

Introduction to SOI Asia Network

- SOI Asia Network Overview
- UDLR Overview
- Receive Router Configuration
- Debugging SOI Asia Network



Before we go in detail on SOI Asia Network...

- In general, satellite links has
 - Wide coverage without geographical limitation
 - Broadcast capability
 - Flexibility on link configuration
 - Frequency, information rate, etc...



Earth Station Read-Only vs. Send-Capable

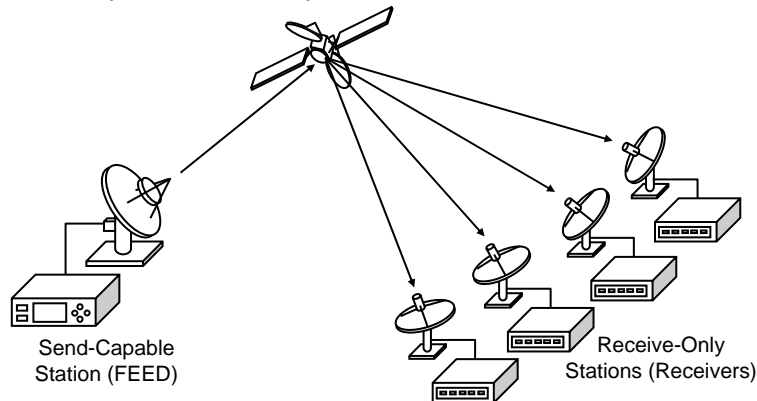


	Read-Only	Send-Capable
Cost of building earth station	Cheap	Expensive
Size of earth station system	Small	Large because of many equipments
Transmission license	No need in most country	Need and difficult to obtain
Radio specialist	No need	Need standing by specialist all the time

Satellite UDL Topology



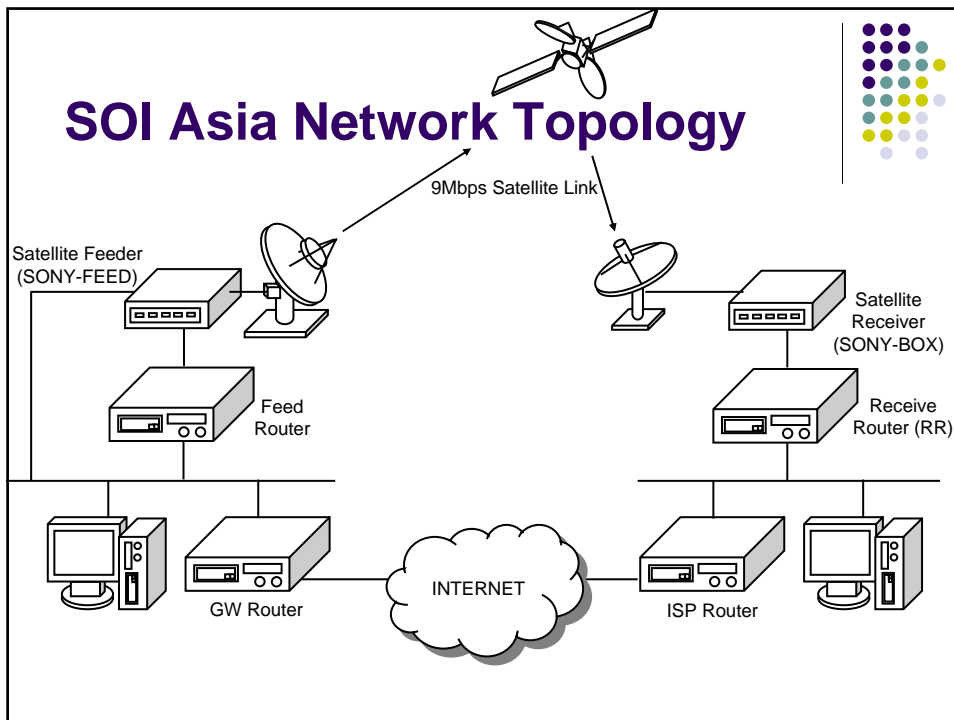
- A satellite network which is composed of:
 - A few send-capable stations
 - Many receive-only stations



