

This is a proposal for the arrangement of communications to the site computers, with an eye to convenient backups in case of failed communications.

It may be expedient to refer to the attached figures schematically showing the network connection and the various communications lines at the stations.

The material below describes the connections of the various computer serial ports recommended. It remains somewhat diffuse because some decisions have to be made concerning the final connection.

Cisco Router:

Ethernet: Circuit currently contains only Cisco and Motorola
Serial port: General Datacomm or Racal-Milgo modem, depending on site.
Command port: Switch to permit site terminal or computer connection

Desktop PC:

This is intended to provide general computing capability at the site. It includes such uses as:

- Terminal emulator on Cisco command port to provide printing capability
- Local storage of various manuals, other documentation
- A screen terminal to provide hard copies of screens.
- Modem access to miscellaneous (especially non-NRAO) computers
- Computer use, eg word processing for memos, letters

Spark PC:

This is intended to be really portable, including uses as

- Portable SCREEN terminal on RS 232 Circuit in building, antenna pedestal room, antenna vertex room
- Take-home for modem access to station SCREENs
- Computer use, eg word processing for memos, letters (when two are needed)

Motorola Station computer:

Ethernet: To Cisco Router
Console=MVME712Port1: Normally not connected (used for changing boot parameters and some software development work)
MVME701Port1: Racal-Milgo 3222 Modem for SLIP network backup
MVME701Port2: Normally for use of site RS 232 Loop
MVME712Port2: Normally for Racal-Vadic 2400VP Modem for remote SCREEN use
MVME712Port3: GPS receiver
MVME712Port4: Barcode Wand

AOC Sun (vlbacc):

ttya=DDS (as current)
ttyb=Racal-Vadic 2400VP (as current)
ttyh0=Racal-Milgo 3222 for SLIP network backup
ttyh1=Racal-Milgo 3222 for SLIP network backup
ttyh2-ttyhf: unused

Site telephone extensions:

Leased line for host router <=> local Cisco via either analog (Racal-Milgo 3222) or digital (General Datacom) modem
Network backup line, dialup line to 3222 for implementation of SLIP connection on command from the AOC.
Remote monitoring line, dialup line to Racal-Vadic 2400VP modem for SCREEN port.

Voice Lines

Two voice lines seems like a good idea. One will additionally serve the Chatterbox monitor/control/autocallout device. It would be possible to share the second with either of the two functions above, by instructing the modem not to pickup until the fifth ring.

Note that this plan calls for purchasing an additional 9600 baud modem for each site to function solely as a hot spare/backup. These would nominally be Racal-Milgo 3222s, as above, but perhaps we should also look into the General Datacom equivalent, the 296B, which is slightly cheaper. A 9600 baud modem (at about \$1000 per station) is necessary, I think, because I was never able to successfully run slip at 2400 baud, although it theoretically should work.

Now, for this configuration, I will discuss what has to be done for the failure of various components. The actions depend somewhat on whether the problem is being handled by the operator or by the site technician, and by whether the latter is at the site or operating from home, via the Spark or other terminal/modem. I deal here only with the case of single item failures. It will be clear from the material below how to handle some double failures, but I haven't analysed them in general. Perhaps the most common will be the "hung computer" failure while the station technician is trying to deal with something else at home. This involves the annoying sequence of hanging up, rebooting via Chatterbox, reconnecting. This looks pretty unavoidable.

Failure of observing equipment:

OP - Handled with SCREEN package in usual way (rscreen program)
TECH/SITE - Handled by screen on Spark or desktop PC, connected to site RS 232 Loop, either in computer room or near equipment, or, occasionally, screens run from the -> prompt via Telnet from Cisco console port.
TECH/HOME - Connect to 2400VP for SCREEN access

Failure of MCB coprocessor:

Symptom: Any of 1) Screens, observing system hang up, won't run, even after reboot. 2) All screens show only **** for values read. 3) Screens dealing with any one of the three MCB circuits show only **** for values read. 4). Screens unable to send commands, either all screens, or screens on a particular MCB circuit. May be mimicked by a broken MCB interface card (swap terminals on Motorola to be sure). Nothing can be done until it is fixed.

Failure of Motorola CPU:

Symptom: Nothing restores communications by any of the routes.
Nothing can be done until it is fixed.

Software Failure/Hung computer:

OP - Reboot via Chatterbox
TECH/SITE - Press red button
TECH/HOME - Hang up, reboot via Chatterbox
(NB - we shall probably implement a watchdog (but it may have a long timeout period))

Failure of Motorola ethernet controller, ethernet transceivers, Cisco ethernet controller

Symptom: Can ping from AOC to Cisco, but not to Motorola; SCREENs work normally on RS 232 loop and 2400VP port. Transceiver lights indicate no transmit from Motorola.
OP - Enter appropriate phone number in AOC Sun Racal-Milgo 3222, press dial. When connection established, execute appropriate script file (as superuser) to start SLIP (there would be provided 20 files, one for each station for each of the two 3222s connected to the Sun). Access station for rscreen, rlogin by station name with appended "_sl".
TECH/SITE - Look at lights on transceivers to isolate problem; otherwise, let operator handle it.
TECH/HOME - Let operator handle it.
NB - As well as the "sl" nuisance, dial backup is expensive. Efforts to get it fixed should be immediate and intensive.

