

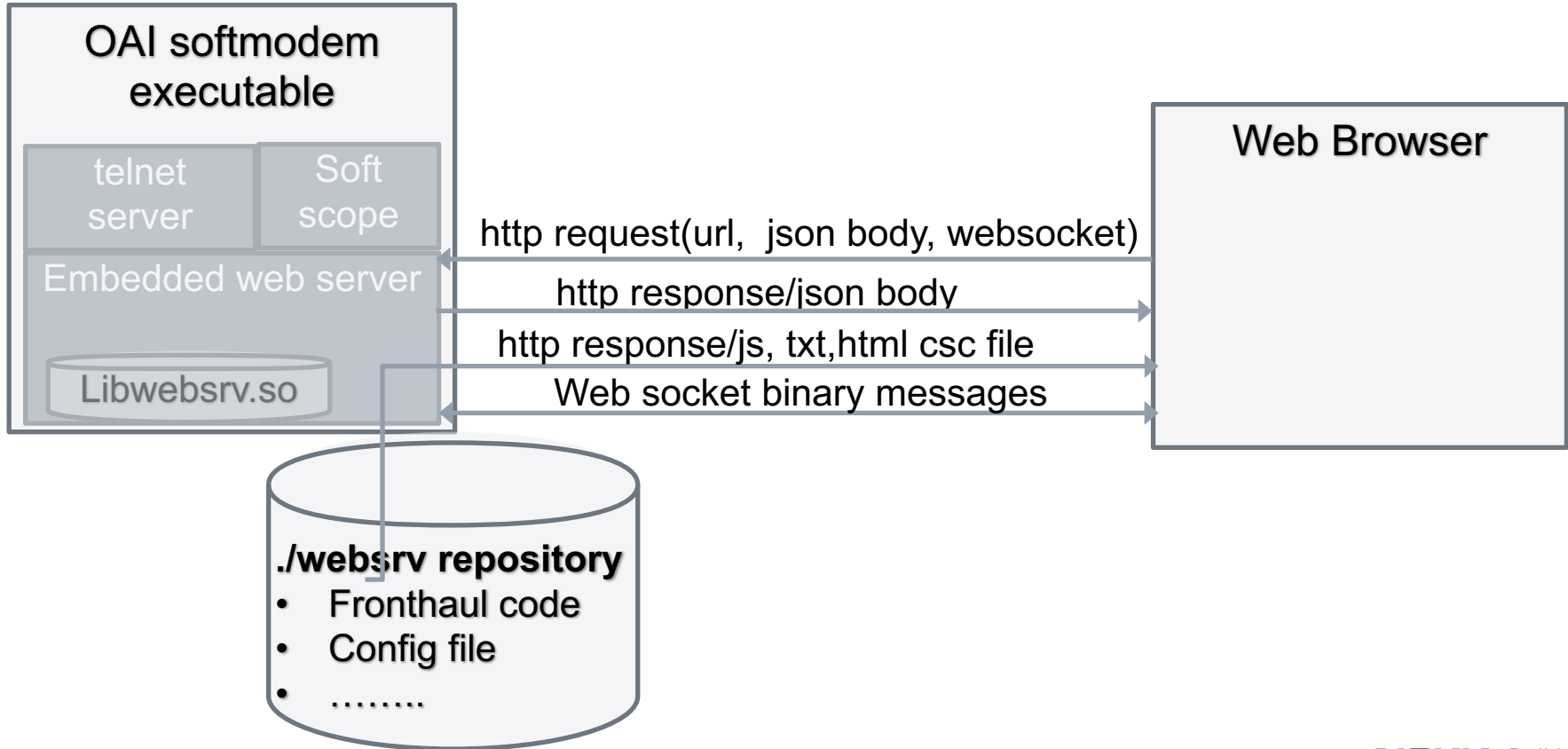
# WEB interface for oai softmodem

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# Requirements

1. Provide some nice interface when oai softmodem's included in demo's
  - Oai has already a set of tools for debugging and monitoring
  - Console or X11 interfaces: convenient for debugging or test automation, web interface easier to deploy (remote access, platform agnostic client), easier to make it "user friendly"
2. Not a new tool but a single point of access to oai softmodem's monitoring and debugging tools
  - Keep existing tools functionalities, they have their advantages and their supporters
  - Provide an easy access to oai functionalities
3. Optional, build and use it if interested and when it can help
4. Evolutive, flexible
  - Available for eNB, gNB and UE's
  - Easy addition of new functionalities
  - Minimize adaptation work when softmodem's are updated

# Architecture



# implementation

## 1. Two new targets in oai build

- defined in common/utils/websrv/websrv\_CMakeLists.txt
- websrv, optional shared lib: the embedded web server (backend)
- websrvfront, the user interface implementation, executed by the browser and downloaded from the backend.

