBL system. Using common RBLS system like ordb.org. Using our RBL with the data from our antivirus and antispam system (`http://rbl.itb.ac.id`) (Fig. 2.2).

With this schema ITB can reduce spam below 5 percent of incoming email and virus below 12 percent of incoming mail compare to last system (last year).



Hello, guest

Home
Update
Search
Logout

| IP | First time | Last time | Spam/Virus | Kind | Action |
|---|---|---|---|---|---|
| 131.103.218.79 | - | - | SPAM | - | delete |
| 133.11.74.202 | - | - | SPAM | - | delete |
| 167.205.100.139 | - | - | Virus | I-Worm.NetSky.Z1 | delete |
| 167.205.18.241 | - | - | Virus | I-Worm.MyTob.EH | delete |
| 252.227.138.202 | - | - | SPAM | - | delete |
| 234.190.154.202 | - | - | Virus | I-Worm.Netsky.Q1 | delete |
| 100.104.5.61 | - | - | SPAM | - | delete |

**Fig. 2.2.** RBL

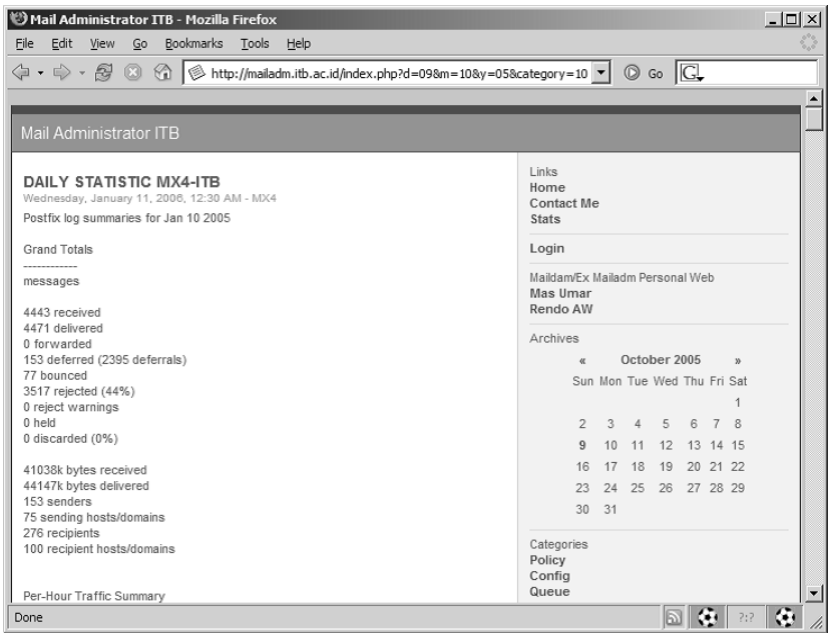



**Fig. 2.3.** Pflogsumm for SMTP

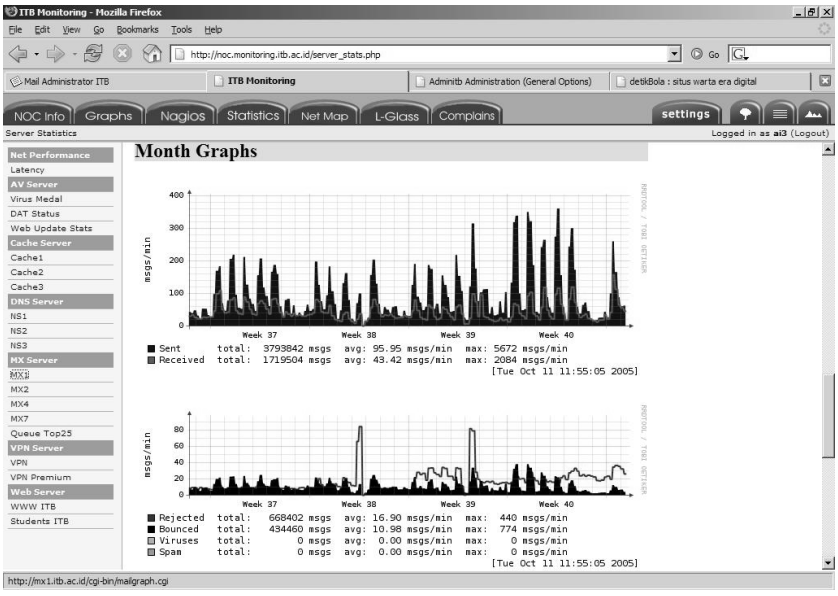



**Fig. 2.4.** Mailgraph for SMTP monitoring

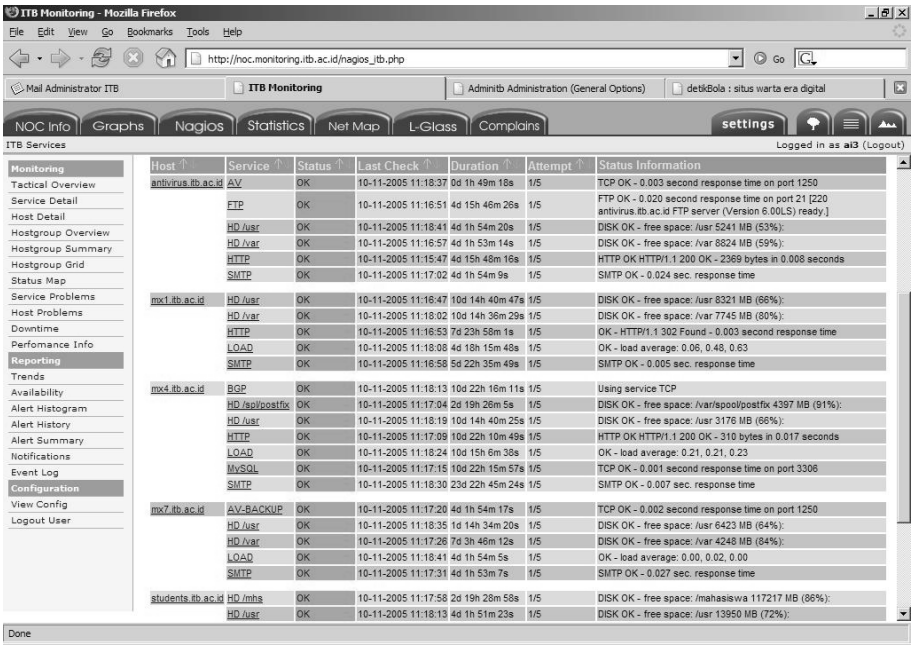



**Fig. 2.5.** Cacti and Nagios for Realtime Monitoring

All of MX has dual IPv4 and IPv6 operation. We proudly operate SMTP IPv6 services for almost 4 years.

**Network Monitoring**

During 2005 year we redesign and populate network monitoring system onto one interface. We monitor all of operation aspect and services.

We use pflogsumm and Mailgraph for monitoring SMTP traffic. Figure 2.3 and 2.4 shows screen image of these systems. Nagios is running on our network for monitoring our satellite network. Figure 2.5 shows the example of realtime alerting in Nagios.

### 2.2.5 Research Aspect

During year 2005, we have been doing research on:

- I root server measurement and analysis
- DNS abuse monitoring, ITB's case study

