

SOI-ASIA Operators Workshop 2003 Spring
TEXTBOOK (1)

February 12, 2003

Keio University Research Institute at SFC
SOI-ASIA Project

About This Textbook

This textbook is for the SOI-ASIA Operators Workshop 2003 which is held in Asian Institute of Technology, Bangkok, Thailand from February 17th to 24th 2003. This textbook helps students understand the lectures in the workshop.

Other Textbooks

We also use these books textbooks. Please use them with this textbook.

- RUNNING LINUX 3rd Edition, Matt Welsh, O'Reilly & Associates Inc, 1999
- TCP/IP Network Administration 3rd Edition, Craig Hunt, O'Reilly & Associates Inc, 2002

Authors

This textbook is written by these researchers in Keio University, Research Institute at SFC.

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Curriculum

Date	Time	Schedule	Topic	Curriculum	
2/17 (Mon)	9:00-10:30	Session 1 (30 min. break)	UNIX and TCP/IP Network Administration	Orientation and Practice Quiz	
	11:00-12:30	Session 2 (1 hour lunch)			
	13:30-15:00	Session 3 (30 min. break)		OS Installation	
	15:30-17:00	Session 4			
	17:00-19:00	Dinner			
19:00-21:00	Self Study				
2/18 (Tue)	9:00-10:30	Session 1 (30 min. break)			UNIX Basic Commands
	11:00-12:30	Session 2 (1 hour lunch)			FreeBSD Configuration (kernel/Daemon), Security
	13:30-15:00	Session 3 (30 min. break)			UNIX Daily Operation
	15:30-17:00	Session 4			TCP/IP Network Configuration
	17:00-19:00	Dinner			
19:00-21:00	Self Study				
2/19 (Wed)	9:00-10:30	Session 1 (30 min. break)	SOI-Asia specific System and Network Administration	UNIX Network Commands	
	11:00-12:30	Session 2 (1 hour lunch)		SOI-ASIA RO Network and UDLR technology	
	13:30-15:00	Session 3 (30 min. break)		SONY-BOX / RR Configuration	
	15:30-17:00	Session 4			
	17:00-19:00	Dinner			
19:00-21:00	Self Study				
2/20 (Thu)	9:00-10:30	Self Study			
	10:30-13:30	ASEAN-Japan 30 Years Anniversary			
	13:30-14:30	Lunch			
	14:30-17:00	Session 1			Linux configuration
	17:00-19:00	Dinner			
19:00-21:00	Self Study				
2/21 (Fri)	9:00-10:30	Session 1 (30 min. break)	UNIX and TCP/IP Network	Trouble Shooting	
	11:00-12:30	Session 2 (1 hour lunch)			
	13:30-15:00	Session 3 (30 min. break)		DNS/Mail/Web Server Administration/Operation	
	15:30-17:00	Session 4			
	17:00-19:00	Dinner			
19:00-21:00	Self Study				
2/23 (Sun)	9:00-10:30	Session 1 (30 min. break)		SOI ASIA Course Application	SOI Mirror Server Administration
	11:00-12:30	Session 2 (1 hour lunch)			Multicast File Transfer Application
	13:30-15:00	Session 3 (30 min. break)			SOI ASIA Class Application
	15:30-17:00	Session 4			
	17:00-19:00	Dinner			
19:00-21:00	Self Study				
2/24 (Mon)	9:00-10:30	Session 1 (30 min. break)	SOI ASIA Course Application		
	11:00-12:30	Session 2 (1 hour lunch)			How to make SOI Style Materials
	13:30-15:00	Session 3 (30 min. break)			
	15:30-17:00	Session 4			Practice Quiz
	18:00-20:00	Dinner & Farewell Party			

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This textbook explains about the SOI-ASIA network administration (Feb 19th).

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UDLR Technology

In the SOI-ASIA network we are using satellite link as UDL (Uni Directional Link). Benefits of using satellite link as UDL are;

- We can use RO (Receive Only) station.

The RO station is much cheaper than normal earth station.

- We do not need transmission license.

In some countries it is very difficult to get a transmission license.

