Access Server

User's and Developer's Guide

Bluegiga Technologies

Access Server: User's and Developer's Guide
by Bluegiga Technologies

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Chapter 1. Introduction to Access Server

Bluegiga's WRAP™ product family offers for device manufacturers, integrators, companies and developers a simple and fast way to set-up wireless communication systems between standard or proprietary devices, networks, machines and instruments.

Access Server is a cutting edge wireless Bluetooth router. It supports multiple communication standards including Ethernet, WiFi, and GSM/GPRS enabling full media-independent TCP/IP connectivity. Access Server is easy to deploy and manage in existing wired and wireless networks without compromising speed or security. For rapid deployment, Access Server configurations can easily be copied from one device to another by using USB memory dongles. The device can be fully managed and upgraded remotely over SSH secured links. Large numbers of Access Servers can easily be controlled using Bluegiga Solution Manager (BSM), a web-based remote management and monitoring platform.

Access Server usage scenarios and applications:

- Point-of-sales systems
- Logistics and transportation systems
- Telemetry and machine-to-machine systems
- Medical and healthcare systems
- Fitness and sport telemetry systems
- Cable replacement
- Content and application distribution to mobile phones and PDAs

Access Server key features:

- Enables Bluetooth networking between multiple devices and networks
- Serves up to 21 simultaneous Bluetooth connections
- Offers an open platform for adding local applications
- Acts as a transparent router or bridge
- Supports all key communication medias:
  - Bluetooth
  - Ethernet
  - WiFi, GSM and GPRS with a Compact Flash card
  - USB and RS232
- Incorporates a packet filtering firewall
- Is fast and easy to install
- Supports all relevant Bluetooth profiles and APIs
- 100 meter range / Software configurable to support 10 meter range
- DHCP support for plug-and-play installation
- Uncompromised security: SSH, firewall, and 128 bit Bluetooth encryption

- Simple and secure mounting accessory available
- Bluetooth, CE, and FCC certified
- Compliant with Bluetooth 1.1, 1.2 and 2.0 Specification

1.1. Licenses and Warranty

Warning

Bluegiga Technologies is hereby willing to license the enclosed WRAP product and its documentation under the condition that the terms and conditions described in the License Agreement are understood and accepted. The License Agreement is supplied within every WRAP product both in hard copy. It is also available on-line at http://bluegiga.com/as/current/doc/eula.pdf. The use of the WRAP product will indicate your assent to the terms. If you do not agree to these terms, Bluegiga Technologies will not license the software and documentation to you, in which event you should return this complete package with all original materials, equipment, and media.

Some software components are licensed under the terms and conditions of an open source license. Details can be found in Appendix C. Upon request, Bluegiga will distribute a complete machine-readable copy of the source of the aforementioned open source software components during a period of three (3) years from the release date of the software. Delivery costs of the source code will be charged from the party requesting the source code.

The Bluegiga WRAP Product Limited Warranty Statement is available on-line at http://bluegiga.com/as/current/doc/warranty.pdf.

1.2. Bluegiga Technologies Contact Information

Please see http://www.bluegiga.com/ for news and latest product offers. For more information, contact <`sales@bluegiga.com`>.

Please check http://bluegiga.com/as/ for software and documentation updates.

Please contact <`support@bluegiga.com`> if you need more technical support. To speed up the processing of your support request, please include as detailed information on your product and your problem situation as possible.

Please begin your email with the following details:

- Access Server product type
- Access Server product serial number
- Access Server software version
- End customer name
- Date of purchase

Chapter 2. Getting Started with Access Server

Access Server can be controlled in three ways:

- by using the WWW interface
- by entering commands and using applications at the Access Server shell prompt
- by sending and/or retrieving files to/from Access Server.

Note: The default username is **`root`** and the default password is **`buffy`**.

2.1. Powering Up

To get started with Access Server, connect it to your local area network (LAN) by using an Ethernet cable, and connect the power adapter. Access Server will power up and retrieve the network settings from your network's DHCP server.

Access Server will also use Zeroconf (also known as Zero Configuration Networking or Automatic Private IP Addressing) to get an unique IP address in the 169.254.x.x network. Most operating systems also support this. In other words, you can connect your controlling laptop with a cross-over Ethernet cable to Access Server, then power up Access Server, and the devices will automatically have unique IP addresses in the 169.254.x.x network.

Note: If you need to configure the network settings manually and cannot connect first by using Zeroconf, you can do it by using the management console. For more information, see Section 2.3.1.

The physical interface locations of Access Server are described in Figure 2-1 and Figure 2-2.

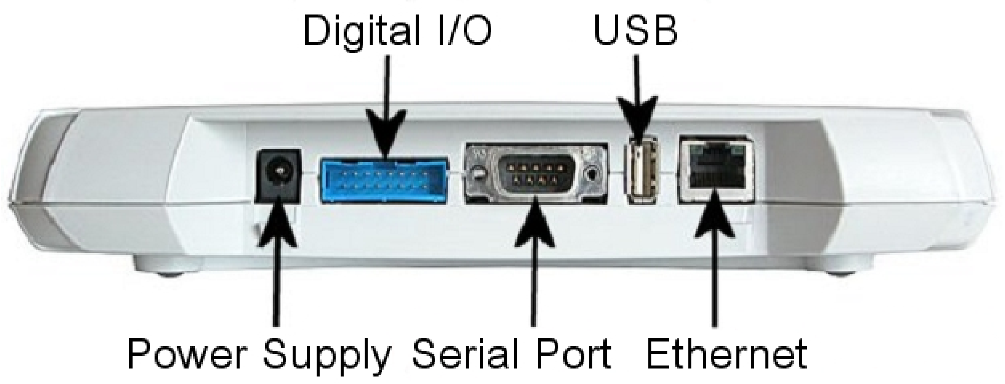


Figure 2-1. Access Server Connectors

Note: There is no power switch in Access Server. The adapter is the disconnection device; the socket-outlet shall be installed near the equipment and shall be easily accessible. Unplug and plug the power adapter to switch the power on and off. The power led in Figure 2-2 is on when the power adapter is connected.

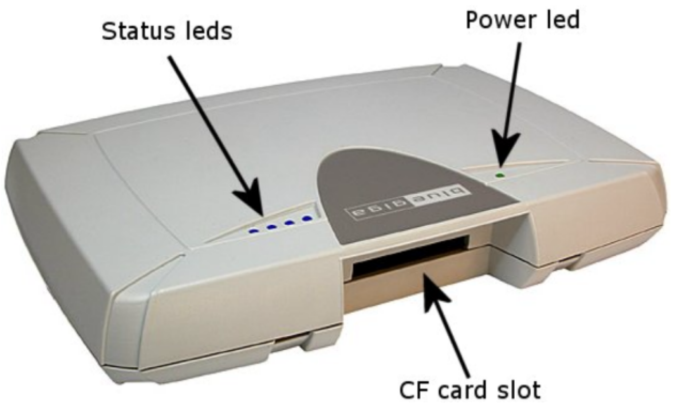


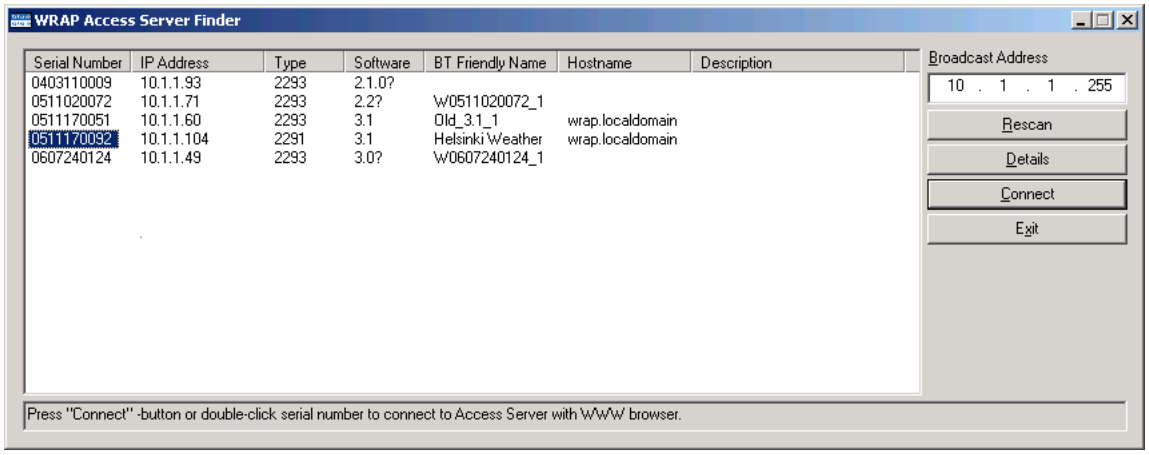
Figure 2-2. Access Server LEDs

All the blue status LEDs are turned off when the boot procedure is finished and Access Server is ready to be connected.

2.2. WWW Interface

Most Access Server functionality can be controlled through the WWW interface by using any standard WWW browser.

The wrapfinder application (see Figure 2-3), available for the Windows operating system from Bluegiga Techforum (http://www.bluegiga.com/techforum/) provides an easy-to-use interface for finding Access Servers (with SW version 2.1.0 or later) in the local area network.



Serial Number	IP Address	Type	Software	BT Friendly Name	Hostname	Description
0403110009	10.1.1.93	2293	2.1.0?			
0511020072	10.1.1.71	2293	2.2?	W0511020072_1		
0511170051	10.1.1.60	2293	3.1	Old_3.1_1	wrap.localdomain	
0511170092	10.1.1.104	2291	3.1	Helsinki Weather	wrap.localdomain	
0607240124	10.1.1.49	2293	3.0?	W0607240124_1		

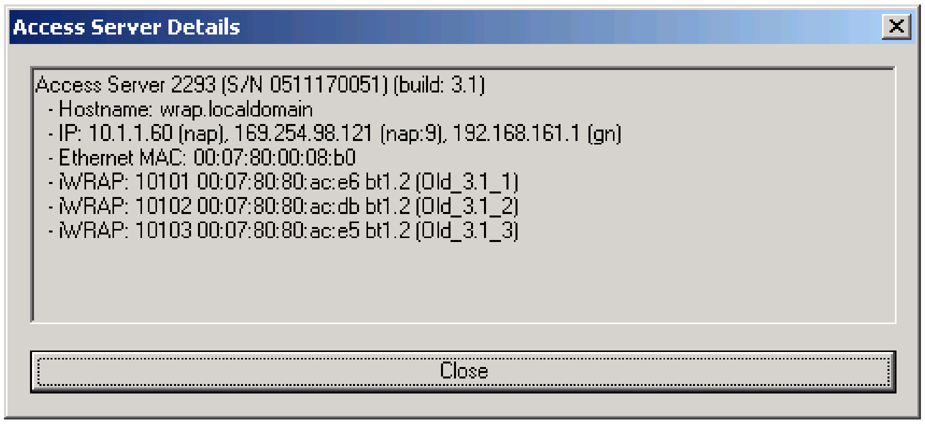
Press "Connect" -button or double-click serial number to connect to Access Server with WWW browser.

Figure 2-3. Access Server Finder Application

When wrapfinder is launched, it automatically identifies the broadcast address of the network it runs in and sends a special query packet (UDP broadcast) to Access Servers. Most important information in their answers is then shown in table format.

You can change the broadcast address used for finding Access Servers. A new scan can be done by clicking Rescan.

Select an Access Server by clicking its serial number, and click Details to see more information (such as all Bluetooth addresses and friendly names) on Access Server. See Figure 2-4 for details.



```
Access Server 2293 (S/N 0511170051) (build: 3.1)
 - Hostname: wrap.localdomain
 - IP: 10.1.1.60 (nap), 169.254.98.121 (nap:9), 192.168.161.1 (gn)
 - Ethernet MAC: 00:07:80:00:08:b0
 - iWRAP: 10101 00:07:80:80:ac:e6 bt1.2 (Old_3.1_1)
 - iWRAP: 10102 00:07:80:80:ac:db bt1.2 (Old_3.1_2)
 - iWRAP: 10103 00:07:80:80:ac:e5 bt1.2 (Old_3.1_3)
```

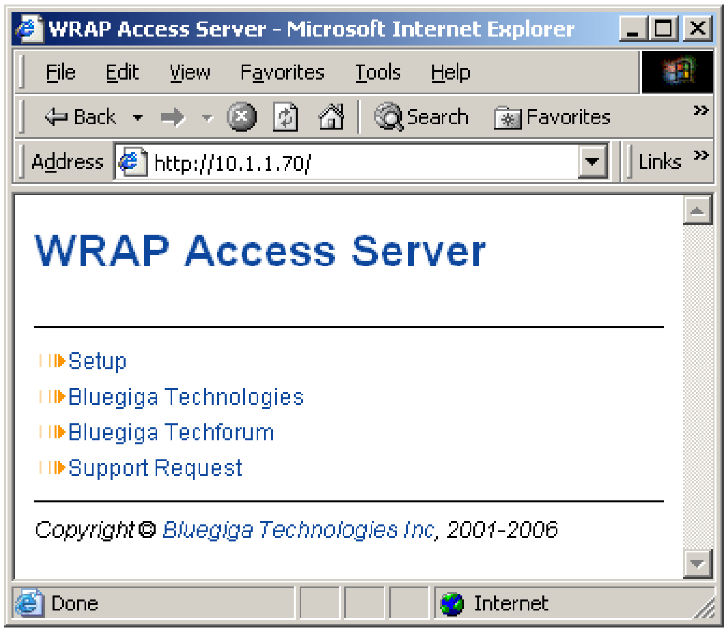
Figure 2-4. Details Dialog of Access Server Finder

Click Connect or double-click a serial number to connect to the selected Access Server by using a WWW browser.

Click Exit to close the program.

> **Note:** To find Access Server's IP address without wrapfinder, see Section 2.3.2.

To access the WWW interface, enter the IP address of Access Server to the browser's address field and press **Enter** (see Figure 2-5).


WRAP Access Server - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://10.1.1.70/
Links
Done
Internet

WRAP Access Server

- Setup
- Bluegiga Technologies
- Bluegiga Techforum
- Support Request

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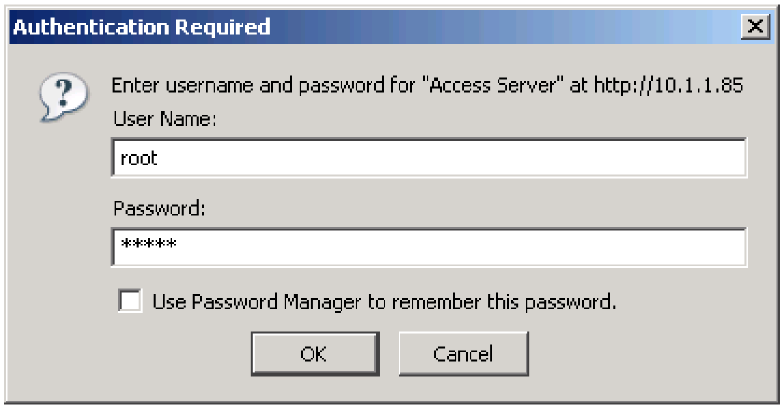
Figure 2-5. Access Server WWW Interface

From the top-level page, click Setup to log in to the configuration interface. The default user-name is **`root`** and the default password is **`buffy`** (see Figure 2-6).


Authentication Required

Enter username and password for "Access Server" at http://10.1.1.85

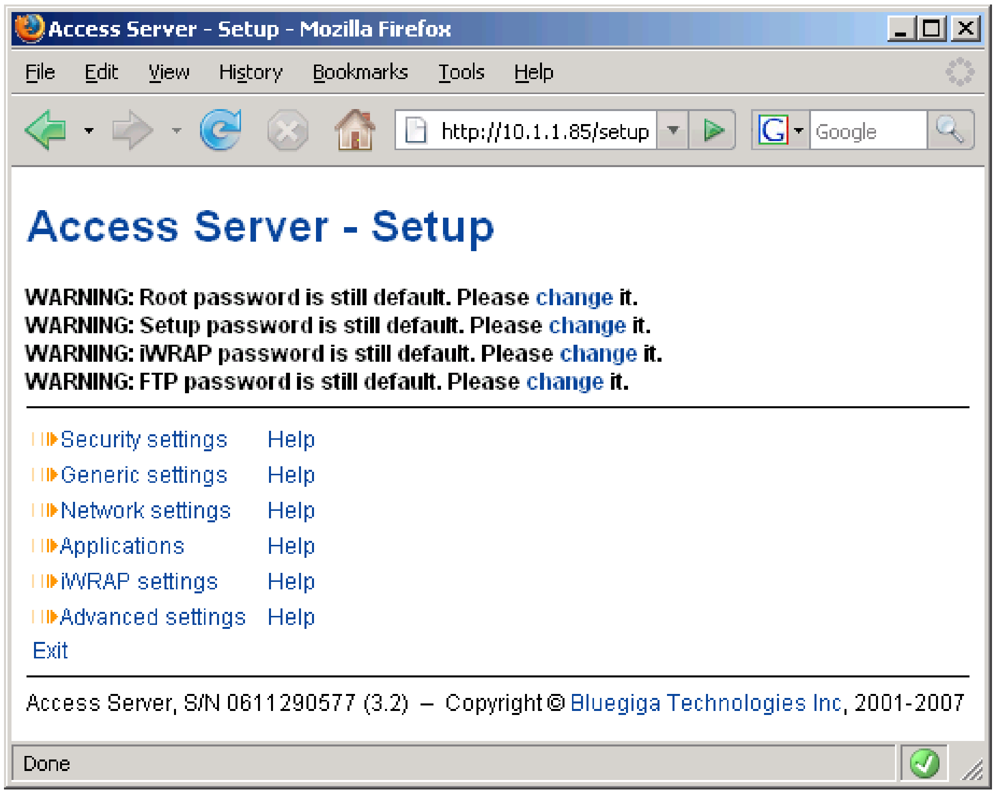
User Name: root

Password: *****

Use Password Manager to remember this password.

Figure 2-6. WWW Login Prompt for Access Server Setup

After logging in, you can configure several Access Server settings (see Figure 2-7). These are discussed in detail in Section 2.4.


Access Server - Setup - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://10.1.1.85/setup
Google

Access Server - Setup

WARNING: Root password is still default. Please change it.
WARNING: Setup password is still default. Please change it.
WARNING: iWRAP password is still default. Please change it.
WARNING: FTP password is still default. Please change it.

Security settings	Help
Generic settings	Help
Network settings	Help
Applications	Help
iWRAP settings	Help
Advanced settings	Help
Exit	

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Figure 2-7. The WWW Configuration Interface of Access Server

2.3. Shell Prompt Access

Shell prompt access may be needed for advanced controlling operations that cannot be performed by using the WWW interface.

You can get to the shell prompt by using either SSH or the management console. The management console is only needed to change the network configuration settings if you cannot configure the network by using DHCP or Zeroconf. The management console is connected to Access Server with a serial cable. All further controlling activities can be performed remotely using SSH sessions over Ethernet or Bluetooth LAN/PAN connection.

If you can establish an SSH connection from a device that has Bluetooth LAN Access or PAN profile support, you do not need the management console. Just connect to Access Server by using LAN Access or PAN profile. Access Server can be seen in Bluetooth inquiries as "Wserialno_n", where "serialno" is the serial number of the device and "n" is the number of the Bluetooth baseband in question (model 2293 has three Bluetooth basebands, any of which can be connected). After you have connected to the server (no PIN code, username or password needed), establish an SSH connection to the device at the other end of the connection, typically 192.168.160.1. You can also use the wrapfinder application to find the IP address (see Section 2.2 for details).

> **Note:** Bluetooth LAN Access and PAN profiles are disabled by default. Use the WWW interface to enable them, if needed. The PAN profile can also be enabled by sending the `enable-pan.wpk` file (available on-line at http://bluegiga.com/as/current/enable-pan.wpk) to Access Server by using Bluetooth Object Push profile or by inserting a USB memory dongle with the file in its root directory to Access Server's USB port.
> **Note:** The default username is **`root`** and the default password is **`buffy`**.

2.3.1. Management Console

If you do not have a Bluetooth LAN/PAN client and if Access Server is not connected to your LAN, or if you do not know the IP address given to Access Server, you can get the first shell prompt access by using the management console.

To setup the management console, proceed as follows:

1. Have a PC with a free COM port.
2. Power off Access Server.
3. Configure your terminal application, such as HyperTerminal in Windows, to use the settings below for your computer's free COM port

Setting	Value
Speed	115200bps
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

Table 2-1. The Management Console Port Settings

4. Connect the serial cable shipped with Access Server to your PC's free COM port.
5. Connect the serial cable to the management (user) port in Access Server (see Figure 2-1).
6. Power on Access Server.
7. Enter letter **b** in the terminal application during the first five seconds, while the blue LEDs in Access Server turn on one by one.
8. The management console is now activated and you can see the boot log in your terminal window.

Note: The boot process may stop at the following U-Boot prompt:

```
Hit any key to stop autoboot:  0
U-Boot>
```

If this happens, enter command **`boot`** to continue to boot Linux.

9. Wait for the device to boot up and end with the following prompt:

```
Please press Enter to activate this console.
```

10. Press **Enter** to activate the console. You will be logged in as **`root`** in directory `/root`:

```
[root@wrap root]
```

11. You can now control Access Server from the management console.

2.3.2. Accessing Remotely

When Access Server is connected to a LAN, it tries to get the IP address by using DHCP and Zeroconf by default. You can then use the wrapfinder application to find the IP address (see Section 2.2).

If you cannot get the IP address by using the wrapfinder, another way to see the IP address of Access Server is to connect with a management console (see previous section), power on the unit and, after the system is up and running, give the **ifconfig nap** command. The `inet addr` field for the `nap` interface contains the IP address of Access Server. For example, in the following capture from the management console, the IP address is `192.168.42.3`.

```
[root@wrap /]$ ifconfig nap
nap       Link encap:Ethernet  HWaddr 00:07:80:00:BF:01
          inet addr:192.168.42.3  Bcast:192.168.42.255  Mask:255.255.255.0
          inet6 addr: fe80::207:80ff:fe00:bf01/64 Scope:Link
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:12635 errors:0 dropped:0 overruns:0 frame:0
          TX packets:8 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          RX bytes:1686246 (1.6 MiB)  TX bytes:1640 (1.6 KiB)
          Interrupt:24 Base address:0xc000
```

You can use this address to connect to Access Server remotely over SSH, SCP or SFTP.

Note: The default username is **`root`** and the default password is **`buffy`**.

2.3.3. Transferring Files to/from Access Server

You can transfer files to and from Access Server by using, for example:

- SCP (secure copy over SSH)
- SFTP (secure FTP connection over SSH)
- FTP (plain FTP connection)
  Note: FTP is disabled by default for security reasons. Use SFTP instead.

> **Tip:** If enabled, use the integrated FTP client on the Internet Explorer (type ftp://root:buffy@wrap-ip-address/ in the address bar)

- Bluetooth OBEX (Object Push and File Transfer Profiles) to/from directory `/tmp/obex` in Access Server
- NFS (mount an NFS share from a remote computer as a part of Access Server's file system)
- SSHFS (mount an Access Server directory over SSH as a part of any other Linux host file system)

  To download and install SSHFS, visit http://fuse.sourceforge.net/sshfs.html.
- CIFS (mount a Common Internet File System share from a remote computer as a part of Access Server's file system). A CIFS client, available in a separate installation packet, is required.
- USB memory dongle (see Section 3.4 for more information).
- Xmodem/Ymodem/Zmodem (use **rz/rx/rb/sz/sx/sb** commands from the management console)

For examples of transferring files, see Section 6.3.4.

2.4. Introduction to Configuration

When Access Server is installed and powered up for the first time, the default configuration settings are being used. With these settings, Access Server automatically configures its network settings assuming that it is connected to a LAN network with a DHCP server running. Additionally, Access Server also uses Zero Configuration Networking (also known as Automatic Private IP Addressing) to connect to the 169.254.x.x network, which can be used if the network has no DHCP server.

After booting up, the only Bluetooth profiles enabled are the Object Push and File Transfer Profiles, used to send files to/from Access Server.

More Bluetooth profiles can be enabled, and most of Access Server settings can be configured by using the **setup** application. It has a WWW interface at http://wrap-ip/setup but it can also be run at the command line.

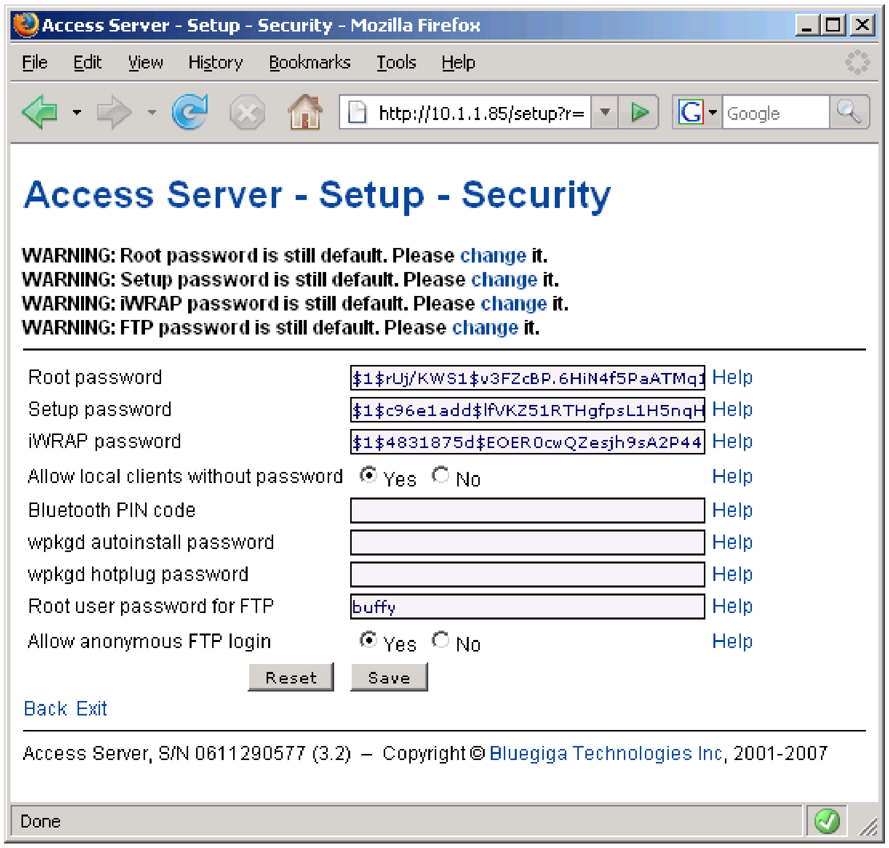
All configurable settings in the **setup** application are listed in Appendix B with short help texts.

> **Note:** The default username is **`root`** and the default password is **`buffy`**.

2.5. Using the Setup WWW Interface

The easiest way to change Access Server settings is to use the WWW interface. Accessing the WWW interface is instructed in Section 2.2.

A typical WWW configuration page is shown in Figure 2-8 (This page can be found at Setup ⟶ Security settings)


Access Server - Setup - Security - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://10.1.1.85/setup?r=
Google

Access Server - Setup - Security

WARNING: Root password is still default. Please change it.
WARNING: Setup password is still default. Please change it.
WARNING: iWRAP password is still default. Please change it.
WARNING: FTP password is still default. Please change it.

Root password	$1$rUj/KWS1$v3FZcBP.6HiN4f5PaATMq1	Help
Setup password	$1$c96e1add$lfVKZ51RTHgfpsL1H5nqH	Help
iWRAP password	$1$4831875d$EOER0cwQZesjh9sA2P44	Help
Allow local clients without password	[✓ Yes] No	Help
Bluetooth PIN code		Help
wpkgd autoinstall password		Help
wpkgd hotplug password		Help
Root user password for FTP	buffy	Help
Allow anonymous FTP login	[✓ Yes] No	Help

Reset Save

Back Exit

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Done

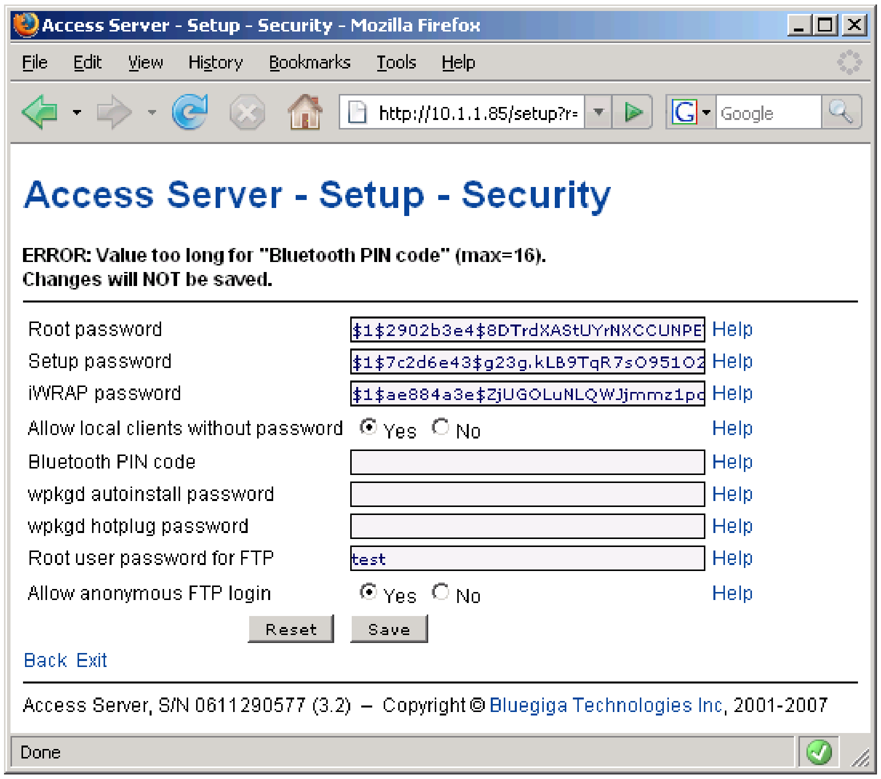
Figure 2-8. Example WWW Setup Page

The different parts of the WWW Setup page are discussed in the following list:

- Status area

  The status area serves two purposes:

  - It indicates that the changes are permanently saved when the user clicks the Save button (or when the user clicks a toggling Yes/No link).
  - If invalid values were entered in one or more fields, an error message is shown in this area (see Figure 2-9).


Access Server - Setup - Security - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://10.1.1.85/setup?r=
Google

Access Server - Setup - Security

ERROR: Value too long for "Bluetooth PIN code" (max=16).
Changes will NOT be saved.

Root password	$1$2902b3e4$8DTrdXAStUYrNXCCUNPE	Help
Setup password	$1$7c2d6e43$g23g.kLB9TqR7sO951O2	Help
iWRAP password	$1$ae884a3e$ZjUGOLuNLQWJjmmz1pc	Help
Allow local clients without password	[✓ Yes] No	Help
Bluetooth PIN code		Help
wpkgd autoinstall password		Help
wpkgd hotplug password		Help
Root user password for FTP	test	Help
Allow anonymous FTP login	[✓ Yes] No	Help

Reset Save

Back Exit

Access Server, S/N 0611290577 (3.2) – Copyright © Bluegiga Technologies Inc, 2001-2007

Done

Figure 2-9. Trying to Save an Invalid Input

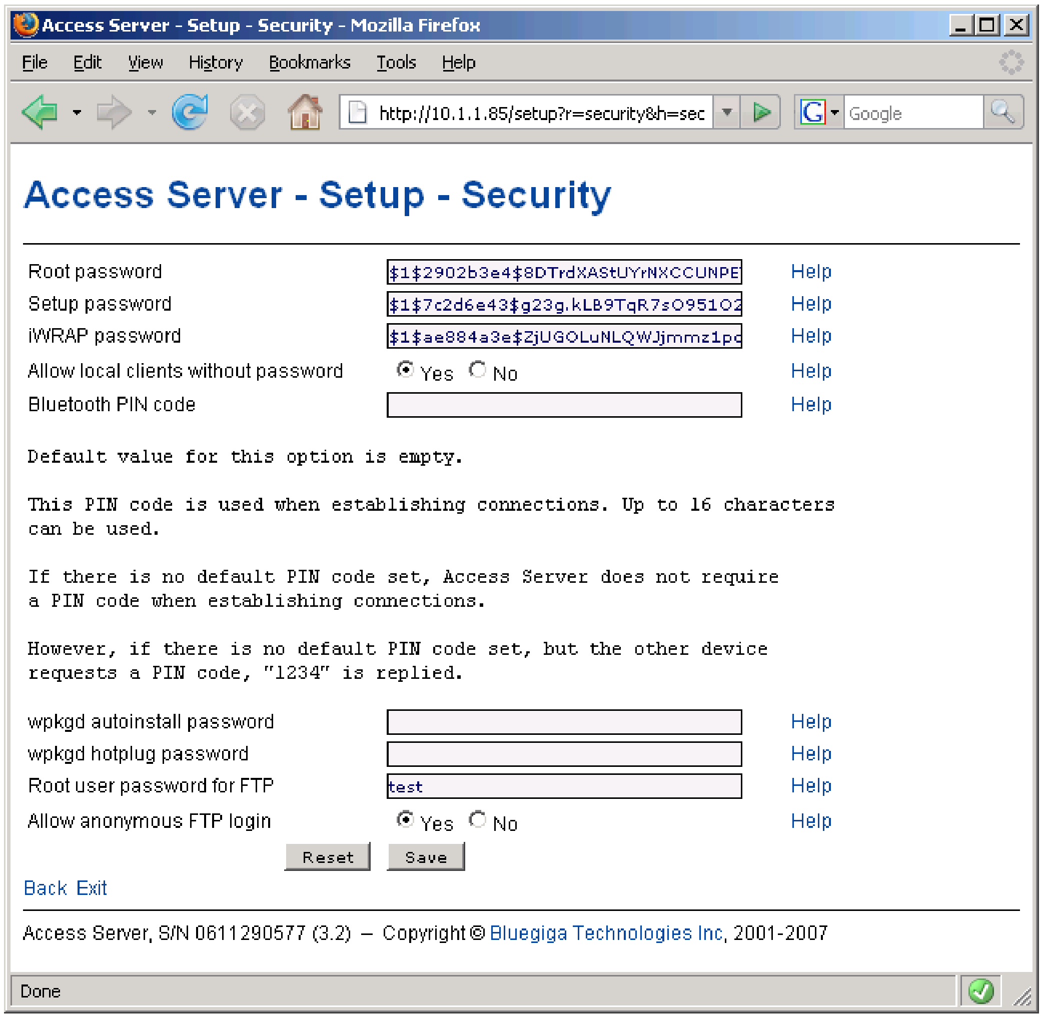
> **Note:** It is typically necessary to reboot Access Server for the changes to take effect. This can be done through the WWW interface (Advanced settings menu).

