

iPAQ, Linux, Bluetooth and GPRS

iPAQ

iPAQ is a small powerful handheld computer based on the StrongARM processor. The following series are available at this time:

Series	Processor	RAM	ROM	Bluetooth
H3970	PXA250 400MHz	64	48	yes
H3950	PXA250 400MHz	64	32	no
H3870	SA1110 206MHz	64	32	yes
H3850	SA1110 206MHz	64	32	no
H3830	SA1110 206MHz	32	32	no

The series are equipped with 320×240 pixels TFT LCD color display with 64K colors.

Familiar

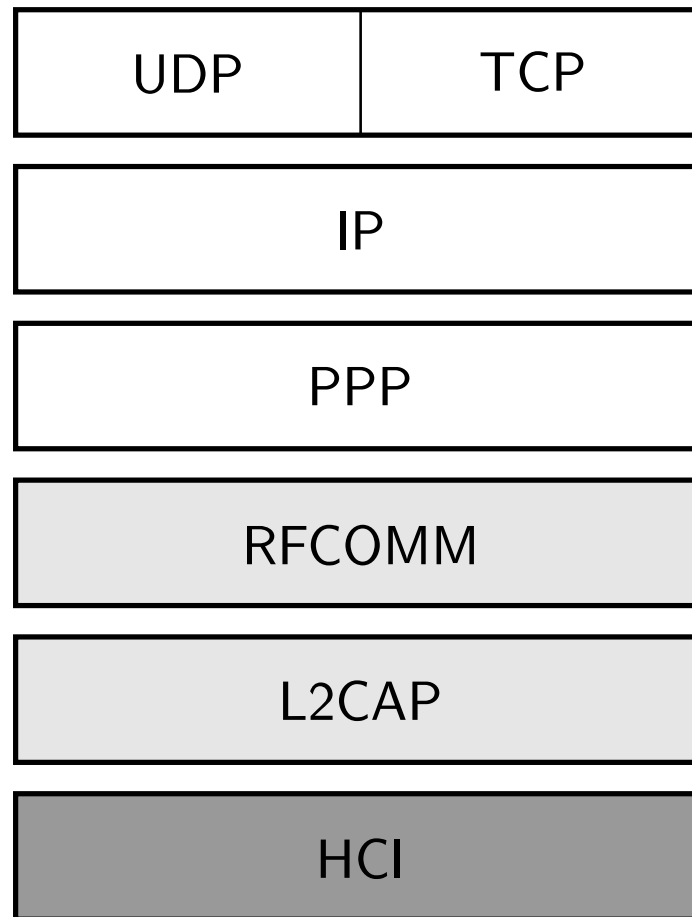
The Familiar Project is composed of a group of developers all contributing to creating the next generation of PDA OS. Currently, most of our development time is being put towards producing a stable, and full featured Linux distribution for the iPAQ series of handheld computers, as well as apps to run on top of the distribution.

Current stable version 0.6 supports series H3100, H3600, H3700 and H3900. The version includes the following key features:

- tiny-X server (XFree86),
- anti-aliased True-Type fonts,
- ssh a sshd (OpenSSH),
- JFFS2,
- binaries and libraries compatible with Debian's ARM distribution,
- package support based on ipkg.

