SWAP
SHIP to SHIP/SHIP to SHORE Wireless Access Protocol

Wireless Mesh Networking in the UNOLS Fleet

State of the Union

Toby Martin
Geoff Davis
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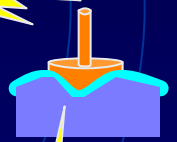
RVTEC 2004

SWAP



Current or Pending Ship Installations

Organization

- U of Hawaii
- Scripps Institute of Oceanography
- Oregon State University
- Woods Hole Institute of Oceanography
- U of Washingtion
- MBARI
- Moss Landing
- U of Delaware

Ship Nodes

- R/V Kilo Moana
- R/V Revelle, R/V Melville, R/V New Horizon, R/V Sproul
- R/V Wecoma, loaner
- R/V Tioga, R/V Oceanus, R/V Knorr, R/V Atlantis
- R/V Thompson, R/V Barnes
- R/V Western Flyer
- R/V Point Sur
- R/V Cape Henlopen

Current or Pending Shore Installations

U Hawaii
UH Marine Center-Snug Harbor

U. Washington

Oregon State
Hatfield Marine Science Center

Moss Point

WHOI
Martha's Vineyard Dock
Clark Building

Univ Delaware
2 Buoys

QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.

Scripps
Nimitz Marine Facility

Much to Do.

- **Documentation so adoption is easier.**
- **Engineering Teething Process**
- **Routing issues with >2 nodes.**
- **Standard mechanism for maintaining and upgrading distributions.**
- **Dedicating time for continued development and peer institution assistance.**

The End.

- **Next slide begins afternoon sesssion...**

10 STEPS TO CREATING A SWAP NODE ON YOUR SHIP OR PIER

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STEP 1

Join the SWAP Email List,

Send an email and introduce yourself!

http://siomail.ucsd.edu/mailman/listinfo/swap

Step 2
Review the SWAP Hardware

http://data.ldeo.columbia.edu/admin/twiki/bin/view/SWAP/WebHome

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

Things to Note

- **Cabling**
  - **Two CAT-5 Ethernet**
  - **1 Serial**
  - **1 or 2 Antenna Cables**
- **Electronics Enclosure Size**
- **Antenna Size**
- **110-220V 50/60Hz**

STEP -3
Determine Installation Location

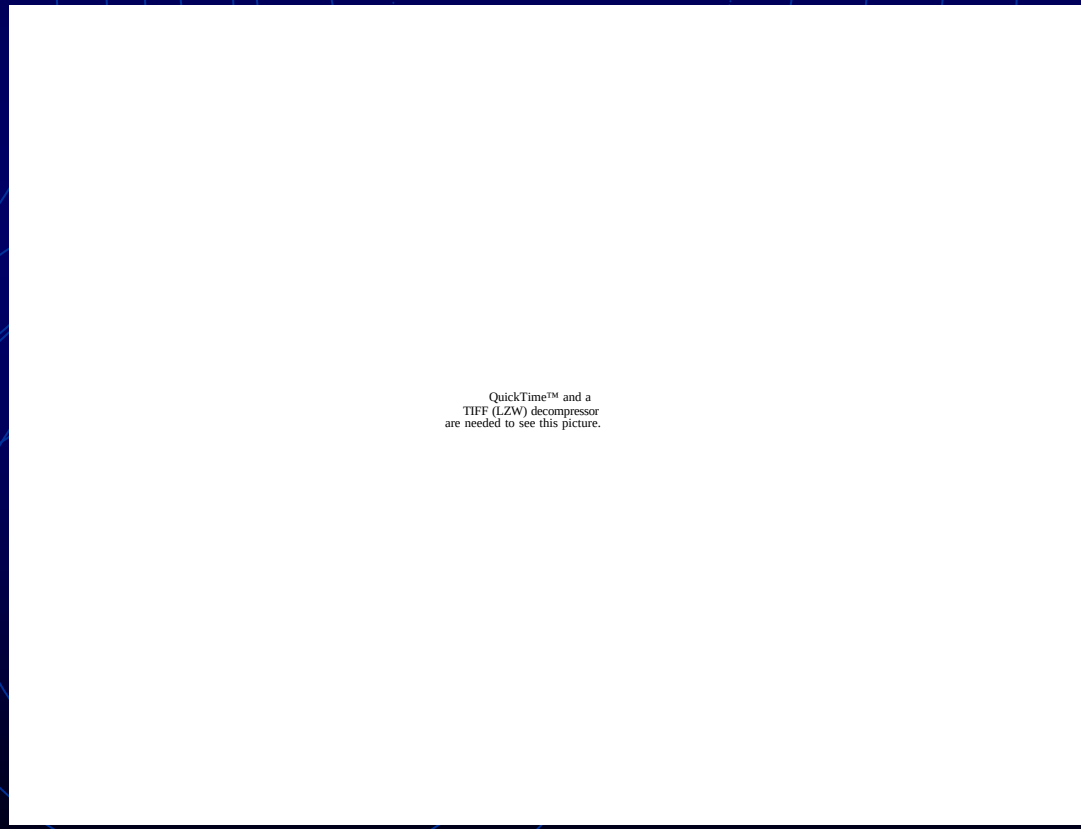
- Antenna(s) should be as high as possible.
- One Antenna or Two?
- Electronics enclosure may be mounted inside, away from the elements or outside nearer the antenna.
- Power is supplied over one of the two Ethernet lines.
- Serial line need not be connected (but should be protected from weather).
- This gives minimum of EITHER 2 CAT-5 lines to feed into ship or one antenna cable out. (if electronics box is mounted internally).