- Number or text entry fields

  Most of the configurable settings are text (or number) entry fields. For some fields, such as the IP address or netmask, there are restrictions on the input format. Setup validates the input at save time and accepts valid data only. The fields with errors are shown to the user so that mistakes can be fixed (see Figure 2-9).

- Help -link

  Click the Help link to retrieve the setup page again with requested help information displayed. For an example, see Figure 2-10.


Access Server - Setup - Security - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://10.1.1.85/setup?r=security&h=sec
Google

Access Server - Setup - Security

Root password	$1$2902b3e4$8DTrdXAStUYrNXCCUNPE	Help
Setup password	$1$7c2d6e43$g23g.kLB9TqR7sO95102	Help
iWRAP password	$1$ae884a3e$ZjUGOLuNLQWJjmmz1pc	Help
Allow local clients without password	[✓ Yes] No	Help
Bluetooth PIN code		Help

```
Default value for this option is empty.

This PIN code is used when establishing connections. Up to 16 characters
can be used.

If there is no default PIN code set, Access Server does not require
a PIN code when establishing connections.

However, if there is no default PIN code set, but the other device
requests a PIN code, "1234" is replied.
```

wpkgd autoinstall password		Help
wpkgd hotplug password		Help
Root user password for FTP	test	Help
Allow anonymous FTP login	[✓ Yes] No	Help

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Figure 2-10. Help Links in WWW Setup

> **Warning**
>
> If you have made changes to the settings on the page before clicking Help and not saved them yet, they are lost.

- Yes and No radio buttons

  These buttons are typically used to configure a setting that can be either enabled or disabled, and this setting has no effect on the visibility of other settings.

- Reset button

  Reset button resets the fields to the values currently in use at Access Server. In other words, the Reset button discards unsaved changes.

  Note: The Reset button does *not* make a "factory reset".

- Save button

  Save button sends the WWW page to the setup application for validation. If the values in the fields are valid, they are permanently saved and the page is refreshed with the Changes have been saved. message at the top. The accepted values are shown in the page fields.

If there were errors in the fields, these are shown as in Figure 2-9.

> **Note:** It is typically necessary to reboot Access Server for the changes to take effect. This can be done through the WWW interface (Advanced settings menu).

- Back link

  Press the Back link to return to the previous level of the Setup menu hierarchy.

  > **Note:** Pressing the Back link does *not* save changes in the fields on the current page.

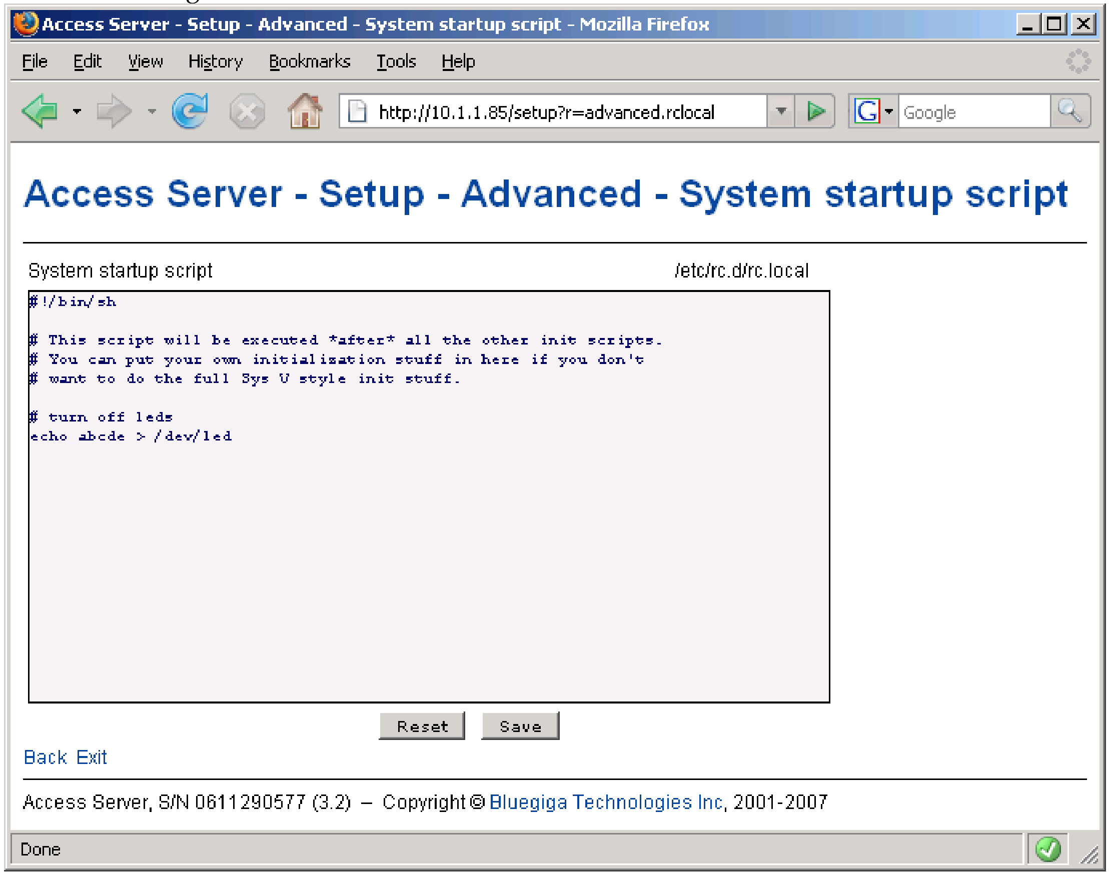
- Exit link

  Exit link quits the setup application and returns to the Access Server's main WWW page.

  > **Note:** Pressing the Exit link does *not* save changes in the fields on the current page.

- Link to a configuration file

  Some of the configurable settings are actually editable configuration files, such as `/etc/rc.d/rc.local` for Setup ⟶ Advanced setting ⟶ System startup script. Clicking the link will retrieve the file for editing in the browser window, or create a new file, if it does not exist. See Figure 2-11.


Access Server - Setup - Advanced - System startup script - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://10.1.1.85/setup?r=advanced.rclocal
Google

Access Server - Setup - Advanced - System startup script

System startup script /etc/rc.d/rc.local

```
#!/bin/sh

# This script will be executed *after* all the other init scripts.
# You can put your own initialization stuff in here if you don't
# want to do the full Sys V style init stuff.

# turn off leds
echo abcde > /dev/led
```

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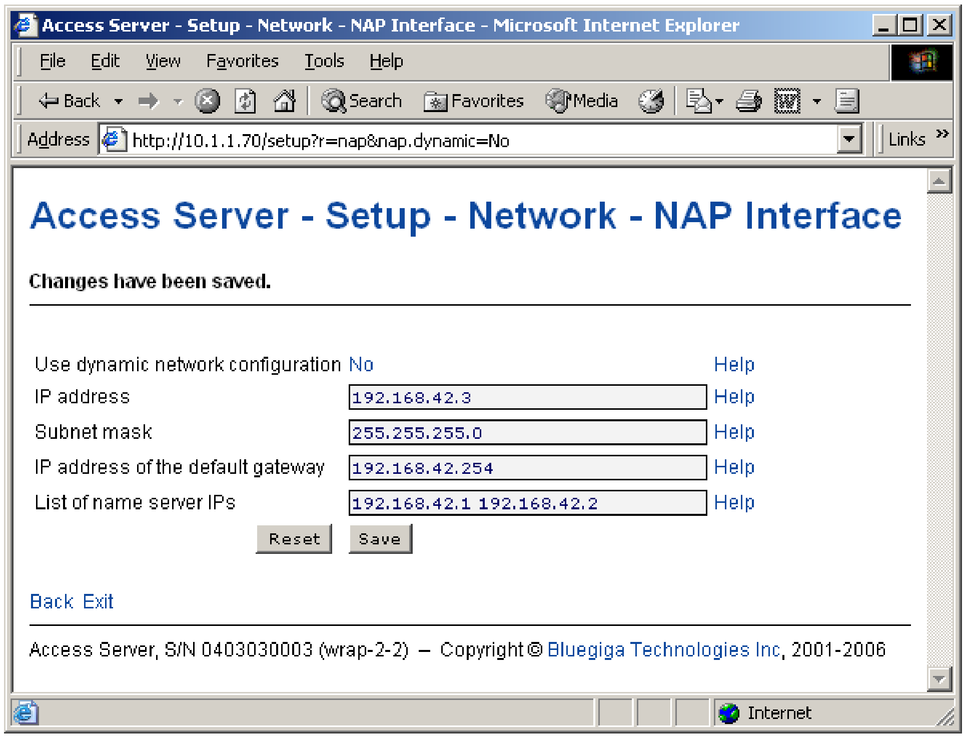
Figure 2-11. Editing Files in WWW Setup

> **Note:** You can edit any file through the WWW Setup. to edit files, navigate to Setup ⟶ Advanced setting ⟶ Edit other configuration files.

- Toggling Yes/No and on/off links

  Clicking the Yes/No link (see Figure 2-12) immediately changes the setting and saves the change. Typically these links are used display or hide further settings.


Access Server - Setup - Network - NAP Interface - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://10.1.1.70/setup?r=nap&nap.dynamic=No
Links
Internet

Access Server - Setup - Network - NAP Interface

Changes have been saved.

Use dynamic network configuration	No	Help
IP address	192.168.42.3	Help
Subnet mask	255.255.255.0	Help
IP address of the default gateway	192.168.42.254	Help
List of name server IPs	192.168.42.1 192.168.42.2	Help

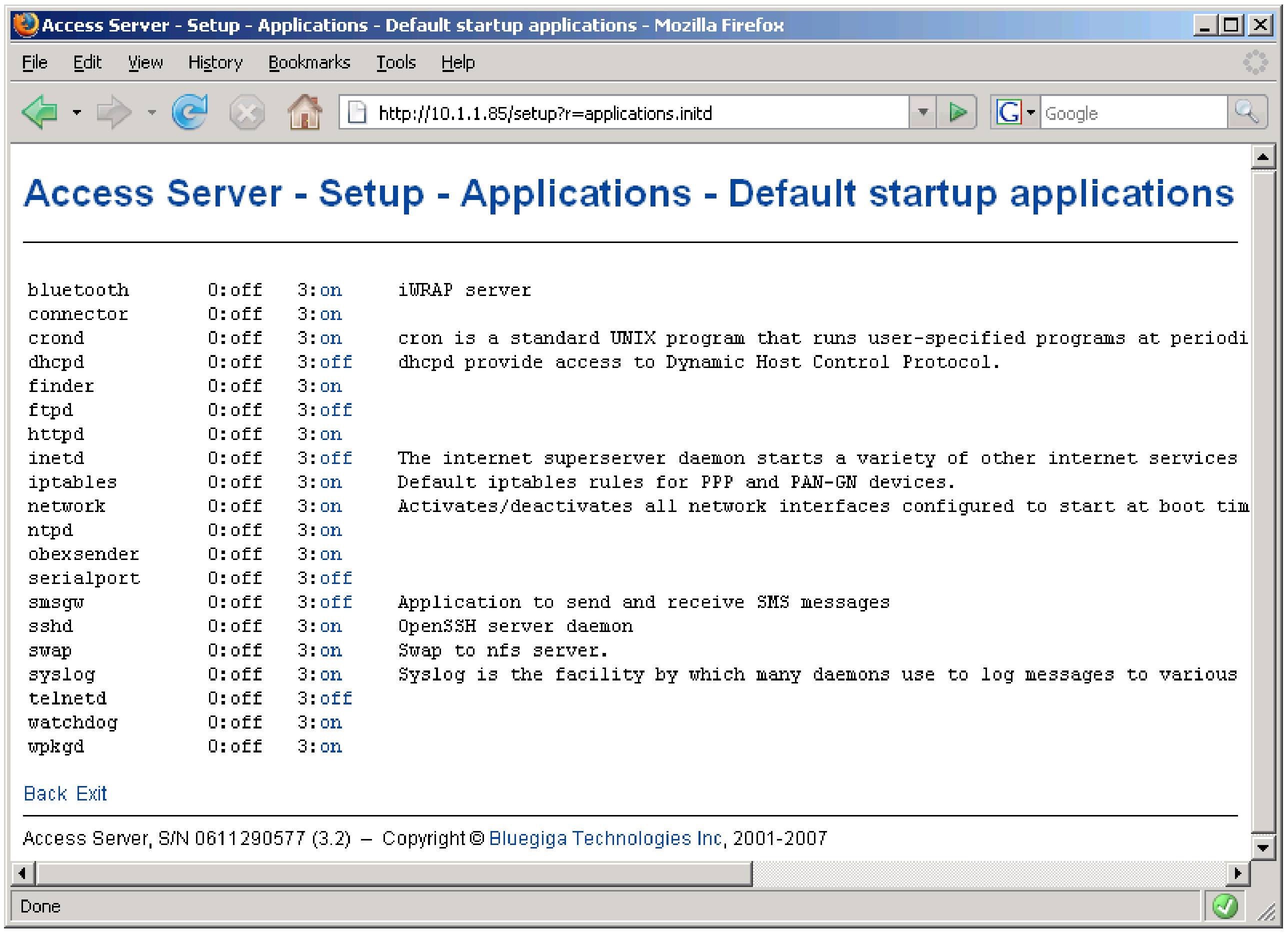
Reset Save

Back Exit

Access Server, S/N 0403030003 (wrap-2-2) — Copyright © Bluegiga Technologies Inc, 2001-2006

Figure 2-12. Yes / No links in WWW Setup

The on/off links in Setup ⟶ Applications ⟶ Default startup applications behave in a same way, making and saving the change immediately (see Figure 2-13).


Access Server - Setup - Applications - Default startup applications - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://10.1.1.85/setup?r=applications.initd
Google
Done

Access Server - Setup - Applications - Default startup applications

```
bluetooth       0:off   3:on    iWRAP server
connector       0:off   3:on
crond           0:off   3:on    cron is a standard UNIX program that runs user-specified programs at periodi
dhcpd           0:off   3:off   dhcpd provide access to Dynamic Host Control Protocol.
finder          0:off   3:on
ftpd            0:off   3:off
httpd           0:off   3:on
inetd           0:off   3:off   The internet superserver daemon starts a variety of other internet services
iptables        0:off   3:on    Default iptables rules for PPP and PAN-GN devices.
network         0:off   3:on    Activates/deactivates all network interfaces configured to start at boot tim
ntpd            0:off   3:on
obexsender      0:off   3:on
serialport      0:off   3:off
smsgw           0:off   3:off   Application to send and receive SMS messages
sshd            0:off   3:on    OpenSSH server daemon
swap            0:off   3:on    Swap to nfs server.
syslog          0:off   3:on    Syslog is the facility by which many daemons use to log messages to various
telnetd         0:off   3:off
watchdog        0:off   3:on
wpkgd           0:off   3:on
```

Back Exit

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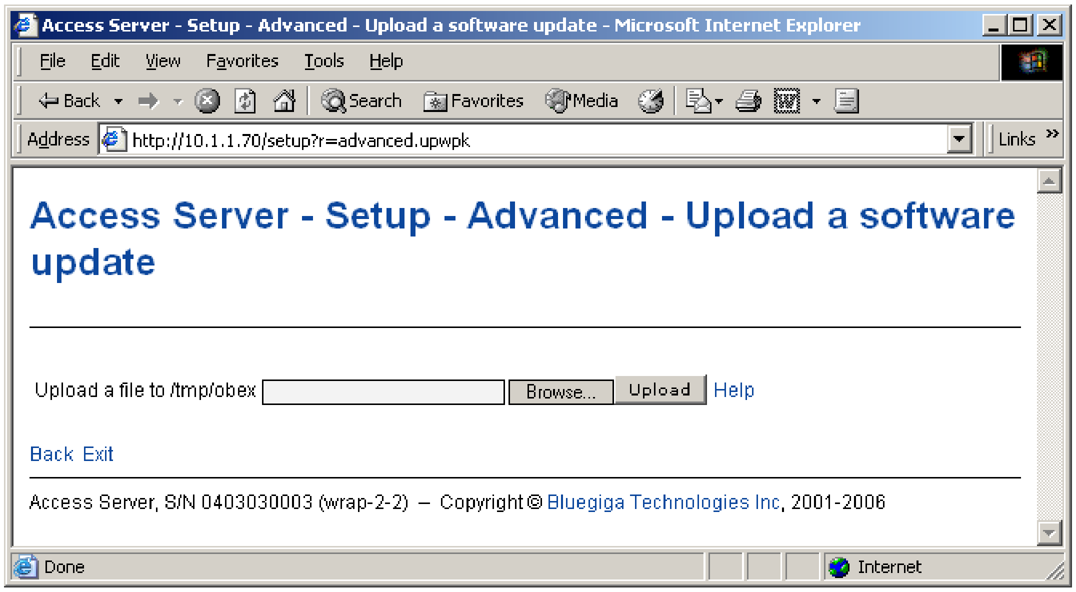
Figure 2-13. Selecting Default startup applications in WWW Setup

> **Note:** To configure the default startup applications from the command line, use the **chkconfig** command.

- Upload links

  The WWW Setup has settings that allow user to upload files to Access Server, for example Setup ⟶ Advanced ⟶ Upload a software update (see Figure 2-14).


Access Server - Setup - Advanced - Upload a software update - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://10.1.1.70/setup?r=advanced.upwpk
Links
Browse...
Upload
Help
Done
Internet

Access Server - Setup - Advanced - Upload a software update

Upload a file to /tmp/obex

Back Exit

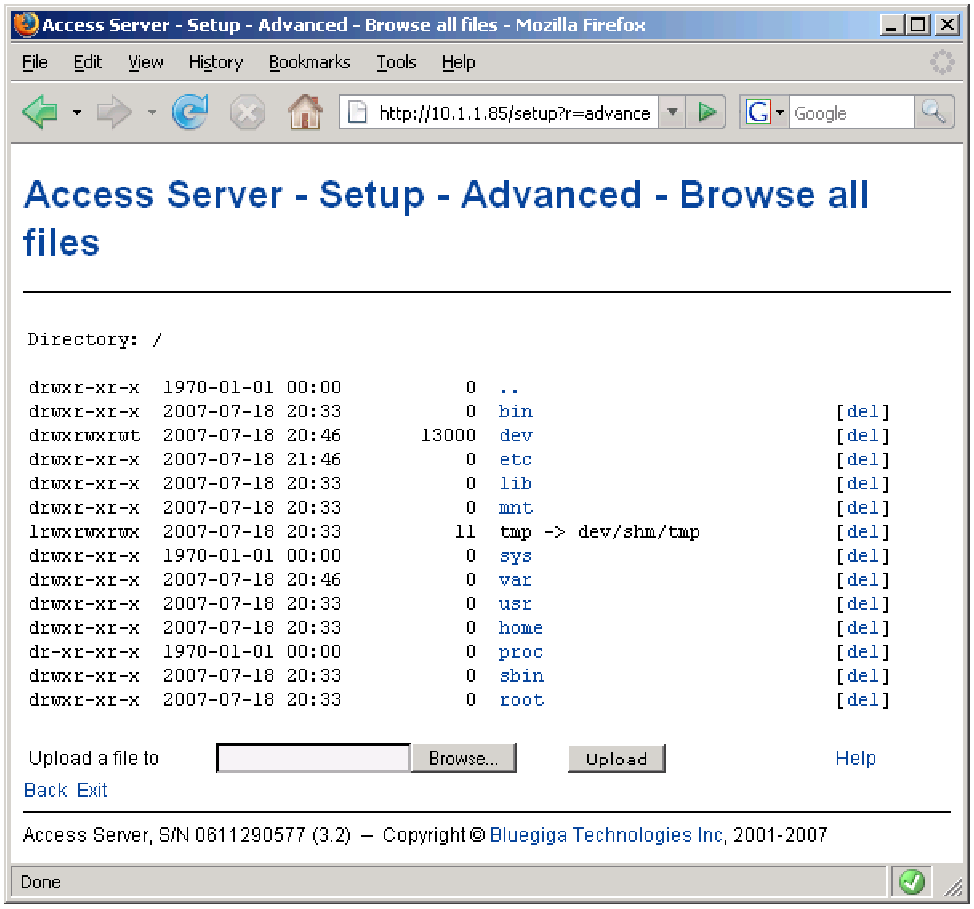
Access Server, S/N 0403030003 (wrap-2-2) — Copyright © Bluegiga Technologies Inc, 2001-2006

Figure 2-14. Uploading files via WWW Setup

Use the Browse... button to select the file to be uploaded, and send it to Access Server by clicking Upload.

- Browsing files

  Some WWW Setup pages allow users to browse the Access Server file system or part of it, such as Setup ⟶ Advanced settings ⟶ Browse all files (see Figure 2-15).


Access Server - Setup - Advanced - Browse all files - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://10.1.1.85/setup?r=advance
Google

Access Server - Setup - Advanced - Browse all files

```
Directory: /

drwxr-xr-x   1970-01-01 00:00          0  ..
drwxr-xr-x   2007-07-18 20:33          0  bin                          [del]
drwxrwxrwt   2007-07-18 20:46      13000  dev                          [del]
drwxr-xr-x   2007-07-18 21:46          0  etc                          [del]
drwxr-xr-x   2007-07-18 20:33          0  lib                          [del]
drwxr-xr-x   2007-07-18 20:33          0  mnt                          [del]
lrwxrwxrwx   2007-07-18 20:33         11  tmp -> dev/shm/tmp           [del]
drwxr-xr-x   1970-01-01 00:00          0  sys                          [del]
drwxr-xr-x   2007-07-18 20:46          0  var                          [del]
drwxr-xr-x   2007-07-18 20:33          0  usr                          [del]
drwxr-xr-x   2007-07-18 20:33          0  home                         [del]
dr-xr-xr-x   1970-01-01 00:00          0  proc                         [del]
drwxr-xr-x   2007-07-18 20:33          0  sbin                         [del]
drwxr-xr-x   2007-07-18 20:33          0  root                         [del]
```

Upload a file to [Browse...] [Upload] Help

Back Exit

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Done

Figure 2-15. Browsing files via WWW Setup

Click the directory names to navigate in the file system.

Click a file name to view its contents.

Click del to delete a file or an empty directory.

Warning

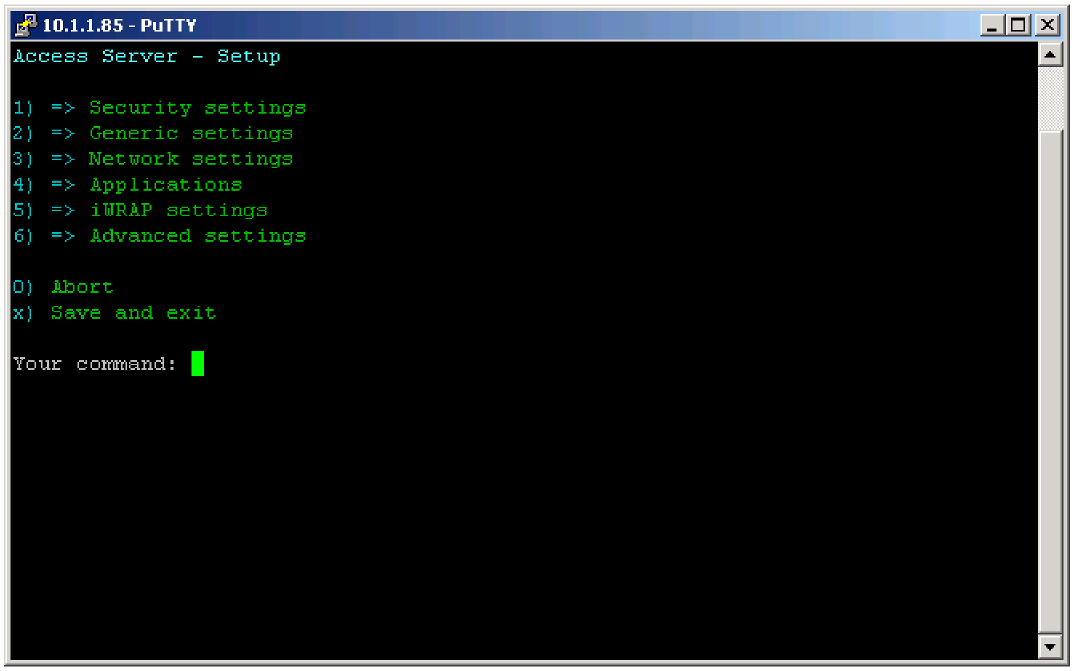
Deletion is not confirmed.

The WWW Setup also has menu items that run commands in Access Server, and show the output in the browser window. Some commands, such as rebooting Access Server, are confirmed before execution.

2.6. Using the setup Command Line Application

The basic configuration settings can also be changed by using the **setup** application at the command line interface.

The **setup** application displays the settings in a hierarchical menu (see Figure 2-16). Navigating the menu is accomplished by entering the number or letter corresponding to the setting to be viewed and/or changed and pressing **Enter**. Pressing only **Enter** either accepts the previous value of the setting or returns to the previous level in the menu hierarchy.



```
Access Server - Setup

1) => Security settings
2) => Generic settings
3) => Network settings
4) => Applications
5) => iWRAP settings
6) => Advanced settings

0) Abort
x) Save and exit

Your command:
```

Figure 2-16. Using the setup Command Line Application

> **Note:** Ensure that your terminal application does not send line ends with line feeds. If your terminal sends both CR and LF when you press **Enter**, you cannot navigate in the **setup** application.

2.7. Resetting a Configuration

You can reset the default configuration with the **setup -r** command. The command requires rebooting of Access Server. When the system starts up, the default configuration settings are restored. If you have only changed the configuration by using the **setup** application, the following commands at the Access Server's command prompt will suffice:

```
[root@wrap /]$ setup -r
[root@wrap /]$ reboot
```

> **Note:** This does not reset the edited files to factory defaults; it only affects only the settings changed through the WWW Setup or the **setup** command line application.

2.8. Exporting and Importing Configurations

You can export configuration settings (expect for passwords and the list of default startup applications) with the following command:

```
[root@wrap /root]$ setup -o > settings.txt
```

The saved settings can later be restored with the following commands:

```
[root@wrap /root]$ setup -m settings.txt
[root@wrap /root]$ reboot
```

Chapter 3. Using the System

This chapter describes the basic features of a Bluegiga Access Server. This includes information on using Access Server as a Bluetooth LAN/PAN Access Point or a Bluetooth Serial Port Cable Replacer, using the Web Server, ObexSender, and WRAP Package Management System. The various ways of uploading content for browsing and/or downloading are also included, as well as getting familiar with the utility applications.

Using the features described in this chapter does not require Access Server Software Development Kit to be installed.

Note: The default username is `root` and the default password is `buffy`.
Note: Most of the configuration files are in Linux text file format, where the lines end with a single Line Feed (LF, "\n") character. Some applications will not work if the configuration file format is changed to MS-DOS format (this happens, for example, if you transfer the files to Windows for editing with Notepad), where the lines end with both Carriage Return and Line Feed (CR+LF, "\r\n") characters.

3.1. Network Interfaces

The Access Server network interfaces are described in Table 3-1.

Interface	Description
nap	Dynamic virtual Ethernet ("cable") device. This is the device having an IP address. All the programs should use this device instead of eth0.
eth0	Real Ethernet device, which is dynamically linked to the nap device. Do not use this device, use nap instead.
wlan0	Wi-Fi device. In the client mode (default), this device has its own IP address. In the access point mode, it is dynamically linked to the nap device (the default interface).
wifi0	Virtual control device for wlan0. Do not use this device.
gn	Virtual device for PAN-GN connections.
bnep#	These devices are used for incoming and outgoing PAN connections. These devices are created, deleted and linked (to nap or gn) dynamically.
ppp#	These devices are used for incoming and outgoing LAP connections. These devices are created and deleted dynamically. By default, data coming from ppp# is masqueraded to the nap device.

Table 3-1. Access Server Network Interfaces

3.2. Bluetooth

The iWRAP servers (one server in Access Server 2291, three in Access Server 2293) are automatically started at power-up. By default, the Object Push and File Transfer Profiles are activated. The iWRAP servers can be accessed and controlled (by applications or even interactively with a telnet client) through the iWRAP interface, described in Chapter 7. Currently, there can be up to 14 simultaneous Bluetooth connections between a single master iWRAP server and up to seven simultaneous slaves.

3.2.1. iWRAP Password Protection

The access to iWRAP can be password protected. The default password is **`buffy`**, but it can be set off or changed with the **setup** application (see Section 2.4). The password is case sensitive. The password must be typed in as the first command after the server has replied with "READY."

3.2.2. LAN Access Profile

This profile is not automatically started at boot. The default settings can be changed with the **setup** application (see section Section 2.4), or runtime with the iWRAP interface (see Chapter 7).

Access Server can also act as a LAN Access Client, but in this case it must be controlled manually using iWRAP commands, as described in Chapter 7.

> **Note:** Since Bluetooth specification 1.2, LAN Access Profile has been deprecated.

3.2.3. Serial Port Profile

This profile is not automatically started at boot. The default settings can be changed with the **setup** application (see section Section 2.4).

The Serial Port Profile is used to replace an RS-232 serial cable between two devices with a Bluetooth connection. The physical setup is shown in Figure 3-1.

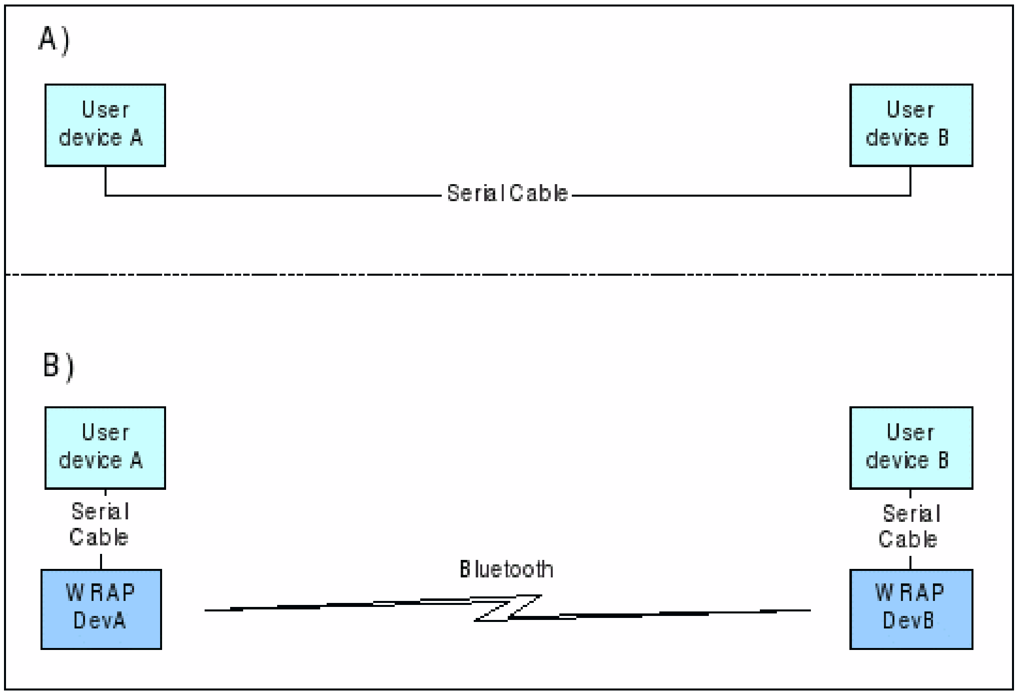


Figure 3-1. Serial Cable Replacement Physical Setup

State A) in the figure is the starting situation with a serial cable connecting the devices. This cable is to be replaced with a Bluetooth connection.

In state B) the long serial connection is replaced with a Bluetooth Serial Port Profile connection between the two Access Server devices. These Access Server devices are then locally connected to the user devices with (short) serial cables. The cable between user device A and Access Server device A must be a cross-over cable. The cable between user device B and Access Server device B must be similar (direct or cross-over) to the one used in state A).