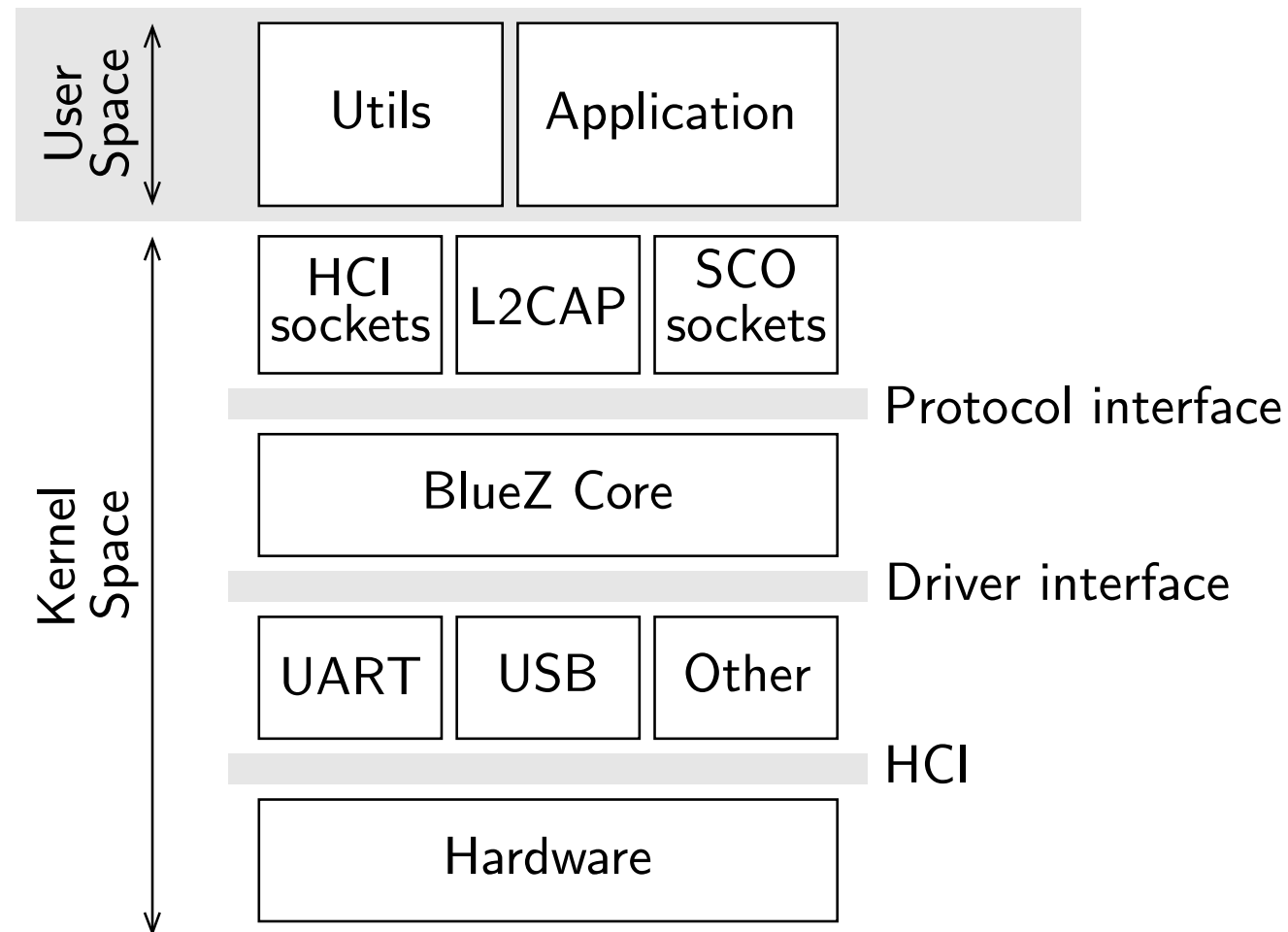
Bluetooth

Bluetooth is the term used to describe the protocol of a short range (10 meter) radio link between devices.