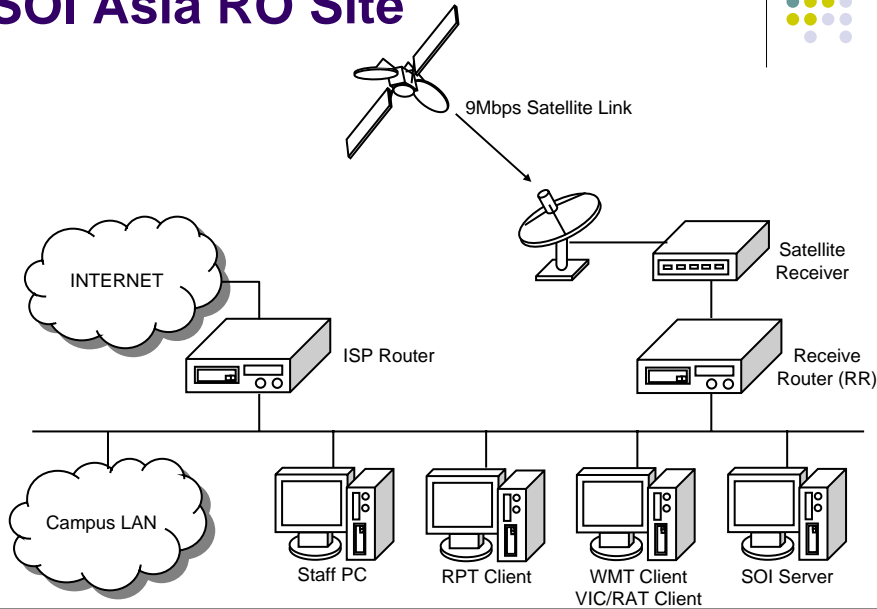
SOI Asia Network Overview



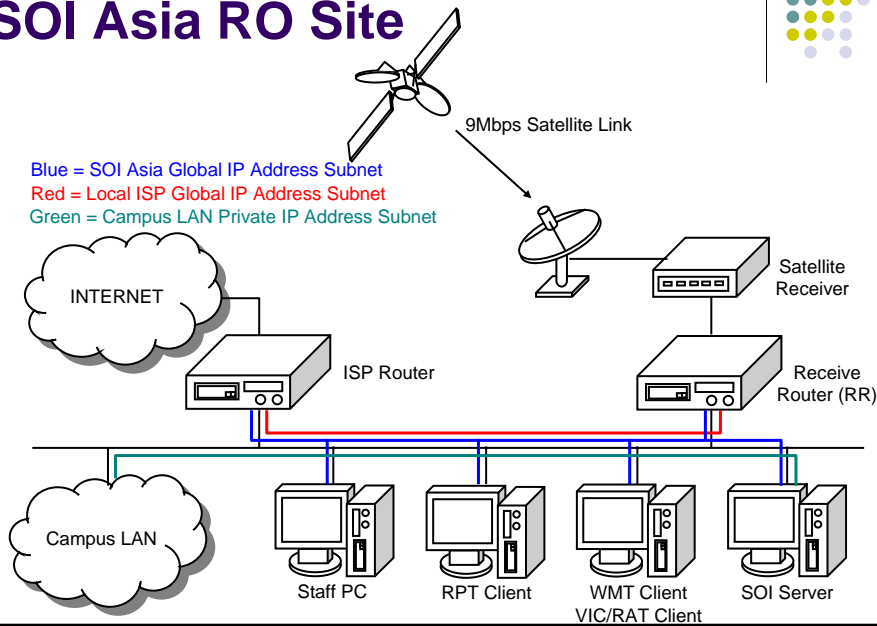
SOI Asia Network Topology



Standard Network Topology of SOI Asia RO Site



Logical Subnets in SOI Asia RO Site



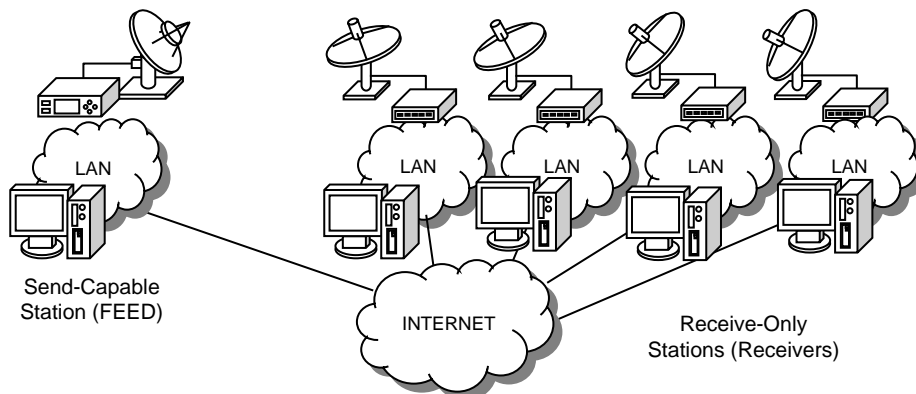
UDLR Overview



Physical Connection



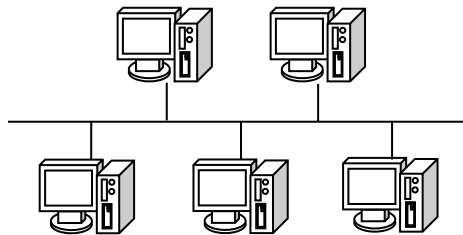
- PCs are belonging to the different LAN
 - Can't directly communicate with others on UDL



Logical Connection with UDLR



- Every PC connects to the single subnet
- The subnet works like Ethernet
 - Bi-directional Multi-Access Link



SONY BOX



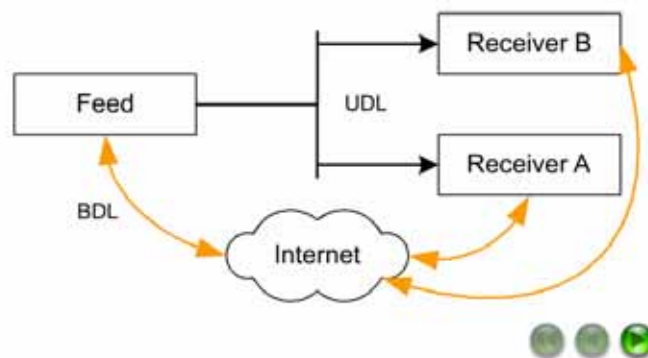
- A satellite receiver for SOI Asia Network which provides:
 - Bridging functionality of satellite UDL (Coax.) and Ethernet
 - Decoding data link frames from UDL
 - Receiver functionality of UDLR
 - GRE Encapsulator

