OLSRd On Gumstix
Overview

- Project topic is to run OLSRd protocol on Gumstix.
- In the process, makefile compilation, Gumstix environment setup processes, Gumstix Buildroot configurations etc were encountered.
The goal of this project is to run the OLSRd protocol on Gumstix. However, it was also run on the Laptop.
OLSR Introduction

- Optimized Link State routing protocol.
- Routing protocol for mobile ad hoc networks.
- Exchanges Hello packets to discover a 2 hop neighborhood.
- Uses selected nodes as MPR's - Multipoint relays.
A little bit about OLSRd

- OLSRd- Optimized Link State routing Daemon
- Started off as a master's thesis by Andreas Tönnessen at UNIK- University Graduate Center.
- It has come a long way since then.
- In my project I used olsrd-0-5-6.rc4.
- Downloaded at www.olsr.org
Procedure

Before building OLSRd, we need to have necessary tools installed.

To install to a directory different from /(/etc, /usr/bin) use DESTDIR=targetdir. To use other compilers set CC=your compiler.
To build:
  make

To install (as root):
  make install

To delete object files run:
  make clean

Optionally, to clean all generated files:
  make uberclean
Before running olsrd you must edit the default configuration file

One must have root privileges to run olsrd.

To run Olsrd simply type olsrd.
The errors I primarily got were something to do with the c files in the source.

Anyhow, I was finally successful in running it.

These tactics primarily involved changing makefile target directories to store olsrd executables.
root@gayatri-laptop:~$ su
Password:
root@gayatri-laptop:~$ cd ..
root@gayatri-laptop:~$ cd ..
root@gayatri-laptop:~$ olsrd

** olsr.org - 0.5.6-rc4 **
Build date: 2008-06-01 16:17:15 on gayatri-laptop
http://www.olsr.org

Parsing file: "/etc/olsrd.conf"

** olsrd configuration **

Debug Level : 2
IPVersion : 4
No interfaces : ALLOWED
TOS : 0x10
RtTable : 0xfe
RtTableDefault : 0x09
Willingness : AUTO
IPC connections : 0
  Host 127.0.0.1
Pollrate : 0.05
NIC ChangPollrate: 3.00
TC redundancy : 2
MPR coverage : 3
LO level : 2
LO fish eye : 0
LO Dijkstra limit: 255, 0.00
LO aging factor : 0.100000
LO algorithm name: default
NAT threshold : 1.000000
Clear screen : yes

Interfaces:
dev: "eth1"

  IPv4 broadcast : AUTO
  IPv6 addrtype : global
  IPv6 multicast site/glob : ff05::15/ff0e::1
  HELLO emission/validity : 2.00/20.00
  TC emission/validity : 5.00/30.00
  MID emission/validity : 5.00/30.00
  HNA emission/validity : 5.00/30.00
Not using hysteresis
Local willingness updated: old 0 new 3
Willingness set to 3 - next update in 20.0 secs
Added 0.0.0.0 to IP deny set
Added 127.0.0.1 to IP deny set

--- Interface configuration ---

Checking eth1:
  Wireless interface detected
  Metric: 1
  MTU - IPHdr: 1472
  Index 3
  Address: 192.168.178.24
  Netmask: 255.255.255.0
  Broadcast address: 192.168.178.255

Adding OLSR socket entry
New main address: 192.168.178.24
Checking wlan0:
  No such interface!
Using 'etx fpm' algorithm for lq calculation.
-- ALL PLUGINS LOADED! --

Main address: 192.168.178.24

Scheduler started - polling every 0.05 seconds

*** olsr.org - 0.5.6-rc4 (2008-06-01 16:17:15 on gayatri-laptop) ***

--- 21:00:05.443038 ------------------------------- DIJKSTRA

--- 21:00:05.443090 -------------------------------- LINKS

--- 21:00:05.443146 ---------------------------- TWO-HOP NEIGHBORS

IP address   hyst   LQ   ETX
--- 21:00:05.443146 ---------------------------- TWO-HOP NEIGHBORS

IP addr (2-hop) IP addr (1-hop) Total cost
No such interface!

Using 'etx_fpm' algorithm for lq calculation.