## 2.3 Institute of Information Technology, Vietnam

### 2.3.1 Institute of Information Technology

**Establishment:**

1976: Institute of Computer Science and Cybernetics (ICSC). 1989: ICSC was renamed Institute of Informatics (IOI). 1993: IOI, Center for System and Management Research and Center of Applied Mathematics merged into Institute of Information Technology (IOIT).

**Staff:**

200 people. Among them 60 Dr. Sc. and Ph.D, 16 Prof. and Ass. Prof.

**The functions:**

Carrying out the studies of basic problems of informatics, mathematical and technical aspects of IOIT, the application of IOIT in socio-economic systems and industrial manufacturing processes. Design, and development of IOIT products, especially softwares. Development of IOIT applications in different sectors, transfer of technologies in the field of IOIT, technical consulting in some

of governmental IOIT projects in administration as well as in other sectors of economics. Training of scientific researchers on IOIT. International cooperation in IOIT.

**Main facilities:**

Institute's LAN has been served as VAST (Vietnam Academy of Science & Technology) Campus Network Center, basing on switched Ethernet on Fiber Optics and Twisted-Pairs and serving nearly 400 PCs, SUN Workstations, Digital Alpha Servers, interconnected by Netware, Window2xx, LINUX using TCP/IP. Platforms are heterogenous, including Windows and UNIX, various databases and different tools for developing integrated database systems, information management systems and other software packages. IOIT is one of the first four Internet Service Providers (ISP) in Vietnam, providing all Internet services for E-mail, Portal, IP phone, .... The Institute has a key-laboratory for Networking Technology and Multimedia.

