



HiSeasNet

INTERNET FOR OCEANOGRAPHIC SHIPS AT SEA

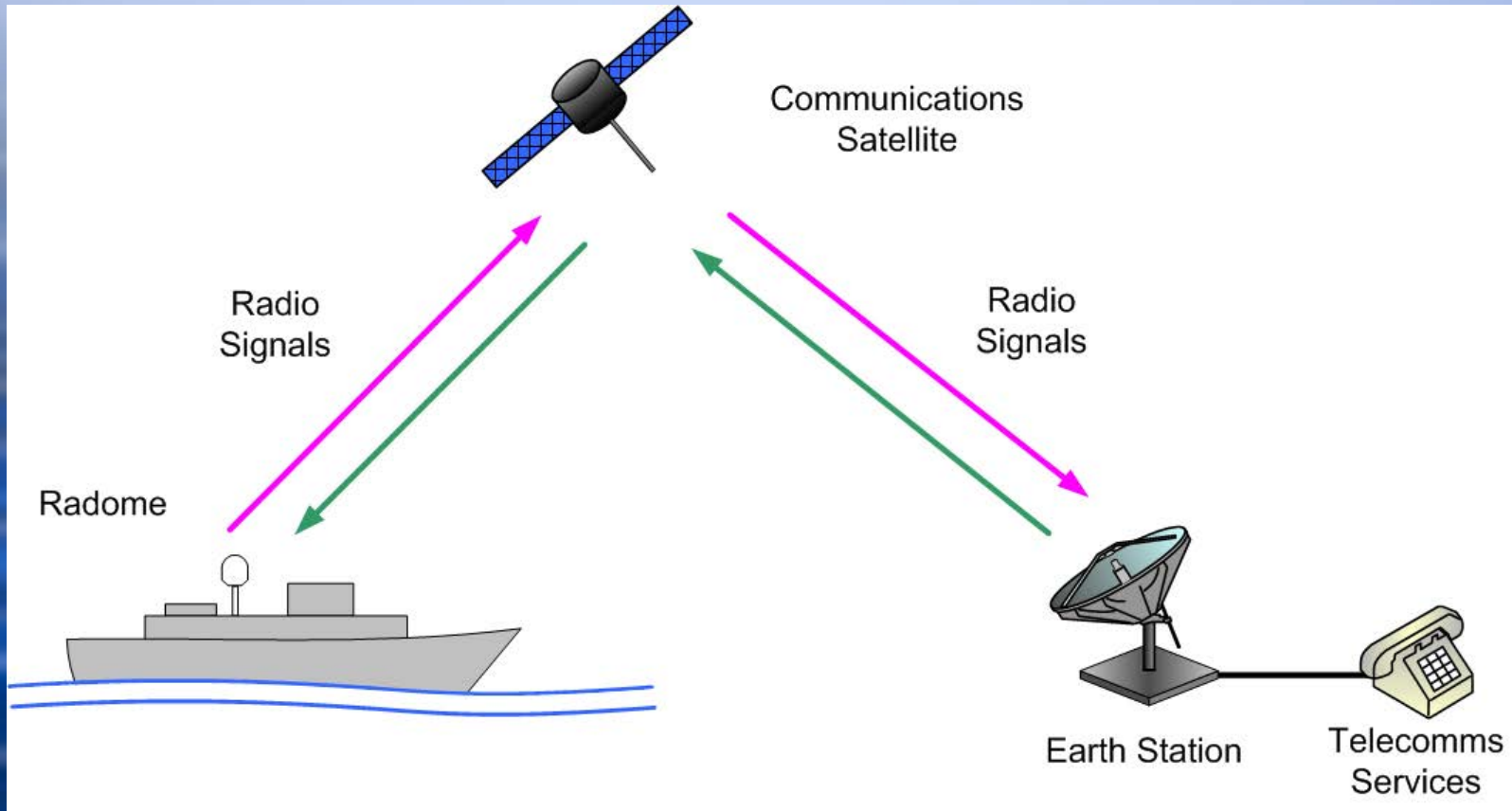
HiSeasNet 2015 Troubleshooting Session

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RVTEC in Miami

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The Big Picture



- ◆ Note both directions, Tx and Rx, must be intact for the whole system to work

High-Level Ship Antenna Plan

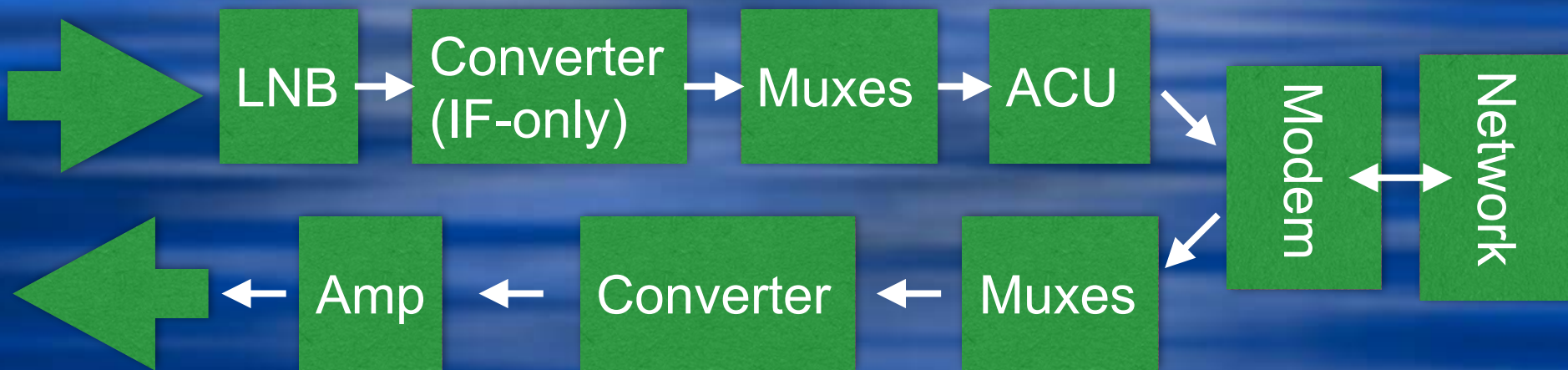
- ◆ The antenna must automatically find the correct signal on the correct satellite (C-band or Ku-band).
- ◆ The antenna must convert the received signal to a frequency the modem can handle (IF [50-90 MHz] or L-band [950-1500 MHz]).
- ◆ The antenna must track the satellite based on high signal strength (AGC) values on the antenna controller (ACU) for a particular single frequency (HSN shore-to-ship, beacon, other, etc.).
- ◆ The modem must decode the HSN shore-to-ship signal to understand the information in it.
- ◆ The modem must deliver decoded packets to computers on the ship.
- ◆ The modem must accept IP packets from computers on the ship.
- ◆ The modem must encode that data into a satellite signal.
- ◆ The converter must convert the signal to a transmittable frequency.
- ◆ The amplifier must transmit it at the correct power level.

Main Problem Areas

1. Receiving a satellite signal at all
2. Tracking issues with antenna/ACU
3. Decoding the receive signal
4. Transmitting a signal
5. Passing IP data packets across the satellite
6. Last mile of IP packets on ship or shore

Tech's Troubleshooting Plan

- ◆ Figure out what area do or don't have the problem
- ◆ They are in order, so start with the signal and work towards IP packets
- ◆ Follow the paths, (don't forget the cables)
- ◆ Confirm your setup
- ◆ Contact shore for help if needed