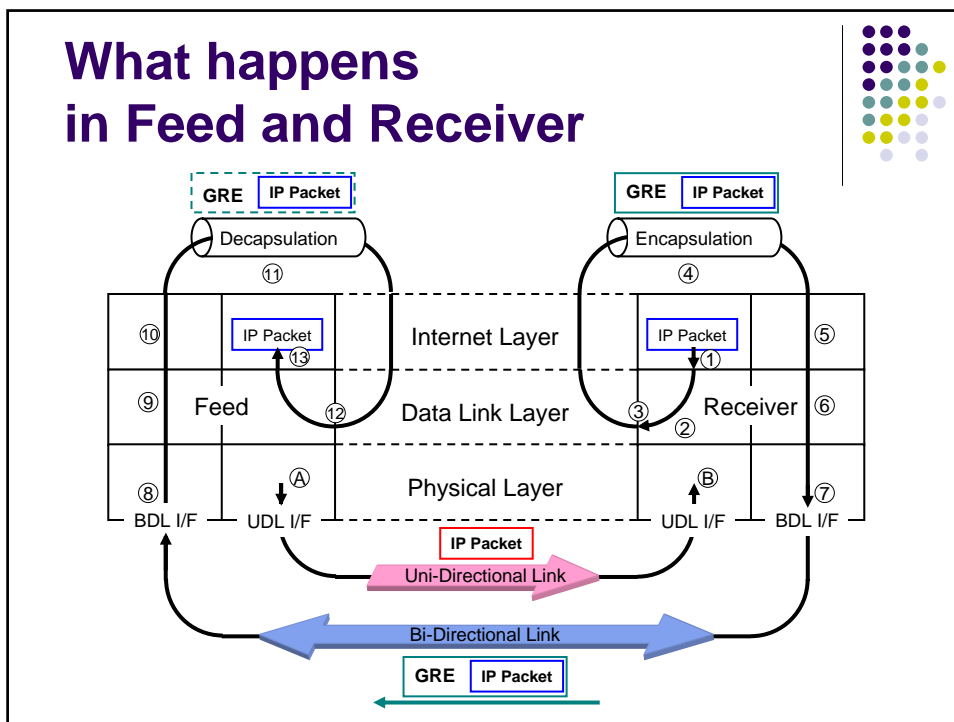
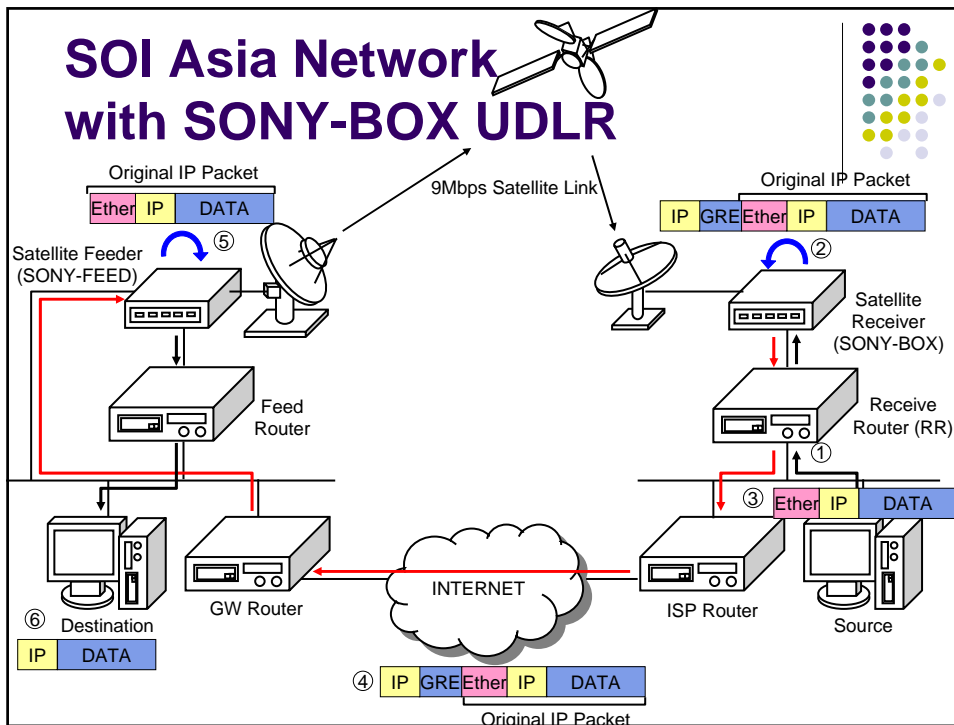
Link-Layer Tunneling Mechanism (LLTM)



- Allows hosts to communicate on a unidirectional link
- Emulates a broadcast bidirectional link
- All hosts need other Internet infrastructure