If RTS/CTS handshaking is used to ensure correct data transfer, the serial cables must have these pins connected. Notice that this handshaking is "local": it takes place between the user device and Access Server. No handshaking between user device A and user device B on the other end of the Bluetooth connection is provided.

If RTS/CTS handshaking is not used, CTS must be connected to DTR.

DCD, DTR, and DSR signals are not supported. This also means that user devices A and B will not be able to tell whether or not the Bluetooth connection is up.

When the physical setup is ready, you can create the Bluetooth connection. By default, the Serial Port Profile is started up at boot with the default settings. That is, listening in DevB mode, at 115200 bps, 8 data bits, no parity, 1 stop bit, and RTS/CTS enabled. To change these settings, use the **setup** application or the WWW Setup interface, as described in Section 2.4.

> **Note:** To enable Serial Port Profile, navigate to Setup ⟶ Applications ⟶ Default startup applications in the WWW Setup interface, and switch serialport application to off.
> Enabling can also be done from command prompt with command **chkconfig serialport on**.

3.2.4. Object Push and File Transfer Profile

Access Server has two OBEX profiles, Object Push Profile (ObjP) and File Transfer Profile (FTP). You can use these profiles to transfer files between different Access Servers and other devices supporting ObjP or FTP.

3.2.4.1. Incoming ObjP and FTP

Incoming ObjP and FTP connections are handled by forwarding the call to **obexserver** program, which handles both profiles. By default the working directory is `/tmp/obex`. FTP users have full read and write access to that directory. When Access Server starts up, the default contact card is copied from `/etc/default.vcf` to that directory.

In ObjP mode, **obexserver** will prefix received files with sender's Bluetooth address and iWRAP port number. In case of a duplicate filename, a counter is also appended to filename.

The **--fork** parameter in **obexserver** understands following meta characters:

Meta	Description
$$	Character '$'
$r	Configured root directory
$p	Configured prefix
$b	Remote's Bluetooth address
$t	Temporary file name, with directory
$T	Real file name, without prefix and directory
$f	Real file name, with prefix and directory
$F	Real file name, with prefix, but without directory

Meta	Description
$d	Current UNIX timestamp

Table 3-2. obexserver's metas

If the **--fork**'ed program returns non-zero errorlevel, the received file will be deleted.

3.2.4.2. Outgoing ObjP and FTP

Three simple utilities, **obexput**, **obexget** and **obexsender-put** are provided. They can be used to send and retrieve files to and from another Bluetooth device using ObjP or FTP.

Usage:

```
obexput [parameters] bdaddr channel file(s)

obexget [parameters] bdaddr channel file(s)

obexsender-put parameters
```

Enter any of these commands without parameters to get a short help for using the command.

Note: You can use friendly name instead of Bluetooth address as the "bdaddr" parameter and keyword "OBJP" or "FTP" as the "channel" parameter for automatic device and service discovery.

For **obexput** and **obexget**, a non-zero return value indicates an error. The reason for this error is printed to standard output.

Tip: You can use **obexput** easily from iWRAP (see Chapter 7) with following syntax:

```
CALL bdaddr OBJP FORK \"/usr/bin/obexput - 1 filename\"
```

Value `-` as bdaddr and *1* as channel tells **obexput** that it is launched by the iWRAP server, and that data connection is bound to standard input and output.

Originally **obexsender-put** was a helper application for ObexSender. It can also be used by other programs. It calls the given Bluetooth device, calculates a device hash value and then sends one or more files to it using ObjP. **obexsender-put** takes following parameters:

Parameter	Description
--configfile name	Use "name" as config file.
--bdaddr bd	Call to "bd" and send files specified in config file.
--iwraphostname host	Use iWRAP in host. Defaults to "localhost".
--iwrapport port	Use iWRAP in port. Defaults to "10101".
--iwrappassword pass	Use iWRAP password. Defaults to empty.
--verbose level	Specify debug verbosity level. Defaults to "0". Logging is written to standard output.
--hash bd	Calculate and show hash value by calling to "bd", don't send anything.

Parameter	Description
--uuid uuids	Use specified UUIDs. Defaults to "OBEXOBJECTPUSH,OBEXFILETRANSFER".

Table 3-3. Parameters for obexsender-put

Config file specifies filenames and hash values for them. First there has to be one or more "regex" lines, followed by one or more "file" or "exec" lines, followed by an empty line. There can be multiple instances of these tuples. Syntax is:

```
regex <match1>
regex <match2>
file <fakename1> </path/to/file1>
file <fakename2> </path/to/file2>
exec </path/to/command1>
exec </path/to/command2>

regex <match3>
file <fakename3> </path/to/file3>

...
```

Parameter "match" is a regex of hash. If it matches calculated hash, the file(s) in this tuple will be sent. See `lottery` example in SDK for more information about **exec**.

Example of config file:

```
regex Nokia.9500
file hello.jpg /mnt/usb/communicator.jpg

regex .
file hello.jpg /mnt/usb/unknown.jpg
```

The return value is:

Value	Description
0	OK, files sent without errors.
1	Error in parameters.
2	Fatal error. Reboot!
3	No files sent. Operation should be retried.
4	No files sent. Remote refused to received, do not retry.
5	OK, no files matched the hash, nothing sent.
6	Error, file not found from disk.
7	Error, remote device does not support specified UUID(s).

Table 3-4. Errorlevels from obexsender-put

There is also another ObexSender helper application called **obexsender-inquiry**. It can be used to inquiry for nearby Bluetooth devices. It's usage and return values are similar to **obexsender-**

put command. All results are written to standard output.

Usage:

```
obexsender-inquiry parameters
```

Parameter	Description
--pair-only	List all paired devices and exit.
--inquiry	Inquiry and exit.
--ready-check	Check if iWRAP is ready or not.
--iwraphostname host	Use iWRAP in host. Defaults to "localhost".
--iwrapport port	Use iWRAP in port. Defaults to "10101".
--iwrappassword pass	Use iWRAP password. Defaults to empty.
--verbose level	Specify debug verbosity level. Defaults to "0". Logging is written to standard output.

Table 3-5. Parameters for obexsender-inquiry

Value	Description
0	OK.
1	Error in parameters.
2	Fatal error. Reboot!

Table 3-6. Errorlevels from obexsender-inquiry

3.2.5. PAN Profiles

Access Server has support for all PAN profile modes: Personal Area Network User (PANU), Network Access Point (NAP) and Generic Networking (GN). Accepting incoming PAN connections to any of these modes is disabled by default for security reasons.

Access Server can be configured to accept incoming PAN connections and the default settings can be changed by using the **setup** application (see section Section 2.4).

The Network Access Point mode is the most useful PAN profile mode. You can enable it by sending the `enable-pan.wpk` file (available on-line at http://bluegiga.com/as/current/enable-pan.wpk) to Access Server by using the Bluetooth Object Push profile. Alternatively, you can copy the file to the root of a USB memory dongle and insert the dongle to Access Server's USB port.

The device creating the PAN connection decides upon the modes to be used. Access Server automatically handles incoming connections. Access Server can also act as a PAN client, but in this case it must be controlled manually by using the iWRAP interface, described in Chapter 7.

3.2.6. Changing the Bluetooth Range

The transmit power of Access Server is configurable. By default, class 1 (100 meter range) settings are used. The settings can be changed down to "class 2" (10 meter range) settings with the **btclass 2** command, or even lower with the **btclass 3** command. Class 1 settings can be restored with the **btclass 1** command. You can find these command also in Setup ⟶ Advanced settings ⟶ Bluetooth commands menu in the WWW Setup interface.

After **btclass #** is given, it is recommended to reboot Access Server once to restart ObexSender and other applications connected to the iWRAP server(s).

Note: It is recommended to stop all applications using Bluetooth before issuing **btclass** command.

3.2.7. btcli

You can send iWRAP commands from the command line by using the **btcli** application. See Section 7.4 for more information.

3.2.8. serialbluetooth

It is also possible to control the first iWRAP server (at port 10101) through RS-232 with the **serialbluetooth** application.

Usage:

```
serialbluetooth [options]
```

To see the command options, enter the **serialbluetooth --help** command.

Basically, **serialbluetooth** takes commands from a serial port and forwards them to the iWRAP server. All the commands available through iWRAP are also available through serial port.

There are two exceptions:

1. After making an outgoing RFCOMM data call, all input from the serial port is forwarded to the data socket, not to the control socket. To close the data socket, you have to write **+++** with a 200ms pause before each character. It is not possible to have two concurrent RFCOMM calls.
2. All incoming RFCOMM calls are answered automatically. Again, to close the data socket, write **+++** as with the outgoing call.

3.3. Compact Flash Cards

Access Server functionality can be extended by using GSM/GPRS, Wi-Fi and GPS Compact Flash cards. The supported Compact Flash cards are listed in Appendix D.

3.3.1. Compact Flash GPRS Cards

The operating system automatically identifies the Compact Flash GPRS card when it is inserted. Access Server can use the GPRS card to connect to the GPRS network, or to act as an SMS gateway to send and receive SMS messages.

You can enable the GPRS mode and configure its settings, such as the SIM card's PIN code, by using the setup application or its WWW interface. For more information, see Section 2.4 and documentation for Setup ⟶ Network settings ⟶ Enable GPRS interface in Appendix B.

GPRS, when enabled, is by default only turned on when needed. If Access Server can access the Internet (or any desired address) by using the default interface `nap`, it does not activate and use the GPRS (`ppp0`) interface.

The simplest way to test the GPRS interface is to configure the default interface `nap` to use dynamic network configuration (the default) and enable GPRS through the **setup** application, then to disconnect the Ethernet cable, reboot the device with the management console enabled. After the boot, **ping** an IP address in the Internet, such as 194.100.31.45 (bluegiga.com).

The first five or so packets are lost, but after that the GPRS connection should be up. To enable the interface automatically, just enter **ping -c 20 ip-in-internet** to `/etc/rc.d/rc.local`.

> **Note:** If you also want to use the Ethernet connection, you must remove it from the default interface (`nap`) bridge and configure its network settings individually using the **setup** application while keeping the default interface network settings in their default (dynamic) state.

Using WRAP SMS Gateway Server is documented in Section 3.5.3.

If needed for some special use, the Compact Flash GPRS card can also be accessed directly from `/dev/ttyS0`, a device file which exists if the GPRS card is successfully initialized.

3.3.2. Compact Flash GPS Card

The operating system automatically identifies the Compact Flash GPS card when it is inserted. At that time, the device file `/dev/ttyS0` is created and the GPS card can be accessed by using that device with the serial port settings the GPS card uses.

The supported Compact Flash cards are listed in Appendix D.

3.3.3. Compact Flash Wi-Fi Cards

Access Server supports Prism II/III based CF Wi-Fi cards. The supported Compact Flash cards are listed in Appendix D.

By default, Access Server notices when a supported Wi-Fi card is inserted and tries to use it in the client mode, without encryption. So, if there is an open Wi-Fi Access Point in range, Access Server will automatically connect to it.

To configure Wi-Fi to the Access Point mode, or to change other Wi-Fi settings, use the setup application or its WWW interface at Setup ⟶ Network settings ⟶ Wi-Fi.

> **Note:** Older Compact Flash cards with firmware version 1.4.2 do not work in the Access Point mode. Instead, you will see an error message in the system log (`/var/log/messages`, viewable at Setup ⟶ Advanced ⟶ System Information ⟶ Show system log file).

A standard set of command line wireless utilities is provided to fine-tune your Wi-Fi configuration:

- iwconfig
- iwlist
- iwpriv

For more information on these utilities, see: http://www.hpl.hp.com/personal/Jean_Tourrilhes/Linux/Tools.ht

3.4. USB Memory Dongles and Compact Flash Memory Cards

Access Server's persistent memory storage can be extended by using an USB memory dongle or a Compact Flash memory card. These are also used by the Access Server Remote Management System (see Section 3.5.5) - each time a dongle or memory card is inserted, it is automatically mounted, and scanned for management packets, which are processed and unmounted.

To use the USB dongle or Compact Flash memory card for your own applications, the memory must be mounted manually by using command:

```
[root@wrap /]$ mount -t vfat device /mnt/usb
```

The `device` parameter is a path to the USB dongle or Compact Flash memory card filesystem device. For the first dongle inserted after a reboot, it is `/dev/sda1` if the dongle is partitioned (which often is the case), or `/dev/sda` if the dongle has no partition table. The first Compact Flash memory card is typically at `/dev/hda1`, correspondingly. If you have used several dongles after reboot, new device file names are created: `/dev/sdb1` for the second one, `/dev/sdc1` for the third one, and so on. In the case of memory cards, naming is similar, that is, the second one gets device file name `/dev/hdb1`.

Note: Always remember to unmount the memory dongle or memory card with command:

```
[root@wrap /]$ umount /mnt/usb
```

The filesystem in USB dongle can get corrupted if you have a power failure while you are writing data to it. Utility called **fsck.vfat** is included to fix the problem. There's no harm running it on a clean filesystem. If you are using init scripts (`/etc/rc.d/rc.local`) to automatically mount the USB dongle on boot time, it is recommended to run **fsck.vfat** before mounting.

```
[root@wrap /]$ fsck.vfat -a device
[root@wrap /]$ mount -t vfat device /mnt/usb
```

3.5. Servers

Access Server server applications are started automatically at system power-up or when an iWRAP server or the Internet services daemon needs them. The servers and their purposes are described in Table 3-7.

Server	Description
bluetooth	Access Server iWRAP Server, which is described in detail in Chapter 7.
connector	Access Server Connector, service which automatically opens and maintains connections to specified Bluetooth devices. Configurable using the **setup** application and its WWW interface.
finder	WRAP Finder Service.
obexsender	WRAP ObexSender server.
smsgw	WRAP SMS gateway server, which is described in detail in Section 3.5.3. Notice that this server is disabled by default. Use the **setup** application or the **chkconfig smsgw on** command to enable it.
watchdog	WRAP user level watchdog.
wpkgd	WRAP remote management system daemon.
crond	A daemon to execute scheduled commands. This server is configurable through the `/var/spool/cron/crontabs/root` file or the **crontab** command in the same way as any Linux crond.

Server	Description
ftpd	Internet File Transfer Protocol Server. You can configure this server with the **setup** application. Notice that this server is disabled by default. Use the WWW interface of the **setup** application or the **chkconfig ftpd on** command to enable it.
udhcpd	This server is a DHCP daemon for providing automatic network configuration for clients in the network. Notice that, by default, this server is only enabled for the `gn` interface, used by Bluetooth PAN Generic Networking profile.
udhcpcd	DHCP client daemon for automatic network configuration.
inetd	Internet services daemon. Notice that this server is disabled by default. Use the **setup** application or the **chkconfig inetd on** command to enable it.
httpd	Web server, which is described in detail in Section 3.5.7.
pppd	Point to Point Protocol daemon. iWRAP server uses this server. This server can be used manually over the user serial port (`/dev/ttyAT1`).
snmpd	SNMP daemon. This server is available as a separate installation packet.
sshd	SSH daemon.
syslogd	System logging daemon. This server can be configured by using the **setup** application.
telnetd	Telnet protocol server. Notice that this server is disabled by default. Use the **setup** application or the **chkconfig telnetd on** command to enable it.
zcip	Zero configuration networking service.
ntpd	Network Time Protocol (NTP) daemon.

Table 3-7. Access Server Servers

3.5.1. Finder

The Finder service is a small service, which listens for UDP broadcast queries from Access Server Finder applications and responses to those queries with identification information (IP address, model, serial number, etc.) about Access Server.

The **finder** command can be used to query Finder service information from Access Servers in the network. With no parameters, **finder** sends the query using the broadcast address of the default interface (`nap`). Broadcasting to networks of other interfaces can be done with `--interface` parameter, such as the zero configuration interface `nap:9`in the following example:

```
[root@wrap root]$ finder --interface nap:9
Access Server 2291 (S/N: 0402110112) (build: 3.1)
- Hostname: wrap.localdomain
- IP: 169.254.30.233 (nap:9), 192.168.161.1 (gn)
- Ethernet MAC: 00:07:80:00:03:ed
- iWRAP: 10101 00:07:80:80:0b:c3 bt1.2 (W0402110112_1)

Access Server 2291 (S/N: 0606221029) (build: 3.1)
```

```
- Hostname: wrap.localdomain
- IP: 169.254.36.138 (nap:9), 192.168.161.1 (gn)
- Ethernet MAC: 00:07:80:00:0d:44
- iWRAP: 10101 00:07:80:80:0b:c4 bt1.2 (W0606221029_1)

[root@wrap root]$
```

With parameter `--send` **finder** will send info once to a specified host, for example to inform that device has booted.

For information about the finder protocol, see Chapter 9.

3.5.2. ObexSender

The ObexSender application is automatically started in Access Server. Its purpose is to receive business cards (vCards), images, or other files, and analyze their content and send files back selecting them based on configured keywords found.

ObexSender can also make an inquiry for bluetooth devices, and automatically send one or more files to all new devices found.

ObexSender can be configured with the **setup** application or by editing the `/etc/obexsender.conf` file (see Section 2.4).

For detailed instructions on using ObexSender, see Chapter 5.

3.5.3. SMS Gateway Server

WRAP SMS Gateway Server supports Nokia 20, Nokia 30, or Wavecom WMOD2 compatible GSM terminals and the supported GSM/GPRS Compact Flash cards for sending and receiving SMS messages. By default, the Compact Flash card is used. The PIN code query of the SIM card at power-up must be disabled.

WRAP SMS Gateway Server is disabled by default. To enable it, use the **setup** application's WWW interface, as described in section Section 2.4. Enabling is done at Setup ⟶ Applications ⟶ Default startup applications ⟶ smsgw.

WRAP SMS Gateway Server can be configured to use a modem connected to the user serial port with the setup application or its WWW interface by changing the setting at Setup ⟶ Applications ⟶ SMS gateway settings ⟶ Modem device to `/dev/ttyAT1` from the default `/dev/ttyS0`.

Note: If you are using the user serial port, ensure you have Bluetooth Serial Port Profile disabled, as they share the same physical user serial port.

Note: To use Nokia terminals, the device must be connected to the user serial port when the server starts up. Also, the terminal must be configured to operate in RS-232/AT command. Nokia terminals are configured with the N20 or N30 Configurator application.

For further information on using **smsgw**, see the **makesms** example in Section 6.3.1.

3.5.4. User Level Watchdog

WRAP User Level Watchdog daemon listens on UDP port 4266 for "id timeout" messages. "id" is an ASCII string, without spaces. If "timeout" equals to 0 (zero), the "id" is removed from the list of processes to wait. If "timeout" is greater than 0 (zero), the "id" is added or updated.

When there is no message for "id" received within the "timeout" seconds, the user level watchdog dies and the kernel watchdog reboots Access Server.

The **watchdog** command can be used to send messages to the watchdog daemon. This is done through command **watchdog id timeout**. For example, **watchdog test 5**.

3.5.5. Remote Management

Access Server contains simple tools that provide means for full and secure remote management of the device.

The basic remote management can be performed using the WWW Setup interface, SSH command line access, and SCP and SFTP file transfer protocols.

In addition to those, Access Server contains WRAP Remote Management System for transferring management packets over different media to Access Server and automatically sending response packets back.

The management packets (`*.wpk`) are automatically processed when they are transferred to the autoinstall directory in Access Server (`/tmp/obex` by default, but configurable with the setup application or WWW interface at Setup ⟶ Applications ⟶ wpkgd settings). The easiest way to transfer a management packet to this directory is to upload it from WWW Setup at Setup ⟶ Advanced settings ⟶ Upload a software update.

3.5.5.1. Overview

A management action is performed using the following procedure:

1. A customer system prepares the management packet (*.wpk).
2. The management packet is delivered to Access Server, to the packaging daemon's directory. You can currently use Bluetooth, SCP, SFTP and plain FTP to do this. The packet can also be transmitted using a USB memory dongle, Compact Flash memory card or through the WWW Setup interface.
3. The Access Server packaging daemon processes the management packet, possibly generating a reply packet.
4. (Optional) The reply packet is delivered to the customer system.

3.5.5.2. Management Packet Format

- The package name must be of format `name.wpk`, where "name" can be user defined.
- Package must be a `tar` archive that is compressed with **gzip** (such as files named *.tar.gz or *.tgz).

- The package must contain a package information file called `wpkg.pif` in the package root (the file contents are described later), otherwise the built-in defaults for `wpkg.pif` are used.
- All other files, if any exist, should be data files, scripts or executables required for the management operation.

3.5.5.3. Management Packet Information File Format

The management packet information file (`wpkg.pif`) consists of tags and their data, described here:

%wpkg-version: 2

Contains information for version checking. 2 is currently the only supported version. It is also the default value.

%wpkg-prepare: [command line[s]]

One or more commands (all commands are lines until the next tag is interpreted as a command line) to execute. Commands may contain parameters, redirections and job control as well.

The built-in default value for this is **/usr/bin/dpkg -i *.deb || echo ERROR: Installation failed.**. This enables the special case of creating .wpk packets from .deb packets simply with **tar czf foo.wpk foo.deb**. (`wpkg.pif` is not needed in this special case).

%wpkg-reply: method

This value indicates where the generated reply packet is sent. By default, it is sent to where it came from. Possible values are:

- default
- file:///path/filename
- scp://remote:file
- objp://bdaddr/
- none

%wpkg-format: type

This value indicates what kind of a reply packet will be generated. Possible values are:

- ascii (this is the default value, everything echoed by the prepare-section will be sent).
- tgz (all files in the current directory will be sent).
- vcf (same as ascii, but assume it is a vCard).
- vmg (same as ascii, but assume it is a vMessage).
- vnt (same as ascii, but assume it is a vNote).
- vcs (same as ascii, but assume it is a vCalendar).
- html (same as ascii, but assume it is HTML).

%wpkg-auth: auth

Optional authentication string required by wpkgd.

3.5.5.4. Management Operation Example: Hello World

See below for the simplest example of `wpkg.pif`:

```
%wpkg-version: 2
%wpkg-prepare:
echo Hello world
```

This will generate a reply packet containing text "Hello world". You can generate the wpk file simply by giving the command **tar czf hello.wpk wpkg.pif**.

3.5.5.5. Management Operation Example: Software Update

See below for a more complex example of **wpkg.pif**:

```
%wpkg-version: 2
%wpkg-prepare:
FOO=`pwd`
cd /
tar xzf ${FOO}/files.tar.gz
echo Done.
```

This example will extract files from the included `files.tar.gz` file. You can generate the wpk file with command **tar czf update.wpk wpkg.pif files.tar.gz**.

3.5.5.6. Management Operation Example: IPQUERY

In this example, we build a simple packet that can be used with a Bluetooth enabled phone to retrieve the IP address of an Access Server. File `wpkg.pif` reads:

```
%wpkg-version: 2
%wpkg-format:  vcf
%wpkg-prepare:

ipaddr() {
echo `ifconfig nap | grep "inet addr" | awk -F [:] \
  \\{print\\$2\\} | awk \\{print\\$1\\}`
}

serialno() {
echo `wrapid | grep Hardware | awk \\{print\\$5\\}`
}

echo -e "BEGIN:VCARD\r"
echo -e "VERSION:2.1\r"
echo -e "N:`serialno`\r"
echo -e "TEL:`ipaddr`\r"
echo -e "URL:`hostname`\r"
echo -e "END:VCARD\r"
```

This example will send the reply back as a vCard (contact card). Please note that you have to include all required vCard formatting by yourself. You can generate the wpk file simply giving the command **tar czf ipquery.wpk wpkg.pif**.

To use this example, send the file `ipquery.wpk` to the inbox of your Bluetooth phone. Check that you have Bluetooth enabled in the phone. Then, from the phone's inbox, send the file `ipquery.wpk` over Bluetooth to Access Server.

3.5.5.7. Management Operation Example: Beep

See below for beep example of `wpkg.pif`:

```
%wpkg-version: 2
%wpkg-reply:   none
%wpkg-prepare:
echo A > /dev/led
sleep 1
echo a > /dev/led
```

3.5.5.8. Management with USB Memory Dongle or Compact Flash Memory Card

When an USB memory dongle or Compact Flash memory card is inserted, Access Server automatically tries to mount it using VFAT filesystem. If the mount is successful, Access Server scans the root directory for `*.wpk` files. If one is found, the WRAP Remote Management System daemon processes it. Optional reply packets are saved back to the root directory (unless otherwise stated in the **%wpkg-reply** tag).

3.5.5.9. Listing and Uninstalling Software Component

To list installed software components use command **wpkgd -l**. To uninstall an installed component use **wpkgd -e [component]**. See **wpkgd** command without parameters for more information.

3.5.6. FTP

If you enable the FTP server, users can use it to log in anonymously to the `/tmp/obex` directory with download access or as **`root`** with password **`buffy`** to the root directory with full access. The password and other settings can be changed on Access Server with the **setup** application or by editing the `/etc/ftpd.conf` file (see Section 2.4).

> **Note:** Do not enable FTP because it is insecure. Use SSH (SCP or SFTP) instead. A commonly used client with a graphical user interface is, for example, WinSCP (http://winscp.net/).

3.5.7. Web Server

The integrated web server in Access Server supports HTTP/1.0 methods GET and POST, and has light user authentication capabilities. The content can be either static or dynamic - the WWW server is CGI/1.1 compatible.

The web server is always running and the content (http://wrap-ip-address/) is located in the `/var/www/html/` directory in Access Server's file system.

The web server is configured to protect the WWW Setup interface with a username and password. The default username and password can be changed as instructed in Section 2.4. For further information about using the web server for your own applications, see the web examples in Section 6.3.1.

3.5.8. SNMP

A separate software update package is available from Bluegiga Techforum (http://www.bluegiga.com/techforum/). This update adds the Net-SNMP suite of applications to Access Server. The current Net-SNMP implementation for Access Server is limited and will be extended in the future. However, it can be used to poll the basic status of Access Server.

Configuration details can be found and altered in configuration file `/etc/snmp/snmpd.conf`, which is accessible as described in Section 2.4.

For more information about the Net-SNMP suite, see http://net-snmp.sourceforge.net/

3.5.9. OpenVPN

A separate software update package is available from Bluegiga Techforum (http://www.bluegiga.com/techforum/). This update adds the OpenVPN™, a full-featured SSL VPN solution, to Access Server.

For detailed instructions on using OpenVPN with Access Server, see Section 10.4.

For more information about the OpenVPN™, see http://openvpn.net/.

3.5.10. SSH

By default, users can use SSH to log in (or SCP and SFTP to transfer files) as user **`root`** with password **`buffy`**. The password can be changed on Access Server by using command **passwd** or with the **setup** application.

3.5.11. Telnet

If you enable telnet, users can log in over telnet as user **`root`** with password **`buffy`**. The password can be changed on Access Server using the command **passwd** or with the **setup** application.

Note: Do not enable telnet because it is insecure. Use SSH instead.

3.5.12. NTP

The **ntpd** service uses the standard Network Time Protocol (NTP) to keep Access Server system time automatically in sync using a random selection of eight public stratum 2 (NTP secondary) time servers. The service is also configured to answer NTP requests from other devices.

The NTP server configuration can be altered by editing its configuration file `/etc/ntpd.conf`.

3.6. Utilities

Access Server is basically a small Linux system. Whether logged in from the management console or with SSH, your shell session starts as the root user in the root directory. After that, you have the option to use most of the standard Linux utilities, briefly listed and described in Table 3-8. Most of the commands have a small built-in usage help that can be seen by executing the command with the **-h** or **--help** parameter.

Application	Description
adduser	This command add user to the system.
arping	This command pings hosts by ARP requests/replies.
awk	Pattern scanning and processing language.
btclass	WRAP baseband module control script (sets basebands power class).
basename	Strip directory and suffix from file names.
bash	Bourne-Again SHell.
btcli	WRAP iWRAP Server Command Line Interface utility.
btproxy	WRAP iWRAP Proxy for Access Servers (test revision).
bunzip2	Decompress bzip2-compressed files.
bzcat	Decompress bzip2-compressed files to stdout.
cardctl	Monitor and control the state of PCMCIA sockets.
cat	Concatenate files and print on the standard output.
chat	Automated conversational script with a modem.
chgrp	Change group ownership.
chkconfig	Updates and queries runlevel information for system services.
chmod	Change file access permissions.
chown	Change file owner and group.
chroot	Run command or interactive shell with special root directory.
clear	Clear the terminal screen.
cmp	Compare two files.
cp	Copy files and directories.
cpio	Copy files to and from archives.
crontab	Maintain crontab files for individual users.
cut	Remove sections from each line of files.
date	Print or set the system date and time. Notice that the date command does not store the date into the battery powered real time clock. Use the hwclock application instead.
dd	Convert and copy a file.
deluser	Delete a user from the system.
df	Report file system disk space usage.
dfu	WRAP baseband module firmware upgrade tool.
dialup	WRAP iWRAP helper application.
dirname	Strip non-directory suffix from file name.
dmesg	Prints or controls the kernel ring buffer.
dpkg	A medium-level package manager for (.deb) packages.
dpkg-deb	Debian package archive (.deb) manipulation tool.
du	Estimate file space usage.

Application	Description
dump_cis	Retrieves and parses the Card Information Structures for inserted PCMCIA devices, or optionally, parses CIS information from a file.
dun	WRAP iWRAP helper application.
egrep	Print lines matching a pattern.
encode_keychange	Produce the KeyChange string for SNMPv3.
env	Run a command in a modified environment.
expr	Evaluate expressions.
false	Do nothing, unsuccessfully.
fgrep	Print lines matching pattern.
find	Search for files in a directory hierarchy.
free	Display the amount of free and used memory in the system.
ftp	Internet file transfer program.
gdbserver	Remote server for GDB debugger. Available in a separate software package.
getty	Opens a tty, prompts for a login name, then invokes `/bin/login`.
grep	Print lines matching a pattern.
gunzip	Expand gzip compressed files.
gzip	Compress files into gzip format.
head	Output the first part of files.
hexdump	A filter which displays the specified files, or the standard input, if no files are specified, in a user specified format.
hostid	Print out a unique 32-bit identifier for the machine (not yet implemented).
hostname	Show or set the system’s host name.
hwclock	Query and set the hardware clock.
id	Print information for username or current user.
ide_info	IDE device information.
ifconfig	Configure a network interface.
ifport	Select the transceiver type for a network interface.
ifuser	Checks to see if any of the listed hosts or network addresses are routed through the specified interface.
insmod	Loads the specified kernel modules into the kernel.
ip	TCP/IP interface configuration and routing utility.
iptables, ip6tables	IP packet filter administration.
kill	Terminate a program.
killall	Kill processes by name.
ln	Make links between files.
logger	Make entries into the system log.
login	Sign on.

Application	Description
ls	List directory contents.
lsmod	List loaded modules.
md5sum	Compute and check MD5 message digest.
mkdir	Make directories.
mknod	Make block or character special files.
mktemp	Make a temporary file name (unique).
modprobe	High level handling of loadable modules.
more	File perusal filter for crt viewing.
mount	Mount a file system.
mv	Move (rename) files.
net-snmp-config	Net-SNMP tool.
nslookup	Queries the nameserver for IP address of given host.
ntpd	Network Time Protocol NTP daemon.
obexbrowser	The WRAP obexbrowser. A command line OBEX client interface.
obexget	The WRAP OBEX tool for retrieving a file from a remote device with ObjP/FTP support.
obexput	The WRAP OBEX tool for sending a file to a remote device with ObjP/FTP support.
pack_cis	Convert a text description of a PCMCIA Card Information Structure (CIS) to its packed binary representation.
passwd	Update a user’s authentication token(s).
picocom	Minimal dumb-terminal emulation program. Available in a separate software package.
pidof	Find a process ID of a running program.
ping, ping6	Send ICMP ECHO_REQUEST packets to network hosts.
ps	Report process status.
pwd	Print the name of the current/working directory.
rb, rx, rz, sb, sx, sz	Xmodem, Ymodem, Zmodem file receive and send.
rdate	Get and possibly set the system date and time from a remote HOST.
reboot	Reboot the system.
renice	Alter the priority of running processes.
reset	Resets the screen.
rm	Remove files or directories.
rmdir	Remove empty directories.
rmmod	Unload loadable modules.
route	Show / manipulate the IP routing table.
scp	Secure copy (remote file copy program).
scsi_info	SCSI device description tool.
sed	A Stream EDitor.

Application	**Description**
setup	The WRAP Setup Application. See Section 2.4.
sftp	Secure file transfer program.
sleep	Delay for a specified amount of time.
snmp*	Set of standard SNMP command line applications.
sort	Sort lines of text files.
ssh, slogin	OpenSSH SSH client (remote login program).
ssh-keygen	SSH authentication key generation, management and conversion.
strace	Utility to trace system calls and signals. Available in a separate software package.
strings	Display printable strings in binary file.
stty	Change and print terminal line settings.
su	Run a shell with substitute user and group IDs.
sulogin	Single-user login.
supportinfo	Output collectively all the system status and configuration information.
sync	Flush filesystem buffers.
tail	Output the last part of files.
tar	Tar archiving utility.
tcpdump	Utility for dumping traffic on a network. Available in a separate software package.
telnet	User interface to the TELNET protocol.
test	Check file types and compare values.
time	Run command and display its resource usage information when finished.
top	Provides a view to processor activity in real time.
touch	Change file timestamps.
tr	Translate or delete characters.
traceroute	Trace the route that IP packets take on their way to the host.
true	Do nothing, successfully.
tty	Print the file name of the terminal connected to standard input.
uartmode	WRAP Uartmode: Change the mode of the user serial port (DTE or DCE).
umount	Unmount file systems.
uname	Print system information.
uniq	Remove duplicate lines from sorted lines.
unzip	List, test, and extract compressed files in a ZIP archive.
uptime	Tell how long the system has been running.
usleep	Sleep some number of microseconds.
uudecode	Decode a file create by uuencode.