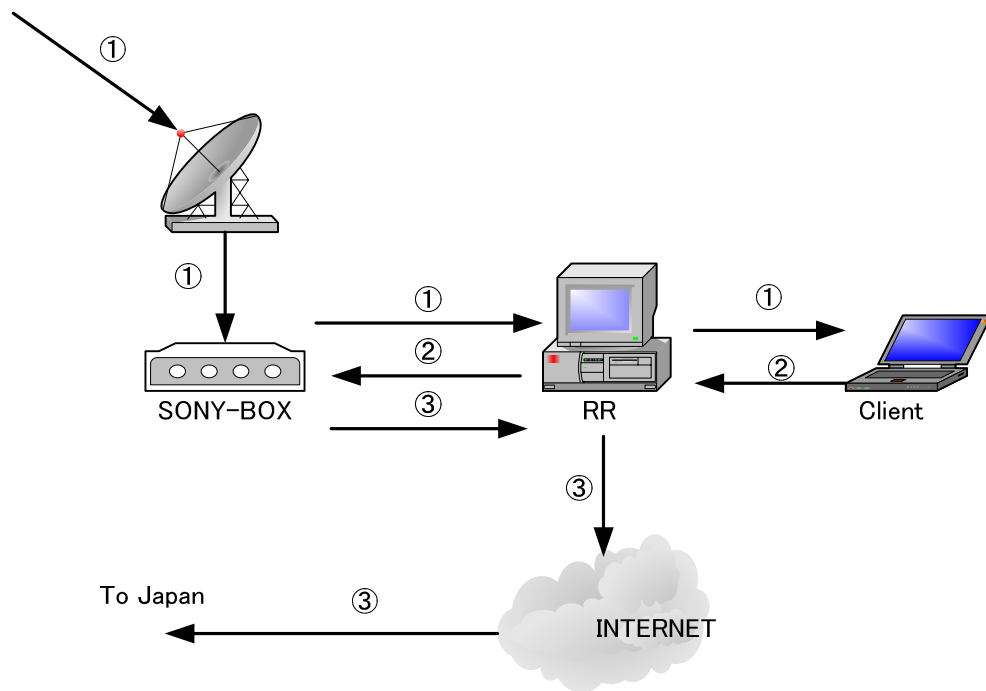
- We do not need any radio operator in RO sites.

If we have normal earth station we need radio specialist in each RO site.

In order to use UDL for the Internet, we need a special mechanism. The Internet is designed for BDL (Bi Directional Link, the antonym of UDL) like telephone line. In principle the incoming packet and the outgoing packet use same route on the Internet, but it is impossible on the UDL.