Packet delivery by LLTM



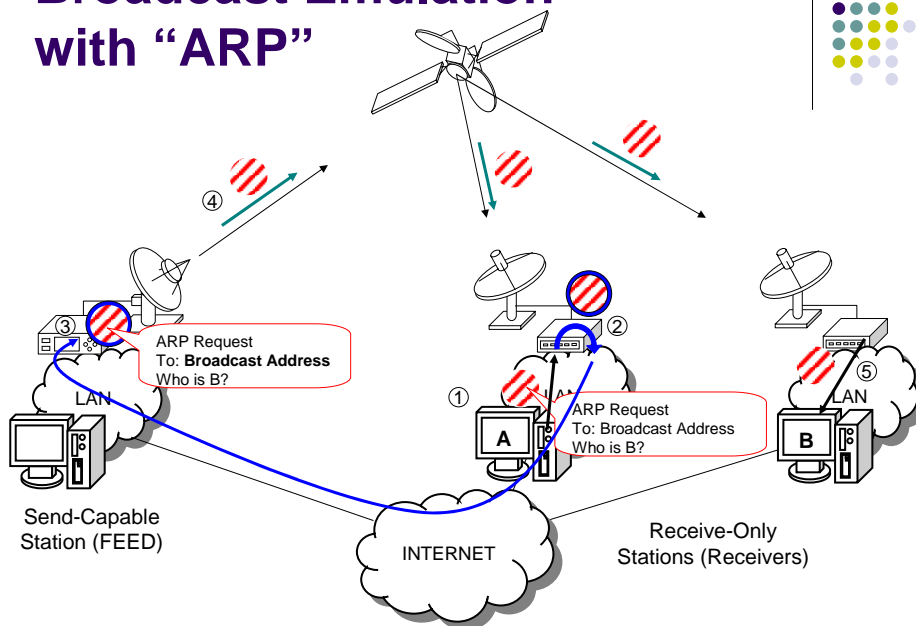


Broadcast Emulation



- Emulate Bi-Directional Multi-access Link on UDL (i.e. Ethernet)
 - Feed forwards the decapsulated data link frame from Receiver if its destination MAC address is:
 - Multicast
 - Broadcast
- Essential for normal behavior for ARP or other infrastructure technology of the Internet

Broadcast Emulation with “ARP”



ARP on UDLR network with Broadcast Emulation

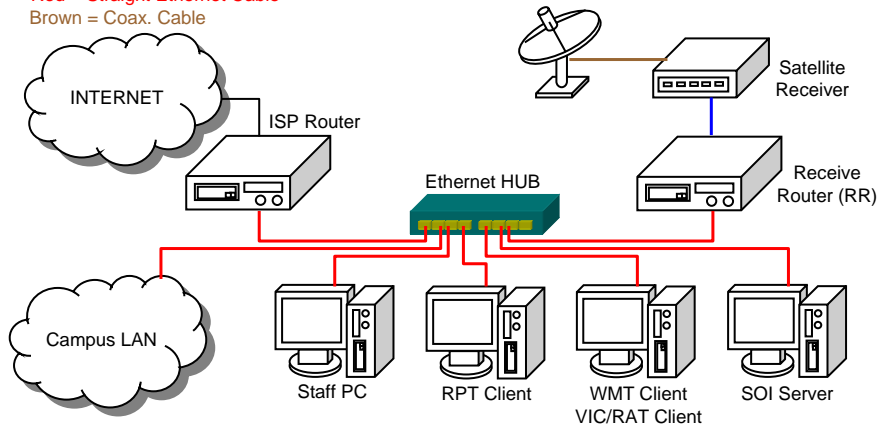


Connecting Devices



Connecting Devices

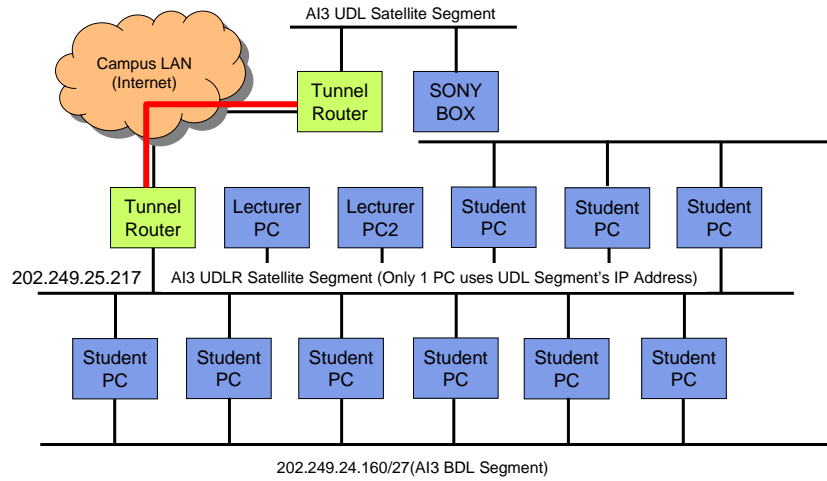
Blue = Cross Ethernet Cable
Red = Straight Ethernet Cable
Brown = Coax. Cable



Receive Router Configuration

Let's see the textbook!!

Target Topology in Workshop



Debugging SOI Asia Network

Let's see the textbook!!



MTU Problem in SOI Asia Network



MTU problem trouble shooting



- What was happening in our network?
- What is MTU?
- Let's take a look how we solved the problem

What was happening in our network?



- Let's see
 - [operator 00071] Email Problem
- From our network
 - we can't access some WEB sites such as Hotmail / Yahoo Mail
 - we can't pass authentication

Why?