BlueZ

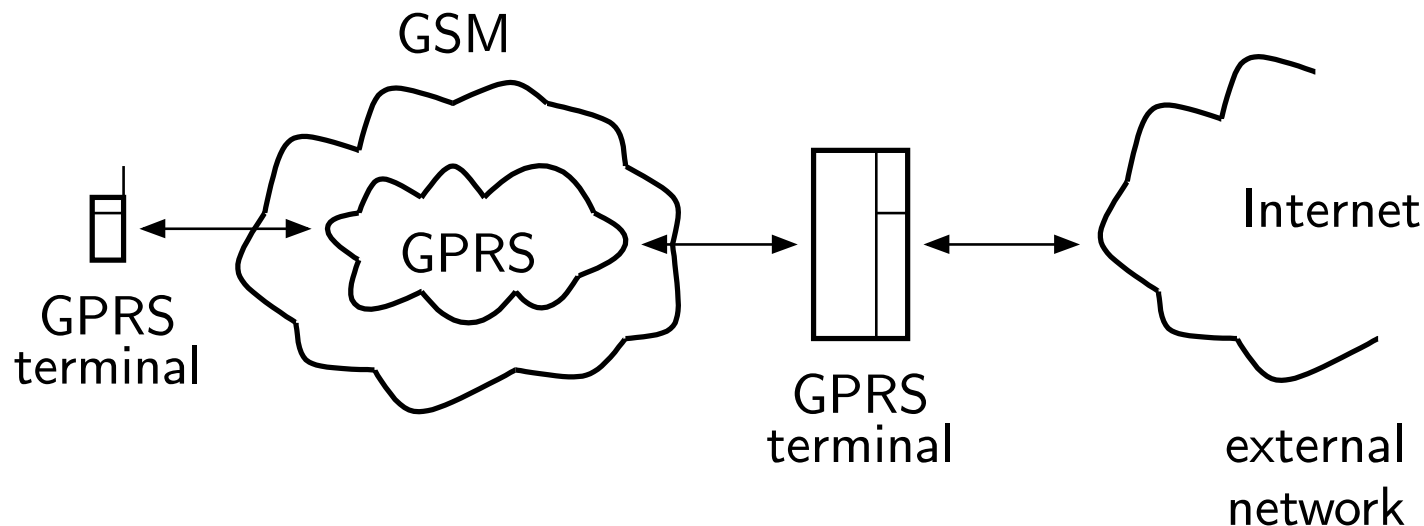
BlueZ is the official Linux Bluetooth stack. It provides support for core Bluetooth layers and protocols.