-- ALL PLUGINS LOADED! --

Main address: 192.168.178.24

Scheduler started - polling every 0.05 seconds

*** olsr.org - 0.5.6-rc4 (2008-06-01 16:17:15 on gayatri-laptop) ***

--- 21:00:05.443038  ------------------------ DIJKSTRA

--- 21:00:05.443090  ------------------------ LINKS

IP address   hyst   LQ   ETX
--- 21:00:05.443146  ------------------------ TWO-HOP NEIGHBORS

IP addr (2-hop) IP addr (1-hop) Total cost
--- 21:00:05.443180  ------------------------ TOPOLOGY

Source IP addr   Dest IP addr   LQ   ETX
OLSRd on Gumstix

- Setting up the gumstix-build root environment.
- Enabling ipv6 features for olsrd.
- Compiling the jffs2 image of buildroot to be compatible with olsrd.
- Re flashing the Gumstix with new olsrd compatible jffs2 image.
- Running olsrd on Gumstix.
Gumstix Buildroot Environment

- Followed directions on the wiki tutorial for Ubuntu version.
- Successfully compiled the buildroot for gumstix buildroot version 1545.
- Result was a new shiny jffs2 image in the gumstix buildroot directory.
IPV6 Enabling

- Change directory to the uClibc build directory
- Run "make menuconfig"
- Under the "Networking Support" menu, check the "IP version 6 Support" box.
- Exit menuconfig, saving the new configuration
Networking Support

Arrow keys navigate the menu. <Enter> selects submenus -->. Highlighted letters are hotkeys. Pressing <Y> selectes a feature, while <N> will exclude a feature. Press <Esc><Esc> to exit, <?> for Help, </> for Search. Legend: [*] feature is selected  [ ] feature is excluded

[*] IP version 6 Support
[*] Remote Procedure Call (RPC) support
[*] Full RPC support
[*] Reentrant RPC support
[*] Use netlink to query interfaces
[ ] Support close kidn (bsd-compat)
Making the buildroot jffs2 image compatible with olsrd

- Change directory to gumstix-buildroot and run 'make menuconfig'
- In the package selection menu, enable "olsrd". Optionally, enable the dot-draw plug in & patch
- Run "make" in the gumstix-buildroot directory, re-flash your gumstix with the new image.
Buildroot Configuration

Arrow keys navigate the menu. <Enter> selects submenus. Highlighted letters are hotkeys. Pressing <Y> selects a feature, while <N> will exclude a feature. Press <Esc><Esc> to exit, <?> for Help, </> for Search. Legend: [*] feature is selected  [ ] feature is excluded

- Target Architecture (arm) ---->
- Target Architecture Variant (xscale (eg Gumstix basix/connex)) ---->
- Target ABI (EABI) --->
- Build options --->
- Toolchain Options --->

- Package Selection for the target --->
  - Target Options --->
  - Board Support Options --->

---
Load an Alternate Configuration File
Save Configuration to an Alternate File
Package Selection for the Target

Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are hotkeys. Pressing <Y> selects a feature, while <N> will exclude a feature. Press <Esc><Esc> to exit, <?> for Help, </> for Search. Legend: [*] feature is selected  [ ] feature is excluded

~(-)

[ ] adm
[ ] mmtester
[ ] microcom
[ ] microperl
[ ] mcowin
[ ] dosfs
[*] module-init-tools
[ ] dutils
[ ] mgl23
[ ] mouted
[*] mtd/jffs2 utilities
    MD package selection --->
    MD tools selection --->

[ ] nano
[ ] nurses
[ ] ntktbase
[ ] ntkt#elsenet
[ ] netperf
[ ] ntsnmp
[ ] nwt
[ ] nts-utils
[ ] nmp
[ ] ntp
[ ] ggl23
[*] olsrd
[*] Build OLSRD's Dot-Draw plugin
[*] Allow dot-draw connection from any host
V(+)

<Select>  < Exit >  < Help >
Errors

- After running `make` in the gumstix buildroot directory, I received errors.
- Due to the `olsrd.mk` file not being parsed correctly.
The olsrd make file olsrd.mk

OLSRD_VERSION:=0.5.5
OLSRD_SOURCE:=olsrd-$\{OLSRD_VERSION\}.tar.gz
OLSRD_SITE:=http://texas.funkfeuer.at/olsrd/0.5.5
OLSRD_DIR:=\$(BUILD_DIR)/olsrd-$\{OLSRD_VERSION\}
OLSRD_BINARY:=olsrd
OLSRD_TARGET_BINARY:=usr/sbin/olsrd