Application	Description
uuencode	Encode a binary file.
wc	Print the number of bytes, words, and lines in files.
vi	A text editor.
wget	A utility to retrieve files from the World Wide Web.
wrapfinder	Finds other Access Servers in the network.
wrapid	Access Server identification program. Shows build and hardware configuration information.
which	Shows the full path of (shell) commands.
whoami	Prints the user name associated with the current effective user id.
zcat	Expand gzip compressed files to the standard output.
zcip	Zero Configuration Networking application.
xargs	Build and execute command lines from the standard input.

Table 3-8. Access Server Utilities

3.7. Real Time Clock

The system clock is read from the battery operated real time clock during boot. The time between the system time and the real time clock is automatically synchronized when the system is rebooted using the **reboot** command. Synchronizing can also be done using the **hwclock --systohc --utc** command. Give command **hwclock --help** for more information about the **hwclock** utility.

3.8. Time Zone

The default time zone in Access Server is UTC. You can change it by installing correct `tzdata*wpk` management packet, available from Bluegiga Techforum (http://www.bluegiga.com/techforum/) or Access Server Software Development Kit CD-ROM.

3.9. System Re-Install and Upgrade

Access Server can be re-installed with the latest software version. The latest software updates and instructions are available at http://www.bluegiga.com/techforum/.

Most of the software updates are delivered as a `wpk` file.

The easiest way to install the latest software version is:

1. Start Access Server.
2. Copy the `wpk` file or files to an empty USB memory dongle.
3. Insert the dongle in Access Server
4. One or several LEDs will turn on, and after 10-60 seconds they will all turn off.
5. Remove the dongle and reboot Access Server.

6. You have now successfully upgraded Access Server.

See Section 3.5.5 for detailed descriptions of other options and how to create your own `wpk` files.

Chapter 4. SPP-over-IP

SPP-over-IP is a special functionality of iWRAP Bluetooth servers running in Access Servers. It offers a transparent way to transmit data from Bluetooth Serial Port Profile (SPP) enabled devices to server computers or PCs. Several transport medium are supported, such as Ethernet, Wi-Fi or and GPRS.

4.1. How SPP-over-IP Works

The SPP-over-IP application enables transparent data transfer between any Bluetooth Serial Port Profile (SPP) complaint device and a server, laptop or desktop connected to the same network. This enables plug n' play connectivity from a Bluetooth network to any standard TCP/IP based network. See Figure 4-1 for an overview of the application and a brief introduction to its functionality.

Features of SPP-over-IP are:

- Access Server 2291 supports 7 incoming SPP connections.
- Access Server 2293 supports 21 incoming SPP connections.
- SPP-over-IP can be used over Ethernet, Wi-Fi or GRPS networks.
- SPP-over-IP also works over Bluetooth Personal Area Networking (PAN) connections, so not all Access Servers need to be physically (cable) connected to the TCP/IP network, but some Access Servers can linked using the Bluetooth PAN connection. This is referred to as *repeater* operation.
- If SPP-over-IP application cannot open the TCP connection to defined IP address and port, the SPP connection will not be accepted.
- If the TCP server on PC is closed, all SPP connections will be closed as well.
- When Access Server is in its default configuration, it tries to enable sniff power saving mode on all idle Bluetooth connections to minimize power consumption.
- SPP-over-IP can also be used to opposite direction, i.e. Access Server opens the Bluetooth connections to dedicated Bluetooth devices. See Section 4.1.4 for more details.
- SPP-over-IP can also be combined with the Tactical Software's Serial/IP® software. Serial/IP software converts automatically TCP connections to virtual COM ports on the host PC, so legacy applications utilizing COM-ports instead of TCP/IP can also be used.

4.1.1. Standard Operation

With the standard configuration, SPP-over-IP works as described below:

- Listens for incoming Serial Port Profile (SPP) connections
- Takes control of all incoming connections
- Opens a TCP connection to the defined IP address and TCP port
- Forwards all incoming data from the SPP device to the established TCP connection and vice versa

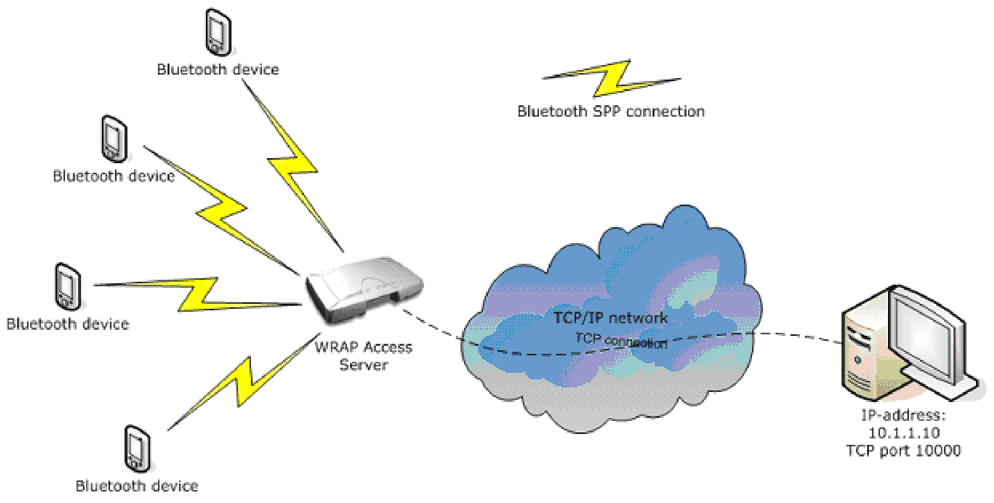


Figure 4-1. SPP-over-IP Network Architecture

All the server computer needs to do is to listen for incoming TCP connections from Access Server to a specified TCP port and receive/send the application data.

4.1.2. Repeater Operation

The SPP-over-IP application can also be used in a so-called repeater mode. This feature is useful when all Access Servers can not be directly connected to the TCP/IP network, but they can be connected to other Access Servers by using Bluetooth PAN-connection. PAN enables transmitting TCP/IP packets wirelessly over Bluetooth. The figure below illustrates this configuration:

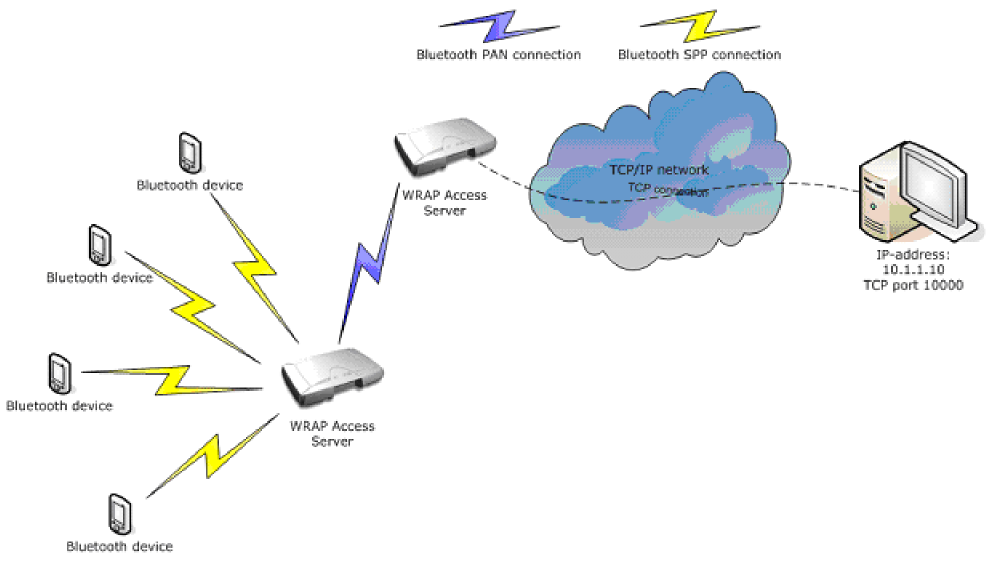


Figure 4-2. Repeater Mode in SPP-over-IP

4.1.3. SPP-over-IP over GPRS

SPP-over-IP software can also be used over GPRS instead of wired Ethernet connection. This requires that Access Server is equipped with a working GSM/GPRS compact flash card. See Appendix D for supported cards.

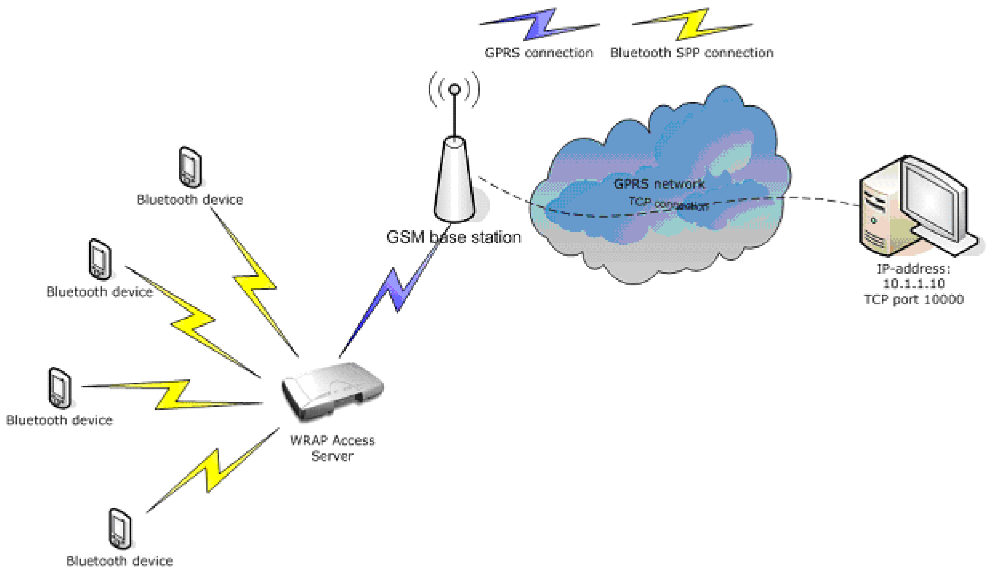


Figure 4-3. SPP-over-IP over GPRS

Notice when using GPRS:

- Data upload rate is around 8-12kbps (depending on GPRS card)
- Data download rate is around 32-48kbps (depending on GPRS card)
- Data transmission delays can be very high, sometimes even seconds
- GPRS connection may be unreliable and break easily. This should be taken account when designing the system. If GPRS connection breaks, all the TCP and Bluetooth connections will also be closed.

4.1.4. Opening Connections from Access Server

In the basic SPP-over-IP use case, Access Server is in passive mode and only accepts incoming connections. Using **connector** service, Access Server can open and maintain outgoing Bluetooth connections to defined Bluetooth devices

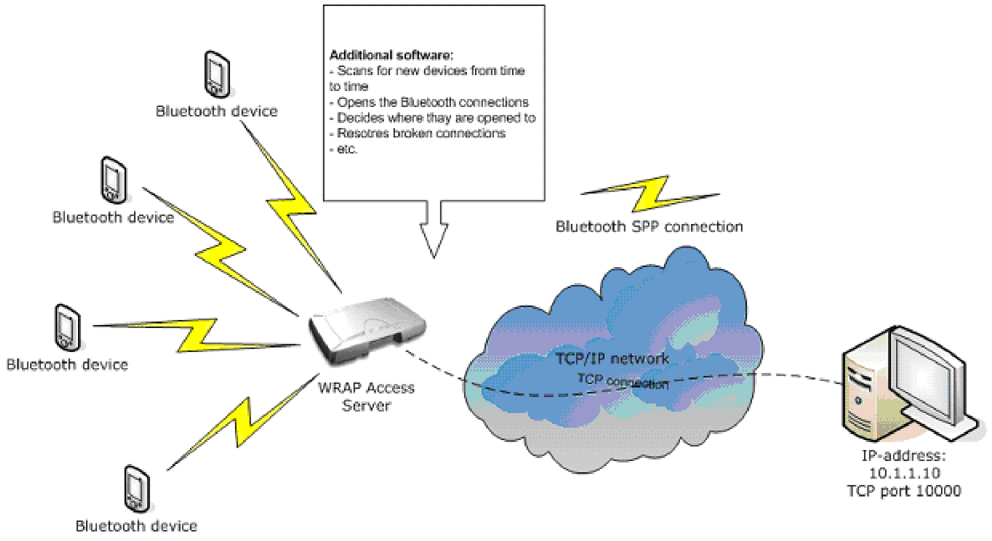


Figure 4-4. Access Server Opening the Connections

4.1.5. SPP-over-IP and COM Ports

SPP-over-IP can also be used together with Tactical Software's Serial/IP® software. Serial/IP software simply converts the TCP connections into virtual COM ports on the host computer. This is very useful in applications, which do not have support for TCP/IP but support COM ports instead.

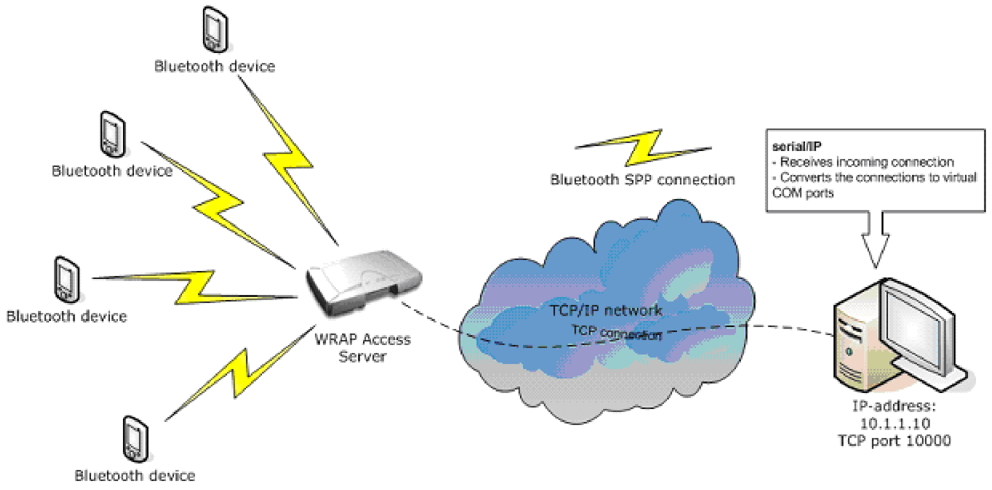


Figure 4-5. SPP-over-IP with Serial/IP

An evaluation version of Serial/IP can be downloaded from: http://www.tacticalsoftware.com/products/serialip.htm

4.2. Configuring SPP-over-IP

This chapter briefly instructs you to configure SPP-over-IP to work in different network setups or use cases.

SPP-over-IP is easiest to configure through WWW setup, which allows you to access all the necessary configurations. For instructions about finding Access Server's IP address and using the WWW setup interface, see Section 2.2.

4.2.1. Forwarding Incoming Connections

The basic SPP-over-IP operation, listening incoming Bluetooth connections and forwarding them to a TCP/IP socket on a remote host (or a local application), is configured at Setup ⟶ iWRAP settings ⟶ Bluetooth profiles ⟶ Connection forwarding. For details of the settings, see Section B.5.1.5

4.2.2. Maintaining and Forwarding Outgoing Connections

The SPP-over-IP **connector**, which opens and maintains outgoing Bluetooth connections and forwards them to a TCP/IP socket on a remote host (or a local application), is configured at Setup ⟶ Applications ⟶ Connector. For details of the settings, see Section B.4.3

4.2.3. Repeater Configuration

If you want to configure Access Server also to act as a repeater (see Figure 4-2) you must make some additional configurations. Add the line below to your Bluetooth startup script, editable at Setup ⟶ iWRAP settings ⟶ Edit startup script. Line starting with # is comment which can be left out:

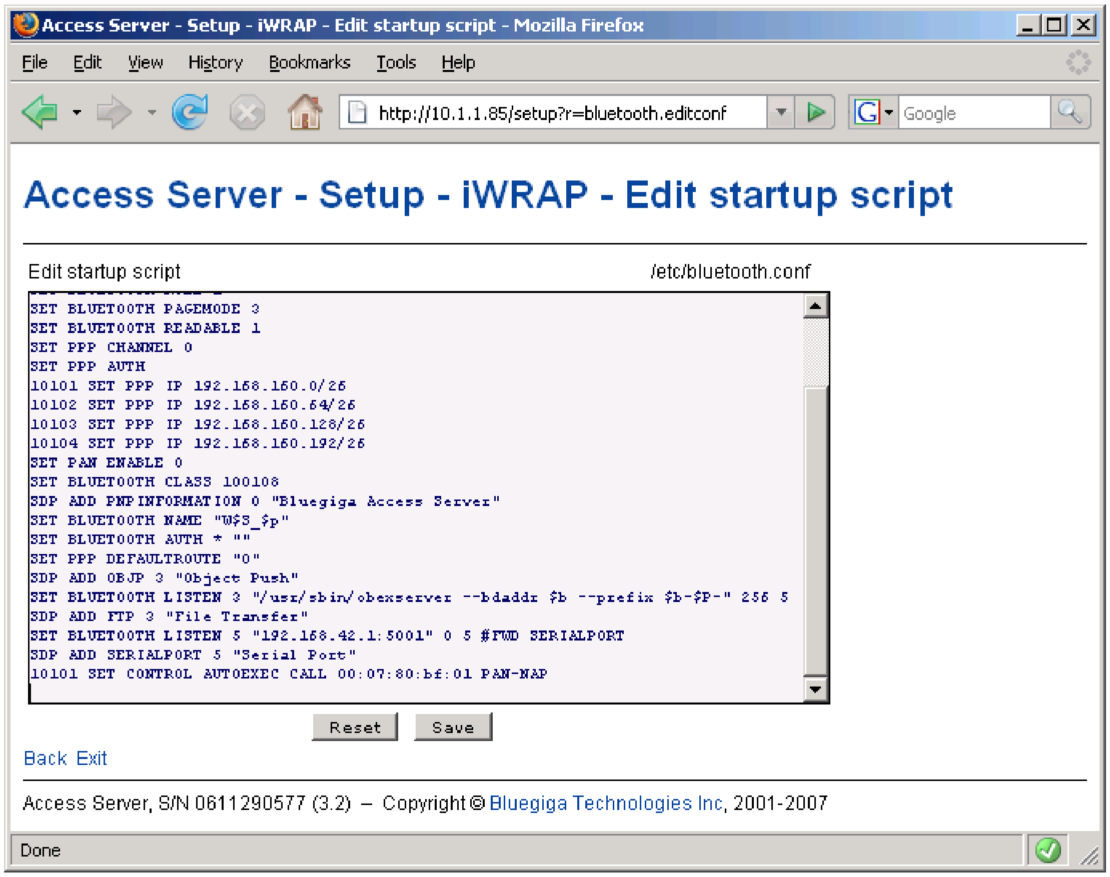
```
# Automatically connect to Access Server with PAN-NAP enabled using baseband 1
10101 SET CONTROL AUTOEXEC CALL 00:07:80:bf:01 PAN-NAP
```

You must replace the Bluetooth address used in the example (00:07:80:80:bf:01) with the Bluetooth address of the Access Server, on which you want to receive the PAN connection.

> **Note:** The server receiving the PAN connection must have the PAN-NAP profile enabled. This is by default not the case, so in setup or its WWW interface, ensure that the setting at ⟶ Bluetooth settings ⟶ Bluetooth profiles ⟶ Enable PAN network access point profile says yes. No other configuration is needed. See Section 3.2.5 for more information on PAN profiles.

The Bluetooth PIN codes must be the same in both Access Servers.

In the example configuration (Figure 4-6) connection forwarding has already been configured using the WWW Setup (two lines above the **SET CONTROL AUTOEXEC** line).



Access Server - Setup - iWRAP - Edit startup script - Mozilla Firefox

http://10.1.1.85/setup?r=bluetooth.editconf

Access Server - Setup - iWRAP - Edit startup script

Edit startup script /etc/bluetooth.conf

```
SET BLUETOOTH PAGEMODE 3
SET BLUETOOTH READABLE 1
SET PPP CHANNEL 0
SET PPP AUTH
10101 SET PPP IP 192.168.160.0/26
10102 SET PPP IP 192.168.160.64/26
10103 SET PPP IP 192.168.160.128/26
10104 SET PPP IP 192.168.160.192/26
SET PAN ENABLE 0
SET BLUETOOTH CLASS 100108
SDP ADD PNPINFORMATION 0 "Bluegiga Access Server"
SET BLUETOOTH NAME "W$S_$p"
SET BLUETOOTH AUTH * ""
SET PPP DEFAULTROUTE "0"
SDP ADD OBJP 3 "Object Push"
SET BLUETOOTH LISTEN 3 "/usr/sbin/obexserver --bdaddr $b --prefix $b-$P-" 256 5
SDP ADD FTP 3 "File Transfer"
SET BLUETOOTH LISTEN 5 "192.168.42.1:5001" 0 5 #FWD SERIALPORT
SDP ADD SERIALPORT 5 "Serial Port"
10101 SET CONTROL AUTOEXEC CALL 00:07:80:bf:01 PAN-NAP
```

Access Server, S/N 0611290577 (3.2) – Copyright © Bluegiga Technologies Inc, 2001-2007

Figure 4-6. Repeater Configuration

4.2.4. Wi-Fi Configuration

If Access Servers must be connected to Wi-FI (WLAN) instead of physical Ethernet connection, you also need to make additional configurations through the WWW setup.

See Section 3.3.3 for more information.

4.2.5. GPRS Configuration

If Access Servers must be connected to GPRS network instead of physical Ethernet or Wi-Fi connection, you also need to make additional configurations through the WWW setup.

See Section 3.3.1 for more information.

Chapter 5. Obexsender

Obexsender is one of the built-in applications in Access Server. It is dedicated to Bluetooth proximity marketing, content distribution, location based services, and much more. Access Server plus Obexsender provide the user with a ready platform to start content distribution including all the necessary Bluetooth functions from discovering the devices to transmitting the content. The user needs to only focus on what, when, and to whom to send the content - rest is taken care of by Access Server and Obexsender.

The figure below illustrates a simplified Obexsender network:

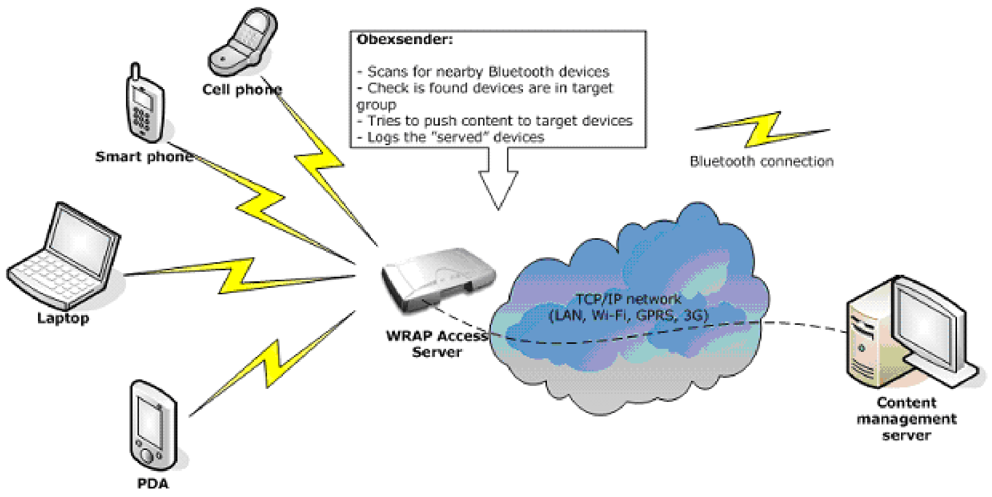

Obexsender:
- Scans for nearby Bluetooth devices
- Check is found devices are in target group
- Tries to push content to target devices
- Logs the "served" devices
Cell phone
Smart phone
Laptop
PDA
Bluetooth connection
WRAP Access Server
TCP/IP network (LAN, Wi-Fi, GPRS, 3G)
Content management server

Figure 5-1. Simplified Obexsender network

5.1. Key Features

- Automatic device discovery and content push over a Bluetooth connection
- 18 simultaneous Bluetooth connections with one Access Server
- Upload speed even up to 75KB/sec with Bluetooth 2.0+EDR
- Content can be stored locally - with external memory even up to 2GB space
- Wide networking support: Bluetooth, Ethernet, Wi-Fi, GPRS and EDGE
- Secure remote connections over a Virtual Private Networking
- Remote file system support
- Lots of filtering options, such as device type, or distance from Access Server
- Extensive logging
- Interaction between several Access Servers
- Content time stamping

5.2. Use Cases

This chapter describes some possible ObexSender use cases.

5.2.1. Content Push

This is the standard functionality in ObexSender. In content push mode, ObexSender is scanning for devices and pushing it to clients who belong to the target group (not opted out by filtering).

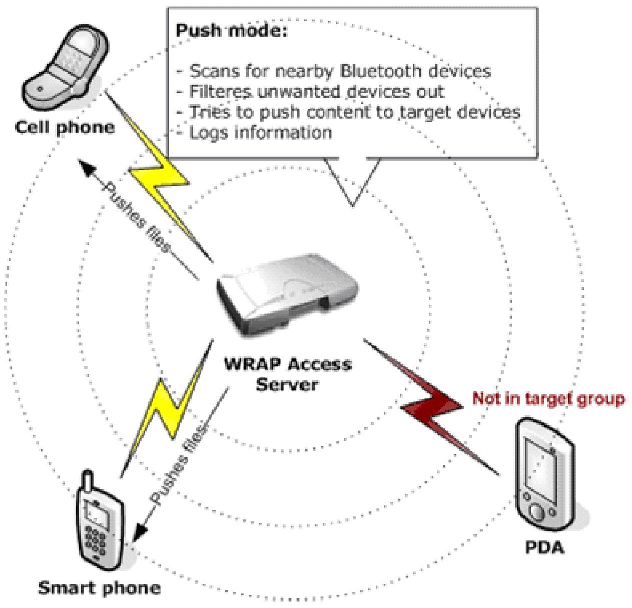


Figure 5-2. ObexSender Use Case: Content Push

5.2.2. Content Pull

ObexSender can also be configured into a content pull mode. In this mode, the transaction is initiated by the user. The user can send any file to the server or alternatively a file containing some specific string such as "MP3" or "NOKIA N73". The server parses the received file and as a response pushes a corresponding file to the user if such exists.

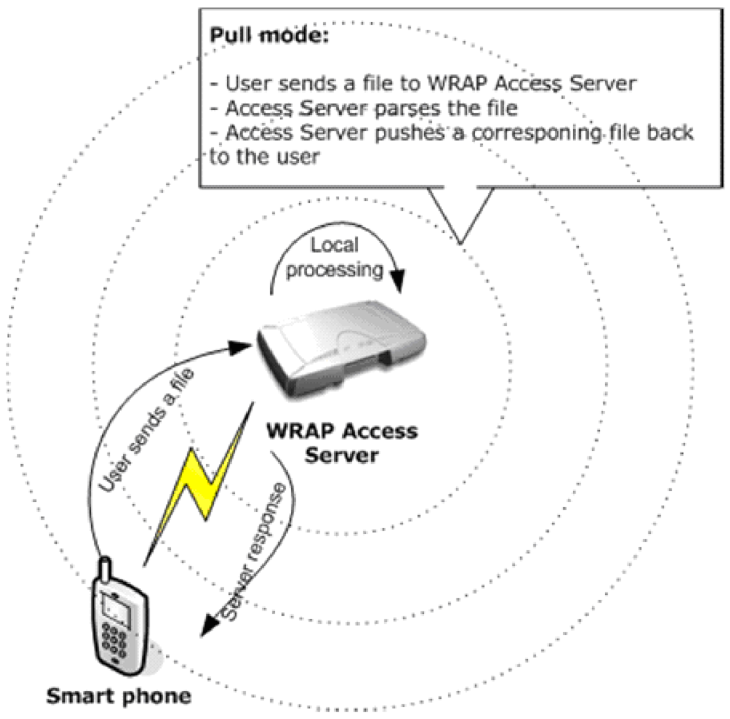

Pull mode:
- User sends a file to WRAP Access Server
- Access Server parses the file
- Access Server pushes a corresponing file back to the user
Local processing
WRAP Access Server
User sends a file
Server response
Smart phone

Figure 5-3. ObexSender Use Case: Content Pull

5.3. Configuration

This chapter contains basic ObexSender configuration instructions. The easiest and fastest way to configure ObexSender is through the WWW setup. For instructions about finding Access Server's IP address and using the WWW setup interface, see Section 2.2.

For details and default values of ObexSender configuration, please study the help texts in WWW Setup interface (also in Section B.4.2) and the ObexSender configuration file, which can be viewed and edited at Setup ⟶ Applications ⟶ ObexSender settings ⟶ Edit configuration file.

> **Note:** ObexSender will exit at startup by default, as it is not configured to do anything (there are no active send or reply rules in the default configuration).

5.3.1. Uploading Files

ObexSender needs content (files) to be send for users. These can easily be uploaded by navigating to Setup ⟶ Applications ⟶ ObexSender settings ⟶ Upload a new file. All you need to do is browse for the file you want to upload and click Upload. You will see a confirmation note, for example *"File /usr/local/obexsender/files/pic.jpg uploaded"* .

At the moment, you can only upload to `/usr/local/obexsender/files` directory from ObexSender main menu. If you would like to upload to another directory, you can do it from Setup ⟶ Advanced settings ⟶ Browse all files menu.

You can also use secure FTP to transfer files (normal FTP is disabled by default in Access Server for security reasons). For example WinSCP, available from http://www.winscp.org, is a good application for secure FTP file transmissions.

5.3.2. Configuring Content Rules

Specifying the content (files) to be sent by ObexSender is done by adding **send** and **reply** directives to ObexSender configuration file `/etc/obexsender.conf`. The file is editable at Setup ⟶ Applications ⟶ ObexSender settings ⟶ Edit configuration file and also contains usage examples of both directives.

5.3.3. How to Store Files Sent to Access Server

By default, all files sent over Object Push to Access Server are stored to the `/tmp/obex` directory and deleted after they have been processed. It is however possible to save a copy of the file to another directory before it is deleted. This is configured by adding the *`--fork`* with **cp** command to the Optional parameters for server setting in Setup ⟶ iWRAP Settings ⟶ Bluetooth profiles ⟶ Object push profile settings menu, following the example of parameters below:

```
--bdaddr $b --prefix $b-$P- --fork '/bin/cp $$t /tmp/$$p$$d-$$T'
```

Now, after reboot, all incoming files are copied to `/tmp` directory. The format of the files is `bdaddr-btserverport-timestamp-filename.ext`.

5.4. Monitoring ObexSender

ObexSender logs its operation using syslog or to a specified log file (configurable via WWW setup).

When you choose View log in the ObexSender menu, you can only see the summary of ObexSender action, i.e how many successes, failures and retries have occurred. When you select the date or Total in the summary view, you will see more details. You will see to which Bluetooth address the content was sent and if the transmission was a failure or success, or if transmission will be retried later.

5.5. Bluetooth Device Database

ObexSender uses special Bluetooth device database for recognizing Bluetooth devices. If you find devices that are not identified properly, please send output of command Setup ⟶ Applications ⟶ ObexSender settings ⟶ Inquiry and calculate hash to <`support@bluegiga.com`> together with detailed information, or at least the exact model of device identified with its Bluetooth address and friendly name, of devices found with that command, but improperly identified by ObexSender. Bluegiga Technologies will then provide you with the latest Bluetooth device database.

Chapter 6. Software Development Kit

6.1. Introduction to SDK

This chapter describes how to create and use applications by using Access Server's Software Development Kit.

The software running in Access Server can be divided to following categories:

1. Linux kernel and boot loader.
2. Bluegiga Access Server kernel device drivers (led, io, bbreset).
3. Bluegiga iWRAP Bluetooth stack, profiles (SPP, PAN, ObjP, FTP) and applications (for example ObexSender, connector and btcli).
4. Bluegiga servers (for example finder, smsgw and wpkgd) and applications (for example setup and chkconfig).
5. GPLed applications (for example BusyBox, OpenSSH and bash).
6. Applications written with Software Development Kit.

6.2. Installing SDK

Note: The Software Development Kit can only be installed on a Personal Computer (PC) running the Linux operating system.

6.2.1. Access Server Software Development Kit System Requirements

The following hardware and software are required to run the Access Server Development Kit:

A PC with:

- CD-ROM drive
- i386 Linux operating system (SDK has been tested with Foobar Linux 5, RedHat Enterprise Linux 5, Fedora Core 6 and above; SuSE and Ubuntu (Feisty) are reported to work too). SDK has not been tested on x86_64 platform.

  `gcc`, `autoconf`, `make`, `bison`, `byacc`, `flex`, `gawk` and `ncurses` must be installed

  Devel libraries (especially `glibc-devel`, `zlib-devel`, `openssl-devel`, `e2fsprogs-devel`, `readline-devel` and `ncurses-devel`) must be installed
- 300MB of available hard disk space

An Ethernet connection to a Local Area Network (also connected to Access Server) is highly recommended.