GPRS

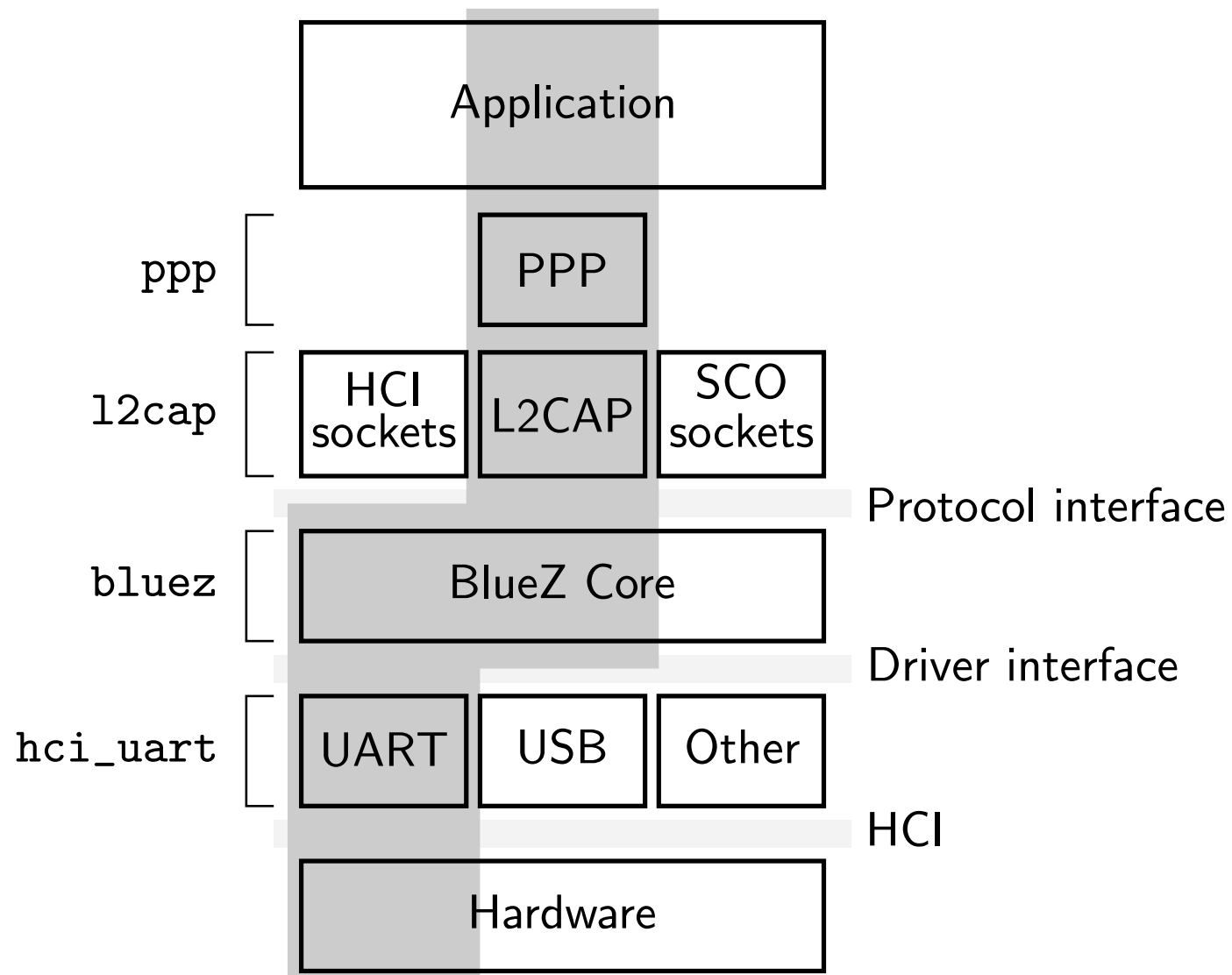
General Packet Radio Service is a service designed for digital cellular networks. It utilises a packet radio principle and can be used for carrying end user's packet data protocol (such as IP and X.25) information from/to a GPRS terminals to/from other GPRS terminals and/or external packet data networks.

One of the advantages of GPRS is its ability to provide instant connection where information can be sent and received immediately.



Theoretical maximum speed can be up to 171.2 Kb/sec, however realistic speed fluctuates between 43 and 56Kb/sec.

Kernel Modules



HCI Tools

The daemon

```
iPAQ> hcid
```

The hciattach

A simple utility that initializes a given serial port.

```
iPAQ> hciattach /dev/ttySB0 csr
```

The hciconfig

HCI device configuration utility.

```
iPAQ> hciconfig
hci0:  Type: UART
      BD Address: 00:02:C7:0B:FE:D5 ACL MTU: 128:8  SCO MTU: 64:8
      UP RUNNING PSCAN ISCAN
      RX bytes:17199 acl:687 sco:0 events:748 errors:0
      TX bytes:11592 acl:704 sco:0 commands:27 errors:0
```


The hcitool

Generic writing and monitoring to the HCI interface.

```
iPAQ> hcitool -i hci0 inq
Inquiring ...
      00:80:37:B9:5B:0F          clock offset: 0x343b      class: 0x520204

iPAQ> hcitool info 00:80:37:B9:5B:0F
Requesting information ...
  BD Address:  00:80:37:B9:5B:0F
  Device Name: Gismobb
  LMP Version: 1.1 (0x1) LMP Subversion: 0x400
  Manufacturer: Ericsson Mobile Communications (0)
  Features: 0x04 0xea 0x31 0x00
            <encryption> <RSSI> <SCO link> <HV3 packets>
            <u-law log> <A-law log> <CVSD>
```