**Major R & D Activities**

Computer Science: Artificial intelligence, Pattern recognition and Image processing, Programming languages, Parallel processing, Information cryptography. Software Engineering: Distributed database, computer graphic, software engineering methodology, system analysis and design, multimedia, geographical information systems, management information systems. Technical Informatics: Networking, informatics on telecommunication, system support. Industrial Automation: Advanced control technologies, modern control theory, robotics, embedded control, PC based control systems. Mathematical Aspects of IT: Mathematical modeling, numerical methods, computational statistics. IT for Socio-Economic Systems: Economic models, economic system analysis, analysis, design and implementation of computerized information system for socio-economic activities.

### 2.3.2 Network topology

We describe our network status here. Figure 2.6 shows our network. It transfer IPv4 and IPv6 traffic for our commodity use. Figure 2.7 shows our testbed network. It is constructed for our experiments on IPv6 environment. At last, in fig. 2.8 we pict the status of our network use in 2005.

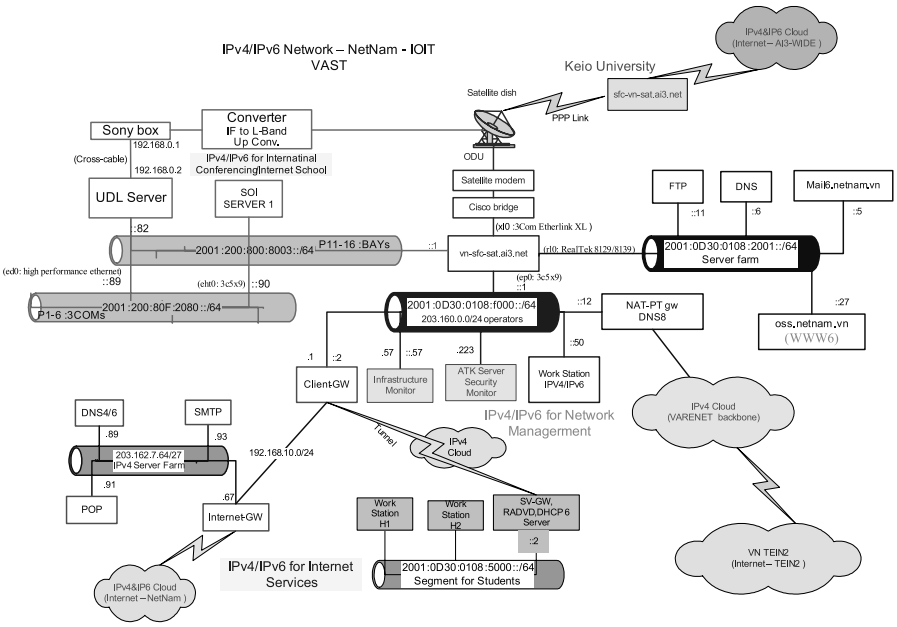



**Fig. 2.6.** IPv4/v6 network topology

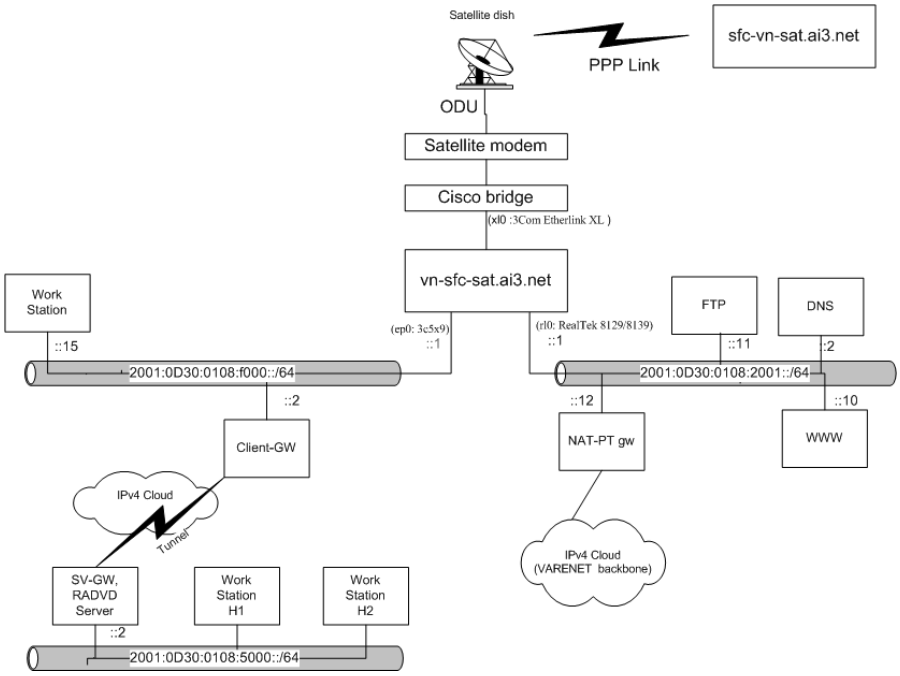



**Fig. 2.7.** IPv6 network topology as testbed network

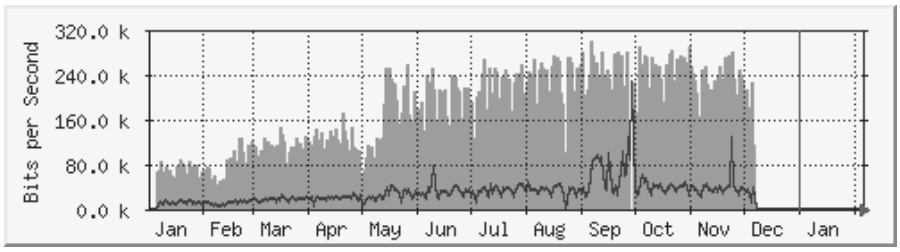



**Fig. 2.8.** Bandwidth utilization — year 2005

### 2.3.3 Research & Development

**IPv6**

- IPv4/IPv6 multicast gateway

  Figure 2.9 is the model of our multicast gateway system. The system consist of three parts.

  – Host IPv4 multicast
  – Converter
  – Host IPv6 multicast

  Figure 2.10 shows how it works.