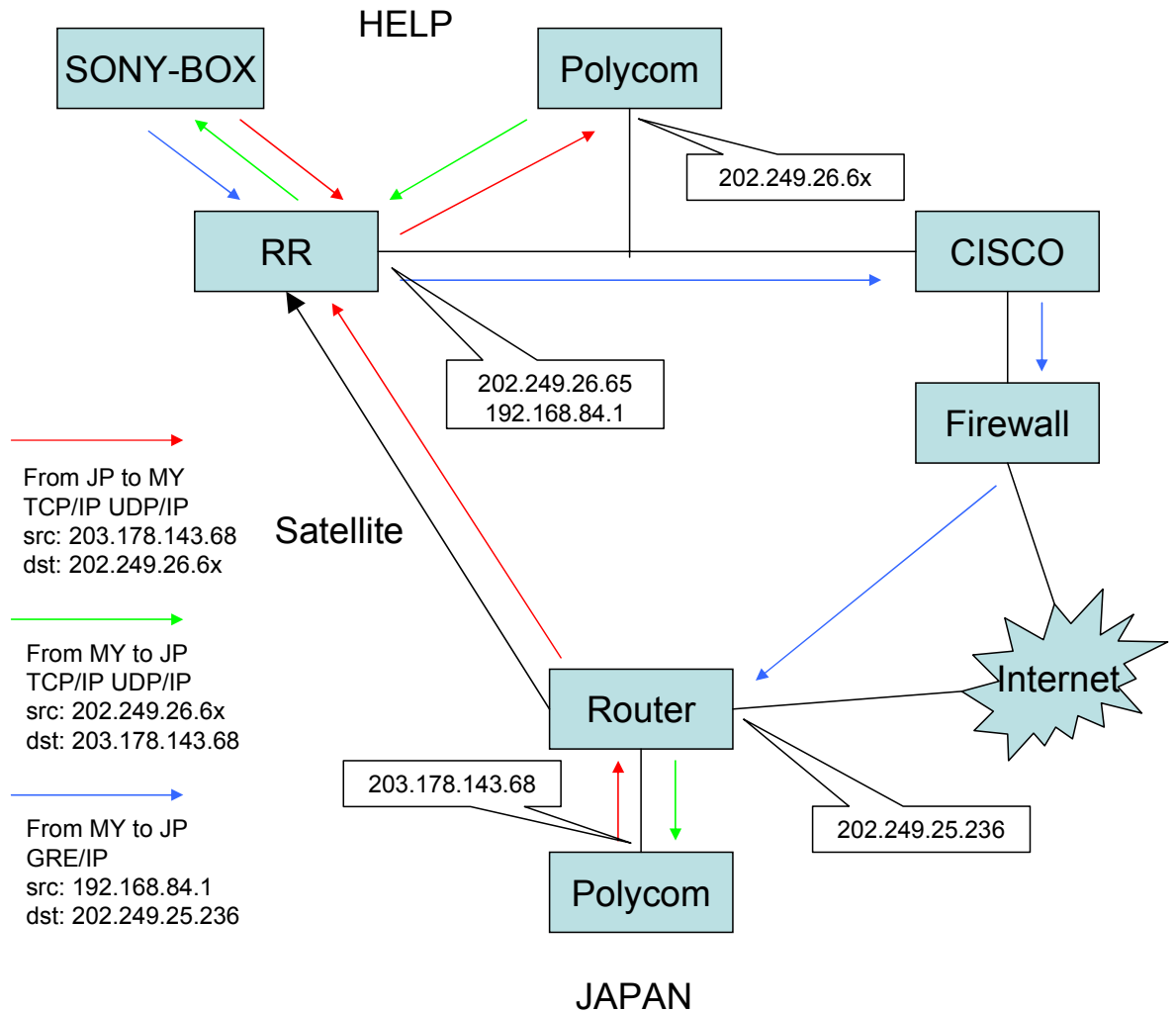
We have solved this problem by UDLR (Uni Directional Link Routing) technology developed by us. The SONY-BOX is “UDLR BOX”. By installing the SONY-BOX on your RO station you can use UDL satellite link just like BDL satellite link.

The next figure explains how UDLR and SONY-BOX work.



1. The data come from Japan via satellite link, and they reach the client.
2. The data from client to Japan try to use satellite link because default route is satellite link.
3. However this satellite link is UDL, the data from client cannot be transmitted. So the SONY-BOX catches the data, encapsulates by "GRE", and sends them to Japan by terrestrial Internet.

The next figure shows an example in AYF, Malaysia.