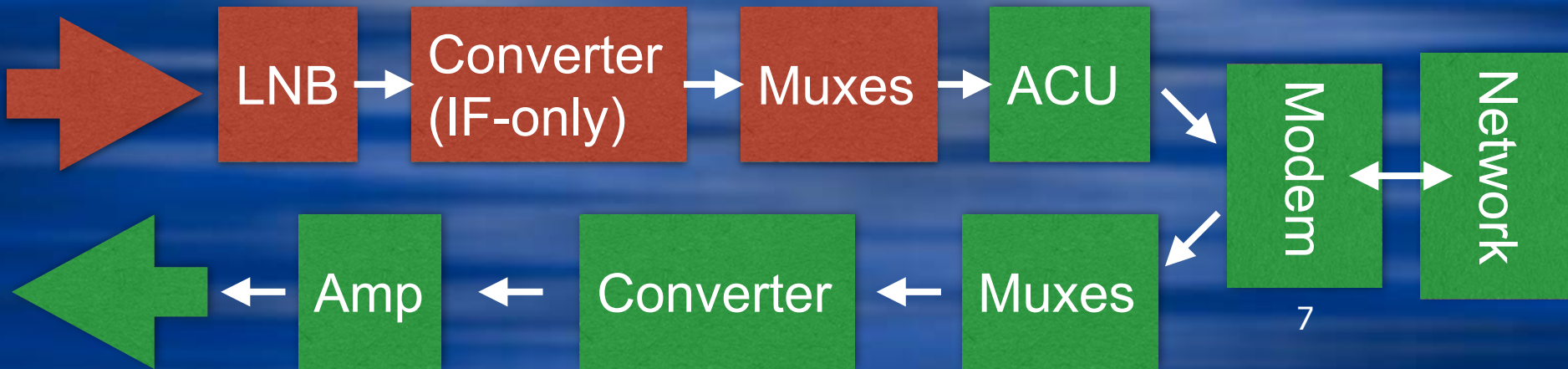


Breaking it Down

- ◆ Let's look at each part of the system in terms of the following:
 - A. What the part is all about and what it is trying to do
 - B. How you know when it is **probably** good
 - C. What the common problems **might** be
 - D. Quirks

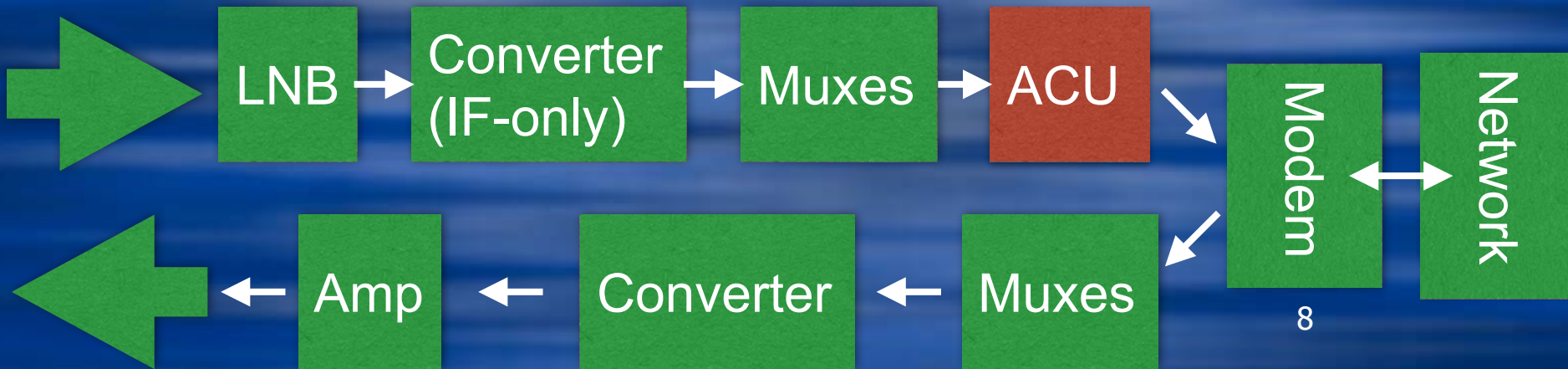
Receiving a Signal

- ◆ What: A satellite signal MUST come into the antenna, get converted by the LNB, and down to the rack
- ◆ Good?: Look for varying AGC > 800 on ACU
- ◆ Problem?: No power in the dome, bad BUC