## 2. websrv

- C code, linked with libulfius-dev and libjansson-dev (ubuntu packages)
- Source files in common/utils/websrv
- url requests are mapped to callbacks
- url used for connection triggers frontend code delivery to the client and interface customization depending on softmodem functionalities and configuration
- User interface objects (buttons...) trigger callbacks in charge of interfacing with softmodem modules
- Websocket, initialized using a specific url can be used for backend-initiated update of interface

# implementation

## 2. webservfront

- Angular application (typescript, html, css,scss)
- The most difficult part: angular imply knowing web development technologies and adds it's specificities, with lots of optional packages.
- Source files in common/utils/websrv/webservfront
- User interface functionalities received from the server, interface dynamically built depending on backend responses to initial url requests
- triggers http requests depending on user actions, update user interface when receiving http responses
- Support to websocket has been added to allow interfacing with softscope or any module which needs to receive unsolicited interface updates from the server.

# status

## 1. completed

- Implementation and test performed on ubuntu20, restrictions on ubuntu 18 (no https, websockets ?)
- Generic functions in webserv.c and telnet server (enhancements) to map any telnet server module and command to menu option and button in the browser interface
- Generic functions in webserv.c and telnet server enhancements to build 3 kind of responses
  - a) Simple result pages, containing command results, as printed in telnet interface
  - b) Automatically updated result pages
  - c) Table pages with modifiable field
- Frontend building blocks
  - a) Interface objects created dynamically depending on back-end responses
- Back-end/front-end interface
  - a) Json message body in requests and responses
  - b) Websocket initialization, message creation/reception