L2CAP Tool

The l2ping

L2CAP analogy of traditional ping utility.

```
iPAQ> l2ping 00:80:37:B9:5B:0F
Ping: 00:80:37:B9:5B:0F from 00:02:C7:0B:FE:D5 (data size 20) ...
0 bytes from 00:80:37:B9:5B:0F id 200 time 57.85ms
0 bytes from 00:80:37:B9:5B:0F id 201 time 60.09ms
0 bytes from 00:80:37:B9:5B:0F id 202 time 60.09ms
0 bytes from 00:80:37:B9:5B:0F id 203 time 70.04ms
0 bytes from 00:80:37:B9:5B:0F id 204 time 70.09ms
0 bytes from 00:80:37:B9:5B:0F id 205 time 60.09ms
0 bytes from 00:80:37:B9:5B:0F id 206 time 60.09ms
7 sent, 7 received, 0% loss
```

Setting up RFCOMM and PPP on Top of BlueZ

The rfcmmnd

The `rfcomm` mediates communication between bluetooth device and user applications. Behavior of the daemon can be adjusted by its `rfcomm.conf` file.

```
...
# Network Access
na
  channel 1;
  up
    ppp "call gprsbt";
  ;
...
```

PPP settings

Creation of point-to-point connection is driven by `/etc/ppp/peers/gprsbt` file.

```
file /etc/ppp/options.gprs
...
connect "/usr/sbin/chat -f /etc/ppp/chat.gprs"
```

IP Address Handling

Handling of IP addresses is specified in `options.gprs` file.

```
# pppd must not propose any IP address to the peer!
noipdefault

# Accept peers idea of our local address
ipcp-accept-local

# Add default route
defaultroute
```

Modem Settings

GPRS-enabled phone behaves as a modem with extended command set.

```
# pppd must not propose any IP address to the peer!
# cid          = 1          (context)
# PDP_type     = IP        (packet type)
# APN          = internet  (GGSN)
# PDP_addr     = "0.0.0.0" (address, null means provider chooses)
# data_comp    = 0          (data compression)
# head_comp    = 0          (header compression)
#
      OK          'AT+CGDCONT=1,"IP","internet","0.0.0.0",0,0'
      SAY        "\n + defining PDP context"
...
# Enter data state
#
      OK          'AT+CGDATA="PPP",1'
      SAY        "\n + requesting data connection"
      CONNECT    'ATDT*99***1#'
      SAY        "\n + connected"
```

Running RFCOMM daemon

The `rfcommd` initialized `ppp0` interface through the medium of `pppd`.

```
iPAQ> rfcommd -n -f /etc/bluetooth/rfcommd.conf na 00:80:37:B9:5B:0F
rfcommd[402]: RFCOMMd client ver 1.1 07/22/2002 started
rfcommd[402]: Connecting to 00:80:37:B9:5B:0F
rfcommd[402]: Session na[00:80:37:B9:5B:0F] opened
...
iPAQ> ifconfig
...
ppp0 Link encap:Point-to-Point Protocol
inet addr:160.218.195.32 P-t-P:160.218.195.32 Mask:255.255.255.255
UP POINTOPOINT RUNNING NOARP MULTICAST MTU:1500 Metric:1
RX packets:3 errors:0 dropped:0 overruns:0 frame:0
TX packets:5 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:3
RX bytes:30 (30.0 b) TX bytes:55 (55.0 b)
```

Phone Settings

A GPRS-enabled phone must be configured properly. Although values of the configuration are specific to each provider, the following items are typically required:

Item	Value
APN	internet
User id	eurotel
Password	****
Password request	Off
Allow calls	GPRS only
IP address	
DNS address	160.218.10.201

Note, that values in the table are specific to Eurotel.

Links

- **Familiar**

<http://familiar.handhelds.org>

- **BlueZ**

<http://bluez.sourceforge.net>