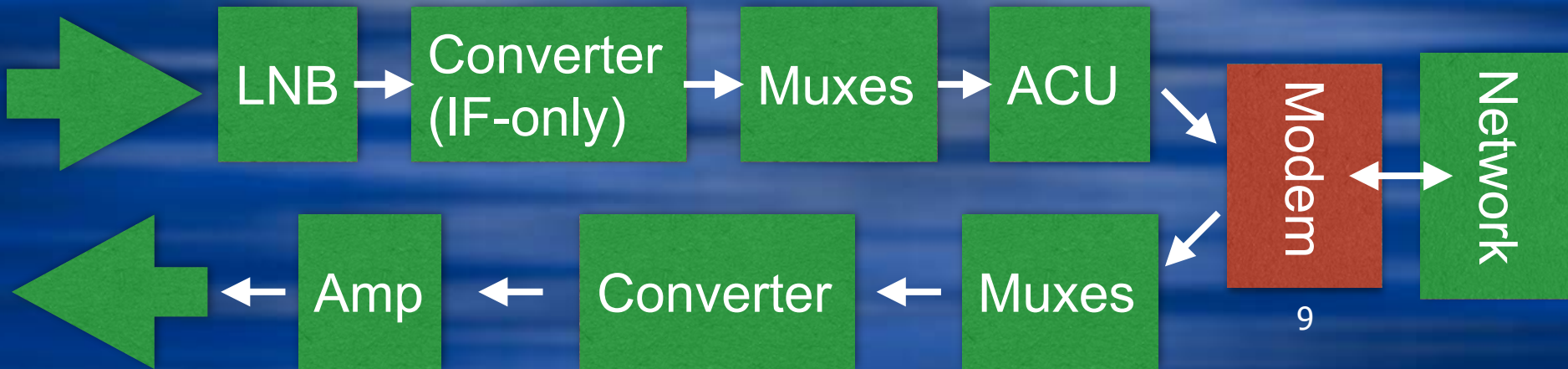
Tracking a Satellite

- ◆ What: The antenna must always point to the right satellite via ACU commands. AGC must be above THRS value consistently.
- ◆ Good?: Look for “normal” AGC that is ≥ 100 counts above THRS
- ◆ Problem?: On a louder neighboring satellite, edge or out of footprint, antenna obstructed, bad ACU settings, failed antenna component preventing antenna from obeying ACU
- ◆ Quirks: Only looks at power level at a specific frequency to determine if on satellite. Can be coupled with modem input with special cable.