Legend’s Main Mast Height (~24m)

STEP -4
GET THE HARDWARE LIST AND MODIFY IT FOR YOUR SITUATION AND PLACE ORDERS

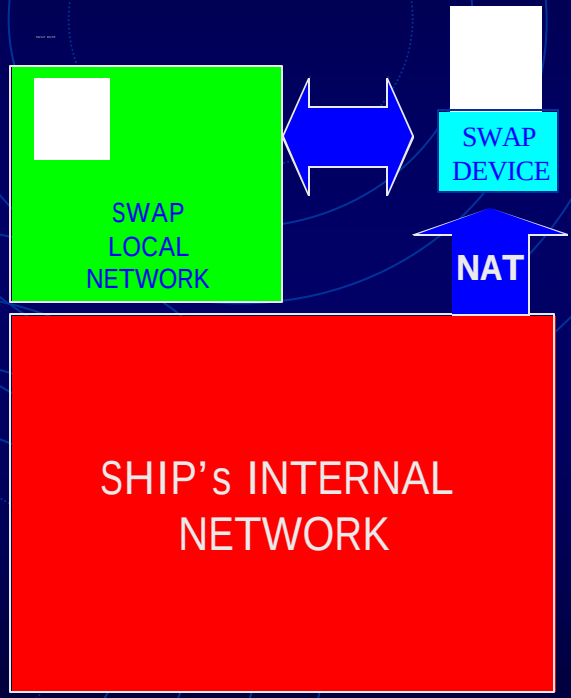
http://data.ldeo.columbia.edu/admin/twiki/bin/view/SWAP/TheHardware

- Things to Consider:
  - Number of Antennas, Pigtails, Cables
  - Length of Antenna Cable
  - Soekris or Microtik Electronics
  - Additional Mounting Gear (electronics board standoffs, epoxy, assorted machine Screws)
  - Cost ~ $518: electronics board, wireless card, cf card, antenna, cable, pwr supply



STEP 5
Email the SWAP list
and get your Network Assignments

Interface	Network	Address(es)
eth0	SWAP Local Network	10.200.1.0/27 (255.255.255.223)
eth1	Ship's Internal Network	????
wlan0wds?	WDS Pool	10.200.1.32/27 (255.255.255.223)



SWAP Network Assignments List

http://data.ldeo.columbia.edu/admin/twiki/bin/view/SWAP/SwapDeviceNetworkAssignments

STEP 6
Download, install and configure the latest SWAP Distribution

http://data.ldeo.columbia.edu/admin/twiki/bin/view/SWAP/SwapDistros

- Complete step-by-step instructions at SWAP site above.
- Requires Linux System and CF Card Reader
- Must be able to become “root” user.

1. Create bootable partition on CF card.
2. Create file system on CF Card.
3. Run pebble.install script.
4. Enter root password when prompted.
5. Run swap.config script
6. Enter IP address and network masks when prompted.

STEP - 6 OPTION 2

Send your compact flash card to one of us and we'll install, configure and test the latest distribution and send it back.