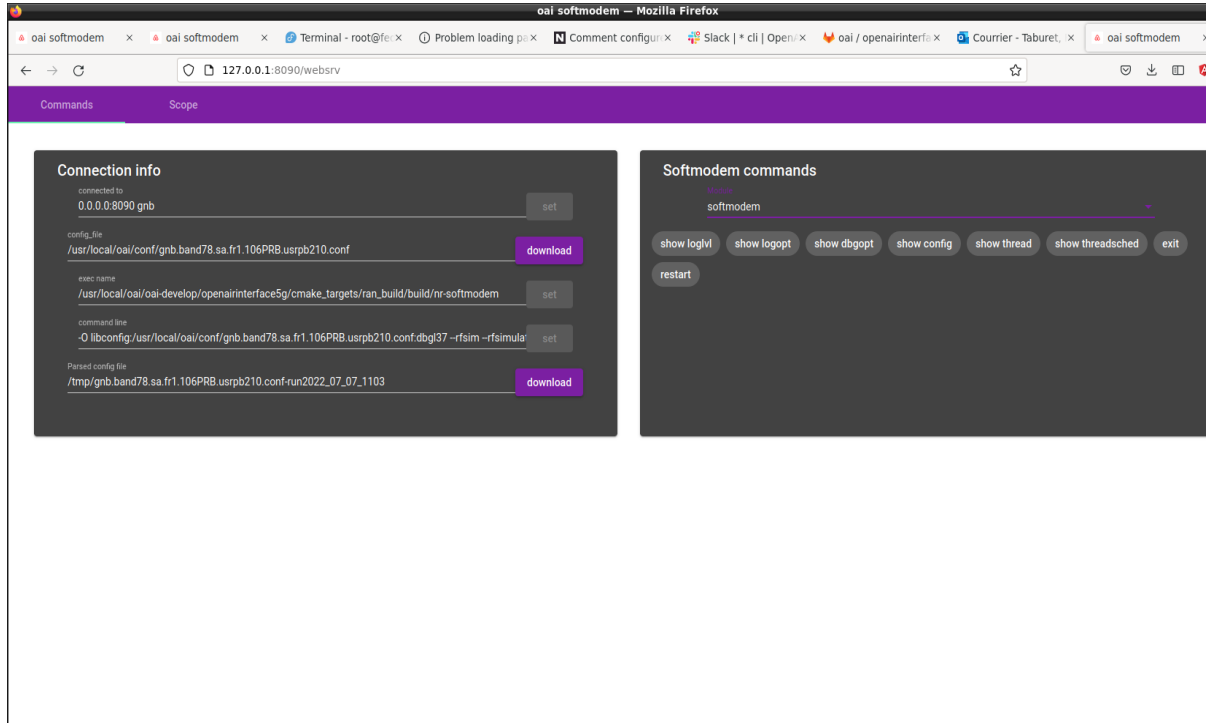
## status

1. On-going
  - Investigation to build a softscope interface
    - a) Feasibility is proved, performance to be evaluated
  - Https support: implemented but not working
  - Build and test on non ubuntu distrib
2. To be done, ideas for future
  - Rebase to develop and merge request
  - Help implementation
  - Tests with lte softmodem's
  - Interface to new measurement mechanism
  - Interface to edit config file
  - Interface to analyze logfile
  - Alarm notifications via websocket

# Screenshots: running with the web server

```
root@oaibbu2: /usr/local/oai/oai-develop/openairinterface5g/cmake_targets/ran_build/build
File Edit Tabs Help
root@oaib... oai@oaibb...
--rfsimulator.options chanmod^C
:
:ls
CMakeCache.txt      libL2_NR.a          libNFAPI_COMMON_LIB.a  libPHY_UE.a         libwebsrv.so
CMakeFiles          libL2_UE.a          libNFAPI_LIB.a         librfsimulator.so  libX2AP_ENB.a
cmake_install.cmake libL2_UE_LTE_NR.a  libNFAPI_PNF_LIB.a    libRRC_LIB.a       libX2AP_LIB.a
err.txt             libldpc_cuda.so    libNFAPI_USER_LIB.a   libS1AP_ENB.a      log.txt
libASYNCRIF.a      libldpc_optim8seg.so libNFAPI_VNF_LIB.a   libS1AP_LIB.a      lts-softmodem
libcoding.so        libldpc_optim.so   libNGAP_GNB.a         libSCHED_LIB.a     lts-uesoftmodem
libCONFIG_LIB.a    libldpc_optim.so   libNGAP_LIB.a         libSCHED_NR_LIB.a  Makefile
libdfts.so          libldpc.so         libNGAP_L2_UE.a       libSCHED_NR_UE_LIB.a nrL1_stats.log
libenbscope.so     libLFD57.a         libNR_L2_UE.a         libSCHED_RU_LIB.a  nrL1_UE_stats-0.log
libF1AP.a          libLIB_SGNAS_GNB.a libNR_RRC_LIB.a       libSCHED_UE_LIB.a  nrMAC_stats.log
libF1AP_LIB.a      libLIB_NAS_SIMUE.a liboai_eth_transpro.so libSCTP_CLIENT.a   nr-softmodem
libFLEXRAN_AGENT.a libLIB_NAS_UE.a   liboai_lqplayer.so    libSECU_CN.a       nr-uesoftmodem
libFLPT_MSG.a      libM2AP_ENB.a     liboai_transpro.so    libSECU_OSA.a      oaisoftmodem.log
libFSPT_MSG.a      libM2AP_LIB.a     libparams_libconfig.so libSIMU_COMMON.a   prach_iffft0.m
libGTPV1U.a        libM3AP_ENB.a     libPHY.a              libSIMU_COMMON.a   prach_rxF0.m
libHASHTABLE.a     libM3AP_LIB.a     libPHY_COMMON.a       libSIMU_COMMON.a   prach_rxF1.m
libITTI.a          libMAC_NR_COMMON.a libPHY_NR.a           libSIMU_COMMON.a   prach_rxF_comp0.m
libL2.a            libMISC_NFAPI_LTE_LIB.a libPHY_NR_COMMON.a   libtelnetnsrv_5Gue.so rxsigf.m
libL2_LTE.a        libMISC_NFAPI_NR_LIB.a libPHY_NR_UE.a       libtelnetnsrv_enb.so websrv
libL2_LTE_NR.a     libMME_APP.a      libPHY_RU.a           libuescope.so      Xu.m
:
:./nr-uesoftmodem -O /usr/local/oai/conf/nrue_sim.conf --sa --numerology 1 -C 3619200000 --rfsim --rfsimulator.server
addr 127.0.0.1 --websrv --telnetnsrv --websrv.listenport 8092 --telnetnsrv.listenport 8091 --websrv.url websrv/index.ht
ml -d^C
:
:./nr-softmodem -O libconfig:/usr/local/oai/conf/gnb.band78.sa.fr1.106PRB.usrbp210.conf:dbg137 --rfsim --rfsimulator
.serveraddr server --telnetnsrv --telnetnsrv.listenstdin --sa --websrv --websrv.url websrv/index.html --websrv.debug 1
--rfsimulator.options chanmod
```