  An IPv6 host that wants to receive data from the IPv4 multicast group 223.2.240.176 will join the IPv6 multicast group represented as ff3e:30:2001:700:1:ffff:224.2.240.176 by transmitting a PIM join message to the gateway. The gateway then sends the join message to the respective IPv4 multicast

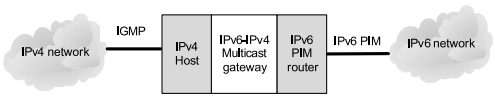



**Fig. 2.9.** Our multicast gateway Model (1)

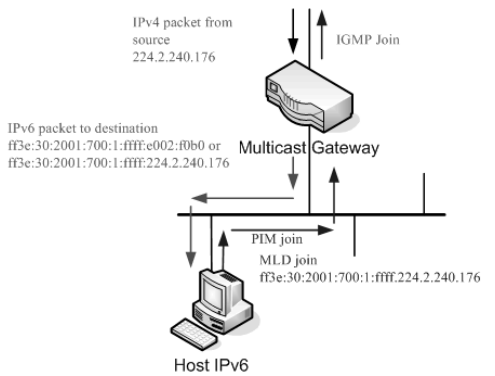



**Fig. 2.10.** Our multicast gateway Model (2)

address (e.g. 223.2.240.176) using its IPv4 address as the source address of the message. The gateway becomes a source host of the specified IPv4 multicast address, if there is no existing IPv4 multicast group. The gateway resends all IPv4 multicast traffic (e.g. 223.2.340.176) to the IPv6 multicast group (e.g. ff3e:30:2001:700:1:ffff:224.2.240.176).

### 2.3.4 Network management

The monitoring and measuring system

**Function:**

- Monitoring the network resources, network operations: bandwidth, in and out packet
- Displaying the condition of network devices and services.
- Tracking the network quality of service.

**Measuring methods:**

The monitoring system uses two basic methods to measure:

- passive measuring:
  - The server sends snmp request to the measured devices to receive the operating information.
  - This method is used to show the statistic of bandwidth, the number of packets; CPU, RAM utilization of routers and other network devices
- active measuring:
  - The server impacts the devices or the services by sending ICMP ping packets or service request packet such as http request or dns query, etc.
  - The latency of the reply and the packet loss ratio can show the availability and the quality of network devices and services.