- A big packet is not delivered from RO site to the Internet

```
01:24:07.967993 0:24:9c:fa:10:15 0:90:99:1a:8e:a4 0800 1514: 203.141.35.120.80 >  
202.249.26.2.49431: . 1:1449(1448) ack 1404 win 33304 <nop,nop,timestamp 476990557  
567509> (DF) (ttl 54, id 54515, len 1500)
```

ATTENTION

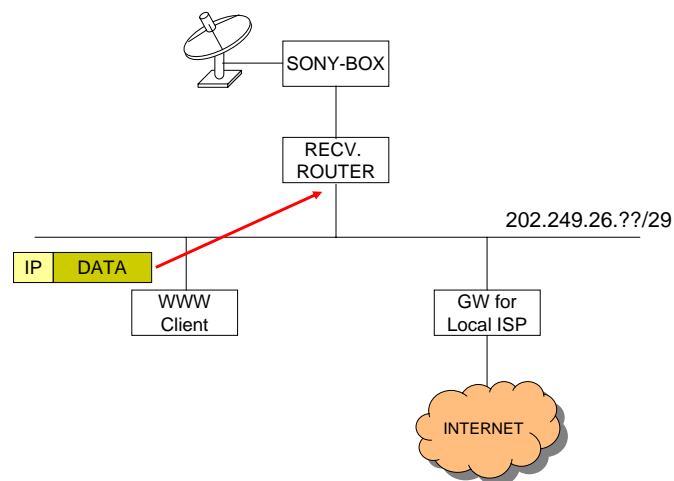
- Hint...
 - in the UDLR environment, a data link frame from RO site is **encapsulated** in an IP packet with GRE header

UDLR Background

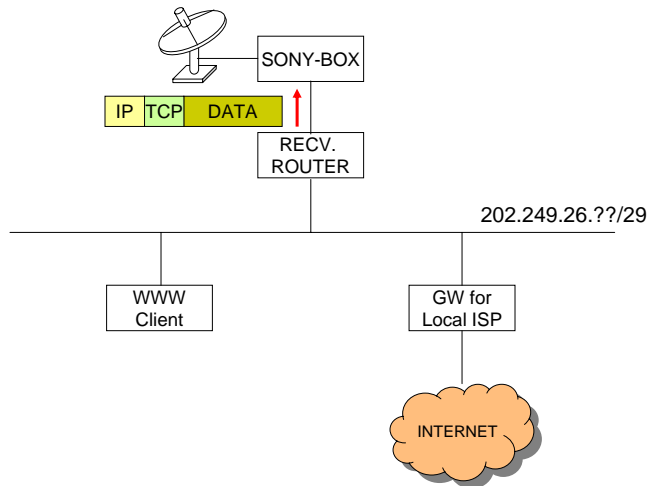


- To understand our situation, we have to know about UDLR
- Especially, how an IP packet is delivered to the Internet is important
- Let's know the function of SONY-BOX and SONY-FEED

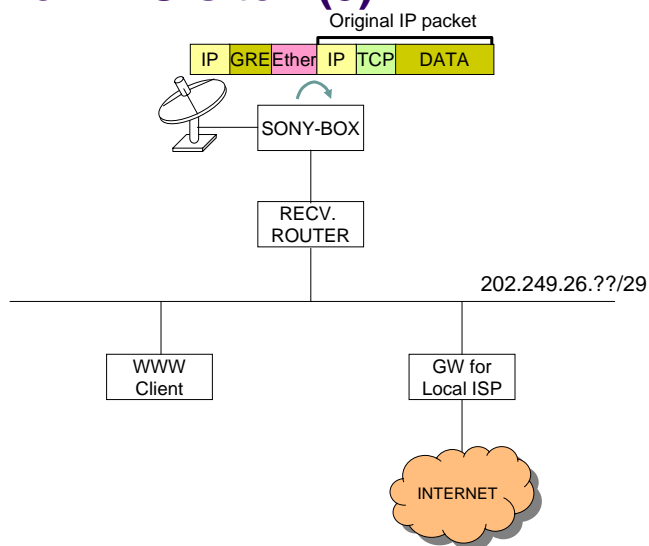
How an IP packet is delivered to SFC from RO site? (1)



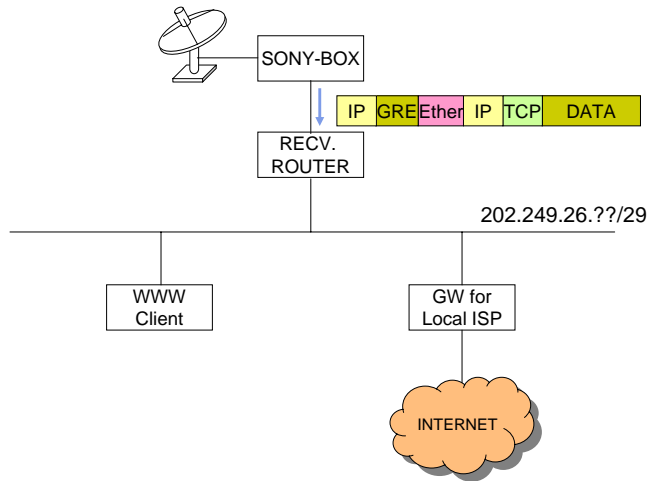
How an IP packet is delivered to SFC from RO site? (2)