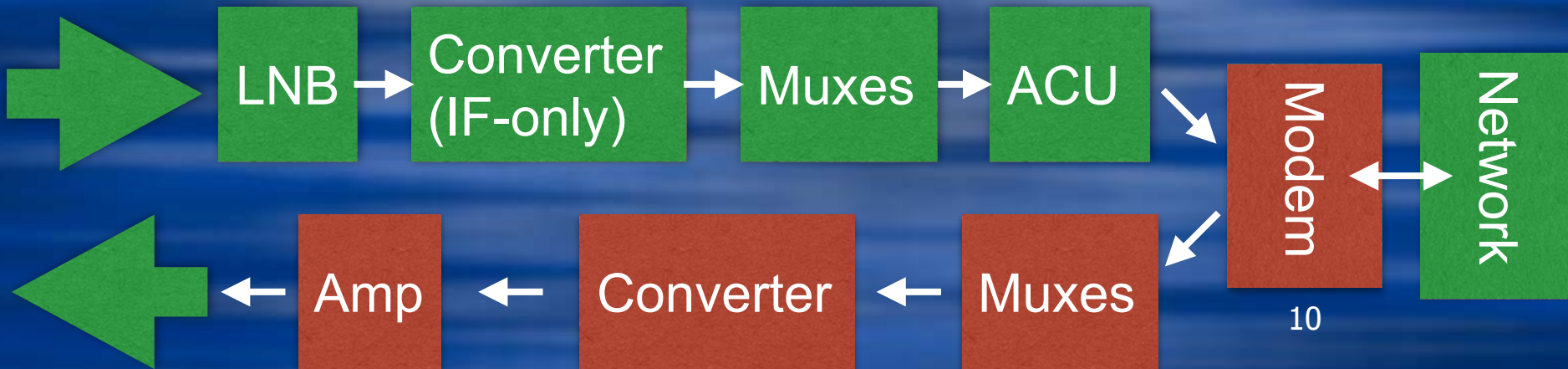
Decoding a Rx Signal

- ◆ What: The signal coming out of the antenna must be understandable to the modem.
- ◆ Good?: EbNo on ship modem is “normal” (greater than 4ish?)
- ◆ Problem?: Modem settings mismatched between ship and shore, antenna on the wrong satellite, signal too low, interference
- ◆ Quirks: Lots of little settings on the modem that all must agree



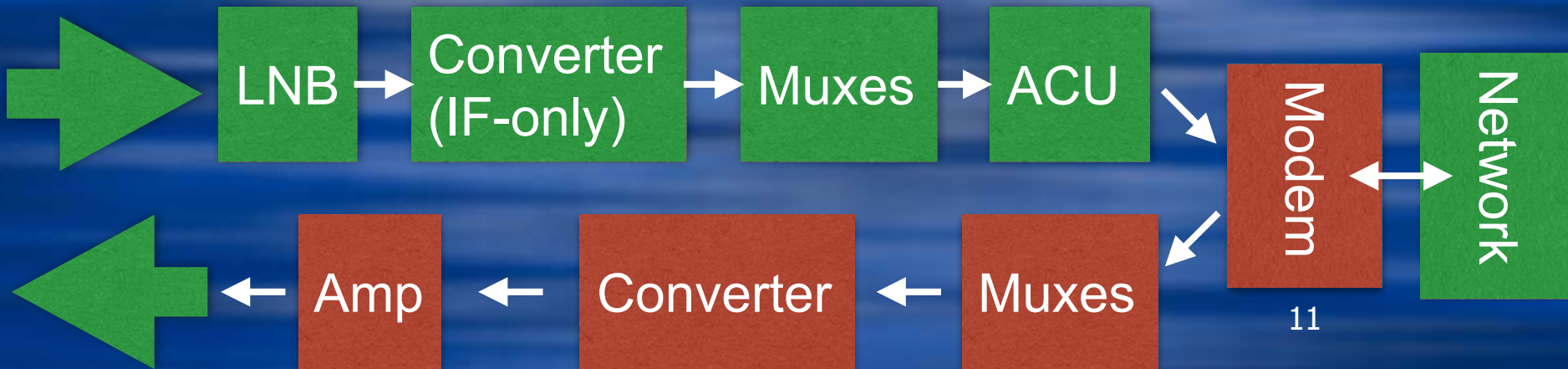
Transmitting a Signal

- ♦ What: The signal coming out of the modem must be understandable to shore, be at the right frequency and power level, and be amplified out the dish
- ♦ Good?: EbNo on shore modem, all green lights on the modem
- ♦ Problem?: Modem settings mismatched between ship and shore, antenna on the wrong satellite, transmit signal too low, failed equipment in the path
- ♦ Quirks: Lots of little settings on the modem that all must agree, in "Rx Enabled" mode, ship modem must be receiving (and therefore on the right satellite) in order to transmit