Step 7
Assemble Your SWAP Box

http://data.ldeo.columbia.edu/admin/twiki/bin/view/SWAP/WebHome

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Networking Review

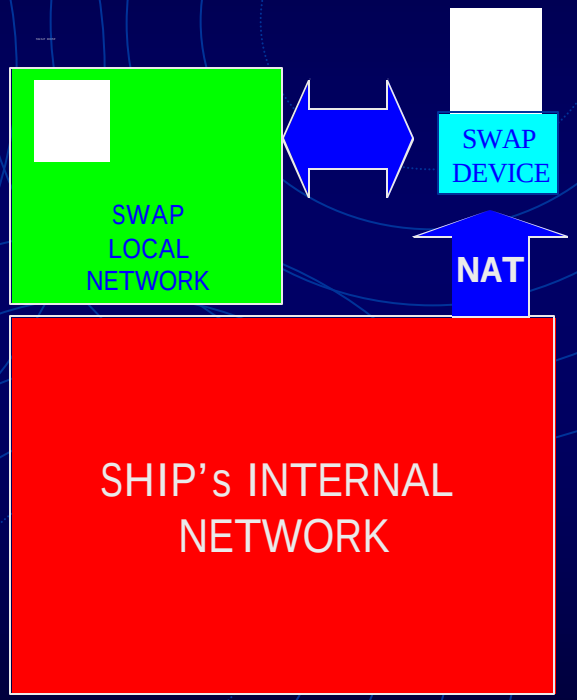
- TCP/IP Network Interface Configuration
  - IP Address -- 192.168.10.5
  - Network Mask 255.255.255.0
  - Gateway -- 192.168.10.1

The Gateway (or "default route") is where packets are sent when your computer doesn't know where else to send them.

The Gateway is the IP address of a *router* that can pass the packet closer to its destination.

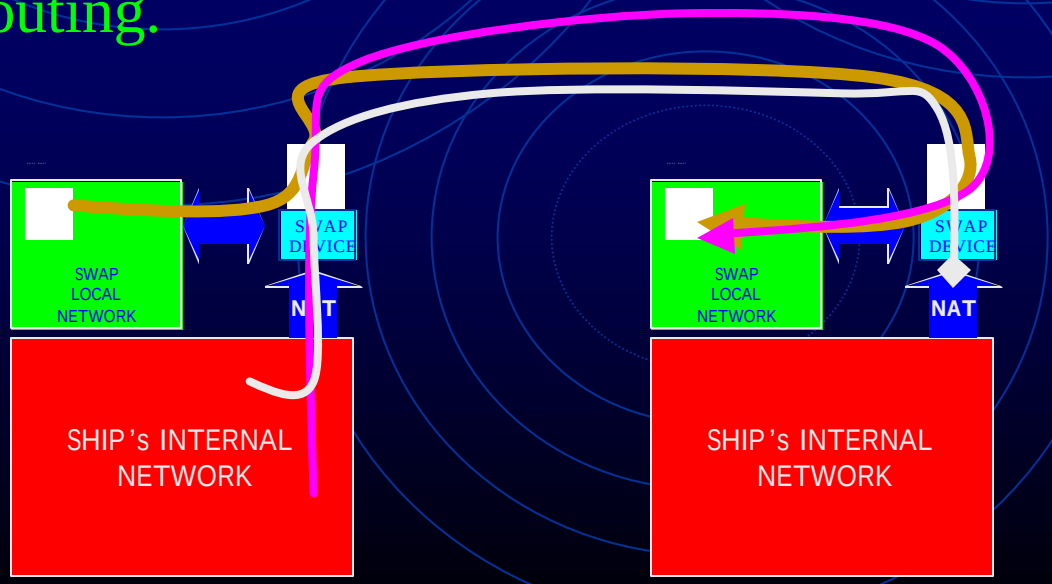
STEP 8
Consider your Networking Setup

- **Computers on ship's internal network whose Gateway is set to the SWAP Device will be able to use SWAP.**
- **If your ship already has a router (for INMARSAT or HighSeasNet) you can optionally configure multiple Gateways within the router with varying precedence. This allows static configuration for individual computers.**
- **Identify a SWAP Local Host for your ship's SWAP Network.**



Step 9
Insert your CF Card and Test Your Box

- Really requires more than one box.
- Monitor boot process via serial port (19200 8N1).
- SSH into the box as root and inspect routing with “route” or “netstat -r”.
- Verify routing.



Step 10
Install your SWAP Box

http://data.ldeo.columbia.edu/admin/twiki/bin/view/SWAP/WebHome