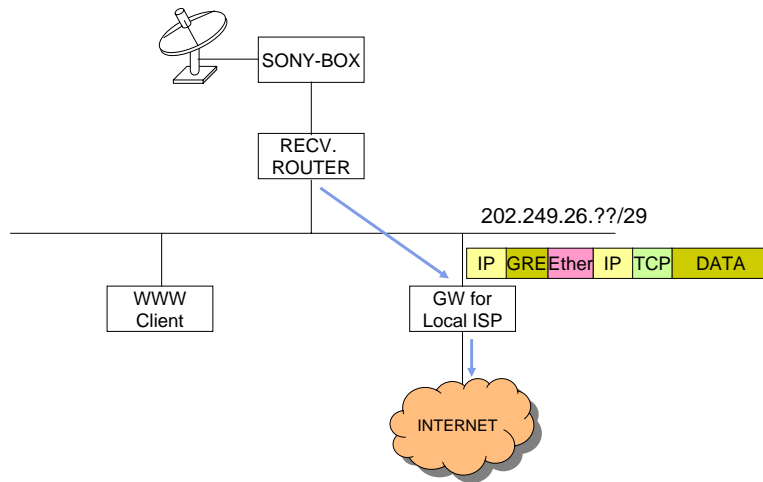
How an IP packet is delivered to SFC from RO site? (3)



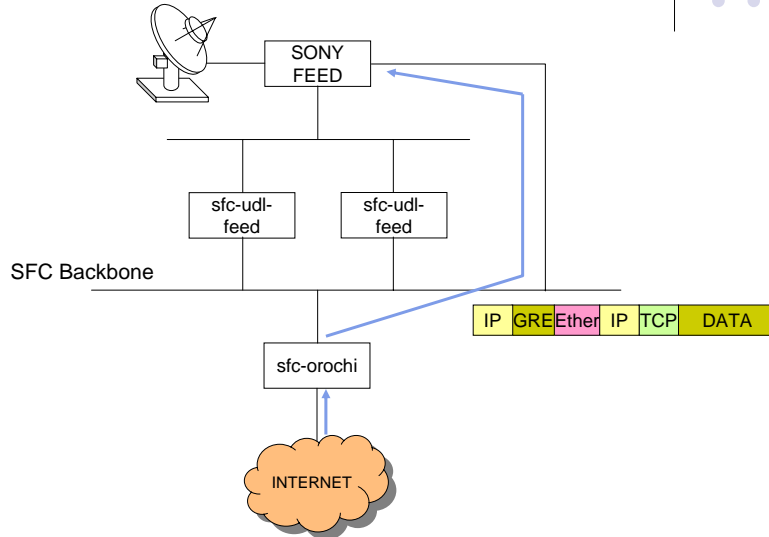
How an IP packet is delivered to SFC from RO site? (4)



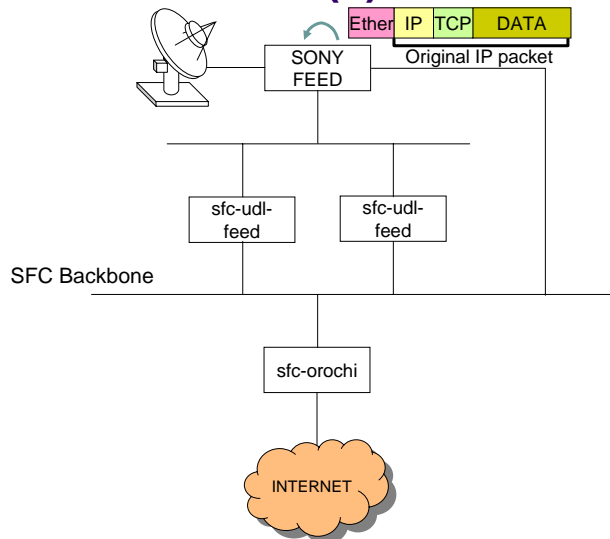
How an IP packet is delivered to SFC from RO site? (5)



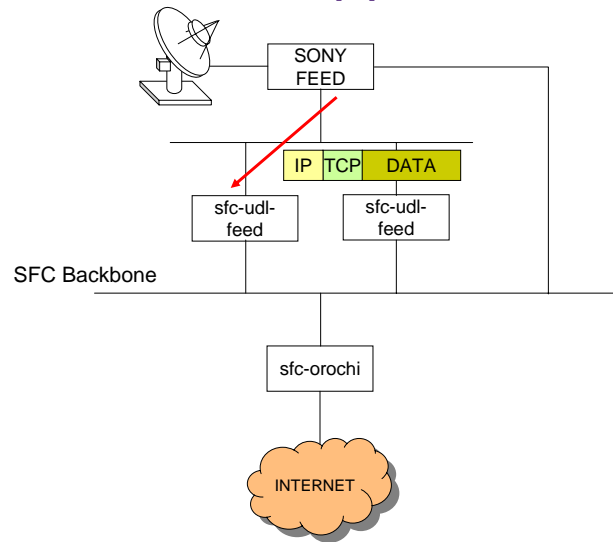
How an IP packet is delivered to SFC from RO site? (6)