Mount the Access Server SDK CD-ROM or ISO image, change the current working directory to where it is mounted, and run the **install** script. If the user running **install** does not have privileges to create the directory for the toolchain, normally `/usr/local/arm`, the install script prompts for root's password.

Example (user input is printed **like this**):

```
$ mount /dev/cdrom /mnt/cdrom
$ (or mount -o loop /path/to/sdk2.iso /mnt/cdrom)
$ cd /mnt/cdrom
$ sh install
```

During the installation, the system will prompt you with some questions (described below) regarding the components to install and the paths to install them to. If you are not familiar with Linux, just press **enter** to these questions to accept the default values. The default values are suitable for most users and systems.

6.2.2. Questions Asked by the Install Script

`Access Server toolchain directory` (default: `/usr/local/arm`)

This is the path where you want the Access Server Software Development tools (`arm-linux-gcc`, etc.) to be installed.

> **Note:** If you change this value, the Access Server tools and `libc` must be recompiled. The recompilation process is complicated and lengthy, and it can also fail, depending on your system. Recompilation is automatically done by the install script, if necessary.

`Development directory` (default: `[home_of_current_user]/asdk`)

This is the path where you want the Access Server Software Development Kit to be installed.

`Development directory owner` (default: *`[current_user]`*)

(Asked only if run as root.) This is the development directory owner's username.

> **Note:** If this is not the username of the developer for whom the Software Development Kit is being installed, the user will not have rights to use the development files and therefore can not develop any Access Server software.

`Install toolchain sources` (default: no - unless the tools directory was changed)

This value indicates whether the toolchain sources will be installed. The sources are only required if the Access Server tools directory was changed from the default target location in step 1.

`Compile image after installation` (default: yes)

If set to yes, the install script will compile the Access Server filesystem image to test that the installation was successful and that the Development Kit is working correctly.

6.3. Creating Applications

The fastest way to start developing Access Server applications is to study, change, and recompile the example files in the `asdk/examples` directory.

6.3.1. Application Examples

To demonstrate the software development features of Access Server, the Access Server Software Development Kit comes with several example applications.

6.3.1.1. Installing Examples

The compiled example files are located in WPK packets on the Access Server SDK tree in subdirectories of directory `asdk/examples`.

The examples can be manually uploaded and installed on Access Server by sending them to the `/tmp/obex` directory. The **wpkgd** server automatically installs them. Uploading can be done over Bluetooth, SCP, SFTP or WWW Setup ⟶ Advanced ⟶ Upload a software update (see Figure 2-14).

6.3.1.2. Running Examples

The examples, with their usage and purpose, are described in Table 6-1.

Example	Usage	Purpose
helloworld	**/usr/bin/helloworld**	The "Hello, world!" application.
serial	**/usr/bin/serial /dev/ttyAT1**	"Hello, world!" to the serial port. Notice that `/dev/ttyAT1` must be free (no WRAP SMS Gateway or Bluetooth Serial Port Profile is using it).
forkserver	**SET BLUETOOTH LISTEN 11 /usr/bin/forkserver**	This is the simplest Bluetooth RFCOMM server example. Use, for example, **btserver** as a client to test this example. This example waits for a full line from the client, echoes is back and then exits.
btlogger	**SET BLUETOOTH LISTEN 11 /usr/bin/btlogger /tmp/logfile**	This is a simple Bluetooth RFCOMM server example, which logs lines received from the connected client, and answers with "ACK". Use, for example, **btserver** as a client to test this example.
btserver	**/usr/bin/btserver -** for server mode (if no forkserver is running), **/usr/bin/btserver <bdaddr of btserver in server mode or forkserver> 11** for client mode	This is an advanced iWRAP client example, which can run both as an RFCOMM server, when it works as **forkserver**, or as a client, when it sends "YooHoo" to remote server, waits, displays the response, and quits).
ledtest	**/usr/bin/ledtest**	I/O: LED example.
m2n	**echo testmessage | /usr/bin/m2n**	This is a Machine-2-Network (M2N) example. For actual remote connection, **syslog** must be configured to log to a remote syslog server.

Example	Usage	Purpose
www	Browse to http://wrap-ip-address/example.html	Demonstration of the web server capabilities.
makesms	Browse to http://wrap-ip-address/send.html. Notice that this example assumes that WRAP SMS Gateway is up and running (see Section 3.5.3).	This example demonstrates WRAP SMS Gateway by sending SMS messages with it.
setup-helloworld	Install the generated WPK and navigate in WWW Setup	This example demonstrates how to add a new helloworld submenu to the WWW Setup, with two menu items that change the variables in `/etc/sysconfig/helloworld` file.
lottery	Install the generated WPK and uncomment **exec** example in `/etc/obexsender.conf`	This example demonstrates the how ObexSender responses can be generated from an application.

Table 6-1. Examples, Their Usage and Purpose

6.3.2. Creating a New Project

To start a new project, you must create a new subdirectory in your Development Kit's directory (`asdk/`) and add your application source files and `Makefile` to that directory.

A project skeleton can be automatically created by using the Access Server Project AppWizard. Just give the **make appwiz APP=dir/to/newapp** command in the Development Kit's top level directory (`asdk/`). A "hello world" example ANSI C project is then created.

To use C++ compiler, replace `$(do_link)` with `$(do_link_cc)` in `Makefile`.

The details of the compile process and variables you may need to modify before compiling your application, such as `CFLAGS`, `LDFLAGS` and `CXXFLAGS`, can be seen in file `asdk/Rules.mak`.

Now you have a new project waiting for coding. To compile the project, run **make** in the `asdk/dir/to/newapp` directory.

The build system also creates the installation packet (`hello-timestamp.wpk`), which can be transferred to the `/tmp/obex` directory of Access Server from where it is installed automatically.

6.3.3. Building from the Command Line

The Access Server Development Kit uses the ARM port of the GNU bintools and compilers to build applications. If you are not familiar with Linux development, use the method explained in the previous section instead of writing your own makefiles.

If you still want to use your own development environment, there are two minor issues to remember:

1. Tools are prefixed with **arm-linux-**, so for calling the **gcc** C-compiler, you must call **arm-linux-gcc**, and so on.

2. Tools are located in `/usr/local/arm/3.4.5/bin/` directory, which is not in PATH by default.

6.3.4. Transferring an Application to Access Server

To run an application on Access Server, it must first be transferred to it. There are several ways of doing this (see Section 2.3.3). The most convenient ways in conjunction with software development are discussed in the following subsections.

6.3.4.1. Transferring an Application Using SCP or SFTP

An SCP transfer is done with a single command. In the following example, `myapp` is transferred to the `/tmp` directory in Access Server:

```
$ scp myapp root@<wrap-ip-address>:/tmp
root@<wrap-ip-address>'s password: buffy (not echoed back)
/path/to/myapp/myapp  100%    20KB    20.0KB/s    00:00
$
```

An SFTP transfer is almost similar, but the command procedure resembles an FTP session (FTP can also be used if the FTP server is enabled):

```
$ sftp root@<wrap-ip-address>
Connecting to <wrap-ip-address>...
root@<wrap-ip-address>'s password: buffy (not echoed back)
sftp> cd /tmp
sftp> put myapp
Uploading myapp to /dev/shm/tmp/myapp
/path/to/myapp/myapp  100%    20KB    20.0KB/s    00:00
sftp> quit
$
```

6.3.4.2. Using SSHFS

With SSHFS, the Access Server filesystem can be securely mounted to be a part of the development host's filesystem.

To download and install SSHFS, visit http://fuse.sourceforge.net/sshfs.html. After installation you can mount the whole filesystem and copy the `myapp` application to the `/tmp` directory in Access Server by using the following commands:

```
$ mkdir mnt
$ sshfs root@<wrap-ip-address>: mnt
root@<wrap-ip-address>'s password: buffy (not echoed back)
$ cp myapp mnt/tmp
$ fusermount -u mnt
$
```

6.3.4.3. Transferring an Application Using Terminal Software

If your Access Server is not connected to a LAN, you can use terminal software of your choice to transfer data to Access Server.

Access Server contains an X/Y/Zmodem protocol application, which allows you to transfer data over the console using almost any terminal software available:

1. Connect your computer to the Access Server management UART using a cross-over serial cable, and start your terminal software (use settings: 115 200bps, 8 data bits, no parity, 1 stop bit).
2. Change your working directory to where you want to upload your application, and run the Xmodem application with your application name as a parameter.
3. Start Xmodem send from your terminal software.

Example 6-1. Transfering Files with Xmodem

```
[root@wrap /] cd /tmp
[root@wrap /tmp] rx testapp
rx: ready to receive testapp.
now start xmodem (checksum, not CRC) send from your terminal
[root@wrap /tmp]
```

If you want to save the application to `/usr/local/bin` (on the flash file system), you will have to replace **cd /tmp** with **cd /usr/local/bin** (and possibly create the directory, if it does not exist). To examine Access Server directory structure, please see Appendix A.

6.3.4.4. Using NFS Mount

To use NFS mount, have a NFS share prepared in your development PC and mount the directory by using command **mount -o nolock <dev-pc-ipaddress>:/nfsshare /mnt/nfs**. After this, you can access the share in directory `/mnt/nfs`.

When the share is not needed, unmount it with command **umount /mnt/nfs**

6.3.4.5. Using CIFS Mount

To use CIFS mount, have a CIFS share (for example a shared folder in Windows) available in you PC and `cifs-client.wpk` installed to Access Server. Mount the directory by using command **mount.cifs //ipaddr-of-pc/sharename /mnt/nfs -o username**. You will then be prompted for password for the username you specified. After entering correct password, you can access the share in directory `/mnt/nfs`.

When the share is not needed, unmount it with command **umount /mnt/nfs**

6.3.5. Running an Application Transferred to Access Server

To run the application you just transferred to Access Server, you need access to the Access Server console, either using terminal software connected to the Access Server management UART or using the SSH connection (log in as user **`root`** and the root password, which is **`buffy`** by default).

Having established a connection to Access Server, change the directory to where your application is located and change file permissions so that it can be executed, then run it.

Example 6-2. Running an Application

```
[root@wrap /] cd /tmp
[root@wrap /tmp] chmod 755 testapp
[root@wrap /tmp] ./testapp
```

6.3.6. Using GNU Project Debugger (GDB)

You can use GDB, the GNU Project debugger, to debug applications in Access Server. This requires that you install `gdbserver-*.wpk` package to Access Server. You can find it from SDK CD or from `asdk/arch/arm/gpl/gdbserver/` directory on your development PC.

To debug an application it has to be compiled with debugging options enabled and stripping disabled. This can be done by overriding the default `CFLAGS` variable. You can do this by modifying the `Makefile` for your project:

```
# Makefile

SDKBASE=/home/user/asdk
include $(SDKBASE)/Rules.mak

CFLAGS=-Wall -Os -ggdb -I$(SDKBASE)/include -L$(SDKBASE)/lib

ifdef SDKINSTALL
...
```

After you have compiled your application with these options and transferred it to Access Server, you can start debugging the application as follows:

1. Start **gdbserver** on Access Server. For example:

   ```
   gdbserver :6789 /tmp/hello
   ```

2. Start **arm-linux-gdb** on development PC. For example:

   ```
   /usr/local/arm/3.4.5/bin/arm-linux-gdb \
   -ex 'set solib-absolute-prefix /usr/local/arm/3.4.5/arm-linux' \
   -ex 'target extended-remote Access_Server_IP:6789' \
   hello
   ```

3. Run the application by using **continue** command.

You can also use Data Display Debugger (DDD), a graphical front-end to GDB. Start it as:

```
ddd --debugger "/usr/local/arm/3.4.5/bin/arm-linux-gdb \
-ex 'set solib-absolute-prefix /usr/local/arm/3.4.5/arm-linux' \
-ex 'target extended-remote Access_Server_IP:6789'" \
hello
```

6.3.7. Native SDK

It is also possible compile applications for Access Server using native toolchain. To use it, copy files `sdk.iso` and `sdkmount.wpk` from directory `lib` in the Access Server SDK CD-ROM (or ISO image) to the root directory of an USB memory dongle, and insert it to Access Server's USB port. (You can also use Compact Flash memory card for this purpose in similar manner). The native SDK is automatically mounted and you can start using the compiler (**gcc**) in Access Server. All tools now available can be found in directory `/usr/sdk/bin`.

Chapter 7. iWRAP - The Bluetooth API

The Bluetooth service in Access Server is controlled via a TCP socket interface, called iWRAP. The first iWRAP server is listening on port 10101. In case of Access Server 2293, the second iWRAP server is listening on port 10102, and the third one is listening on port 10103. All commands to the iWRAP server and replies from the server are plain ASCII strings ending in CR+LF ("\r\n"). Commands and replies are not case sensitive.

When connecting to iWRAP, you must first wait for the `READY.` prompt. Do not send any commands prior to this.

By default the connection to iWRAP is protected by a password. The default password is **`buffy`**. The password can be disabled or changed. For more information, see SET command. If the password is enabled, it must be sent first, immediately following the `READY.` prompt. Otherwise all commands will fail with an error code.

Some replies are broadcasted to all clients by the iWRAP server. If you see something that you have not requested or the reply is not intended to you, simply ignore the reply.

In the following examples, **`bold lines`** are commands sent by the client to the iWRAP server and `normal lines` are replies received from the iWRAP server by the client.

7.1. Terms

Bluetooth address (bdaddr) consists of six hex digits separated by a colon. For example, "00:07:80:80:bf:01". With commands requiring a Bluetooth address, you can also use the Bluetooth friendly name instead.

Bluetooth RFCOMM channels are numbered from 1 to 30. In Access Server, Serial Port Profile is assigned to channel number two, Object Push Profile and File Transfer Profile to channel number three, and LAN Access Profile is on channel number four. The other channels are free for user applications.

Link Identifier (link_id) is a number from 0 to 99. It is used to identify established Bluetooth connections.

7.2. Starting iWRAP

Normally, the iWRAP servers are started automatically upon power-up. You can restart them manually (for example, to apply changes made to the iWRAP settings with the **setup** application without rebooting the system). To restart the servers manually, execute the startup script with option **restart**:

```
[root@wrap /] service bluetooth restart
```

When the iWRAP servers start up, they use settings configured with the **setup** application. You can put additional iWRAP commands to `/etc/bluetooth.conf` file. Commands in that file are processed as the last task every time the iWRAP server is started.

7.3. Writing iWRAP Applications

There are two approaches when writing a iWRAP server program (a program accepting incoming calls) for Access Server, both having different pros and cons:

1. Forklistener
2. iWRAP Client

Note: When writing a client program (that is, a program making an outgoing call), you have to use iWRAP.

7.3.1. Forklistener

This is a standard program reading data from standard input and writing output to standard output. See the SDK directory `examples/forkserver/` for an example of this kind of program.

Pros:

- Easy to write.
- Very robust for simple services.
- You do not have to understand Bluetooth or iWRAP.

Cons:

- Your program is started and stopped for every incoming connection.
- If there are multiple connections, it is not possible to communicate to an external program through one socket.
- You cannot use stdout for debugging; you must use syslog or a log file.
- iWRAP's advanced features are not available: powermodes, MSC, SDP, inquiry, ...

To setup a forklistener, see the **SET** command.

7.3.2. iWRAP Client

iWRAP client is a program communicating with the iWRAP server through control and data sockets. See the SDK directory `examples/btserver/` for an example of this kind of program.

Pros:

- The cons with forklistener do not apply.

Cons:

- More complex than forklistener.
- You must have basic knowledge about Bluetooth and iWRAP.
- If you have multiple iWRAP clients (which is usually the case), some kind of IPC is usually needed. For example, if client #1 uses CALL command, client #2 may not do the same before client #1 receives RINGING reply. The easiest way to do this is to use LOCK command.

7.4. btcli - iWRAP Command Line Interface Utility

You can send iWRAP commands from the command line by using the **btcli** application.

Usage:

```
btcli [options] command
```

To see the command options, enter the **btcli --help** command.

The specified command is sent to iWRAP server (the first server at port 10101 by default) and all replies are echoed to the standard output. The application waits and prints the replies for a certain amount of time (6 seconds by default) and exits.

7.5. iWRAP Commands

INFO

`INFO` — Get basic info

Synopsis

INFO

Description

INFO is used to retrieve version information on the iWRAP server, in the same format as presented by the `READY.` prompt when the iWRAP connection is opened.

Reply

```
READY. (wrap-2-1-0 $Revision: 1.28 $ bt1.2)
```

QUIT

`QUIT` — Close iWRAP connection

Synopsis

QUIT

Description

To close the connection to the iWRAP server, use the **QUIT** command.

Reply

There is no reply.

Example

```
READY.
QUIT
```

SET

`SET` — Change parameters

Synopsis

SET [variable [value]]

Description

The **SET** command allows you to alter various Bluetooth and iWRAP parameters. The supported variables are listed in Table 7-1. Issuing a **SET** command without parameters lists the current settings.

Variable	Description
BLUETOOTH BDADDR bdaddr	Our bdaddr. This is a read-only value.
BLUETOOTH NAME friendly_name	You can set your Bluetooth friendly name with this command. Others can request this name with the **NAME** command. You can use the following meta characters: **$S**: Hardware serial number, all ten digits **$s**: Hardware serial number, last three digits **$P**: iWRAP port **$p**: last digit of iWRAP port **$H**: FQDN **$h**: hostname **$b**: our Bluetooth address, last two digits **$B**: our Bluetooth address **$$**: $ The default value is **$S_$p**.
BLUETOOTH READABLE mode	If enabled, some SDP result codes will have literal values instead of numeric values. 0: No (always use numeric values) 1: Yes (literal values)

Variable	**Description**
BLUETOOTH CLASS value	You can set the class-of-device value with this command.
BLUETOOTH ROLE role {policy {timeout}}	You can set the master/slave role switch preference with this command. Optionally, you can also set the link policy and link supervision timeout. The possible values for "role" are: **0**: allow when calling, do not request when answering **1**: allow when calling, request when answering **2**: do not allow when calling, request when answering The default link policy is 000f and the default link supervision timeout is 7d00. See *Bluetooth Specification* for more information on these parameters.
BLUETOOTH ENCRYPT value	This command defines whether to use Bluetooth encryption. To actually enable Bluetooth encryption, the connection must be authenticated. 0: No 1: Yes
BLUETOOTH LAP value	You can set the IAC LAP value with this command. The default value is 9e8b33

Variable	Description
BLUETOOTH PAGEMODE mode {page_timeout {page_repetition_mode {scan_activity_interval scan_activity_window {inquiry_activity_interval inquiry_activity_window}}}}	Pagemode defines whether other devices can find and call you. There are four different modes: 0: No inquiry, no paging 1: Inquiry, no paging 2: No inquiry, paging 3: Inquiry and paging The page timeout is given in hex and the default value is 2000. The default page repetition mode is 2 (R2). The default scan activity is interval 0800 and window 0012 (R1). The default inquiry activity is interval 0800 and window 0012 (R1). See the *Bluetooth Specification* for more information on these parameters.
BLUETOOTH AUTOHIDE physical logical	This command automatically hides the baseband (sets pagemode to 0) if there are more physical ACL links or logical connections than defined. Value 0 means "don't care". Default values: 7 0
BLUETOOTH AUTH * {authflags}	This command removes the default PIN code. If you are making an outgoing connection and the remote end asks for the PIN, "1234" will be sent.
BLUETOOTH AUTH * pin {authflags}	This command sets the default PIN code.
BLUETOOTH AUTH bdaddr {authflags}	This command removes the PIN code for bdaddr.

Variable	**Description**
BLUETOOTH AUTH bdaddr pin {authflags}	This command sets the PIN code for bdaddr. Authflags are: **--NEWPAIR** Only if we do not have linkkey yet **--REQUEST** Request this PIN from remote, do not reply with this one **--REPLY** Reply to remote requests with this PIN **--CALL** Only if making an outgoing call **--ANSWER** Only when answering to an incoming call **--RFCOMM** Call type is RFCOMM (includes FORK/PPP/...) **--BNEP** Call type is BNEP **--L2CAP** Call type is L2CAP Default authflags are all enabled, except for **--NEWPAIR**. There are three special PINs: **-** Reject without asking PIN. **--** Reject on the connection open, do not check for call types. **+** Accept without asking PIN.
BLUETOOTH PAIR bdaddr linkkey	With this command, you can manually set the linkkey for bdaddr. Note: **SET BLUETOOTH AUTH** must also be set for a value to enable encrypted connections with previously stored link keys.
BLUETOOTH PAIR bdaddr	With this command, you can manually delete the linkkey for bdaddr.
BLUETOOTH PAIREXPIRE seconds	With this command, you can set the expiration time, in seconds, for pairing information.

Variable	**Description**
BLUETOOTH LISTEN channel cmd {mem {delay}}	This command adds a fork-listener for the channel. When there is an incoming RFCOMM connection to the channel, the iWRAP server handles the connection by itself by forking "cmd". At least "mem" kilobytes of free memory must be available, or the connection will be rejected. After forking, the iWRAP server waits for "delay" timerticks (50ms) before transmitting any data. The client application must modify both the stdout and stdin pipes and set NOECHO, 8BIT and all other necessary modes at the very beginning. The purpose of the "delay" parameter is to give the application enough time to do this. You can use following meta characters in "cmd": **$b**: Bluetooth address. **$c**: RFCOMM channel **$d**: 1 if CALL, 0 if RING **$P**: iWRAP port **$C**: link_id **$$**: $
BLUETOOTH LISTEN channel host:port	This command adds a forward-listener for the channel. When there is an incoming RFCOMM connection to the channel, the iWRAP server will forward it to host:port by using a raw TCP socket.
BLUETOOTH LISTEN psm L2CAP	This command adds an L2CAP listener for the psm.
BLUETOOTH LISTEN psm L2CAP:host:port	This command adds a forward-listener for the psm. When there is an incoming L2CAP connection to the psm, the iWRAP server will forward it to host:port by using a raw TCP socket.
BLUETOOTH LISTEN channel	This command removes a fork/forward/L2CAP listener from the channel/psm.

Variable	Description
BLUETOOTH LINK mode params	With this command, you can modify the slave's powermode according to the "mode". "params" are optional and mode-dependent. The possible values for "mode" are: 0: Active. Params: None. 1: Park: Round-robin. Params: max_beacon min_beacon sleep_after_unpark sleep_after_round Defaults: 254 160 5 30 Sleeps are specified by timerticks (50ms). 2: Park: Idle. Params: max_beacon min_beacon max_active Defaults: 512 384 6 max_active is the maximum number of active slaves. 3: Sniff: All. Params: max_interval min_interval attempt timeout Defaults: 640 426 1 8 4: Sniff: Idle. Params: idle_timeout max_interval min_interval attempt timeout Defaults: 400 640 426 1 8 idle_timeout is in timerticks (50ms). See *Bluetooth Specification* for more information on params.

Variable	**Description**
BLUETOOTH QOS service_type token_rate peak_bandwidth latency delay_variation	This command sets default QoS values for a new connection. The parameters are in hex. See *Bluetooth Specification* for more information on params. Defaults: 01 00000000 00000000 000061a8 ffffffff
L2CAP TIMEOUT flushto linkto	With this command, you can define the FlushTimeout and LinkTimeout for L2CAP connections. See *Bluetooth Specification* for more information on params. Defaults: 65535 40000
PPP AUTH	Do not require any PPP authentication on incoming connections.
PPP AUTH username password	Require specified username:password on incoming PPP connections.
PPP CHANNEL channel	Our PPP (LAN Access Profile) channel. The iWRAP server handles this channel internally. If you change this, remember to modify the SDP record as well. Use zero value to disable the LAN Access Profile.
PPP DEFAULTROUTE value	This setting controls whether the iWRAP server should modify the defaultroute setting. There are four different modes: 0: Do no alter defaultroute 1: Set defaultroute according to the outgoing PPP 2: Set defaultroute according to the incoming PPP 3: Set defaultroute according to all PPP calls
PPP WINHANDSHAKE seconds	Timeout to wait for the Windows RAS handshake.
PPP IP ipaddr/mask	This command sets the network IP range for PPP clients.

Variable	**Description**
PAN ENABLE bitmap	This command controls incoming PAN connections. Bitmap: **1**: Allow incoming PAN-PANU connections. **2**: Allow incoming PAN-GN connections. **4**: Allow incoming PAN-NAP connections. **8**: Enable zeroconf for incoming PAN-PANU connections. **16**: Enable zeroconf for outgoing PAN-PANU connections. Defaults: 0
CONTROL AUTOEXEC cmd	Run the **CALL** command, and rerun it when the call is disconnected. Example: **SET CONTROL AUTOEXEC CALL bdaddr PAN-NAP PAN-NAP**
CONTROL PASSWORD	Do not require a password from iWRAP clients.
CONTROL PASSWORD pass {--LOCAL}	Enable password. iWRAP clients must send this password before giving any other command. The password is case sensitive. With an optional **--LOCAL** parameter, clients connecting from localhost are accepted without a password.
CONTROL PING seconds	If this setting is enabled (seconds > 0), the iWRAP server sends a `PING` reply to all iWRAP clients. You have to reply to it with **PONG** or the connection will be closed.
CONTROL WRITETIMEOUT timeticks	With this command, you can set in timeticks (1/20s) how long iWRAP tries to write to the datasocket if it's blocked before giving up and closing the connections.
CONTROL AUTOSAVE what filename	If this setting is enabled, the system automatically saves settings to a file when they change. See the **SAVE** command for possible "what" values.
link_id MSC value	Set MSC for link_id to value. See *ETSI TS 101 369 (GSM 07.10)* for more information.
link_id ACTIVE	With this command, you can set the powermode for a link_id to active.

Variable	Description
link_id PARK params	With this command, you can set the powermode for link_id park. Required "params" are: avg_beacon or max_beacon min_beacon See *Bluetooth Specification* for more information on params.
link_id HOLD params	With this command, you can set the link's powermode to hold. Required "params" are: avg max min See *Bluetooth Specification* for more information on params.
link_id SNIFF params	With this command, you can set the powermode for a link_id to sniff. Required "params" are: avg_interval or max_interval min_interval or max_interval min_interval attempt or max_interval min_interval attempt timeout The default attempt is 1, the default timeout is 8. See *Bluetooth Specification* for more information on params.
link_id QOS service_type token_rate peak_bandwidth latency delay_variation	With this command, you can set the link's QoS values. The parameters are in hex. See *Bluetooth Specification* for more information on params.
link_id MASTER	With this command, you can switch the role to master.
link_id SLAVE	With this command, you can switch the role to slave.

Table 7-1. Supported Parameters for iWRAP SET Command

Reply

When there are parameters, there is no reply.

Example

```
READY.
SET BLUETOOTH NAME Buffy
SET BLUETOOTH PAGEMODE 3
SET BLUETOOTH READABLE 1
SET BLUETOOTH CLASS 020300
SET BLUETOOTH ROLE 0
SET BLUETOOTH ENCRYPT 0
SET BLUETOOTH PAGEMODE 3
SET BLUETOOTH AUTH * 1234
SET BLUETOOTH AUTH 00:07:80:80:bf:01 4242
SET BLUETOOTH AUTH *
SET BLUETOOTH PAIREXPIRE 600
SET BLUETOOTH LISTEN 1 /bin/login 200
SET BLUETOOTH LISTEN 2 "my/own/command with parameters" 100 5
SET BLUETOOTH LISTEN 3
SET PPP DEFAULTROUTE 0
SET PPP AUTH buffy willow
SET PPP AUTH
SET PPP CHANNEL 4
SET PPP WINHANDSHAKE 10
SET PPP IP 192.168.166.0/24

SET 0 MSC 8d

SET CONTROL PING 60
PING
PONG

SET CONTROL PASSWORD

SET CONTROL PASSWORD buffy
<client reconnects>
READY.
SET
ERROR PASSWORD NEEDED.
<client reconnects>
READY.
buffy
SET
SET BLUETOOTH BDADDR 00:07:80:80:bf:01
SET BLUETOOTH NAME Buffy
SET PPP AUTH
SET CONTROL PASSWORD buffy
SET
```

SAVE

`SAVE` — Save iWRAP settings

Synopsis

SAVE {what} {filename}

Description

The **SAVE** command writes the current settings to a file.

What	Settings
AUTH	SET BLUETOOTH AUTH ...
PAIR	SET BLUETOOTH PAIR ...
BTSET	SET BLUETOOTH ..., but not AUTH or PAIR
OTHERSET	All but SET BLUETOOTH
ALL	Everything

Table 7-1. SAVE parameters

Reply

There is no reply.

Example

```
READY.
SAVE PAIR /etc/bluetooth.pair
SAVE AUTH,PAIR /etc/bluetooth.security
```

LOAD

`LOAD` — Run iWRAP command script

Synopsis

LOAD {filename}

Description

The **LOAD** command runs commands from a file. This command is usually used with **SAVE** or **SET CONTROL AUTOSAVE** commands.

Reply

There is no reply.

Example

```
READY.
LOAD /etc/bluetooth.security
SET CONTROL AUTOSAVE AUTH,PAIR /etc/bluetooth.security
```

PING

`PING` — Ask if the connection is alive

Synopsis

PING

Description

The **PING** command can be used to check that the connection to the iWRAP server is alive.

The iWRAP can also send the `PING` to the client application. In that case, you must reply with the **PONG** command.

Reply

```
PONG
```

Example

```
READY.
PING
PONG

PING
PONG
```

PONG

`PONG` — Connection is alive

Synopsis

PONG

Description

The **PONG** command has to be sent back if you see a `PING` reply from the server. If you do not answer, the connection will be closed after a few seconds.

Reply

There is no reply.

Example

```
READY.
PING
PONG
```

ECHO

`ECHO` — Send a message to other iWRAP clients

Synopsis

ECHO {data}

Description

This command broadcasts its parameters to all iWRAP connections, including the one that sent the command.

Reply

```
ECHO data
```

Example

```
READY.
ECHO Hello world!
ECHO Hello world!
```

LOCK

`LOCK` — Lock other iWRAP clients

Synopsis

LOCK

Description

This command locks all other iWRAP connections, allowing commands only from this one. This includes all the **PING**s and **PONG**s too. Be polite and do not lock it for a long time.

Reply

There is no reply.

Example

```
READY.
LOCK
UNLOCK
```

UNLOCK

`UNLOCK` — Unlock other iWRAP clients

Synopsis

UNLOCK

Description

This command opens the lock created by using the **LOCK** command.

Reply

There is no reply.

Example

```
READY.
LOCK
UNLOCK
```

SHUTDOWN

`SHUTDOWN` — Close iWRAP server

Synopsis

SHUTDOWN

Description

To close the iWRAP server, you can use the **SHUTDOWN** command. This also immediately closes all active connections.

Reply

There is no reply.

Example

```
READY.
SHUTDOWN
```

SLEEP

`SLEEP` — Wait a second

Synopsis

SLEEP {seconds}

Description

The **SLEEP** command waits for a specified number of seconds before processing further commands.

SLEEP is only usable in rc scripts (`/etc/bluetooth.conf`).

Reply

There is no reply.

Example

```
READY.
SLEEP 4
```

LOG

`LOG` — Control iWRAP logging

Synopsis

LOG {mask} [target]

Description

To control iWRAP logging, you can use **LOG** command. The required parameter *`mask`* is a decimal number specifying which message categories are logged. The value is a sum of bitmasks, described in Table 7-1.

Bitmask	Description
0x00	Log nothing.
0x01	Enable logging of iWRAP connection related events (**READY**, **CALL**, **CONNECT**, **RING**, **NO CARRIER**) and fatal errors. This is the default.
0x02	Enable logging of all iWRAP commands and events.
0x04	Enable logging of iWRAP debugging messages.

Table 7-1. Log bitmask descriptions

The optional *`target`* parameter controls where the log messages are written. Possible targets are described in Table 7-2.

Text	Description
syslog	Log using syslog. This is the default.
stdout	Log to standard output, which is the console where the Bluetooth service was last started. After boot, this is the management console.
iWRAP	Log to iWRAP connection.
/path/to/file	Log to the file specified.

Table 7-2. Log target options

Reply

There is no reply.

Example

```
READY.
LOG 0
LOG 1 syslog
LOG 1 stdout
LOG 2 iWRAP
LOG 7 /tmp/everything.log
```

7.6. Finding Bluetooth Devices

INQUIRY

`INQUIRY` — Search for other devices

Synopsis

INQUIRY [timeout] [LAP {lap}]

Description

INQUIRY command is used to search for other Bluetooth devices. The optional timeout number parameter defines the length of inquiry, in units of 1.25 seconds. The default timeout is 4 units, which is a good average value for all cases. The minimum timeout is 2 and the maximum is 10. The optional **LAP** option specifies the used IAC LAP; the default value is 9e8b33 (GIAC).

During the inquiry, all devices are listed as soon as they are found by using `INQUIRY_PARTIAL` reply. If iWRAP server has cached the friendly name of the device found, it is also displayed. When the inquiry ends, a summary is displayed indicating how many devices were found. The summary also repeats the device information.