Failure of Cisco

Symptom: Can ping to host router, but not to Cisco; SCREENs work normally on RS 232 loop and 2400VP port. Transceiver lights indicate Motorola transmit but no Cisco transmit.
OP - Connect via SLIP as above.
TECH/SITE - verify location of problem by looking at transceiver lights.
TECH/HOME - let operator handle it.

Failure of leased line, Cisco <=> host router or modems thereon

Symptom: Cisco can ping Motorola, but not host router. vlbacc can ping host router but not Cisco. Modem self-test procedures should help to localize failure. Also worth asking if either router has been reconfigured lately; having the computer instructed to ignore the line can mimic its failure.
OP - Connect via SLIP as above.
TECH/SITE - localize problem via ping, modem self-test.
TECH/HOME - Let operator handle it.

Failure of telco exchange

Symptom: No phones to site work.

OP - See if site technician can be reached. If weather indicates possible hazzard to antenna, request him to drive to site.

TECH/SITE - Grumble, drink cup of coffee.

TECH/HOME - Drive to site if weather indicates possible hazzard to antenna

Failure of host router

Symptom: can't be pinged (but other stations OK).

OP - Connect via SLIP as above.

TECH/SITE - Verify that local Cisco is working normally, cannot ping host router

TECH/HOME - Let operator handle it.

Failure of network backbone

Symptom: lots of stations down. Unlikely to last long enough to require major action, but, if so, handle like network access failures below.

Failure of Socorro-Albuquerque fiber bundle

Symptom: neither network nor phones get out.

Nothing to do but wait it out.

Failure of Westnet router at NMIMT

Symptom: all stations except PT down (presuming the eventual configuration with PT connected to an AOC router).

OP - Connect to stations in sequence enough to keep track of what is happening, using the SLIP connection procedure above. Connecting to two different stations every half hour might be a reasonable expectation, leaving stations unmonitored for 2h.

TECH - Let operator handle it.

Failure of AOC ethernet

Symptom: nothing works anywhere except modem calls to the 2400VPs.

Computer communications on other ethernets within the AOC work.

OP - If outage will be long enough to justify it (many hours), have network person reroute network communications from vlbacc through its second ethernet to the Westnet router

Failure of AOC router

Symptom: nothing works anywhere except modem calls to the 2400VPs.

OP - A Unix system person can boot vlbacc so that it is happy with no ethernet. The array can then be operated by cycling through the stations with SLIP connections as above.

If the router will be down for a long period, a network person could substitute the spare small Cisco to get the VLBA subnet only working. This would be a major effort, and should not be attempted if the router can be brought back up again in a day or so.

Failure of vlbacc

OP - connect to another convenient Sun (eg ccc) who has rscreen for monitoring purposes. Observing files and observ.tx files must be copied by hand to stations, and monitor data either written to floppies and mailed or copied by hand when the computer is fixed. (Alternately, we easily could implement the software to provide netmon monitor data service and observe file copying service to ccc in case of vlbacc failure.)

With the internet connection backed up by a SLIP connection, I do not see the need to maintain the capability of running systems by an ASCII connection to the console port. This capability can always be restored by having the site technician swap the cable back if some extraordinary combination of failures dictates it, but providing the second level of backup to normal observing (as opposed to monitoring and antenna control) without intervention of the site technician seems to me excessive.

This plan also does not provide for automatic dial backup on the modems between the local Cisco and the host router. This is because 1). the operating cost (about \$6,000 per year for 10 sites) is not negligible. 2). I worry about a large phone bill being run up when the leased line goes down and nobody notices until the toll charges surface. 3). The savings in time, convenience, and money vis-a-vis the SLIP backup route are fairly small, the last because most calls to the host router will be long distance at most sites and current toll charges are nearly independent of distance. 4). The arrangement would be slightly different at different sites (depending on whether they have digital or analog modems on the leased