**System Elements**

- MRTG

  The Multi Router Traffic Grapher (MRTG) is a tool to monitor the traffic load on network links. MRTG generates HTML pages containing PNG images which provide a LIVE visual representation of this traffic. MRTG is based on passive measuring and uses SNMP protocol to communicate with network devices. The monitoring examples are shown in figure 2.11, 2.12, 2.13.
- Smokeping

  Smokeping bases on the active measuring and uses RRDTools. It can measure, store

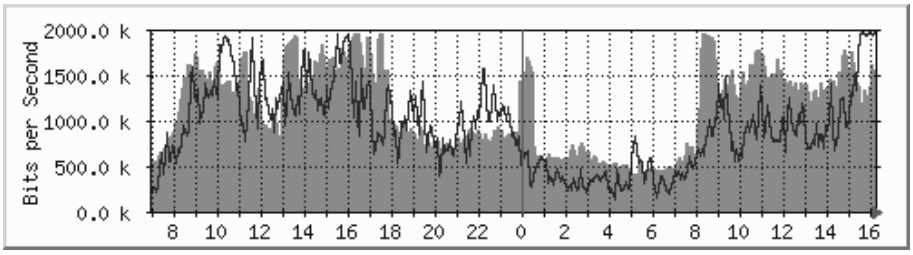



**Fig. 2.11.** Bandwidth measured by MRTG

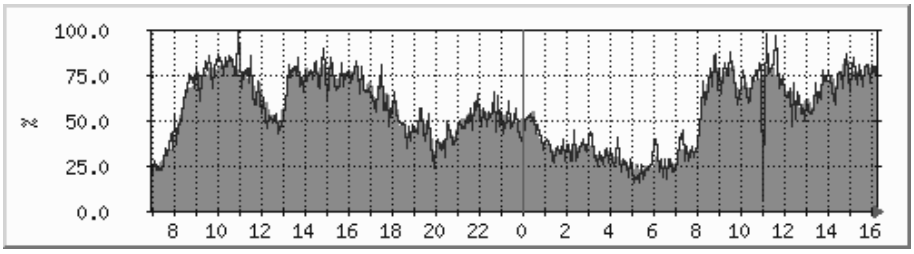



**Fig. 2.12.** CPU Utilization of Router measured by MRTG

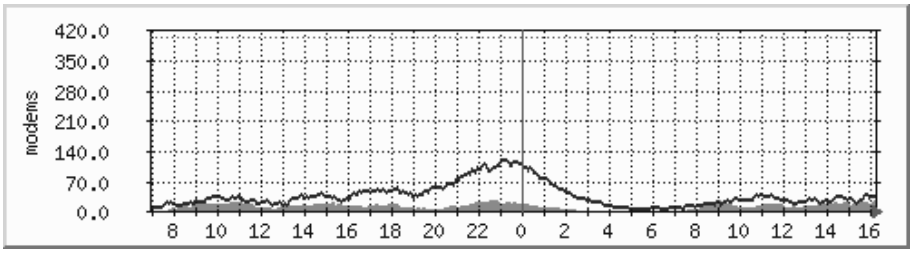



**Fig. 2.13.** The number of modem sessions connecting to NOC measured by MRTG

and display latency, latency distribution and packet loss. SmokePing uses RRDtool to maintain a longterm data-store and to draw pretty graphs, giving up to the minute information on the state of each network connection. The important feature of Smokeping is Alarm. The administrator can define the threshold to alarm. This threshold can be the latency or the packet loss.

### 2.3.5 Security R&D based on open-source softwares: Firewall, IDS, Anti-spam

**Anti-spam solution**

We have constructed e-mail system with anti-spam solution (Fig. 2.14). It is based on Spamassassin, sendmail.

### 2.3.6 Operation activities

- Update RR (zebra0.95, xorp 1.1, support multicast over IPv4/IPv6)
  Global IPv4 address of SOI Asia server: 202.249.24.88/29, Global IPv6 address of SOI Asia server: 2001:d30:108:2001::/64
- Realtime class (WindowsXP, Fedora core4, support multicast over IPv4/IPv6)
- Join to Aichi Expo (Camera)
- Broadcasting COSGov to SOI ASIA (Fig. 2.15)
- Video-Conferencing lab (belong to National lab of Networking and Multimedia, Institute of Information Technology, VietNam) (Cisco MCU 3511, Polycom ViewStation, Sony DSP1600) (Fig. 2.16)