\$(DL_DIR)/$(OLSRD_SOURCE):
  $(WGET) -P \$(DL_DIR) \$(OLSRD_SITE)/$(OLSRD_SOURCE)

\$(OLSRD_DIR)/.source: \$(DL_DIR)/$(OLSRD_SOURCE)
  zcat \$(DL_DIR)/$(OLSRD_SOURCE) | tar -C \$(BUILD_DIR) \$(TAR_OPTIONS) -
  touch \$(OLSRD_DIR)/.source

\$(OLSRD_DIR)/$(OLSRD_BINARY): \$(OLSRD_DIR)/.source
  CC=\$(TARGET_CC) STRIP=\$(STRIP) make -C \$(OLSRD_DIR)

\$(OLSRD_DIR)/lib/dot_draw/src/.patched:
ifeq \$(strip \$(BP2_PACKAGE_OLSRD_DD_ANYHOST)),y
  toolchain/patch-kernel.sh \$(OLSRD_DIR)/lib/dot_draw/src package/olsrd dot_draw_anyhost.patch
  touch \$(OLSRD_DIR)/lib/dot_draw/src/.patched
endif

olsrd-plugins: \$(OLSRD_DIR)/.source \$(OLSRD_DIR)/lib/dot_draw/src/.patched
ifeq \$(strip \$(BP2_PACKAGE_OLSRD_DOT_DRAW)),y
  CC=\$(TARGET_CC) STRIP=\$(STRIP) make -C \$(OLSRD_DIR)/lib/dot_draw
endif

olsrd-plugins-installed: olsrd-plugins
ifeq \$(strip \$(BP2_PACKAGE_OLSRD_DOT_DRAW)),y
  cp -f \$(OLSRD_DIR)/lib/dot_draw/olsrd_dot_draw.so.0.3 \$(TARGET_DIR)/usr/lib
endif

\$(TARGET_DIR)/$(OLSRD_TARGET_BINARY): \$(OLSRD_DIR)/$(OLSRD_BINARY)
Why these errors?

- The repository was initially pointing to www.olsr.org/...
- This webpage is not accessible directly, it gets redirected.
- I had to find alternative sources for the repository. This took a while.
- There also seemed to be problems with the dot draw patch.
- After doing a bit of code reading I decided it was not necessary.
- I commented it out from the makefile.
chmod 0600 /gumstix-buildroot/build_arm_nofpu/root/etc/bluetooth/pin
install -D -m 0644 /gumstix-buildroot/build_arm_nofpu/bluez-utils-3.13/rfcomm/rfcomm.conf /gumstix-buildroot/build_arm_nofpu/root/etc/bluetooth/rfcomm.conf
mkdir -p /gumstix-buildroot/build_arm_nofpu/root/etc/default
install -D -m 0644 /gumstix-buildroot/build_arm_nofpu/bluez-utils-3.13/scripts/bluetooth.default /gumstix-buildroot/build_arm_nofpu/root/etc/default/bluetooth

echo DISTRIB_ID='\'gumstix\'' > /gumstix-buildroot/build_arm_nofpu/root/etc/gumstix-release

echo DISTRIB_DESCRIPTION='\'' >> /gumstix-buildroot/build_arm_nofpu/root/etc/gumstix-release

echo DISTRIB_RELEASE='\''svnversion /gumstix-buildroot\'' >> /gumstix-buildroot/build_arm_nofpu/root/etc/gumstix-release

echo DISTRIB_CODENAME='\'' >> /gumstix-buildroot/build_arm_nofpu/root/etc/gumstix-release

echo BUILD_DATE='\''date\'' >> /gumstix-buildroot/build_arm_nofpu/root/etc/gumstix-release

echo BUILD_HOSTNAME='\''hostname -f\'' >> /gumstix-buildroot/build_arm_nofpu/root/etc/gumstix-release
/sbin/ldconfig -r /gumstix-buildroot/build_arm_nofpu/root 2>/dev/null

# Use fakeroot to pretend all target binaries are owned by root

 cp -f /gumstix-buildroot/build_arm_nofpu/staging_dir/fakeroot-devs.env /gumstix-buildroot/build_arm_nofpu/staging_dir/fakeroot.env