Reply

```
INQUIRY_PARTIAL bdaddr_of_dev_1 class_of_dev_1 "friendly name" rssi
INQUIRY_PARTIAL bdaddr_of_dev_2 class_of_dev_2 "friendly name" rssi
...
INQUIRY_PARTIAL bdaddr_of_dev_n class_of_dev_n "friendly name" rssi
INQUIRY number_of_devices_found
INQUIRY bdaddr_of_dev_1 class_of_dev_1 "friendly name"
INQUIRY bdaddr_of_dev_2 class_of_dev_2 "friendly name"
...
INQUIRY bdaddr_of_dev_n class_of_dev_n "friendly name"
```

Example

```
READY.
INQUIRY
INQUIRY 0

INQUIRY
INQUIRY_PARTIAL 00:07:80:80:bf:01 120300 "willow" -42
INQUIRY_PARTIAL 00:07:80:80:bf:02 520204 "" -66
INQUIRY 2
INQUIRY 00:07:80:80:bf:01 120300 "willow"
INQUIRY 00:07:80:80:bf:02 520204 ""
```

NAME

`NAME` — Find a friendly name

Synopsis

NAME {bdaddr}

Description

You can ask for the friendly name of another Bluetooth device with the **NAME** command.

Reply

```
NAME bdaddr "friendly name"
NAME ERROR bdaddr reason_code more_info
```

Example

```
READY.
NAME 00:07:80:80:bf:02
NAME 00:07:80:80:bf:02 "buffy"
NAME 00:07:80:80:bf:01
NAME ERROR 00:07:80:80:bf:01 108 HCI_ERR_PAGE_TIMEOUT
```

7.7. Bluetooth Connections

CALL

`CALL` — Connect to other device

Synopsis

CALL {bdaddr} SDP
CALL {bdaddr} {psm} L2CAP
CALL {bdaddr} {channel} RFCOMM
CALL {bdaddr} {uuid} RFCOMM
CALL {bdaddr} {channel} PPP [username password]
CALL {bdaddr} {uuid} PPP [username password]
CALL {bdaddr} {channel} WINPPP [username password]
CALL {bdaddr} {uuid} WINPPP [username password]
CALL {bdaddr} {channel} FORK {"/full/path/to/command and parameters"}
CALL {bdaddr} {uuid} FORK {"/full/path/to/command and parameters"}
CALL {bdaddr} {channel} FORK {host:port}
CALL {bdaddr} {uuid} FORK {host:port}
CALL {bdaddr} {PAN-destUUID} [PAN-srcUUID]

Description

The **CALL** command is used to make a connection to other Bluetooth devices. It returns the link identifier (with an immediate reply), which will be used in subsequent commands and replies.

> **Note:** Always check for a correct link_id before processing replies further.

You can use the special **FORK** call type to create an RFCOMM connection and automatically launch an application, which gets the RFCOMM connection bound to its standard input and output. The client application should modify both the stdout and stdin pipes and set NOECHO, 8BIT and all other necessary modes at the very beginning.

> **Note:** There can only be one pending **CALL** at a time. You have to wait for the `RINGING` event before issuing another CALL. The `RINGING` event comes almost immediately after the **CALL**. You get the `ERROR 008` error if you try to establish another call too quickly. In that case, wait for some tens of milliseconds and retry. Receiving the `CONNECT` or `NO CARRIER` reply may take some time, for example, when the user is keying in the PIN code.
> **Note:** PPP is "raw" PPP without any special handshaking. WINPPP is a Windows RAS handshake followed by raw PPP. If you are unsure, use WINPPP.

Reply

```
CALL link_id
RINGING link_id
```

Example

```
READY.
CALL 00:07:80:80:bf:01 SDP
CALL 0
RINGING 0
CONNECT 0 SDP

CALL 00:07:80:80:bf:01 4 PPP
CALL 1
RINGING 1
CONNECT 1 PPP

CALL NameOfOtherDevice LAN PPP
CALL 1
RINGING 1
CONNECT 1 PPP

CALL 00:07:80:80:bf:02 4 WINPPP buffy willow
CALL 2
RINGING 2
CONNECT 2 PPP

CALL 00:07:80:80:bf:01 1 RFCOMM
CALL 3
RINGING 3
CONNECT 3 RFCOMM 1042

CALL 00:07:80:80:bf:01 2 FORK /bin/login
CALL 4
RINGING 4
CONNECT 4 FORK

CALL 00:07:80:80:bf:01 PAN-NAP
CALL 5
RINGING 5
CONNECT 5 PAN-NAP

CALL 00:07:80:80:bf:02 PAN-NAP PAN-NAP
CALL 6
RINGING 6
CONNECT 6 PAN-NAP

CALL 00:07:80:80:bf:02 2 FORK 127.0.0.1:23
CALL 7
RINGING 7
CONNECT 7 FORK
```

CONNECT

`CONNECT` — Connected to other device

Synopsis

This is not a command.

Description

`CONNECT` is not a command, but rather a reply broadcast to you when **CALL** successfully establishes the connection. Remember to check that the link_id matches your **CALL**.

On RFCOMM/L2CAP connections, there is an additional parameter called port. Port refers to the TCP socket port number, which is used to send and receive data to and from the remote device. Connect to the port just like you connected to the iWRAP server. The connection is "raw", which means that no processing of incoming or outgoing data is made.

> **Note:** In the case of L2CAP connections, the data is handled as packets. Therefore, both the incoming and outgoing data must follow the "HDR+L2CAPDATA" format, where HDR is two bytes; first the low byte, and then the high byte of the L2CAPDATA packet length. L2CAPDATA contains the actual L2CAP packet.

Reply

```
CONNECT link_id SDP
CONNECT link_id RFCOMM port
CONNECT link_id L2CAP port
CONNECT link_id PPP
CONNECT link_id FORK
CONNECT link_id PAN-PANU
CONNECT link_id PAN-GN
CONNECT link_id PAN-NAP
```

Example

```
READY.
CALL 00:07:80:80:bf:01 SDP
CALL 0
RINGING 0
CONNECT 0 SDP

CALL 00:07:80:80:bf:01 LAN PPP
CALL 1
RINGING 1
CONNECT 1 PPP

CALL 00:07:80:80:bf:01 1 RFCOMM
CALL 2
RINGING 2
CONNECT 2 RFCOMM 1042
<Client can open socket connection to port 1042>
```

```
CALL 00:07:80:80:bf:01 2 FORK /bin/login
CALL 3
RINGING 3
CONNECT 3 FORK

CALL 00:07:80:80:bf:01 PAN-NAP
CALL 5
RINGING 5
CONNECT 5 PAN-NAP

CALL 00:07:80:80:bf:02 PAN-NAP PAN-NAP
CALL 6
RINGING 6
CONNECT 6 PAN-NAP
```

NO CARRIER

`NO CARRIER` — Disconnected from other device

Synopsis

This is not a command.

Description

The `NO CARRIER` reply indicates that you or the remote device closed the active connection, or that your **CALL** failed for some reason.

See Section 7.10 for the list of error codes. Field "more_info" is optional. If present, it gives you a human readable error code or some statistics about the closed connection.

Reply

```
NO CARRIER link_id ERROR reason
NO CARRIER link_id
```

Example

```
READY.
CALL 00:07:80:80:bf:01 4 PPP
CALL 0
RINGING 0
NO CARRIER 0 ERROR 104 HCI_ERR_PAGE_TIMEOUT

CALL 00:07:80:80:bf:01 1 RFCOMM
CALL 1
RINGING 0
CONNECT 1 RFCOMM 1042
NO CARRIER 1 ERROR 000 IN=42,OUT=66,ELAPSED=69
```

RING

`RING` — Another device is calling you

Synopsis

This is not a command.

Description

The `RING` reply indicates an incoming call from a remote device. As with `CONNECT`, on RFCOMM/L2CAP calls there is an additional "port" parameter. Open a socket to the port, if you want to serve this call. PPP and PAN calls are handled internally, which means that you do not have to do anything on them. The iWRAP server closes the connection if nobody grabs the call within 30 seconds.

Special call type REJECTED is used for information only. It is used if somebody tried to call you but was rejected, usually because of failing authentication.

Reply

```
RING link_id bdaddr channel PPP
RING link_id bdaddr channel RFCOMM port
RING link_id bdaddr psm L2CAP port
RING link_id bdaddr PAN-PANU
RING link_id bdaddr PAN-GN
RING link_id bdaddr PAN-NAP
RING link_id bdaddr REJECTED
```

Example

```
READY.
RING 0 00:07:80:80:bf:01 4 PPP

RING 1 00:07:80:80:bf:01 1 RFCOMM 1042
<Client can open socket connection to port 1042>

RING 2 00:07:80:80:bf:01 PAN-GN
```

RINGING

`RINGING` — Call in progress

Synopsis

This is not a command.

Description

The `RINGING` reply indicates that a previously initiated outgoing **CALL** is in the state where a new outgoing **CALL** can be made.

Reply

```
RINGING link_id
```

Example

```
READY.
CALL 1 00:07:80:80:bf:01 1 RFCOMM
<Making new CALL is not allowed but generates BUSY error>
CALL 1
<Making new CALL is not allowed but generates BUSY error>
RINGING 1
<Making new CALL is allowed>
CALL 2 00:07:80:80:bf:02 2 RFCOMM
<Making new CALL is not allowed but generates BUSY error>
CALL 2
<Making new CALL is not allowed but generates BUSY error>
RINGING 2
<Making new CALL is allowed>
CONNECT 1 RFCOMM 1042
<Client can open socket connection to port 1042>
CONNECT 2 RFCOMM 1043
<Client can open socket connection to port 1043>
```

CLOSE

`CLOSE` — Disconnect

Synopsis

CLOSE {link_id}

Description

The **CLOSE** command closes an active connection started with a `CONNECT` or `RING`. Note that closing the RFCOMM data socket connection also closes the Bluetooth connection.

Reply

There is no direct reply. `NO CARRIER` is replied when the connection actually closes.

Example

```
READY.
CALL 00:07:80:80:bf:01 4 PPP
CALL 1
RINGING 1
CONNECT 1 PPP
CLOSE 1
NO CARRIER 1 ERROR 000
```

LIST

LIST — List connections

Synopsis

LIST

Description

The **LIST** command reports active connections and some statistics.

Reply

```
LIST number_of_connections
LIST link_id status type blocksize bytes_in bytes_out elapsed_time our_msc
  remote_msc bdaddr channel direction powermode role crypt child_pid hcihandle
LIST link_id status type blocksize bytes_in bytes_out elapsed_time our_msc
  remote_msc bdaddr channel direction powermode role crypt child_pid hcihandle
...
LIST link_id status type blocksize bytes_in bytes_out elapsed_time our_msc
  remote_mscbdaddr channel direction powermode role crypt child_pid hcihandle
```

Reply Values

Status values are:

- WAITING. The iWRAP server is waiting for someone to connect to the datasocket created with the RFCOMM `CONNECT` or `RING` event.
- CONNECTED. The data connection is up and running.
- CLOSING. The datasocket has been closed, and the Bluetooth connection shutdown is in progress.

Type is SDP, RFCOMM, PPP, PAN-PANU, PAN-GN, PAN-NAP, FORK or L2CAP.

Blocksize is the maximum transfer unit of the Bluetooth link; used for statistics only.

Bytes_in and bytes_out refer to the numbers of bytes transferred.

Elapsed_time is the number of seconds the connection has been up.

Msc is the link's MSC value for both ends.

Bdaddr is the Bluetooth address of the connected device.

Channel is the service channel of the connection.

Direction is either OUTGOING or INCOMING.

Powermode is ACTIVE, SNIFF, PARK or HOLD.

Role is MASTER or SLAVE.

Crypt is PLAIN or ENCRYPTED.

Child_pid is the child process ID for types PPP and FORK. The PID is zero for others.

Hcihandle is the HCI handle for this connection.

Example

```
READY.
LIST
LIST 1
LIST 0 CONNECTED RFCOMM 666 4242 100 30 8d 8d 00:07:80:80:bf:01 4
  OUTGOING ACTIVE MASTER PLAIN 0 2a
```

RSSI

`RSSI` — Link's RSSI value

Synopsis

RSSI {link_id}

Description

The **RSSI** command reports link_id's RSSI value.

Reply

```
RSSI link_id rssi
```

Example

```
READY.
CALL 00:07:80:80:bf:01 1 RFCOMM
CALL 1
RINGING 1
CONNECT 1 RFCOMM 1234
RSSI 1
RSSI 1 -60
```

TXPOWER

`TXPOWER` — Link's transmit power

Synopsis

TXPOWER {link_id}

Description

The **TXPOWER** command reports link_id's transmit power.

Reply

```
TXPOWER link_id power
```

Example

```
READY.
CALL 00:07:80:80:bf:01 1 RFCOMM
CALL 1
RINGING 1
CONNECT 1 RFCOMM 1234
TXPOWER 1
TXPOWER 1 -3
```

BER

`BER` — Link's bit error rate

Synopsis

BER {link_id}

Description

The **BER** command reports link_id's bit error rate.

Reply

```
BER link_id ber
```

Example

```
READY.
CALL 00:07:80:80:bf:01 1 RFCOMM
CALL 1
RINGING 1
CONNECT 1 RFCOMM 1234
BER 1
BER 1 0.2600
```

CLOCK

`CLOCK` — Link’s piconet clock

Synopsis

CLOCK {link_id}

Description

The **CLOCK** command reports link_id’s piconet clock.

Reply

```
CLOCK link_id clock accuracy
```

Example

```
READY.
CALL 00:07:80:80:bf:01 1 RFCOMM
CALL 1
RINGING 1
CONNECT 1 RFCOMM 1234
CLOCK 1
CLOCK 1 0009fdd7 0001
```

STATUS

`STATUS` — Status of a connection

Synopsis

This is not a command.

Description

The `STATUS` reply is used to inform you about changes in connection status. See also the **SET** command.

Reply

```
STATUS link_id MSC value
```

Example

```
READY.
STATUS 0 MSC 8d
```

7.8. Service Discovery

This section describes the commands used for Bluetooth service discovery and local SDP record manipulation. The commands and their replies use SDP UUID and attribute values, which are listed in the Bluetooth Assigned Numbers documentation. In the commands below, the most useful UUID and attribute values can, however, be replaced with keywords listed in Table 7-5. The same keywords are used in the command replies instead of numeric values, if the parameter **SET BLUETOOTH READABLE** is set to **1**.

Keyword(s)	Hex Value
SDP	0001
RFCOMM	0003
OBEX	0008
BNEP	000F
L2CAP	0100
PUBLICBROWSEGROUP, BROWSE, ROOT	1002
SERIALPORT, SPP	1101
LANACCESS, LAN	1102
DIALUPNETWORKING, DUN	1103
OBEXOBJECTPUSH, OBJP, OPP	1105
OBEXFILETRANSFER, FTP	1106
PAN-PANU, PANU	1115
PAN-NAP, NAP	1116
PAN-GN, GN	1117
PNPINFORMATION, DI	1200
SERVICECLASSIDLIST, SERVICECLASS, CLASS	0001
PROTOCOLDESCRIPTORLIST, DESCLIST, DESC	0004
SERVICEAVAILABILITY	0008
SERVICENAME, NAME	0100
SERVICEDESCRIPTION, DESCRIPTION	0101
SECURITYDESCRIPTION	030A
NETACCESSTYPE	030B
MAXNETACCESSRATE	030C

Table 7-5. Supported Keywords for Replacing SDP UUIDs or Attributes

SDPSEARCH

`SDPSEARCH` — Browse SDP Records

Synopsis

SDPSEARCH {link_id} {uuid}

Description

The **SDPSEARCH** command is used to send a Service Search Request to a connected SDP server, identified with link_id. The command only supports searching for one UUID at a time (specified with the uuid parameter, 4 hex digits, or with a keyword), but several requests can be sent during the same SDP connection. However, you must wait for the reply to the previous reply before issuing a new **SDPSEARCH** command.

Reply

```
SDPSEARCH link_id number_of_handles
SDPSEARCH link_id handle_1
SDPSEARCH link_id handle_2
...
SDPSEARCH link_id handle_n
```

Example

```
READY.
CALL 00:07:80:80:bf:01 SDP
CALL 0
RINGING 0
CONNECT 0 SDP
SDPSEARCH 0 LANACCESS
SDPSEARCH 0 1
SDPSEARCH 0 00010000
CLOSE 0
NO CARRIER 0 ERROR 000
```

SDPATTR

`SDPATTR` — Browse SDP Records

Synopsis

SDPATTR {link_id} {handle} {attribute}

Description

The **SDPATTR** command is used to send a Service Attribute Request to a connected SDP server, identified with the link_id. The command supports requesting for one attribute value (specified with the attribute parameter, 4 hex digits, or a keyword) in one previously retrieved service entry (specified with the handle parameter, 8 hex digits), but several requests can be sent during the same SDP connection. However, you must wait for the reply to the previous reply before issuing a new **SDPATTR** command.

The reply contains the response from the SDP server in encoded form. The code characters are described in Table 7-1.

Char	Description
I	Unsigned integer (2, 4, or 8 hexadecimal digits) follows. This is often a handle, attribute, or attribute value. Attribute values are shown as text if **BLUETOOTH READABLE** is set to **1**.
I	Signed integer byte (2 hexadecimal digits) follows.
U	UUID (4 or 8 hexadecimal digits) follows. Shown as text if **BLUETOOTH READABLE** is set to **1**.
S	String follows.
B	Boolean follows.
<	Start of sequence.
>	End of sequence.
A	Alternative follows.
R	Universal Resource Locator follows.

Table 7-1. SDP Response Formatting Characters

Reply

```
SDPATTR link_id info
```

Example

```
READY.
CALL 00:07:80:80:bf:01 SDP
CALL 0
CONNECT 0 SDP
SDPSEARCH 0 LAN
SDPSEARCH 0 1
SDPSEARCH 0 00010000
SDPATTR 0 00010000 DESCLIST
SDPATTR 0 < I 0004 < < U 0100 > < U 0003 I 04 > > >
CLOSE 0
NO CARRIER 0 ERROR 000
```

SDPQUERY

`SDPQUERY` — Browse SDP Records

Synopsis

SDPQUERY {link_id} {uuid} {attribute}

Description

The **SDPQUERY** command is used to send a Service Search Attribute Request to a connected SDP server, identified with the link_id. The command supports requesting for one attribute value (specified with the attribute parameter, 4 hex digits, or a keyword) in all service entries containing one UUID (specified with the uuid parameter, 4 hex digits, or a keyword), but several requests can be sent during the same SDP connection. However, you must wait for the reply to the previous reply before issuing a new **SDPQUERY** command.

Reply

```
SDPQUERY link_id info
```

Example

```
READY.
CALL 00:07:80:80:bf:01 SDP
CALL 0
RINGING 0
CONNECT 0 SDP
SDPQUERY 0 LAN DESCLIST
SDPQUERY 0 < < I 0004 < < U 0100 > < U 0003 I 04 > > > >
SDPQUERY 0 1102 0100
SDPQUERY 0 < < I 0100 S "Lan Access using PPP" > >
CLOSE 0
NO CARRIER 0 ERROR 000
```

SDP bdaddr

`SDP bdaddr` — Check devices SDP

Synopsis

SDP {bdaddr} {uuid}

Description

The **SDP bddaddr** command is the most useful command for retrieving SDP information from the remote device. The command opens the SDP connection, makes the SDP query, closes the connection and replies to the client in encrypted form. The format is described with the **SDPATTR** command.

Reply

```
SDP bdaddr 0 ERROR reason
SDP bdaddr number_of_entries
SDP bdaddr info
SDP bdaddr info
...
SDP bdaddr info
```

Example

```
READY.
SDP 00:07:80:80:bf:01 SERIALPORT
SDP 00:07:80:80:bf:01 1
SDP 00:07:80:80:bf:01 < I SERVICENAME S "Serial Port" >
  < I PROTOCOLDESCRIPTORLIST < < U 0100 > < U RFCOMM I 0b > > >
```

SDP ADD

`SDP ADD` — Add entry to local SDP

Synopsis

SDP ADD {uuid [:uuid2]} {channel} {description}

Description

This command adds a new entry to Access Server's SDP record.

Reply

```
SDP handle
SDP handle ERROR reason
```

Example

```
READY.
SDP ADD LANACCESS 4 "Lan access"
SDP 65536

SDP ADD SERIALPORT 10 "Serial port"
SDP 65537

SDP ADD PAN-NAP 0 "PAN Network Access Point"
SDP 65538

SDP ADD L2CAP:1201 4099 "Private L2CAP for networking"
SDP 65539
```

SDP DEL

`SDP DEL` — Delete entry for local SDP

Synopsis

SDP DEL {handle}

Description

This command deletes one entry from Access Server's SDP record.

Reply

There is no reply.

Example

```
READY.
SDP DEL 65537
```

SDP LIST

`SDP LIST` — List local SDP

Synopsis

SDP LIST

Description

This command lists Access Server's SDP record entries.

Reply

```
SDP number_of_entries
SDP handle uuid channel description
SDP handle uuid channel description
...
SDP handle uuid channel description
```

Example

```
READY.
SDP LIST
SDP 1
SDP 65536 LANACCESS 4 "Lan access"
```

7.9. Example Sessions

Outgoing RFCOMM Call:

```
READY.
CALL 00:07:80:80:bf:01 1 RFCOMM
CALL 2
RINGING 2
CONNECT 2 RFCOMM 1042
STATUS 2 MSC 8d
<Client opens socket connection to port 1042 and transfers data>
CLOSE 2
NO CARRIER 2 ERROR 000
```

Incoming RFCOMM Call:

```
READY.
RING 2 00:07:80:80:bf:01 1 RFCOMM 1042
STATUS 2 MSC 8d
<Client opens socket connection to port 1042 and transfers data>
NO CARRIER 2 ERROR 000
```

7.10. Error Codes

Some commands may reply with an error code. The human-readable name of the error is displayed, if the **SET BLUETOOTH READABLE** setting has value **1**. Error code 8 indicates that the iWRAP server is busy executing a number of commands; there can be several client applications using the stack. Just wait a few seconds and try again. Other error codes indicate unexpected, but often only temporary, communication problems.

You can analyze the error from the numeric code. Values bigger than or equal to 900 are iWRAP errors, described in Table 7-7.

Code	Textual Form	Reason
900	SERVICE_NOT_FOUND	Tried to CALL a device whose SDP records do not include the requested service.
901	ALREADY_CONNECTED	Tried to CALL a device and a service channel that is already connected.
902	OUT_OF_HANDLES	Tried to CALL, but there are too many open connections.
903	INVALID_ADDRESS_<addr>	Tried to CALL a device with a friendly name that could not be found with the inquiry.
904	REJECTED	An incoming call was rejected by the iWRAP server.
905	BUSY	Tried to issue SDPATTR, but another SDP request was in progress.

Code	Textual Form	Reason
906	BUSY	Tried to issue SDPQUERY, but another SDP request was in progress.
907	NOT_CONNECTED	Tried to CLOSE a connection handle that is not active.
908	BUSY	Tried to issue SDPSEARCH, but another SDP request was in progress.
909	INVALID_ADDRESS	Tried to NAME a device with a friendly name that cannot be found with the inquiry.
90a	BUSY	Tried to issue NAME, but another NAME was in progress.

Table 7-7. iWRAP Errors

Other error codes can be analyzed as follows. For example, `NO CARRIER ERROR 465`: The number 465 is hexadecimal, the sum of 0x400 and 0x65, where 0x400 is a mask, which means that this is an RFCOMM level error. 0x65 (decimal 101) means that the RFCOMM error was a connection timeout.

Mask	Error level
0x100	HCI
0x200	L2CAP
0x300	SDP
0x400	RFCOMM

Table 7-8. Errors Masks

The error codes for each mask are listed in the following tables.

HCI Error	Code
HCI_SUCCESS	0
HCI_ERR_UNKNOWN_COMMAND	1
HCI_ERR_NOCONNECTION	2
HCI_ERR_HARDWARE_FAIL	3
HCI_ERR_PAGE_TIMEOUT	4
HCI_ERR_AUTHENTICATION_FAILED	5
HCI_ERR_KEY_MISSING	6
HCI_ERR_MEMORY_FULL	7
HCI_ERR_CONNECTION_TIMEOUT	8
HCI_ERR_MAX_NUM_CONNECTIONS	9
HCI_ERR_MAX_NUM_SCO_CONNECTIONS	10
HCI_ERR_ACL_CONN_ALREADY_EXISTS	11
HCI_ERR_COMMAND_DISALLOWED	12

HCI Error	Code
HCI_ERR_HOST_REJECTED_0D	13
HCI_ERR_HOST_REJECTED_0E	14
HCI_ERR_HOST_REJECTED_0F	15
HCI_ERR_HOST_TIMEOUT	16
HCI_ERR_UNSUPPORTED_PARAM_VALUE	17
HCI_ERR_INVALID_HCI_PARAMETER_VALUE	18
HCI_ERR_OTHER_END_TERMINATE_13	19
HCI_ERR_OTHER_END_TERMINATE_14	20
HCI_ERR_OTHER_END_TERMINATE_15	21
HCI_ERR_CONNECTION_TERMINATE_LOCALLY	22
HCI_ERR_REPEATED_ATTEMPTS	23
HCI_ERR_PARING_NOT_ALLOWED	24
HCI_ERR_UNKNOWN_LMP_PDU	25
HCI_ERR_UNSUPPORTED_REMOTE_FEATURE	26
HCI_ERR_SCO_OFFSET_REJECTED	27
HCI_ERR_SCO_INTERVAL_REJECTED	28
HCI_ERR_SCO_AIR_MODE_REJECTED	29
HCI_ERR_INVALID_LMP_PARAMETERS	30
HCI_ERR_UNSPECIFIED_ERROR	31
HCI_ERR_UNSUPPORTED_LMP_PARAMETER_VAL	32
HCI_ERR_ROLE_CHANGE_NOT_ALLOWED	33
HCI_ERR_LMP_RESPONSE_TIMEOUT	34
HCI_ERR_LMP_ERROR_TRANSACTION_COLLISION	35
HCI_ERR_LMP_PDU_NOT_ALLOWED	36
HCI_ERR_ENCRYPTION_MODE_NOT_ACCEPTABLE	37
HCI_ERR_UNIT_KEY_USED	38
HCI_ERR_QOS_NOT_SUPPORTED	39
HCI_ERR_INSTANT_PASSED	40
HCI_ERR_PAIRING_WITH_UNIT_KEY_NOT_SUPP	41
HCI_ERR_ILLEGAL_HANDLE	100
HCI_ERR_TIMEOUT	101
HCI_ERR_OUTOFSYNC	102
HCI_ERR_NO_DESCRIPTOR	103

Table 7-9. HCI Error Codes

L2CAP Error	Code
L2CAP_NO_CAUSE	0
L2CAP_ERR_PENDING	1
L2CAP_ERR_REFUS_INV_PSM	2

L2CAP Error	Code
L2CAP_ERR_REFUS_SEC_BLOCK	3
L2CAP_ERR_REFUS_NO_RESOURCE	4
L2CAP_ERR_TIMEOUT_EXTERNAL	0xee

Table 7-10. L2CAP Error Codes

SDP Error	Code
SDP_ERR_RESERVED	0
SDP_ERR_UNSUPPORTED_SDP_VERSION	1
SDP_INVALID_SERVICE_RECORD_HANDLE	2
SDP_INVALID_REQUEST_SYNTAX	3
SDP_INVALID_PDU_SIZE	4
SDP_INVALID_CONTINUATION_STATE	5
SDP_INSUFFICIENT_RESOURCES	6
SDP_ERR_UNHANDLED_CODE	100
SDP_ERR_TIMEOUT	101
SDP_ERR_NOTFOUND	102
SDP_INVALID_RESPONSE_SYNTAX	103
SDP_NOT_FOUND (not really an error)	200

Table 7-11. SDP Error Codes

RFCOMM Error	Code
RFCOMM_SUCCESS	0
RFCOMM_ERR_NORESOURCES	1
RFCOMM_ERR_ILL_PARAMETER	2
RFCOMM_ERR_REJECTED (Connection setup was rejected by remote side)	100
RFCOMM_ERR_TIMEOUT (Connection timed out)	101
RFCOMM_ERR_NSC (Non supported command received)	102
RFCOMM_ERR_ILLPARAMETER	103

Table 7-12. RFCOMM Error Codes

If the problems persist after restarting the communication parties, please contact Bluegiga Technologies as instructed in Section 1.2.

Chapter 8. I/O API

The Bluegiga I/O API defines how to access Access Server's LEDs, buzzer, and general purpose I/O.

8.1. Led and Buzzer API

Access Server's LEDs and buzzer can be accessed through the `/dev/led` device. You can check the status of the LEDs and the buzzer with the **cat /dev/led** command and set LEDs or the buzzer with the **echo abcde > /dev/led** command. An upper case letter means that the LED or buzzer is ON, a lower case letter means that the LED or buzzer is OFF. Letter "a" is the buzzer, letters "b".."e" are LEDs 1..4.

Example:

```
[root@wrap /] echo abCDe > /dev/led
```

8.2. GPIO API

The Digital I/O pins of Access Server can be controlled write-only by using the `/dev/io` device in the same way as the `/dev/led` device for LEDs and buzzer described above.

The letter-to-I/O mapping of the 16 pins is as follows, when looking at the connector:

```
hgfedcba
Xijklmno
```

X is the ground pin (and cannot be set).

o is the voltage sense pin (user can use any voltage from 3.3V to 5.0V).

The I/O must first be enabled by using the **echo Z > /dev/io** command. After that, pins can be driven up by echoing the corresponding upper case letter (A-N) or down by echoing a lower case letter (a-n) to the `/dev/io` device.

Example:

```
[root@wrap /] echo ZaBcD > /dev/io
```

Chapter 9. Finder Protocol

Finder protocol is used to find Access Servers using a UDP broadcast message. Finder server is listening in port 9990 for broadcast and unicast messages. The reply is unicasted to sender.

In Access Server a finder message can be sent with command **finder**. See **finder --help** for usage. The finder server is enabled by default.

9.1. Finder Search Message

Finder search message has four bytes:

```
0x62 0x66 0x62 0x66
```

9.2. Finder Reply Message

Finder reply message has four header bytes:

```
0x66 0x62 0x66 0x62
```

Following the header bytes there is zero or more value tuples. Each tuple has format:

Field Name	Length	Description
ID	1 byte	Tuple ID, see below
Length	1 byte	Data length, in bytes
Data	Length bytes	Value for ID

Table 9-1. Finder Tuple Format

Following tuple IDs are defined:

Tuple ID	Description of Data
0x01, ProdId	Product identification string, ASCII.
0x02, Revision	Product revision string, ASCII.
0x03, HWSerial	Hardware serial number, ASCII.
0x04, IP	IP address of "nap" interface, 4 bytes.
0x05, EthMac	Ethernet MAC address, 6 bytes.
0x06, iWRAP	iWRAP information string, ASCII.
0x07, IPString	List of all IP addresses, ASCII.
0x08, Hostname	Hostname and domain, ASCII.
0x09, Description	Free description, ASCII.
0x0a, BuildTag	Software version, ASCII.

Table 9-2. Finder Tuple IDs

Chapter 10. Advanced Use Cases for Access Server

This chapter will give you advanced use cases for Access Server. The cases listed here are not so trivial, the simple cases are already listed mostly in Chapter 7.

10.1. Making Access Server Secure

The most important thing is to change default passwords from Setup ⟶ Security settings page.

10.2. Saving Bluetooth Pairing Information Permanently

By default, Access Server discards pairing information after 30 minutes and does not store pairing data permanently. Therefore, rebooting of Access Server removes all pairing information.

To increase the pairing data timeout and to automatically store the pairing data to the permanent storage and to automatically reload the information at reboot, append the following iWRAP commands to the end of `/etc/bluetooth.conf` file (Setup ⟶ Bluetooth settings ⟶ Edit startup script in WWW Setup):

```
# Set pairing data timeout to ~370 days (in seconds)
# Note: timeout counter is restarted at reboot
SET BLUETOOTH PAIREXPIRE 32000000

# Automatically load the pairing data
LOAD /etc/bluetooth.security$p

# Automatically save the pairing data
SET CONTROL AUTOSAVE AUTH,PAIR /etc/bluetooth.security$p
```

Note: Do not forget *$p* from the filename. It is replaced with the Bluetooth baseband number. In Access Server with multiple basebands forgetting it will make security data to be overwritten by other basebands.
Note: Pairing must be done between each Bluetooth device pairs. There is no way of making a single pairing between a device and all three basebands of the WRAP 2293 Access Server.

10.3. Digital Pen

Access Server will support most of the digital pens. The examples below are for Nokia Digital Pen SU-1B but they should apply to other pens too.

To setup Access Server for digital pens you have to give following iWRAP commands. The best way to do this is to append the following line to `/etc/bluetooth.conf` file (Setup ⟶ Bluetooth settings ⟶ Edit startup script in WWW Setup):

```
# Load Digital Pen emulation commands
LOAD /etc/bluetooth.pen
```

The `/etc/bluetooth.pen` must then be created (in WWW Setup, you can do it at Setup ⟶ Advanced settings ⟶ Edit other configuration files). It should contain the lines following the example below:

```
# Emulate a phone
SET BLUETOOTH CLASS 500204
SET BLUETOOTH LISTEN 1 "*/usr/sbin/dun"
SDP ADD DUN 1 "Digital Pen DUN"

# Add two pens and their pin codes
SET BLUETOOTH AUTH 00:07:cf:51:f6:8e 9079 --REPLY
SET BLUETOOTH AUTH 00:07:cf:51:d5:2b 6603 --REPLY
# Note: See pen's manual for correct bluetooth address and pin code

# Optionally reject all other incoming connections
SET BLUETOOTH AUTH * - --NEWPAIR
```

After these settings you can pair and use the digital pen with Access Server just like you would use it with a phone. Both modes, receiving pictures to Access Server, and external server via dialup, are supported.