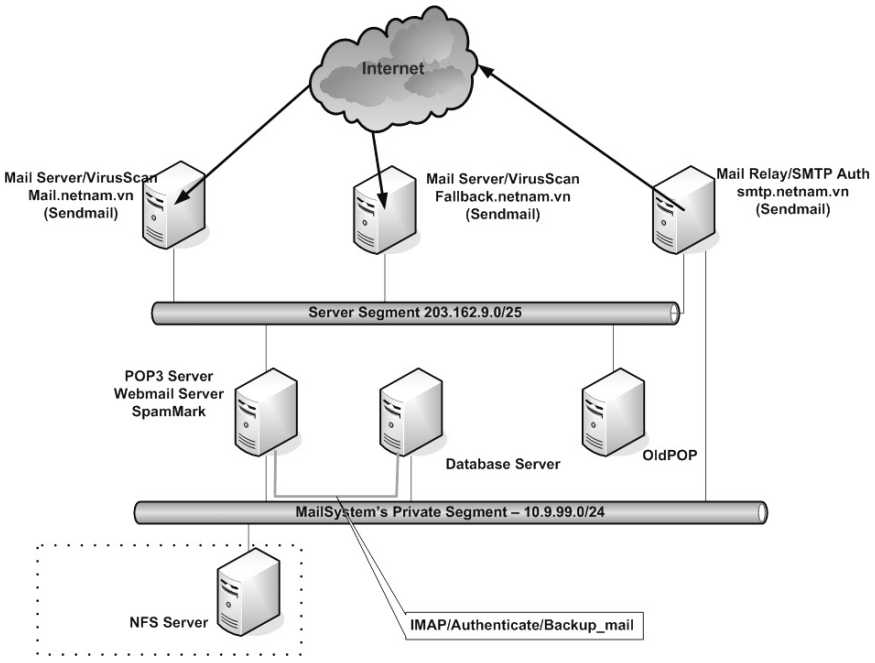



**Fig. 2.14.** Open-Source Email System

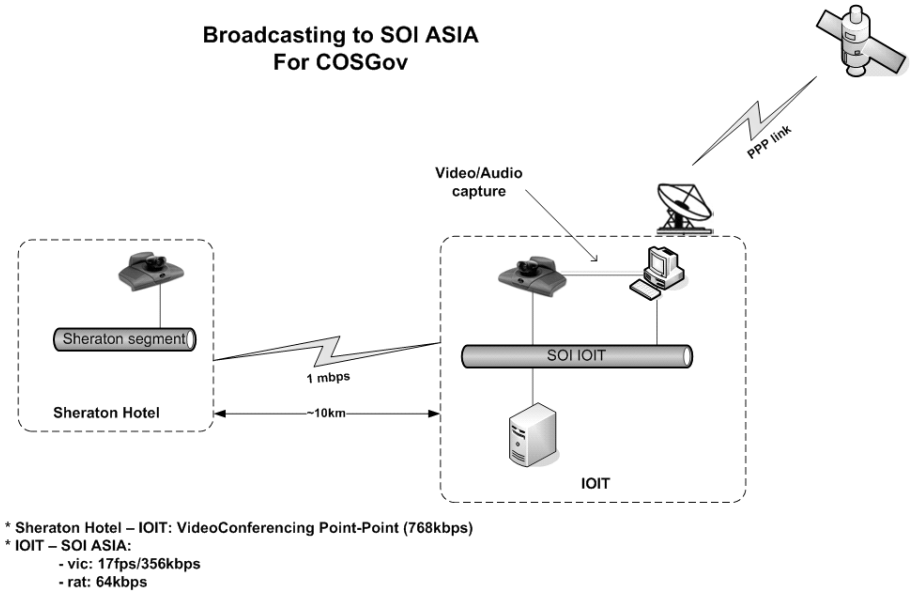



**Fig. 2.15.** Broadcasting COSGov to SOI ASIA


**Fig. 2.16.** Figure I 3 Broadcasting to SOI ASIA

– Problems: Sometimes got net congestions
– Wishes: Cooperate closely with HUT, setup new wireless connection, setup new optic-link
– Planning: Complete SOI classroom setup at HUT.
Propagate SOIASIA-VN activities to VNU VN National Uni,, IBT (Institute of Bio Technology), IET (Institute of Environment Technology), and others.

**Special Notes:**

Tuesday, December 06, 2005 14:08 PM, JSAT YSCC is asking as to stop the transmission from IOIT, because we are transmitting to incorrect frequency. We have stopped the transmission, and check our equipments (IDU/ODU/etc. with VTI) and are waiting to have UAT with YSCC until now.