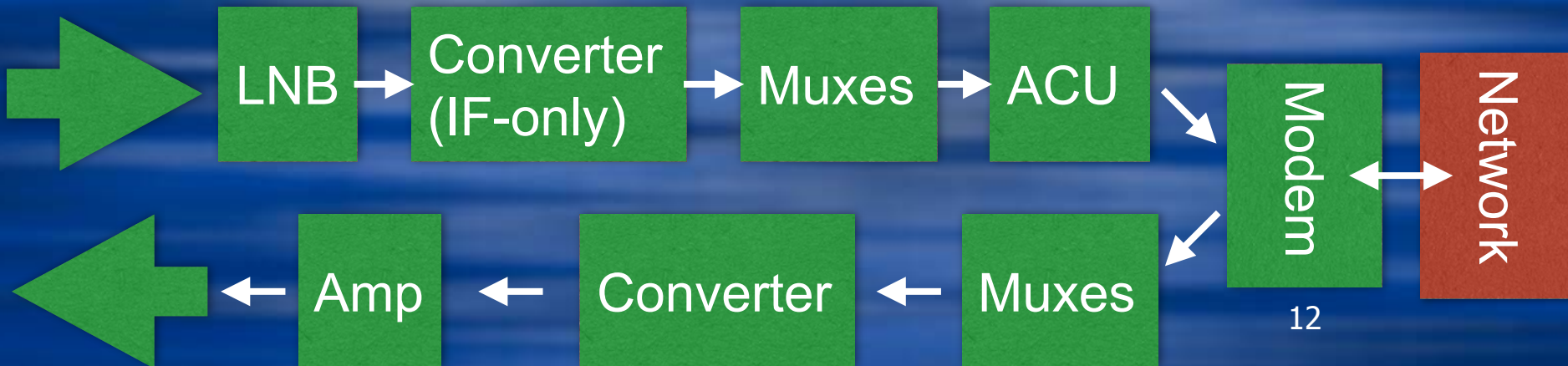
Passing IP Traffic

- ◆ What: When both Tx and Rx paths are good, IP data needs to flow across the link
- ◆ Good?: EbNo on shore modem, all green lights on the modem, pings successful to the internet from the modems
- ◆ Problem?: EbNos on both sides are ok, packets not flowing between modems or beyond
- ◆ Quirks: Many hops in the IP path, many are not visible to the ship, requires shore help if the issue isn't just at the ship modem/net boundary



Last Mile for IP

- ◆ What: Packets may be going over the satellite, but they need to get to the end computers/networks on shore, on the ship, and on the Internet
- ◆ Good?: EbNo on shore modem, all green lights on the modem, pings successful to the internet from the end machine
- ◆ Problem?: Connection between modem and ship network is bad, problem on shore (HSN or Institution), ship firewall is not right
- ◆ Quirks: Hard to see into the potential problems at HSN earth station or the home institution



Now What?

- ◆ You figured out what the problem is?
Sweet! No go fix it!
- ◆ You figured out where the problem isn't? Lets keep going...
 - ◆ Where might the problem be?
 - ◆ What would you need to know to rule an area or component good or bad?
 - ◆ What can you reversibly and safely change to get more information (good to double check with shore if you arent sure)

Look at the bigger picture

- ◆ Should HSN be working now?
 - ◆ Satellite blockage?
 - ◆ Footprint?
 - ◆ Equipment tagged out?
 - ◆ Planned outage?
- ◆ Is the gear configured to where it should be working?
- ◆ How can you get the best help from shore given what you know?

Help shore help you

- ◆ Antenna AGC and THRS
- ◆ Ship latitude, longitude, and heading
- ◆ Antenna azimuth and elevation
- ◆ The longitude that is programmed into your antenna controller
- ◆ The IF or FREQ value that is programmed into your controller
- ◆ A list of error numbers that are showing up and if they stay cleared when you try to clear them
- ◆ Modem EbNo (if it locks) and light status
- ◆ If you have compared your settings to the last known good settings
- ◆ A detailed description of what is going on or what symptoms of a problem exist
- ◆ A detailed description of any corrective action you have taken so far
- ◆ What weather you might be having
- ◆ What addresses along the path you can and cannot ping
- ◆ Anything else you feel may be important for us to know
- ◆ A RemDacP ADMC plot if you can catch the antenna causing a problem (optional)

Want to Dive Deeper?

- ◆ Come to training Thursday afternoon
- ◆ Topics include:
 - ◆ Background and big picture concepts of the changes in 2014/2015
 - ◆ Hands-on and demo of modem configuration and tools
 - ◆ Maybe some case studies?