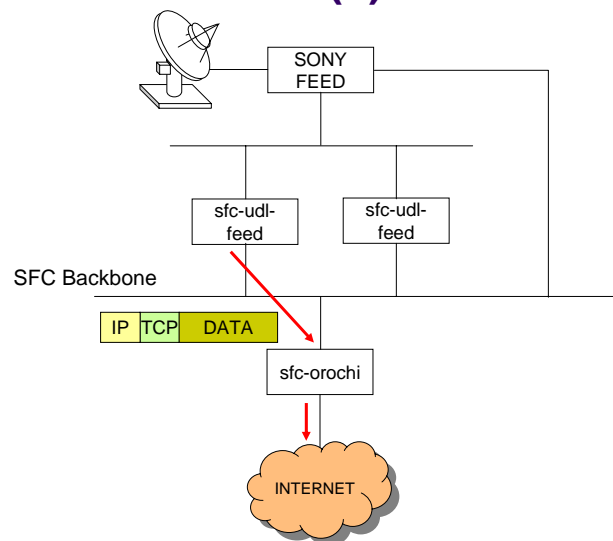
How an IP packet is delivered to SFC from RO site? (7)



How an IP packet is delivered to SFC from RO site? (7)



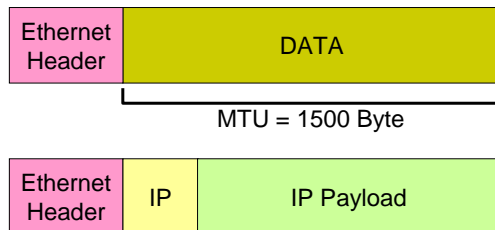
How an IP packet is delivered to SFC from RO site? (8)





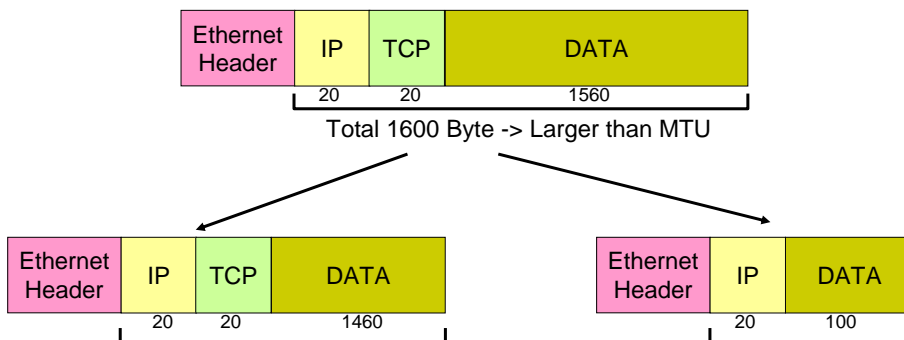
What is MTU?

- Maximum Transmission Unit
 - A limit on the size of data to transmit from a node
 - MTU of Ethernet is 1500 Byte



IP Fragmentation

- When the size of an IP packet is larger than MTU, the Packet is divided into pieces of smaller size



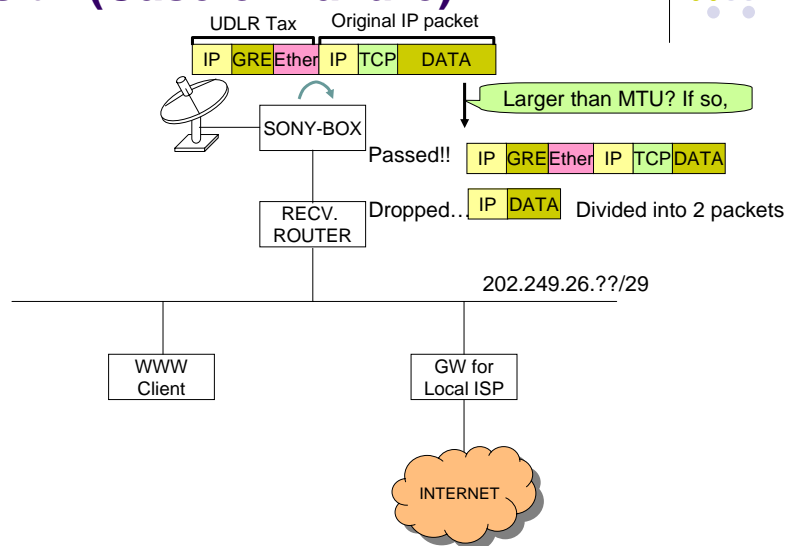


In Our Network?

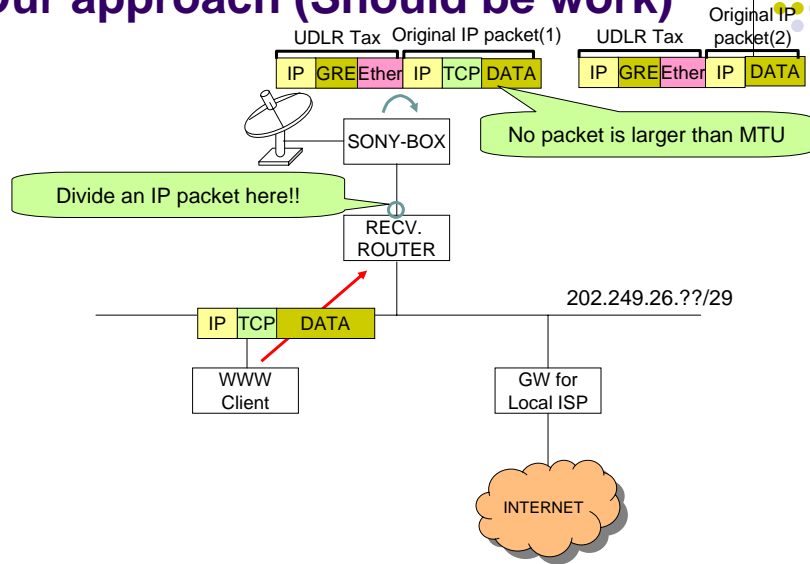
- SONY-FEED doesn't forward a packet without GRE header.
- So, what does it mean?