10.4. OpenVPN

This chapter explains how to create a secure network between your Access Server and a PC running Windows OS. This is done using Virtual Private Networking (VPN) and the particular software in use is OpenVPN, which is open source software and is available for everyone without charge. VPN creates a secure tunnel between Access Server and a PC, which enables you, for example, to control a GPRS connected Access Server in a remote location.

10.4.1. Prerequisites

First, download OpenVPN from http://openvpn.se/. A normal OpenVPN version using plain command line interface is available in http://openvpn.net/download.html. The basic instructions naturally apply for both versions, since the actual software is the same. OpenVPN GUI is only available for Windows OS.

For Access Server, you must download the OpenVPN installation packet from http://www.bluegiga.com/techforum/. If you do not have access to the Tech forum, you can apply for access in the same site. In the Tech forum, go to Access Server -> Downloads, where you can find the installation packet called `openvpn-2.0.8-1.wpk`. Access Server is a Linux system, and only command line interface is provided at this point.

This guide relies on material provided in http://openvpn.net/. If you want more specific information on features described here or other features OpenVPN provides, please visit http://openvpn.net/howto.html.

10.4.2. Installing OpenVPN

In Windows, execute the installation file and wait until it is complete. There should be no need for reboot. After this, the OpenVPN icon appears in the system tray. Right-click the icon and you can see the available options

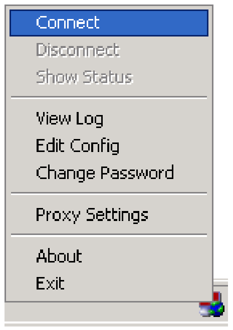


Figure 10-1. OpenVPN GUI Options Menu

In Access Server, the easiest way to install OpenVPN is through the WWW setup. See Section 2.2 for instructions on how use it.

When in WWW setup, go to Setup ⟶ Advanced settings ⟶ Upload a software update. There you can choose the `openvpn-2.0.8-1.wpk` installation packet and upload it to the server. After this you can go to Setup ⟶ Advanced settings ⟶ System information ⟶ List installed software components. If you can see openvpn in this list, the installation is complete.

10.4.3. Creating Certificates and Keys

In this chapter, we create the necessary files to ensure privacy in the VPN, i.e. we will establish a Public Key Infrastructure (PKI). The PKI consists of:

- A master Certificate Authority (CA) certificate and key which is used to sign each of the server and client certificates.
- A separate certificate (also known as a public key) and private key for the server and each client.

OpenVPN uses bi-directional authentication, which means that both server and client will authenticate each other using certificates before connection is considered safe.

To create the files we will use a set of scripts bundled with OpenVPN for Windows. To see how the same thing is done in Linux, see http://openvpn.net/howto.html#pki.

In Windows, open up a Command Prompt window and go to `\Program Files\OpenVPN\easy-rsa`. Run the following batch file to copy configuration files into place (this will overwrite any existing `vars.bat` and `openssl.cnf` files):

```
init-config
```

Now, edit the `vars` file (called `vars.bat` on Windows) and set the *`KEY_COUNTRY`*, *`KEY_PROVINCE`*, *`KEY_CITY`*, *`KEY_ORG`*, and *`KEY_EMAIL`* parameters. Do not leave any of these parameters blank.

```
vars
clean-all
build-ca
```

The **build-ca** builds the certificate authority (CA) certificate and key by invoking the interactive **openssl** command:

```
ai:easy-rsa # ./build-ca
Generating a 1024 bit RSA private key
...........++++++
..........++++++
writing new private key to 'ca.key'
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [FI]:
State or Province Name (full name) [NA]:
Locality Name (eg, city) [ESPOO]:
Organization Name (eg, company) [OpenVPN-TEST]:
Organizational Unit Name (eg, section) []:
Common Name (eg, your name or your server's hostname) []:OpenVPN-CA
Email Address [me@myhost.mydomain]:
```

> **Note:** In the above sequence, the most queried parameters were defaulted to the values set in the `vars` or `vars.bat` files. The only parameter which must be explicitly entered is the *`Common Name`*. In the example above, we have used "OpenVPN-CA".

Next, we will generate a certificate and private key for the server:

```
build-key-server server
```

As in the previous step, most parameters can be defaulted. When the *`Common Name`* is queried, enter "server". Two other queries require positive responses, "Sign the certificate? [y/n]" and "1 out of 1 certificate requests certified, commit? [y/n]".

Generating client certificates is very similar to the previous step:

```
build-key client
```

If you want to use many clients, then you could use, for example, the following commands:

```
build-key client1
build-key client2
build-key client3
```

In this case, remember that for each client, make sure to type the appropriate *`Common Name`* when prompted, i.e. "client1", "client2", or "client3". Always use a unique common name for each client.

Next we'll create Diffie Hellman parameters that must be generated for the OpenVPN server:

```
build-dh
```

The output is as follows:

```
ai:easy-rsa # ./build-dh
Generating DH parameters, 1024 bit long safe prime, generator 2
This is going to take a long time
................+.........................................
.................+...........+...............+.........
.................................
```

Now you can find the generated keys and certificates in the `keys` subdirectory. The final step in the key generation process is to copy all files to the machines which need them, taking care to copy secret files (`server.key` and `client.key`) over a secure channel.

10.4.4. Creating Configuration Files

Both the server and client devices must have certain configuration files for OpenVPN to determine, for example, which IP addresses to use. In this chapter, we will create a basic configuration file for OpenVPN server and client. We'll make the PC as server and Access Server as the client. An example configuration files can be found here: http://openvpn.net/howto.html#examples. In our example, we use most of the setting described in these files.

> **Note:** The configuration files can be named, for example, `server.conf` and `client.conf` in a Linux system. On Windows they would be named `server.ovpn` and `client.ovpn`, where the file extension is different.

10.4.4.1. Server Configuration File

There are lots of configuration options that can be used with OpenVPN, but this guide only covers the basic approach to set up a working VPN with minimal effort. The minimal server configuration file is like following:

```
port 1194
proto udp
dev tun
ca "C:\\Program Files\\OpenVPN\\config\\ca.crt"
cert "C:\\Program Files\\OpenVPN\\config\\server.crt"
key "C:\\Program Files\\OpenVPN\\config\\server.key"
dh "C:\\Program Files\\OpenVPN\\config\\dh1024.pem"
server 172.30.203.0 255.255.255.0
ifconfig-pool-persist C:\\Program Files\\OpenVPN\\config\\Logs\\ipp.txt
keepalive 10 120
persist-key
persist-tun
status C:\\Program Files\\OpenVPN\\config\\Logs\\openvpn-status.log
verb 3
tls-timeout 4
```

The configuration lines are explained in detail in the following:

```
port 1194
```

- Determines the TCP or UDP port that OpenVPN should listen to. For multiple OpenVPN instances on the same machine, you'll need to use a different port for each one. Make sure your firewall allows traffic through these ports.

```
proto udp
```

- Determines whether to use TCP or UDP. We have chosen UDP in our application.

```
dev tun
```

- Determines whether to use routed IP channel (tun) or an Ethernet tunnel, i.e. Ethernet bridging (tap). 'tap' creates a virtual Ethernet adapter, while 'tun' device is a virtual point-to-point IP link. We have chosen 'tun' because of its better efficiency and scalability.

```
ca "C:\\Program Files\\OpenVPN\\config\\ca.crt"
```

- This is a so-called master Certificate Authority (CA) certificate. This will be placed in both the server and client devices, it's the same for all devices. Since the server is a Windows machine, we need to use double backslashes (\\ ) in pathnames. In Linux system one slash (/) is used.

```
cert "C:\\Program Files\\OpenVPN\\config\\server.crt"
```

- This is the certificate (a.k.a public key) for the server device.

```
key "C:\\Program Files\\OpenVPN\\config\\server.key"
```

- This is the private key for the server device and it should be kept secret.

```
dh "C:\\Program Files\\OpenVPN\\config\\dh1024.pem"
```

- This file refers to Diffie-Hellman key exchange, which is a cryptographic protocol that allows two devices that have no prior knowledge of each other to establish a shared secret key over an insecure connection.

```
server 172.30.203.0 255.255.255.0
```

- Here we create the VPN subnet. In this example, the server will take 172.30.203.1 for itself, the rest will be left for clients to use. Each client will be able to reach the server on 172.30.203.1.

```
ifconfig-pool-persist C:\\Program Files\\OpenVPN\\config\\Logs\\ipp.txt
```

- This file maintains a record of client <-> virtual IP address associations. If OpenVPN goes down or is restarted, reconnecting clients can be assigned the same virtual IP address that was previously assigned.

```
keepalive 10 120
```

- This feature causes ping-like messages to be sent back and forth over the link so that each side knows when the other side has gone down. The default parameter "10 120" makes ping occur every 10 seconds and remote peer is assumed down if no ping is received within 120 seconds.

```
persist-key
```

- Persist features try to avoid accessing certain resources on restart that may no longer be accessible.

```
persist-tun
```

- See above.

```
status C:\\Program Files\\OpenVPN\\config\\Logs\\openvpn-status.log
```

- OpenVPN outputs a short status description to this file showing current connections. This file is truncated and rewritten every minute.

```
verb 3
```

- This sets the verbosity level of the log file.
  - 0 is silent, except for fatal errors
  - 4 is reasonable for general use
  - 5 and 6 can help to debug connection problems
  - 9 is extremely verbose

```
tls-timeout 4
```

- Packet retransmit timeout on TLS control channel if no acknowledgment from remote end within n seconds (n = 4 in this example).

10.4.4.2. Client Configuration File

Just like with the server configuration file, we'll describe here the basic client settings needed in our example configuration:

```
client
dev tun
proto udp
remote 192.168.42.1 1194
resolv-retry infinite
nobind
persist-key
persist-tun
ca /usr/local/openvpn/ca.crt
cert /usr/local/openvpn/conf/client1.crt
key /usr/local/openvpn/conf/client1.key
verb 3
```

The configuration lines are explained in detail in the following:

```
client
```

- Here we specify that we are a client and that we will be pulling certain config file directives from the server.

```
dev tun
```

- This setting is the same as in the server configuration file. Use the same setting you're using in the server.

```
proto udp
```

- This setting is the same as in the server configuration file. Use the same setting you're using in the server.

```
remote 192.168.42.1 1194
```

- This setting configures the hostname/IP and port of the server.

```
resolv-retry infinite
```

- Keep trying indefinitely to resolve the host name of the OpenVPN server. Very useful on machines which are not permanently connected to the Internet, such as laptops.

```
nobind
```

- Most clients don't need to bind to a specific local port number.

```
persist-key
```

- This setting is the same as in the server configuration file. Use the same setting you're using in the server.

```
persist-tun
```

- This setting is the same as in the server configuration file. Use the same setting you're using in the server.

```
ca /usr/local/openvpn/conf/ca.crt
```

- This is the same `ca.crt` file as in the server. See server config file descriptions for more information.

```
cert /usr/local/openvpn/conf/client.crt
```

- This is the certificate (a.k.a public key) for the client device.

```
key /usr/local/openvpn/conf/client.key
```

- This is the private key for the client device.

```
verb 3
```

- Sets the verbosity level of the log file.

10.4.5. Starting up VPN

First, place the configuration files in the client and server. Like in the examples, the location for these files can be, for example, `C:\Program Files\OpenVPN\config` in Windows and `/usr/local/openvpn/config` in Linux. Next, copy the authentication files (`ca.crt`, `server.crt`, `server.key`, `client.crt` and `client.key`) into the same directories.

10.4.5.1. Starting up the Server

The OpenVPN server must be accessible from the internet:

- open UDP port 1194 on the firewall (or the TCP/UDP port you've configured), or
- set up a port forward rule to forward UDP port 1194 from the firewall/gateway to the machine running the OpenVPN server
- make sure TUN/TAP device is allowed access through firewalls

To start the OpenVPN server right-click on the `.ovpn` file on Windows and choose "Start OpenVPN on this config file" or by right-clicking the GUI icon on taskbar and start correct config file from there. It's also possible to start from command line:

```
openvpn [server_config_file]
```

Where "server_config_file" is in our Windows examples is `server.ovpn`.

A normal server startup should look like this (output will vary across platforms):

```
Sun Feb  6 20:46:38 2005 OpenVPN 2.0_rc12 i686-suse-linux [SSL] [LZO] [EPOLL] built on Feb
Sun Feb  6 20:46:38 2005 Diffie-Hellman initialized with 1024 bit key
Sun Feb  6 20:46:38 2005 TLS-Auth MTU parms [ L:1542 D:138 EF:38 EB:0 ET:0 EL:0 ]
Sun Feb  6 20:46:38 2005 TUN/TAP device tun1 opened
Sun Feb  6 20:46:38 2005 /sbin/ifconfig tun1 10.8.0.1 pointopoint 10.8.0.2 mtu 1500
Sun Feb  6 20:46:38 2005 /sbin/route add -net 10.8.0.0 netmask 255.255.255.0 gw 10.8.0.2
Sun Feb  6 20:46:38 2005 Data Channel MTU parms [ L:1542 D:1450 EF:42 EB:23 ET:0 EL:0 AF:3/
Sun Feb  6 20:46:38 2005 UDPv4 link local (bound): [undef]:1194
Sun Feb  6 20:46:38 2005 UDPv4 link remote: [undef]
Sun Feb  6 20:46:38 2005 MULTI: multi_init called, r=256 v=256
Sun Feb  6 20:46:38 2005 IFCONFIG POOL: base=10.8.0.4 size=62
Sun Feb  6 20:46:38 2005 IFCONFIG POOL LIST
Sun Feb  6 20:46:38 2005 Initialization Sequence Completed
```

10.4.5.2. Starting up the Client

We'll start the client from Linux command line:

```
openvpn [client_config_file]
```

Where "client_config_file" is in our examples `client.conf`.

A normal client startup looks similar to the server output and should end with the "Initialization Sequence Completed" message.

Now, try a ping across the VPN from the client:

```
ping 10.8.0.1
```

If the ping succeeds, you have a functioning VPN.

Chapter 11. Certification Information and WEEE Compliance

Access Server is CE approved and Bluetooth qualified v. 2.0 + EDR. It has been measured against the following specification standards: ETSI EN 300 328 v1.6.1 / EN 301 489-1/17 / EN 60950-1 / FCC parts 15.247, 15.209, 15.207, 15.109 and 15.107. Supported Bluetooth profiles are: GAP, SDAP, LAN client and server, SPP A and B, FTP client and server, ObjP client and server, PAN-PANU, PAN-GN and PAN-NAP.

Hereby, Bluegiga Technologies declares that this Access Server is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

This device complies with Part 15 of the FCC Rules.

The device operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the distance between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio or television technician for help

Warning

Changes or modifications made to this equipment not expressly approved by Bluegiga Technologies Inc. may void the FCC authorization to operate this equipment.

The radiated output power of Access Server is far below the FCC radio frequency exposure limits. Nevertheless, Access Server should be used in such a manner that the potential for human contact during normal operation is minimized.

To meet the FCC's exposure rules and regulations:

- The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all the persons.

- Any transmitter installed in the CF card slot must not exceed 4 W of e.i.r.p. To check if a particular equipment complies with this restriction, you need to know its FCC ID number and visit the searching engine in the FCC web site in the following Internet address, where you can find the output power by the equipment in the grant of equipment: https://gullfoss2.fcc.gov/prod/oet/cf/eas/reports/GenericSearch.cfm

  If this link does not work properly, please visit the FCC website (http://www.fcc.gov/) and follow the following steps to find the searching engine:

  FCC website ⟶ Office of Engineering Technology ⟶ Equipment Authorization Electronic Filing ⟶ Generic Search

Please notice that the output power listed in the grant uses different units depending on the type of the equipment, e.g.:

1. The output power for 802.11a/b/g/h equipment or similar equipment approved under §15.247 or §15.407 is listed as Conducted RF power. §15.247 or §15.407 limit the e.i.r.p. to 4 W, so this restriction is fulfilled.
2. The output power for Part 22 cellular equipment is listed as e.r.p. The relationship between e.r.p. and e.i.r.p. is the following one:

   e.i.r.p. = 1.64 x e.r.p.
3. The output power for Part 24 PCS equipment is listed as e.i.r.p.
4. For other type of equipment, please consult the distributor in order to assure the restriction is fulfilled.

Note: Definitions:
Effective Radiated Power (e.r.p.) (in a given direction): The product of the power supplied to the antenna and its gain relative to half-wave dipole in a given direction.
Equivalent Isotropically Radiated Power (e.i.r.p.) (in a given direction): The product of the power supplied to the antenna and its gain relative to an isotropic antenna.

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	**Power Density (mW/cm^2)**
300 - 1500	f/1500
1500 - 100000	1.0

Table 11-1. Excerpt of Table 1B of 47 CFR 1.1310

The equipment WRAP Access Server equipment transmits in the 2400 - 2483.5 MHz frequency range, so the applicable MPE limit is 1 mW/cm^2. The equipment can be provided with up to 4 Bluetooth modules WT11# (FCC ID: QOQWT11):

Under the conditions stated above MPE limits can be guaranteed as the calculation below shows:

Example 11-1. 15.247 or 15.407 Compact Flash Card with maximum allowed e.i.r.p. of 4 W

Using Equation from page 18 of OET Bulletin 65, Edition 97-01:

$S_{\text{Compact Flash card}} = \text{Prad (e.i.r.p.)}_{\text{Compact Flash card}} / 4\pi R^2 = 4000 \text{ mW} / 4\pi (20 \text{ cm})^2$

$S_{\text{Compact Flash card}} = 0.795774\ \text{mW/cm}^2$

$S_{\text{Total}} = S_{\text{Bluetooth}} + S_{\text{Compact Flash card}} = 0.003481\ \text{mW/cm}^2 + 0.795774\ \text{mW/cm}^2$

$S_{\text{Total}} = 0.799255\ \text{mW/cm}^2 < 1\ \text{mW/cm}^2$

Example 11-2. Part 22 Compact Flash Card with maximum e.r.p. of 1.5 W (Category excluded of MPE evaluation according to §2.1091)

Using Equation from page 18 of OET Bulletin 65, Edition 97-01 and considering that e.i.r.p. = 1.64 x e.r.p.:

$S_{\text{Compact Flash card}} = \text{Prad (e.i.r.p.)}_{\text{Compact Flash card}} / 4\pi R^2 = 1500 \times 1.64\ \text{mW}/4\pi(20\ \text{cm})^2$

$S_{\text{Compact Flash card}} = 0.489401\ \text{mW/cm}^2$

$S_{\text{Total}} = S_{\text{Bluetooth}} + S_{\text{Compact Flash card}} = 0.003481\ \text{mW/cm}^2 + 0.489401\ \text{mW/cm}^2$

$S_{\text{Total}} = 0.492882\ \text{mW/cm}^2 < 1\ \text{mW/cm}^2$

Example 11-3. Part 24 Compact Flash Card with maximum e.r.p. of 3 W (Category excluded of MPE evaluation according to §2.1091)

Using Equation from page 18 of OET Bulletin 65, Edition 97-01 and considering that e.i.r.p. = 1.64 x e.r.p.:

$S_{\text{Compact Flash card}} = \text{Prad (e.i.r.p.)}_{\text{Compact Flash card}} / 4\pi R^2 = 3000 \times 1.64\ \text{mW} / 4\pi(20\text{cm})^2$

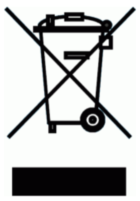
$S_{\text{Compact Flash card}} = 0.978803\ \text{mW/cm}^2$

$S_{\text{Total}} = S_{\text{Bluetooth}} + S_{\text{Compact Flash card}} = 0.003481\ \text{mW/cm}^2 + 0.978803\ \text{mW/cm}^2$

$S_{\text{Total}} = 0.982284\ \text{mW/cm}^2 < 1\ \text{mW/cm}^2$

WEEE Compliance

The crossed-out wheeled bin means that within the European Union the product must be taken to separate collection at the product end-of-life. Do not dispose of these products as unsorted municipal waste.



Appendix A. Directory Structure

```
Directory Tree                          Type Note
==============                          ==== ====
/                                       f    whole filesystem is root writable
|-- bin                                 f
|-- boot                                f
|-- dev                                 r
|   `-- shm                             r    ramdisk
|       |-- etc                         r    resolv.conf
|       |-- tmp                         r    /tmp
|       |   |-- obex                    r    obexserver dir
|       `-- var                         r    ramdisk part of /var
|           |-- lock                    r
|           |   `-- subsys              r
|           |-- log                     r
|           |-- run                     r
|           `-- empty                   r
|-- etc                                 f    system config and init scripts
|   |-- init.d -> rc.d/init.d           l
|   |-- ppp                             f
|   |   `-- peers                       f
|   |-- rc.d                            f
|   |   |-- init.d                      f
|   |   `-- rc3.d                       f
|   |-- rc3.d -> rc.d/rc3.d             l
|   |-- ssh                             f
|   `-- sysconfig                       f
|-- lib                                 f    system libraries
|   |-- iptables                        f
|   |-- pppd                            f
|   `-- modules                         f
|           `-- [module directories]    f
|-- mnt                                 f    mount points
|   |-- nfs                             f    empty mount point
|   `-- usb                             f    empty mount point
|-- proc                                p    proc filesystem
|-- root                                f    home directory of root
|-- sbin                                f
|-- sys                                 p    sys filesystem
|-- tmp -> dev/shm/tmp                  l    temporary data (ramdisk)
|-- usr                                 f
|   |-- bin                             f
|   |-- lib                             f
|   |   `-- gconv                       f
|   |-- libexec                         f
|   |-- local                           f    mount point for second flash
|   |-- sbin                            f
|   `-- share                           f
|       |-- tabset                      f
|       `-- terminfo                    f
|           |-- a                       f
|           |-- l                       f
|           |-- v                       f
|           `-- x                       f
`-- var                                 f
    |-- empty -> ../dev/shm/var/empty   f
    |-- lib                             f
    |   |-- b2b                         f
    |   |-- dpkg                        f
    |       `-- info                    f
    |   `-- setup                       f
    |-- lock -> ../dev/shm/var/lock     l
    |-- log -> ../dev/shm/var/log       l    log files
    |-- run -> ../dev/shm/var/run       l
    |-- spool                           f
    |   `-- cron                        f
    |       `-- crontabs                f
    |-- tmp -> ../dev/shm/var/tmp       l
    `-- www                             f
        |-- cgi-bin                     f
        `-- html                        f    WWW pages

Types
=====

f = FLASH filesystem, read/write, files will be saved on power-down
r = RAM filesystem, read/write, files will be lost on power-down
l = symbolic link
p = proc/sys filesystem, can be used to configure Linux
```

Appendix B. Setup Options

B.1. Security settings

```
Submenu containing most important security settings, like passwords.
```

1. Root password [buffy]

   ```
   Default value for this option is "buffy".

   Password of "root" user, shown in encrypted form.

   To change the password, clear the field, enter a new password and click Save.
   Saving an empty field keeps the old password.

   Please note that the new password is shown in plain text only right after
   you have saved it. Later it is only shown encrypted, and there is no way
   to decrypt it. You must either remember it or change it again to
   something you do remember.
   ```

2. Setup password [buffy]

   ```
   Default value for this option is "buffy".

   Password of "root" user for WWW setup.

   To change the password, clear the field, enter a new password and click Save.
   Saving an empty field keeps the old password.
   ```

3. iWRAP password [buffy]

   ```
   Default value for this option is "buffy".

   The password required to be entered before any commands when communicating
   with iWRAP.

   To change the password, clear the field, enter a new password and click Save.
   Saving an empty field keeps the old password.

   Please note that the new password is shown in plain text only right after
   you have saved it. Later it is only shown encrypted, and there is no way
   to decrypt it. You must either remember it or change it again to
   something you do remember.

   Use "-" to disable iWRAP password.
   ```

4. Allow local clients without password [Yes]

   ```
   Default value for this option is "Yes".

   If this setting is "Yes", iWRAP password is requested only from remote
   clients, not from local clients (127.0.0.1).
   ```

5. Bluetooth PIN code []

   ```
   Default value for this option is empty.
   ```

```
This PIN code is used when establishing connections. Up to 16 characters
can be used.

If there is no default PIN code set, Access Server does not require
a PIN code when establishing connections.

However, if there is no default PIN code set, but the other device
requests a PIN code, "1234" is replied.
```

6. Root user password for FTP [buffy]

```
Default value for this option is "buffy".

Password of the "root" user for FTP connections.
```

7. Allow anonymous FTP login [Yes]

```
Default value for this option is "Yes".

Whether "anonymous" FTP login is allowed or not.
```

8. wpkgd autoinstall password []

```
Default value for this option is empty.

This is optional password to authenticate wpk autoinstall packets (wpk
packets sent to the autoinstall directory). The password is shown encrypted
here, if set.

To change the password, clear the field, enter a new password and click Save.

Please note that the new password is shown in plain text only right after
you have saved it. Later it is only shown encrypted, and there is no way
to decrypt it. You must either remember it or change it again to
something you do remember.

Use "-" do disable the password.

The password must match the authentication parameter in the "wpkg.pif"
file in the wpk packet. Otherwise the packet is not processed.

Syntax in the "wpkg.pif" file:
%wpkg-auth: auth
```

9. wpkgd hotplug password []

```
Default value for this option is empty.

This is optional password to authenticate wpk installation packets
automatically run from USB memory dongles or Compact Flash memory cards.
The password is shown encrypted here, if set.

To change the password, clear the field, enter a new password and click Save.

Please note that the new password is shown in plain text only right after
you have saved it. Later it is only shown encrypted, and there is no way
to decrypt it. You must either remember it or change it again to
```

```
something you do remember.

Use "-" to disable the password.

The password must match the authentication parameter in the "wpkg.pif"
file in the wpk packet. Otherwise the packet is not processed.

Syntax in the "wpkg.pif" file:
%wpkg-auth: auth
```

B.2. Generic settings

```
Submenu containing generic settings.
```

1. Root password [buffy]

   ```
   Default value for this option is "buffy".

   Password of "root" user, shown in encrypted form.

   To change the password, clear the field, enter a new password and click Save.
   Saving an empty field keeps the old password.

   Please note that the new password is shown in plain text only right after
   you have saved it. Later it is only shown encrypted, and there is no way
   to decrypt it. You must either remember it or change it again to
   something you do remember.
   ```

2. Description of this unit [Access Server #1611280191]

   ```
   Default value for this option is empty.

   The description helps to recognize this unit in BSM, finder or in your
   own applications.
   ```

3. Use local syslog service [Yes]

   ```
   Default value for this option is "Yes".

   This option determines whether syslog logs locally to /var/log/messages or
   not.

   Set this to No if you want to log to a remote syslog server.
   ```

4. Size of syslog file [63]

   ```
   Default value for this option is "63".

   Size of one syslog file.
   ```

5. Number of rotated syslog files [3]

   ```
   Default value for this option is "3".

   Number of rotated syslog files to keep.
   ```

6. IP address of the remote syslog server [192.168.42.1]

   ```
   Default value for this option is "192.168.42.1".
   ```

```
The IP address of the device in the network to which syslog should log to.

The remote device must be configured to accept syslogd connections from
this Access Server. See the syslog documentation on the remote device
for more information on how to configure that.
```

7. Swap to NFS server [No]

```
Default value for this option is "No".

Swap to NFS server.
```

8. Hostname and directory for NFS swap [swap.localdomain:/var/swap]

```
Default value for this option is "swap.localdomain:/var/swap".

Hostname and directory for NFS swap.
```

9. NFS swap size in megabytes [64]

```
Default value for this option is "64".

NFS swap size in megabytes.
```

10. System clock tick [10000]

```
Default value for this option is "10000".

Set the number of microseconds that should be added to the system time for
each kernel tick interrupt (100Hz). Increasing val by 1 speeds up the system
clock by about 100 ppm, or 8.64 sec/day.
```

11. System clock frequency [0]

```
Default value for this option is "0".

Set the system clock frequency offset. Frequency gives a much finer
adjustment than the tick option. The value is scaled such that frequency
65536 speeds up the system clock by about 1 ppm, or 0.0864 sec/day.
```

12. Set system clock [No]

```
Default value for this option is "No".

Set system clock.
```

13. Year [2007]

```
Default value for this option is "2007".

Year.
```

14. Month [7]

```
Default value for this option is "7".

Month.
```

15. Day of month [19]

```
Default value for this option is "19".
```

```
Day of month.
```

16. Hour [11]

```
Default value for this option is "11".

Hour.
```

17. Minute [17]

```
Default value for this option is "17".

Minute.
```

18. Second [16]

```
Default value for this option is "16".

Second.
```

B.3. Network settings

```
Submenu containing network settings.
```

1. Hostname of the unit [wrap]

```
Default value for this option is "wrap".

The hostname of Access Server. Local applications will see this
name. This name may be changed by dynamic network configuration.
```

2. Domain of the unit [localdomain]

```
Default value for this option is "localdomain".

The domain name of Access Server. Local applications will see this
name. This name may be changed by dynamic network configuration.
```

3. Enable Ethernet cable interface [Yes]

```
Default value for this option is "Yes".

Set this option to Yes if you want to have the Ethernet cable interface
enabled.

If you don't use this interface, you may disable it to slightly increase
security and system boot speed.
```

4. Enable Wi-Fi interface [Yes]

```
Default value for this option is "Yes".

Set this option to Yes if you want to have the Wi-Fi interface enabled
(you can use the Wi-Fi interface with a supported Compact Flash Wi-Fi
card or USB Wi-Fi dongle).

If you don't use this interface, you may disable it to slightly increase
security and system boot speed.
```

5. Enable GPRS interface [No]

```
Default value for this option is "No".

Set this option to Yes if you want to have the GPRS interface enabled.
To use the interface, a supported Compact Flash GPRS card or a serial GPRS
modem must be attached to Access Server.
```

6. Time server (rdate) []

```
Default value for this option is empty.

Hostname or IP address of the time server to be connected at system boot to
retrieve correct time using the Time Protocol (RFC 868).

NTP client is running by default, so rdate should not be needed at all.
```

7. Update current time now (ntp) [/sbin/service ntpd sync]

```
Update current time now (ntp) from configured NTP servers. By default uses
a random selection of 8 public stratum 2 servers.
```

8. Zeroconf interface [nap]

```
Default value for this option is "nap".

Defines the interface in which Zeroconf is running.
Possible interface names are "nap", "gn" and "none".
```

B.3.1. Default interface settings

```
Default interface settings. By default, Ethernet and Bluetooth
PAN-NAP interfaces are assigned to this interface.
```

1. Use dynamic network configuration [Yes]

```
Default value for this option is "Yes".

This option determines whether or not automatic configuration of the default
network interface (nap) using DHCP should be attempted at boot. If set to
no, you have to manually enter IP address and other network settings.
```

2. IP address [192.168.42.3]

```
Default value for this option is "192.168.42.3".

The IP address of Access Server.
```

3. Subnet mask [255.255.255.0]

```
Default value for this option is "255.255.255.0".

The network mask of Access Server.
```

4. IP address of the default gateway [192.168.42.254]

```
Default value for this option is "192.168.42.254".

The IP address of the default gateway in the LAN to which Access Server
is connected.
```

5. List of name server IPs [192.168.42.1 192.168.42.2]

```
Default value for this option is "192.168.42.1 192.168.42.2".
```

```
The IP address(es) of the name servers, separated by space.
```

B.3.2. Ethernet cable settings

```
Ethernet cable settings.
```

1. Assign to default interface [Yes]

   ```
   Default value for this option is "Yes".

   Assigns Ethernet (eth0) to default interface (nap) with settings
   specified in Default interface settings.

   Do NOT set this to No if you don't know what you are doing. There
   is a high risk that you end up with invalid network settings if you
   do so.

   If you need to set a static IP address to Access Server, do it
   in the Default interface settings.
   ```

2. Use dynamic network configuration [Yes]

   ```
   Default value for this option is "Yes".

   Use dynamic network configuration (DHCP) on Ethernet interface when
   it is not assigned to the default interface.
   ```

3. IP address [192.168.43.3]

   ```
   Default value for this option is "192.168.43.3".

   IP address of the Ethernet interface when it is not assigned to the
   default interface and dynamic network configuration is not in use.
   ```

4. Subnet mask [255.255.255.0]

   ```
   Default value for this option is "255.255.255.0".

   Network mask of the Ethernet interface when it is not assigned to the
   default interface and dynamic network configuration is not in use.
   ```

B.3.3. Wi-Fi settings

```
Wi-Fi settings.
```

1. Act as a Wi-Fi Access Point [No]

   ```
   Default value for this option is "No".

   This option defines whether Access Server acts as a Wi-Fi Access
   Point when Wi-Fi is enabled.
   ```

2. ESSID []

   ```
   Default value for this option is empty.

   Access point network name (Service Set ID).
   ```

3. Nickname []

```
Default value for this option is empty.

The nickname, or station name.
```

4. WEP encryption key []

```
Default value for this option is empty.

WEP encryption key for Wi-Fi.

Examples:
10 hex digits:       "abcdef1234"
26 hex digits:       "1234567890abcdef1234567890"
or                   "1234-5678-90ab-cdef-1234-5678-90"
5 ASCII characters:  "s:abcde"
13 ASCII characters: "s:abcdefghijklm"
```

5. Extra commands for Access Point mode [/etc/sysconfig/ifup-wlan0]

```
Extra commands for Access Point mode. Use only if you know what you're
doing. Here for example you can add allow/reject MAC addresses with
"iwpriv" command.
```

6. Assign to default interface [No]

```
Default value for this option is "No".

Assigns Wi-Fi to default interface with settings specified in
Default interface settings.
```

7. Use dynamic network configuration [Yes]

```
Default value for this option is "Yes".

Use dynamic network configuration (DHCP) for Wi-Fi interface.
```

8. IP address [192.168.44.3]

```
Default value for this option is "192.168.44.3".

IP address of Wi-Fi interface.
```

9. Subnet mask [255.255.255.0]

```
Default value for this option is "255.255.255.0".

Subnet mask of Wi-Fi interface.
```

B.3.4. GPRS settings

```
GPRS settings.
```

1. Dial on demand [Yes]

```
Default value for this option is "Yes".

If this option is set to Yes, the GPRS link is not opened at boot time but
when there is data to be transferred.
```

2. SIM card PIN code []

```
Default value for this option is empty.
```

```
PIN code of the SIM card in the GPRS modem.
```

3. Username [blue]

```
Default value for this option is "blue".

Username for GPRS network. Contact your GSM operator for correct value.

Some examples:

Elisa/Finland:   blue
Sonera/Finland:  blue
Wataniya/Kuwait: blue
Etisalat/UAE:    Mnet

See also: http://www.kh-gps.de/gprsset.htm
```

4. Password [giga]

```
Default value for this option is "giga".

Password for GPRS network. Contact your GSM operator for correct value.

Some examples:

Elisa/Finland:   giga
Sonera/Finland:  giga
Wataniya/Kuwait: giga
Etisalat/UAE:    Mnet

See also: http://www.kh-gps.de/gprsset.htm
```

5. Internet APN [internet]

```
Default value for this option is "internet".

Internet APN for GPRS network. Contact your GSM operator for correct value.

Some examples:

Elisa/Finland:   internet
Sonera/Finland:  internet
Wataniya/Kuwait: action.wataniya.com
Etisalat/UAE:    mnet

See also: http://www.kh-gps.de/gprsset.htm
```

6. Extra parameters for pppd []

```
Default value for this option is empty.

Optional extra parameters for pppd. Use only if you know what you are doing,
for example if you want to debug ppp connections.
```

B.4. Applications

Submenu containing settings of various applications.