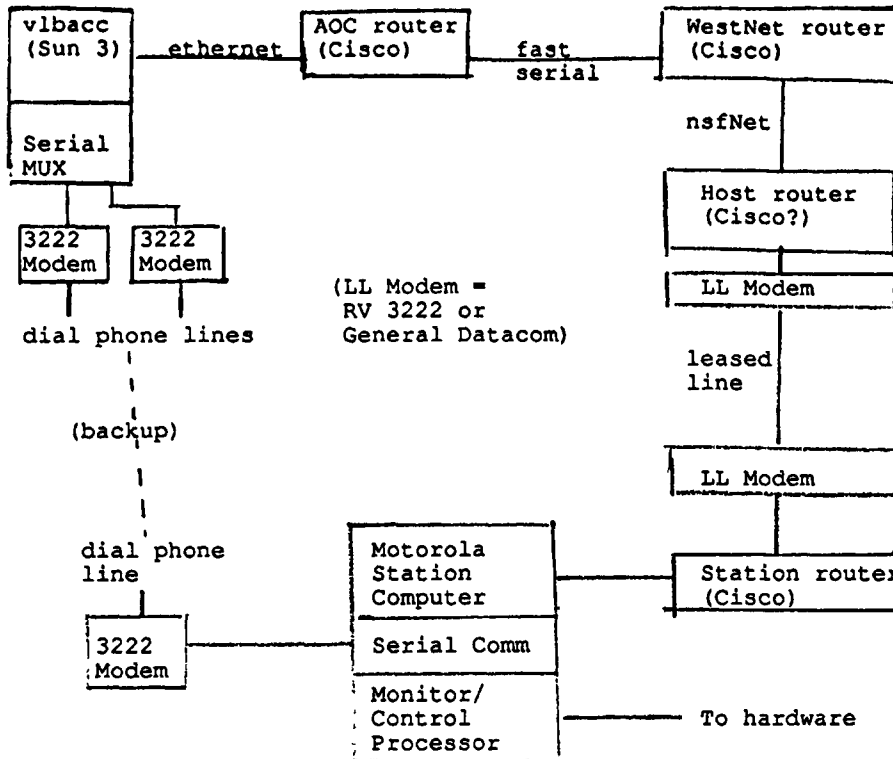
line) which could be confusing in times of stress.

Nor does it provide a modem and dial-up line for use between the AOC router and the local station router, because 1). the arrangement would be different depending on whether the site has a digital or analog modem. 2). Reconfiguring the AOC router for the different route is a more complex and dangerous procedure than configuring vlbacc for SLIP (it should be done by a network person rather than an array operator).

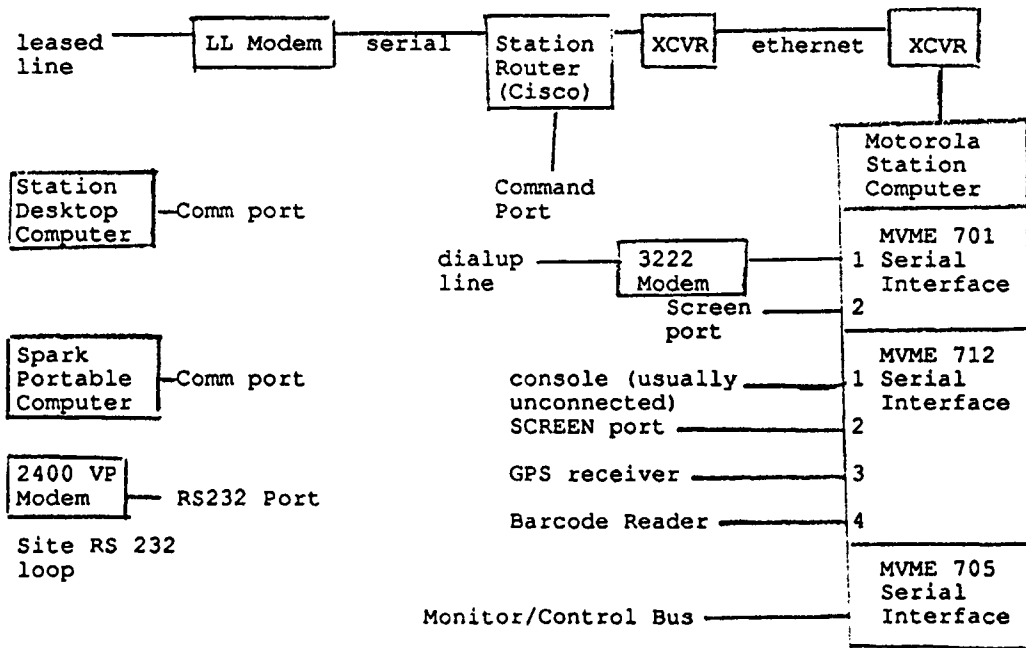
Regular testing would be required on the backup route, or it will not work when you need it. I would suggest activating the SLIP link to each station about once every two months, and verifying that it will go as far as rlogin.

If an additional serial port is needed at the site for, eg, connection to the UPS, it would be possible, with a little work, to modify the software to bring up a SCREEN task on the console port without preempting the shell (-> prompt), so that the console port would be available for the RS 232 loop and the shell would still be available for rlogin and telnet use. One would have to be a little careful about what one connects to avoid upsetting the reboot process.

It should be noted that operating via long-distance dial-up is about 30 times more expensive than by internet/leased line. Communications problems should be jumped on hard: not to the point of calling out people in the middle of the night, but perhaps to the point of calling out people over the weekend, especially long weekends when they will hate it most.



Network connections: VLBA station computers to AOC.



Station Computer connection details.
 Connection of Cisco command port, desktop computer communications port, 2400 VP modem RS232 port, and site RS 232 loop are still to be decided.