Revisit!! (Case of Failure)



Our approach (Should be work)



How to divide a large packet?

- Change MTU
- Where?
 - On each host
 - It take costs if there are so many hosts
 - On RR
 - Each host doesn't take care of its MTU, but RR will divide a packet automatically if the packet larger than MTU



Steps

- Login to RR
- Become super user on the RR
- And change MTU of Satellite Side I/F to 1452



Let's change MTU

```
sfc-cpu.ai3.net - PuTTY
http://www.FreeBSD.org/search/.  If the doc distribution has
been installed, they're also available formatted in /usr/share/doc.

If you still have a question or problem, please take the output of
'uname -a', along with any relevant error messages, and email it
as a question to the questions@FreeBSD.org mailing list.  If you are
unfamiliar with FreeBSD's directory layout, please refer to the hier(7)
man page.  If you are not familiar with man pages, type 'man man'.

You may also use /stand/sysinstall to re-enter the installation and
configuration utility.  Edit /etc/motd to change this login announcement.

[sfc-udl-recv:~:19:09] su
Password:
sfc-udl-recv# ifconfig fxp0 mtu 1452
sfc-udl-recv# ifconfig fxp0
fxp0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1452
    inet 202.249.25.194 netmask 0xfffffe0 broadcast 202.249.25.223
    inet6 fe80::202:b3ff:fe98:6724%fxp0 prefixlen 64 scopeid 0x1
    inet 192.168.0.194 netmask 0xfffff00 broadcast 192.168.0.255
    ether 00:02:b3:98:87:24
    media: Ethernet autoselect (100baseTX <full-duplex>)
    status: active
sfc-udl-recv#
```

Let's check if a large packet goes through to the internet

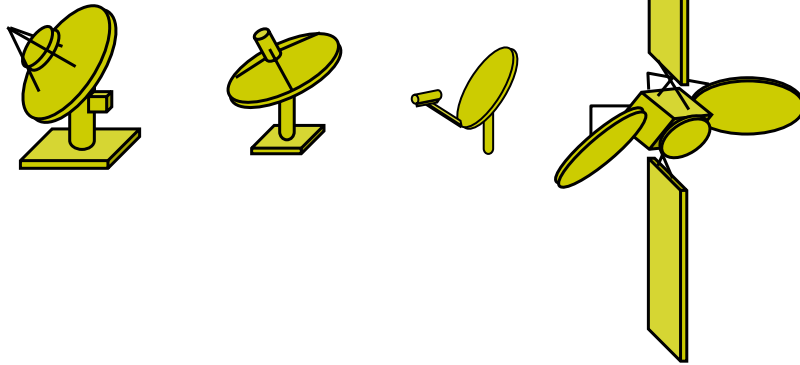


- As root on RR
 - ping -s 1600 202.249.25.10
- On some client machine in the RO site,
 - Let's access hotmail/yahoo mail

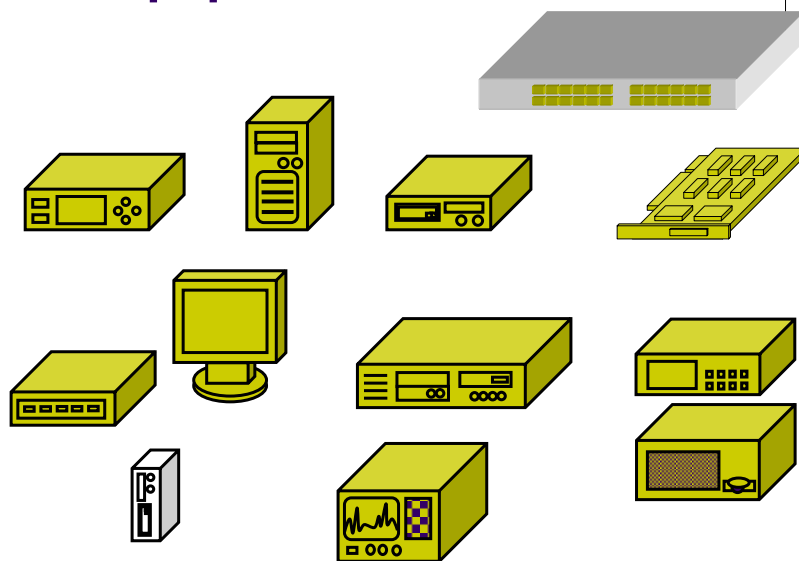
Materials!!



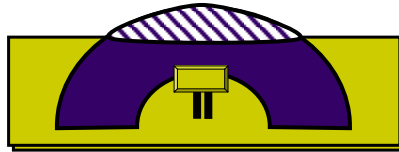
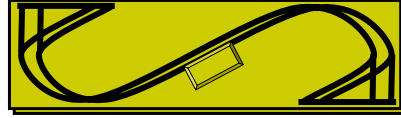
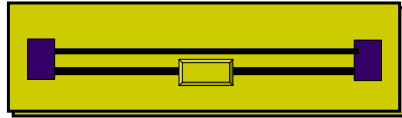
Satellite Equipments



PC Equipments



RFID Tags



IC chips