/gumstix-buildroot/build_arm_nofpu/staging dir/usr/bin/fakeroot

   -i /gumstix-buildroot/build_arm_nofpu/staging_dir/fakeroot.env \
   -s /gumstix-buildroot/build_arm_nofpu/staging_dir/fakeroot.env -- \
   chown -R root:root /gumstix-buildroot/build_arm_nofpu/root

# Use fakeroot to pretend to create all needed device nodes

/gumstix-buildroot/build_arm_nofpu/staging dir/usr/bin/fakeroot

   -i /gumstix-buildroot/build_arm_nofpu/staging_dir/fakeroot.env \
   -s /gumstix-buildroot/build_arm_nofpu/staging_dir/fakeroot.env -- \
   /gumstix-buildroot/build_arm_nofpu/staging_dir/bin/makedevs
   -d target/generic/device table.txt \
   /gumstix-buildroot/build_arm_nofpu/root

toolchain/build_arm_nofpu/mtd-utils-1.9.0/mkfs.jffs2

   -m size -e 0x200000 -l \
   /gumstix-buildroot/build_arm_nofpu/mtd-utils-1.8.0/samtool -e 0x200000 -l -i /gumstix-buildroot/rootfs.arm_nofpu.jffs2mtd-host-samtool -o /gumstix-buildroot/rootfs.arm_nofpu.jffs2

rm -f /gumstix-buildroot/rootfs.arm_nofpu.jffs2mtd-host-samtool

rw-r--r-- 1 root root 8252772 2008-07-02 04:45 /gumstix-buildroot/rootfs.arm_nofpu.jffs2

root@gayatri-laptop:/gumstix-buildroot
What happened further

- I re ran make.
- It was successful in getting the new image
- Now I had to reflash this new image into the Gumstix
Flashing the gumstix with the new image

- To flash the new image I used C-kermit
- All instructions were from the gumstix wiki
- Image was successfully transferred
- However on rebooting, the gumstix seemed to be stuck at the gum prompt.
Current Directory: /gumstix-buildroot
Communication Device: /dev/ttyUSB0
Communication Speed: 115200
Parity: none
RTT/Timeout: 01 / 02
SENDING: rootfs.arm_nofpu.jffs2 => ROOTFS_ARM_NOFPUSJFFS2
File Type: BINARY
File Size: 8252772
Percent Done: 2 /
...10...20...30...40...50...60...70...80...90..100

Estimated Time Left: 00:15:15
Transfer Rate, CPS: 8802
Window Slots: 1 of 1
Packet Type: 0
Packet Count: 64
Packet Length: 4095
Error Count: 0
Last Error:
Last Message:

X to cancel file, Z to cancel group, <CR> to resend last packet,
E to send Error packet, ^C to quit immediately, ^L to refresh screen.
Welcome to minicom 2.2

OPTIONS: I18n
Port /dev/ttyUSB0

Press CTRL-A Z for help on special keys

U-Boot 1.2.0 (Oct 26 2007 - 12:51:31) - 400 MHz -

*** Welcome to Gumstix ***

DRAM: 64 MB
Flash: 16 MB
Using default environment

SMC91C1111-0
Net: SMC91C1111-0
Hit any key to stop autoboot:  B
Instruction Cache is ON
Copying kernel to 0xa2000000 from 0x80f00000 (length 0x00100000)...done
## Booting image at a2000000 ...
Bad Magic Number
GUM> boot
Instruction Cache is ON
Copying kernel to 0xa2000000 from 0x80f00000 (length 0x00100000)...done
## Booting image at a2000000 ...
Bad Magic Number
GUM>
Summary of steps

- Buildroot set up for Gumstix: success
- Enabling ipv6 and olsrd support: success
- Remaking the buildroot to incorporate above changes: success
- Transferring the image: success
- Rebooting gumstix: failure
If it was successful

- Configure interfaces on gumstix in olsrd.conf
- To start the olsrd daemon, run "/etc/init.d/s80olsrd start"
Final Results

- Successful running of olsrd on 1 laptop.
- Successful Buildroot compilation.
- Successful makefile compilation to incorporate olsrd features in image for gumstix.
Conclusions

- It could be possible that the image may not be completely compiled to run on gumstix, although it shows it is.
  - due to removal of certain entities in makefile.
  - Deeper kernel debugging is required.
  - Time constraints.
  - Perhaps a networking of 2 laptops can be done.
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