# Screenshots: Main window



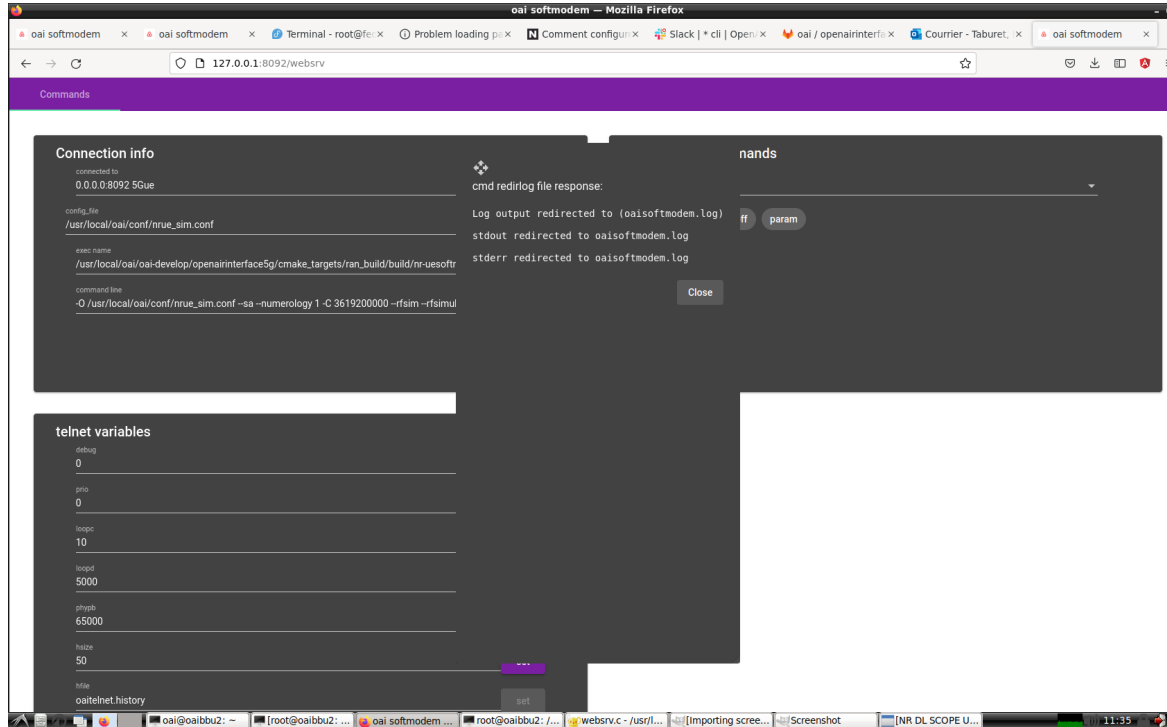
# Screenshots: modify parameters

Parsed config file  
/tmp/gnb.band78.sa.fr1.106PRB.usrbp210.conf-run2022\_07\_1103 [download](#)

### softmodem show loglvl

component	level	enabled	in file	
PHY	Log Level info	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<a href="#">set</a>
MAC	Log Level info	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<a href="#">set</a>
EMU	Log Level info	<input type="checkbox"/>	<input type="checkbox"/>	<a href="#">set</a>
SIM	Log Level info	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<a href="#">set</a>
OCG	Log Level info	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<a href="#">set</a>
OMG	Log Level info	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<a href="#">set</a>
OPT	Log Level info	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<a href="#">set</a>
OTG	Log Level info	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<a href="#">set</a>
OTG_LATENCY	Log Level info	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<a href="#">set</a>
OTG_LATENCY_BG	Log Level info	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<a href="#">set</a>