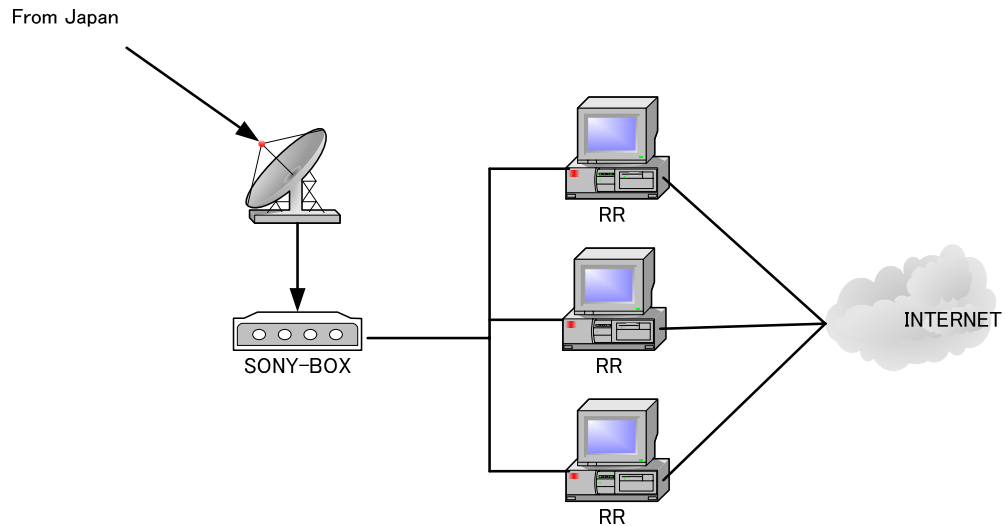


- The data from Japan to Malaysia uses the 6Mbps satellite link. (RED arrow)
- The data from Malaysia to Japan try to use the satellite link, because the satellite link is the shortest path to Japan. (Green arrow)
- The data from MY to JP cannot use the satellite, because AYF radio station is receive-only.
- SONY-BOX encapsulates the data (TCP, UDP), and make new packets. New packets are GRE/IP, and source/destination are 192.168.84.1 to 202.249.25.236. (Blue arrow)
- The router in Japan receives GRE packet from MY via Internet. Then the router decapsulates GRE packets, restores GRE to original TCP/UDP packets.

- The restored data reaches the polycom in Japan. (Green arrow)

The Training Topology

For the practice of SONY-BOX and RR configuration, we build the following network. Each team makes 1 RR, and receives multicast data (lectures) from Japan.



SONY-BOX Configuration

The following is a sample configuration for SONY-BOX. In AIT we have only one SONY-BOX and it is in operation, so we cannot practice practically. In the lecture we learn SONY-BOX's commands using this sample configuration.

```
tuner downlink 4065.375
tuner symbolrate 4.7760
tuner fec 3/4
tuner polarization h
tuner local 5150.000
tuner tone off
tuner interval 30
tuner spectral-inversion
!
service espid 0x0555
!
interface lan
ip address 192.168.0.1 255.255.255.0
media-type auto
```

```

duplex half
exit
!
download pid 0x1ffe
ip route default 192.168.0.2
ip udlr feed 202.249.25.236
ip udlr gateway 192.168.0.2
ip udlr
ip dtcp port 652
ip dtcp address 224.0.1.124
ip dtcp
!
ip igmp robustness 2
no ip igmp
ip igmp query
mac filter pass allmulticast
mac learn maxcount 10
mac learn timeout 0
snmp-server community public
snmp-server address 0.0.0.0
end

```

RR Configuration

In order to make RR, change the following configuration files on your FreeBSD;

- /etc/rc.networks

We need to add the static route to tunnel destination in Japan.

Find “Set up any static routes” strings on rc.networks using search function on vi editor, then add these 2 lines (beginning with “route add”) like the following. The lecturer will instruct which IP address we should use for “x.x.x.x” in the lecture.

```

# Set up any static routes.      → Which you find
#
if [ -n "${static_routes}" ]; then
    for i in ${static_routes}; do
        eval route_args=¥$route_¥{i}
        route add ¥{route_args}
    done
fi
route add -host 202.249.25.234 x.x.x.x
route add -host 202.249.25.236 x.x.x.x

```

```
echo -n 'Additional routing options:'  
case ${tcp_extensions} in
```

- /etc/mrouted.conf

We need to configure multicast daemon called “mrouted”. By vi editor, create new file “/etc/mrouted.conf”, then write these 2 lines:

```
phyint fxp0 altnet 202.249.25.0/27  
phyint fxp1 altnet 202.249.26.160/27
```

The first line specifies the multicast source in Japan, so it is same in every site. The second like specifies the multicast client in your site, so it will differs in each site. 202.249.26.160 is for this workshop.

Multicast Receiving Test

After we complete SONY-BOX and RR configuration, we try to receive multicast data (lecture) from Japan using “tcpdump command”, which you learn the previous lecture.

Also you can test by WMT client on “SOI-ASIA class application” session. If you succeed the configuration you will see the lecture from Japan by WMT client.