# Screenshots: logs redirection



# Screenshots: modify parameters

thread id	thread name	priority	nice	core	sched policy	oai priority	
76758	(nr-softmoc	20	0	4	other	20	set
76772	(telnet	20	0	1	other	20	set
76773	(telnetcli	20	0	0	other	20	set
76774	(MHD-lister	20	0	2	other	20	set
76777	(TASK_SCT	-51	0	5	rt,rr	-150	set
76780	(TASK_NGA	-51	0	1	rt,rr	-150	set
76783	(TASK_GNB	-51	0	5	rt,rr	-150	set
76786	(TASK_RRC	-51	0	2	rt,rr	-150	set
76787	(TASK_GNB	-51	0	1	rt,rr	-150	set
76789	(RLC queue	-51	0	1	rt,rr	-150	set
76790	(PDCP_data	-51	0	1	rt,rr	-150	set
76792	(pdcp_timer	-51	0	4	rt,rr	-150	set

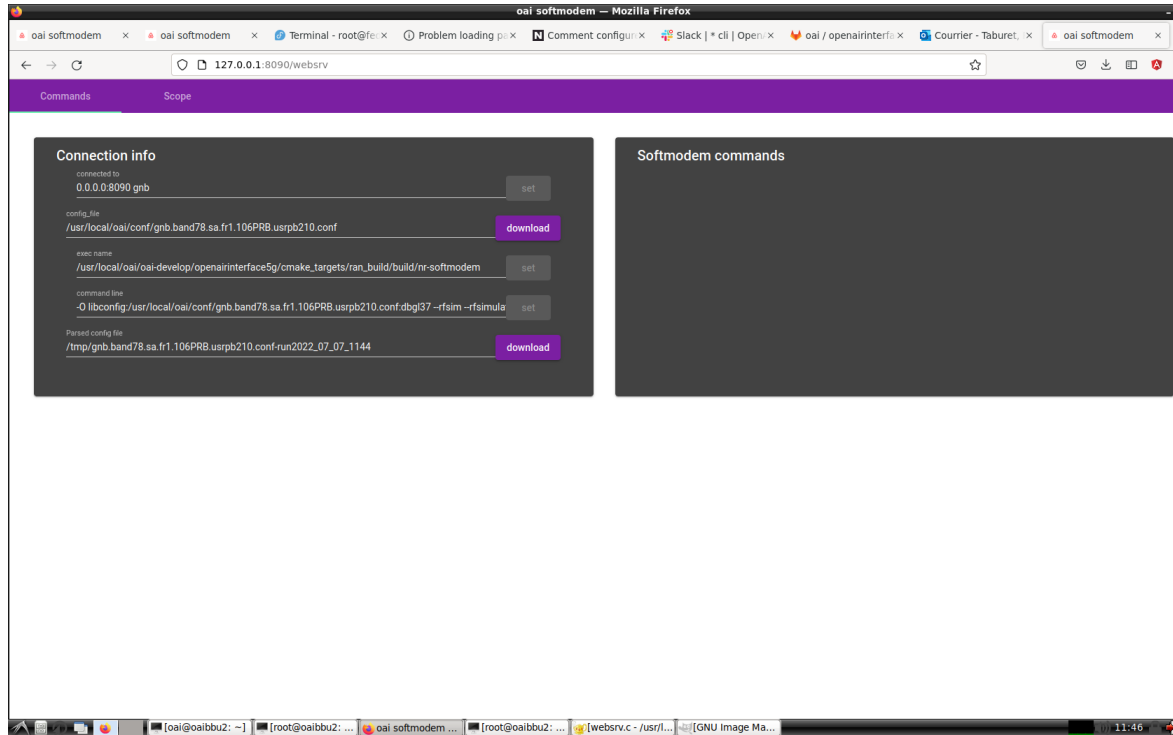
# Screenshots: monitoring

The screenshot shows a web browser window titled "oai softmodem - Mozilla Firefox" with the address bar at "127.0.0.1:8090/websrv". The page content is divided into several sections:

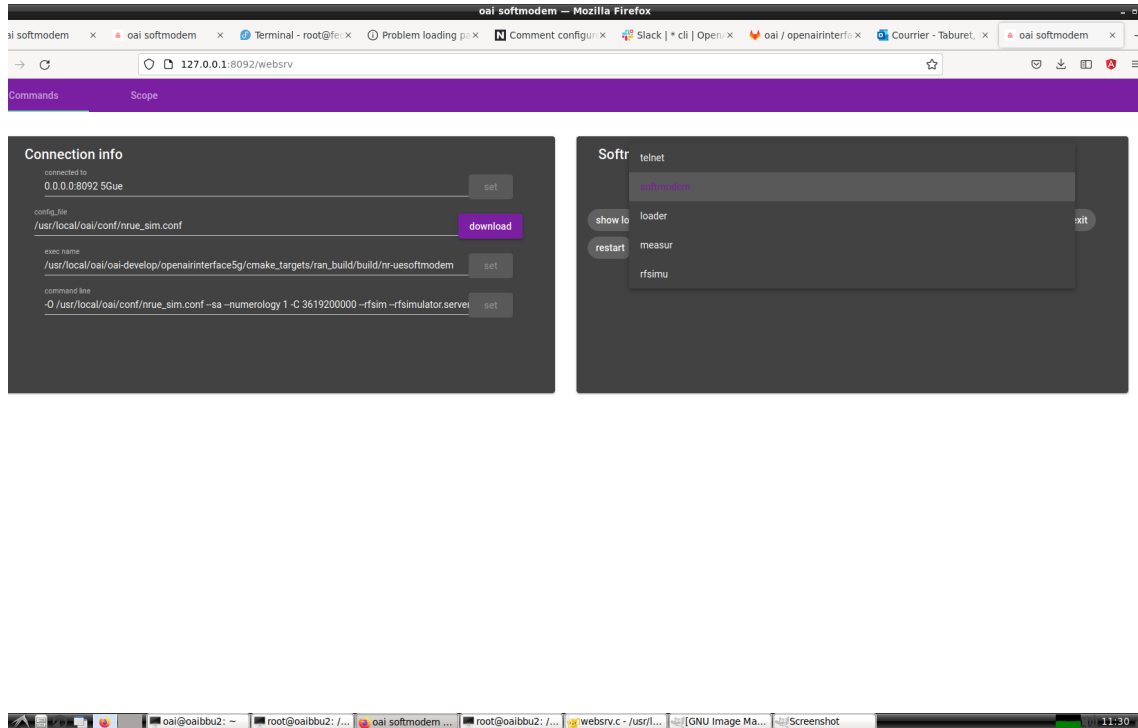
- Connection info:** Lists various configuration files and their paths, such as "0.0.0.0.8090.gnb", "usr/local/oai/conf/gnb.band78.sa.fr1.106PRB.usrb210.conf", and "libconf/usr/local/oai/conf/gnb.band78.sa.fr1.106PRB.usrb210.conf.dbg37-".
- System Statistics:** Displays "System has 4 cores 8 threads 0 Actual threads".
- Process List:** A table showing running processes with columns for ID, name, state, USRead, K99mod, prio, nice, vsize, and proc pol. The list includes processes like "nr-softmodem", "telnet", "MHD-Listen", "TASK\_SCTP", "TASK\_NGAP", "TASK\_GNB\_APP", "TASK\_RRC\_GNB", "RLC queue", "PDCP\_data\_ind", "pdcp\_timer", "TASK\_GTPV1\_U", "thread\_FH", "feprx", "feptx", "Tpool0..1", "Tpool1..1", "Tpool2..1", "Tpool3..1", "L1\_stats", and "MHD-connection".
- Control Panel:** Includes buttons for "fig", "show thread", "show threadsched", "exit", and "restart".

The bottom of the browser window shows a taskbar with several open applications, including "oai@oaiibu2: ~", "root@oaiibu2: /...", "oai softmodem ...", "websrv\_websoc...", "GNU Image Man...", "Toolbox - Tool O...", and "Paths - Brushes". The system clock shows "11:16".

# Screenshots: adaptable interface, ex: no telnet



# Screenshots: adaptable interface, ex: UE...



**NOKIA**