1. Default startup applications []

   Change which applications are to be started at startup and which don’t.

B.4.1. FTP server settings

Submenu containing settings for FTP server application.

1. Root user password [buffy]

   Default value for this option is "buffy".

   Password of the "root" user for FTP connections.

2. Root user directory [/]

   Default value for this option is "/".

   Root directory of the "root" user for FTP connections.

3. Root user instances [5]

   Default value for this option is "5".

   Maximum number of simultaneous logins of the "root" user for FTP connections.

4. Allow anonymous login [Yes]

   Default value for this option is "Yes".

   Whether "anonymous" FTP login is allowed or not.

5. Anonymous user password [*]

   Default value for this option is "*".

   Password of the "anonymous" user for FTP connections.

   Use "*" to allow everything (aka anonymous login).

6. Anonymous user directory [/tmp/obex]

   Default value for this option is "/tmp/obex".

   Root directory of the "anonymous" user for FTP connections.

7. Anonymous user instances [5]

   Default value for this option is "5".

   Maximum number of simultaneous logins of the "anonymous" user for FTP connections.

8. Allow anonymous user to do everything [No]

   Default value for this option is "No".

   Whether "anonymous" user is allowed to do everything (all below) or not.

9. Allow anonymous user to download [Yes]

   ```
   Default value for this option is "Yes".

   Whether "anonymous" user is allowed to download files or not.
   ```

10. Allow anonymous user to upload [No]

    ```
    Default value for this option is "No".

    Whether "anonymous" user is allowed to upload files and make directories
    or not.
    ```

11. Allow anonymous user to overwrite [No]

    ```
    Default value for this option is "No".

    Whether "anonymous" user is allowed to overwrite existing files or not.
    ```

12. Allow anonymous user to multiple login [No]

    ```
    Default value for this option is "No".

    Whether "anonymous" user is allowed to multiple logins or not.
    ```

13. Allow anonymous user to erase [No]

    ```
    Default value for this option is "No".

    Whether "anonymous" user is allowed to erase files and directories or not.
    ```

14. Edit configuration file [/etc/ftpd.conf]

    ```
    Edit the self documented configuration file of the FTP server. Here you
    can change more advanced settings.
    ```

B.4.2. ObexSender settings

```
Submenu containing settings for ObexSender application.
```

1. Bluetooth friendly name [W$S_$p]

   ```
   Default value for this option is "W$S_$p".

   The name shown when this device is found when inquired about by other
   Bluetooth devices. Following meta tags are available:

   $S : Hardware serial number, all ten digits
   $s : Hardware serial number, last three digits
   $P : Server port
   $p : Server port, last digit
   $H : Fully Qualified Domain Name (FQDN)
   $h : hostname
   $$ : $

   For example, "Server_$p" would set the Bluetooth friendly name as
   "Server_1" for first baseband, "Server_2" for second baseband and
   "Server_3" for third baseband.
   ```

2. Minimum RSSI value before sending [-80]

Default value for this option is "-80".

The working range of ObexSender can be configured or limited with this setting. When ObexSender searches for devices, the RSSI (Receiver Signal Strength Indicator) value is also measured. This value ranges from -128 to -1.

128 to -90 means the signal strength is very weak. A connection attempt would very likely fail.

80 to -65 means the signal strength is ok. Connection can be created. With Class 2 devices, like most mobile phones, this means the phone is 10-20 meters away. A Class 1 device can be even more than 100 meters away. Please note that -65 is recommended value for Access Server with serial number 0607239999 and smaller.

45 to -30 means the signal is very strong. The devices are most likely very close to each other (less than a meter away). For example testing purposes value -45 is ideal because you send only to devices very near to Access Server. With the serial numbers of 0607239999 and smaller, 35 or -40 can also be suitable.

3. Whitelist RSSI limit [0]

   Default value for this option is "0".

   Determines an RSSI limit that allows remote device to be removed from all block lists. This can be used in a way that you bring your device very close to Access Server and it will be able to receive content again, without waiting for OK- or FAIL-delays to pass.

   For example, you have received a file succesfully from ObexSender and you then have to wait for OK-delay to pass. You have configured whitelist RSSI limit to -45 (or -35 if serial number is less than 0607239999) and then you bring your device practically attached to Access Server. Now you have to wait for an inquiry to pass (blue led starts blinking and then stops). Then after a short while you should receive content again.

4. Require pairing [No]

   Default value for this option is "No".

   Use pairing to inform "I want to receive files".

   Enabling this means that user must first manually pair his or hers device with Access Server.

5. Delete non-matching requests [Yes]

   Default value for this option is "Yes".

   This setting applies if you're using REPLY-feature of ObexSender and you send a file to Access Server to receive specific content. Now, if the file you sent doesn't match to ObexSender configuration, the file is saved. Matching files are always deleted. Disable this

```
if you have some other program doing ObjP/FTP.
```

6. Register to watchdog daemon [Yes]

```
Default value for this option is "Yes".

If this is enabled, ObexSender will reboot Access Server
automatically if Bluetooth basebands have stopped responding.
```

7. Upload a new file [/usr/local/obexsender/files]

```
This link allows you to upload files into the ObexSender file directory.
```

8. List files [/usr/local/obexsender/files]

```
This link allows you to browse files on the ObexSender file system.
```

9. Edit configuration file [/etc/obexsender.conf]

```
This link opens ObexSender configuration file
(/etc/obexsender.conf) and allows you to edit it manually.

It also allows you to change the settings that are not
configurable with Setup application.
```

10. Inquiry and calculate hash [/usr/sbin/obexsender-hash --download]

```
Inquiry and calculate hash. This feature allows you to expand the database
of recognizable bluetooth devices. You can use this to calculate hash file
from new device and send it to Bluegiga who will update and release new
database.
```

11. Restart ObexSender [/sbin/service obexsender restart]

```
Restart ObexSender.
```

12. View log [-]

```
This link allows you to view ObexSender log file if it exists.
By default a summary of the logged events is displayed.
Detailed information is available by clicking the date links.
```

B.4.2.1. Timeouts and delays

```
Submenu containing ObexSender timeouts and delays.
```

1. Delay between inquiries [10]

```
Default value for this option is "10".

Delay between inquiries (Bluetooth device discoveries) in seconds.
```

2. Delay between reply scans [10]

```
Default value for this option is "10".

Determines how often (in seconds) obexserver's incoming directory
is scanned for remote requests. A low value increases CPU usage.

Basically this value affects on the delay that takes place when
user sends file to Access Server to which ObexSender should
reply with a certain file.
```

3. If previous was ok, timeout before sending again [36000]

   ```
   Default value for this option is "36000".

   If a file has been successfully sent to a device, this timeout
   (in seconds) defines when content can be sent again to the same device.
   ```

4. If previous was fail, timeout before sending again [86400]

   ```
   Default value for this option is "86400".

   If a file transmission to a device has failed or user has declined
   the file, this timeout (in seconds) defines when ObexSender can
   send content to the same device again.
   ```

5. Delay between retrying call [120]

   ```
   Default value for this option is "120".

   When user doesn’t accept or reject the file, ObexSender will try to
   send the file again. This setting determines the timeout (in seconds)
   before resend occurs.

   If you wish to disable this feature you can use the same value as in
   OK-delay or FAIL-delay, i.e. the two previous settings.
   ```

6. Delay after scanning [5]

   ```
   Default value for this option is "5".

   When a remote request from user has been received, this setting
   determines how long (in seconds) ObexSender will wait until the
   response file is sent back to the user.

   Default value is 5 seconds, because some mobile phones are not
   able to receive files over Bluetooth until at least 5 seconds
   has passed from sending.
   ```

7. Tester delay [60]

   ```
   Default value for this option is "60".

   Determines how often content is pushed to a tester device. Tester
   device is a device that is always offered content, so it isn’t
   blocked in any case.
   ```

8. Pair expire timeout [0]

   ```
   Default value for this option is "0".

   How long to keep the pairing. Zero means forever.
   ```

B.4.2.2. Logging

```
Submenu containing ObexSender logging options.
```

1. Logfile name [-]

   ```
   Default value for this option is "-".
   ```

```
Defines the path and name of the ObexSender log file
(for example "/usr/local/obexsender/obexsender.log").
Log file contains information about successful and unsuccessful
transmissions, timestamps and information about sent files.

You can also use an IP address of a log server, which must be another
Access Server running ObexSender.

Type "-" to use syslog.
```

2. Log prefix [-]

```
Default value for this option is "-".

Prefix is put in front of every event in the log file.
Type "-" for none.
```

3. If sending was failure, log it too [Yes]

```
Default value for this option is "Yes".

If this is enabled failed transmissions will be logged too.
```

4. Verbosity level [0]

```
Default value for this option is "0".

Determines the verbosity level of ObexSender logging. The value can
be from 0 to 4. If this setting is set to "0", there will be minimal
logging and with setting "4" there will be maximum amount of logging.

WARNING! Full verbose logging (4) should be used only for debugging
purposes, since it creates a lot of logs and the flash memory can
be filled rather quickly. The only verbose level that should be used
in production is 0 because other verbosity levels generate too much
log and will eventually fill up Access Server.
```

5. Block list save delay [0]

```
Default value for this option is "0".

Determines how often (in seconds) a dump file is updated. Using dump file
allows blocklist to be saved in case of power failure of Access Server.
"0" disables this feature. We recommend to use a rather big value, for
example 15min = 900s.

WARNING: Using a small value here can physically burn the flash memory
over time.
```

6. Block list file name [/var/lib/obexsender/blocklist.dump]

```
Default value for this option is "/var/lib/obexsender/blocklist.dump".

You can choose to save the information about already served devices,
so you can form a so-called "block list". If this ignore list is
saved in flash memory, it will be preserved even if Access Server is
rebooted. This basically ensures that remote devices don't receive
the same content even if Access Server is rebooted.
```

B.4.2.3. Delete log (confirm)

This link will delete the current log file after confirmation.

1. Delete log now! [/bin/false]

   Delete ObexSender log file immediately!

   WARNING: There is no confirmation for this!

B.4.3. Connector settings

Connection forwarding enables you to configure Access Server to automatically open and maintain connections to specific Bluetooth devices. Connection forwarding also forwards the data from the Bluetooth connections to a defined application or IP address using a TCP socket.

1. Delay between calls [20]

   Default value for this option is "20".

   This is the delay between calls to Bluetooth devices. If the call fails this is the time Connector sleeps before trying to connect to that same or next device again.

2. Logfile name [-]

   Default value for this option is "-".

   Defines the path and name of the Connector log file (for example "/usr/local/connector/connector.log").

   Type "-" to use syslog.

3. Register to watchdog daemon [Yes]

   Default value for this option is "Yes".

   If this is enabled, Connector will reboot Access Server automatically if Bluetooth basebands have stopped responding.

4. Verbosity level [0]

   Default value for this option is "0".

   Determines the verbosity level of Connector logging. The value can be from 0 to 4. If this setting is set to "0", there will be minimal logging and with setting "4" there will be maximum amount of logging.

   WARNING! Full verbose logging (4) should be used only for debugging purposes, since it creates a lot of logs and the flash memory can be filled rather quickly.

5. Edit configuration file [/etc/connector.conf]

   This link opens Connector configuration file (/etc/connector.conf) and allows you to edit it manually.

   It also allows you to change the settings that are not

```
configurable with Setup application.
```

6. #1 Bdaddr [-]

```
Default value for this option is "-".

Bluetooth address of remote device, for example 00:07:80:80:bf:01.
```

7. #1 Channel [-]

```
Default value for this option is "-".

Bluetooth channel or UUID where to connect.
```

8. #1 Command [-]

```
Default value for this option is "-".

This is the application or TCP/IP address and port where the connection is forwarded.

Example:

192.168.42.1:5001
/usr/local/bin/myapp
```

B.4.4. wpkgd settings

```
Submenu containing settings for wpkgd application.
```

1. wpkgd's autoinstall directory [@]

```
Default value for this option is "@".

wpkgd will automatically check this directory for wpk files containing
software update packets.

Special meta, "@", means Obexserver's root directory. Use it if you want
to allow updates via Bluetooth ObjP or FTP profiles.
Use empty to disable autoinstall.
```

2. Password for autoinstall packages []

```
Default value for this option is empty.

This is optional password to authenticate wpk autoinstall packets (wpk
packets sent to the autoinstall directory). The password is shown encrypted
here, if set.

To change the password, clear the field, enter a new password and click Save.

Please note that the new password is shown in plain text only right after
you have saved it. Later it is only shown encrypted, and there is no way
to decrypt it. You must either remember it or change it again to
something you do remember.

Use "-" do disable the password.

The password must match the authentication parameter in the "wpkg.pif"
file in the wpk packet. Otherwise the packet is not processed.
```

```
Syntax in the "wpkg.pif" file:
%wpkg-auth: auth
```

3. Delete processed autoinstall packages [Yes]

```
Default value for this option is "Yes".

If this option is set Yes, the wpk autoinstall packets are deleted
after they have been processed.
```

4. Process hotplug packages [Yes]

```
Default value for this option is "Yes".

If this option is set to Yes, wpk packets are automatically processed
from USB memory sticks or Compact Flash memory cards when they are
plugged into Access Server.
```

5. Password for hotplug packages []

```
Default value for this option is empty.

This is optional password to authenticate wpk installation packets
automatically run from USB memory dongles or Compact Flash memory cards.
The password is shown encrypted here, if set.

To change the password, clear the field, enter a new password and click Save.

Please note that the new password is shown in plain text only right after
you have saved it. Later it is only shown encrypted, and there is no way
to decrypt it. You must either remember it or change it again to
something you do remember.

Use "-" to disable the password.

The password must match the authentication parameter in the "wpkg.pif"
file in the wpk packet. Otherwise the packet is not processed.

Syntax in the "wpkg.pif" file:
%wpkg-auth: auth
```

6. Delete processed hotplug packages [No]

```
Default value for this option is "No".

If this option is set Yes, the wpk packets are deleted
after they have been processed.
```

7. Extra parameters for wpkgd []

```
Default value for this option is empty.

Optional extra command line parameters for wpkgd.

Please see wpkgd --help for detailed information on the options.
```

B.4.5. SMS gateway settings

```
Submenu containing settings for SMS gateway application.
```

1. Modem device [/dev/ttyS0]

   ```
   Default value for this option is "/dev/ttyS0".

   Modem device for SMS gateway.

   /dev/ttyAT1 for user uart
   /dev/ttyS0 for CF slot
   ```

2. Log file name [-]

   ```
   Default value for this option is "-".

   The file to which the SMS gateway (smsgw) logs all traffic. Use /dev/null
   for none, - for syslog, /var/log/smsgw.log if you want to save this
   information. Be careful not to fill the RAM file system (use a cron job to
   free disk space from time to time).
   ```

3. SMSC number [+358405202000]

   ```
   Default value for this option is "+358405202000".

   SMSC number. Contact your local GSM operator if you don’t know the correct
   value.

   +358405202000 for Sonera/Finland
   +358508771010 for Elisa/Finland
   ```

4. Edit configuration file [/etc/smsgw.conf]

   ```
   Edit the self documented configuration file of the SMS gateway.
   ```

B.5. iWRAP settings

```
Submenu containing all iWRAP related settings.
```

1. iWRAP password [buffy]

   ```
   Default value for this option is "buffy".

   The password required to be entered before any commands when communicating
   with iWRAP.

   To change the password, clear the field, enter a new password and click Save.
   Saving an empty field keeps the old password.

   Please note that the new password is shown in plain text only right after
   you have saved it. Later it is only shown encrypted, and there is no way
   to decrypt it. You must either remember it or change it again to
   something you do remember.

   Use "-" to disable iWRAP password.
   ```

2. Allow local clients without password [Yes]

   ```
   Default value for this option is "Yes".
   ```

```
If this setting is "Yes", iWRAP password is requested only from remote
clients, not from local clients (127.0.0.1).
```

3. Friendly name [W$S_$p]

```
Default value for this option is "W$S_$p".

The name shown when this device is found when inquired about by other
Bluetooth devices. Following meta tags are available:

$S : Hardware serial number, all ten digits
$s : Hardware serial number, last three digits
$P : Server port
$p : Server port, last digit
$H : Fully Qualified Domain Name (FQDN)
$h : hostname
$$ : $

For example, "Server_$p" would set the Bluetooth friendly name as
"Server_1" for first baseband, "Server_2" for second baseband and
"Server_3" for third baseband.
```

4. Connectable and discoverable mode [3]

```
Default value for this option is "3".

This setting specifies whether this device is connectable and/or
discoverable by other Bluetooth devices.

When a device is connectable, other Bluetooth devices can open a Bluetooth
connection to it. Before opening a connection, the calling device must know
the Bluetooth address of the device it is connecting to. The Bluetooth
addresses can be found by making an inquiry. When a device is discoverable,
it shows up in inquiries. Possible values for all combinations of these
settings are:

0 : Not connectable, not discoverable
1 : Not connectable, discoverable
2 : Connectable, not discoverable
3 : Connectable and discoverable
```

5. Master/slave role switch policy [1]

```
Default value for this option is "1".

This setting specifies how local Bluetooth device should decide
it's role. When a Bluetooth device connects another Bluetooth device,
it is a master by default and the answering device is the slave. When the
connection is being built, a role switch can be made. Normally,
access point devices need to be the master, and therefore they
require a master-slave switch when a new device is connecting.
This is also how Access Server is configured by default. Otherwise
Access server couldn't host the maximum number of slaves (7).
Other possible combinations are:
```

```
0 : Allow switch when calling, don't request it when answering
1 : Allow switch when calling, request it when answering
2 : Don't allow switch when calling, request it when answering

If you have problems connecting to Access Server, it might be
because your client device does not support the master/slave switch.
In this case you should change this setting to 0.
```

6. Default PIN code []

```
Default value for this option is empty.

This PIN code is used when establishing connections. Up to 16 characters
can be used.

If there is no default PIN code set, Access Server does not require
a PIN code when establishing connections.

However, if there is no default PIN code set, but the other device
requests a PIN code, "1234" is replied.
```

7. Power save mode and parameters [4]

```
Default value for this option is "4".

The power save mode used by default for all connections. Possible settings
are:

0 : Active
1 : Park: Round-robin
2 : Park: Idle
3 : Sniff: All
4 : Sniff: Idle

"Active" means that no power saving is in use.
"Sniff: All" means that the connections are kept in sniff mode always.
"Sniff: Idle" means that a connection is switched to sniff mode after
it has not transmitted data for some time (2 seconds by default).
When data transmission resumes, switch to active mode is made.

Park modes are generally not useful. See User's and Developer's Guide
and Bluetooth specification for more information.
```

8. Use literal replies in SDP [Yes]

```
Default value for this option is "Yes".

If enabled, some SDP result codes will have literal values instead of
numeric values.
```

9. Optional command line parameters []

```
Default value for this option is empty.

Optional extra command line startup parameters for the iWRAP servers.
```

10. Edit startup script [/etc/bluetooth.conf]

```
Opens iWRAP configuration file (/etc/bluetooth.conf) for editing.

You can add extra iWRAP commands to that file. iWRAP servers process
the file each time they start. See the User's and Developer's Guide
for iWRAP command reference.

For example, an unique friendly name for each baseband can be added by
using following lines:

10101 SET BLUETOOTH NAME Foobar
10102 SET BLUETOOTH NAME Barfoo
10103 SET BLUETOOTH NAME Buffy!
```

B.5.1. Bluetooth profiles

`Submenu for configuring the supported Bluetooth profiles.`

1. Enable Device ID profile [Yes]

   ```
   Default value for this option is "Yes".

   Whether or not Device ID profile is enabled.
   ```

2. Enable LAN access profile [No]

   ```
   Default value for this option is "No".

   Whether or not the LAN Access Profile is enabled.
   ```

3. Enable PAN user profile [No]

   ```
   Default value for this option is "No".

   Whether or not the PAN User Profile is enabled.
   ```

4. Enable PAN generic networking profile [No]

   ```
   Default value for this option is "No".

   Whether or not the PAN Generic Networking Profile is enabled.
   ```

5. Enable PAN network access point profile [No]

   ```
   Default value for this option is "No".

   Whether or not the PAN Network Access Point Profile is enabled.
   ```

6. Enable object push profile [Yes]

   ```
   Default value for this option is "Yes".

   Whether or not the Object Push Profile is enabled.
   ```

7. Enable file transfer profile [Yes]

   ```
   Default value for this option is "Yes".

   Whether or not the File Transfer Profile is enabled.
   ```

B.5.1.1. LAN access profile settings

`Submenu containing LAN Access Profile settings.`

1. Login name and password []

   ```
   Default value for this option is empty.

   The login name and password required from LAN access clients. Must be entered
   as a single string, separated with a space. For example: guest buffy

   If empty, no login is required.
   ```

2. Service channel [4]

   ```
   Default value for this option is "4".

   Service channel for LAN access profile.
   ```

3. Service name (shown in SDP) [LAN Access]

   ```
   Default value for this option is "LAN Access".

   The name of the LAN Access Profile service shown in the Service Discovery.
   ```

4. Defaultroute modification policy [0]

   ```
   Default value for this option is "0".

   How the LAN Access Profile should modify the defaultroute in routing tables:

   0: Do not alter defaultroute
   1: When acting as a LAP client, set defaultroute according to the LAP server
   2: When acting as a LAP server, set defaultroute according to the LAP client
   3: Set defaultroute according to the LAP server/client connected
   ```

5. First IP for LAP clients [192.168.160.0]

   ```
   Default value for this option is "192.168.160.0".

   This defines the C-class of IP addresses to be used in point-to-point
   connections between Access Server and LAP clients.

   Full C-class is required: use "x.y.z.0".
   ```

B.5.1.2. PAN user profile settings

`Submenu containing Personal Area Network User Profile settings.`

1. Service name (shown in SDP) [PAN User]

   ```
   Default value for this option is "PAN User".

   The name of the PAN User Profile service shown in the Service Discovery.
   ```

2. Enable zeroconf when calling [No]

   ```
   Default value for this option is "No".

   Enable ZeroConf protocol for outgoing PANU connections.
   ```

3. Enable zeroconf when answering [No]

Default value for this option is "No".

Enable ZeroConf protocol for incoming PANU connections.

B.5.1.3. PAN generic networking profile settings

Submenu containing Personal Area Network Generic Networking Profile settings.

1. Service name (shown in SDP) [Generic Networking]

   Default value for this option is "Generic Networking".

   The name of the PAN Generic Networking Profile service shown in the Service Discovery.

2. Use dynamic network configuration for local IP address [No]

   Default value for this option is "No".

   Whether or not DHCP is used for configuring local IP Address. Enable only if you are connecting this PAN-GN to another PAN-GN that will provide the IP configuration.

3. Local GN interface IP address [192.168.161.1]

   Default value for this option is "192.168.161.1".

   The IP address for the local GN interface.

4. Local GN interface subnet mask [255.255.255.0]

   Default value for this option is "255.255.255.0".

   The netmask for the local GN interface.

5. Start DHCP server for remote users [Yes]

   Default value for this option is "Yes".

   Whether or not this device should start DHCP for remote devices connecting to this PAN-GN. Disabled if "Use dynamic network configuration for local IP address" is used.

6. First IP for lease block [192.168.161.2]

   Default value for this option is "192.168.161.2".

   First IP address of the lease block.

7. Last IP for lease block [192.168.161.254]

   Default value for this option is "192.168.161.254".

   Last IP address of the lease block.

8. Subnet of lease block [255.255.255.0]

   Default value for this option is "255.255.255.0".

   Subnet mask of the lease block.

9. Lease time [86400]

   Default value for this option is "86400".

   Lease time in seconds.

B.5.1.4. PAN network access point profile settings

Submenu containing Personal Area Network Network Access Point Profile settings.

1. Service name (shown in SDP) [Network Access]

   Default value for this option is "Network Access".

   The name of the Bluetooth PAN Network Access Point Profile service shown in the Service Discovery.

B.5.1.5. Connection forwarding

Connection forwarding allows you to configure Access Server to automatically receive and forward Bluetooth connections to other applications or TCP socket.

This submenu contains all the settigns related to connection forwarding capability.

1. #1 Command [0.0.0.0:0]

   Default value for this option is "0.0.0.0:0".

   This is the application or TCP/IP address and port where the connection is forwarded. For L2CAP connections, use the following format: "L2CAP:host:port".

   Example:

   ```
   192.168.42.1:5001
   /usr/local/bin/myapp
   ```

2. #1 Service UUID [SERIALPORT]

   Default value for this option is "SERIALPORT".

   This configures the Bluetooth profile that is used for connection forwarding. For L2CAP connections, use the following format: "L2CAP:UUID".

   See User's and Developers Guide for supported UUIDs.

3. #1 Service channel [5]

   Default value for this option is "5".

   RFCOMM channel or L2CAP psm for the Bluetooth profile configured in the "Service UUID" configuration.

4. #1 Service name (shown in SDP) [Serial Port]

   Default value for this option is "Serial Port".

   Name shown in Service Discovery.

B.5.1.6. Serial port profile settings

```
Submenu containing the Bluetooth Serial Port Profile settings.

The profile itself is enabled and disabled by switching "serialport"
application "on" or "off" from the menu:
Setup -> Applications -> Default startup applications.
```

1. Act as the calling device [No]

   ```
   Default value for this option is "No".

   Whether this device should act as the calling device (DevA) or the answering
   device (DevB).
   ```

2. BPS rate [115200]

   ```
   Default value for this option is "115200".

   The bits-per-second rate of the connection. Possible values are:
   300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, and 460800.
   ```

3. Data bits [8]

   ```
   Default value for this option is "8".

   The number of data bits in the connection. Possible values are:
   5, 6, 7, and 8.
   ```

4. Parity [0]

   ```
   Default value for this option is "0".

   The parity bit setting of the connection. Possible values are:

   0: No Parity (default)
   1: Odd Parity
   2: Even Parity
   ```

5. Stop bits [1]

   ```
   Default value for this option is "1".

   The number of stop bits in the connection. Possible values are 1 and 2.
   ```

6. Hardware flow control (RTS/CTS) [Yes]

   ```
   Default value for this option is "Yes".

   Whether or not the hardware flow control is used.
   ```

7. Software flow control (XON/XOFF) [No]

   ```
   Default value for this option is "No".

   Whether or not the software flow control is used.
   ```

8. Bluetooth address of the remote device [00:07:80:80:bf:01]

   ```
   Default value for this option is "00:07:80:80:bf:01".

   The Bluetooth address of the device to be contacted. If the local device
   ```

```
is configured as DevA, this is the DevB it tries to connect.
```

9. Service channel [2]

```
Default value for this option is "2".

In DevA (call) mode:   The Bluetooth RFCOMM channel of the remote device.

In DevB (answer) mode: The Bluetooth RFCOMM channel of the local device.
```

10. Service name (shown in SDP) [Serial Port]

```
Default value for this option is "Serial Port".

The name of the Bluetooth Serial Port Profile service shown in the Service
Discovery.
```

11. Optional command line parameters []

```
Default value for this option is empty.

Optional extra parameters for the Access Server Serial Port profile
application. Currently the supported parameters are:

--device dev     Device, if not the user port (/dev/ttyS0 for CF Card)
--msc            Enables transmitting of DCD/DSR Modem Status Control signals.
--nobuffer       Discard data if no Bluetooth connection, do not buffer it.
```

B.5.1.7. Object push profile settings

```
This submenu contains Object Push Profile settings.
```

1. Service channel [3]

```
Default value for this option is "3".

Service channel for Object Push Profile.
```

2. Service name (shown in SDP) [Object Push]

```
Default value for this option is "Object Push".

The name of the Object Push Profile service shown in the Service Discovery.
```

3. Root directory [/tmp/obex]

```
Default value for this option is "/tmp/obex".

Root directory for obexserver application.

The files received with Object Push Profile and File Transfer Profile are
saved into this directory.

Note: "/tmp/obex" is in RAM filesystem and will be erased during reboot.
```

4. Optional parameters for server [--bdaddr $b --prefix $b-$P-]

```
Default value for this option is "--bdaddr $b --prefix $b-$P-".

Optional parameters for obexserver application. See "obexserver --help"
or User's and Developer's Guide for list of parameters.
```

B.5.1.8. File transfer profile settings

```
This submenu contains File Transfer Profile settings.
```

1. Service channel [3]

   ```
   Default value for this option is "3".

   Service channel for File Transfer Profile.
   ```

2. Service name (shown in SDP) [File Transfer]

   ```
   Default value for this option is "File Transfer".

   The name of the File Transfer Profile shown in the Service Discovery.
   ```

3. Root directory [/tmp/obex]

   ```
   Default value for this option is "/tmp/obex".

   Root directory for obexserver application.

   The files received with Object Push Profile and File Transfer Profile are
   saved into this directory.

   Note: "/tmp/obex" is in RAM filesystem and will be erased during reboot.
   ```

4. Optional parameters for server [--bdaddr $b --prefix $b-$P-]

   ```
   Default value for this option is "--bdaddr $b --prefix $b-$P-".

   Optional parameters for obexserver application. See "obexserver --help"
   or User’s and Developer’s Guide for list of parameters.
   ```

B.6. Advanced settings

```
Submenu containing advanced settings of Access Server.
```

1. System startup script [/etc/rc.d/rc.local]

   ```
   This is the last initialization script executed at system startup.

   By default, the script /etc/rc.d/rc.local just turns off all LEDs to
   indicate the startup has finished. If you want to initialize something
   automatically at every boot, or start up your own applications,
   you should add the required commands to this file.

   Remember to start your programs to the background. Example:
   /usr/local/bin/myapp &

   If you do not start the programs to the backgroud, you will not able
   to access the management console using a serial cable.
   ```

2. Default user profile [/etc/profile]

   ```
   Edit the file containing the default user profile settings.
   ```

3. Setup access [/etc/setup.conf]

   ```
   The "/etc/setup.conf" file can be used to give different access rights to
   different users of the WWW Setup.
   ```

```
The file consist of lines in following format:
example.tag +user1 +user2 -user3 -user4

This will allow (+) access to tag "example.tag" for "user1" and "user2"
and denies (-) access from "user3" and "user4". You can find the tags
from the output of
Setup -> Advanced -> System Information -> Collect info for support request

For example, the tag of this setting is advanced.setupconf. If you
have created another user "guest" in /etc/httpd.conf that can access
"/setup", you can deny that user from changing the Setup access settings
with following line in this file:

advanced.setupconf -guest
```

4. Edit other configuration files []

   ```
   From this menu you can edit any files located in Access Server file system.
   You can for example create "/var/spool/cron/crontabs/root" file for
   configuring the cron daemon.
   ```

5. Browse /tmp/obex files [/tmp/obex]

   ```
   Browse files stored in /tmp/obex directory.
   ```

6. Browse all files []

   ```
   Browse all files stored in Access Server.
   ```

7. Find other Access Servers [/usr/sbin/finder]

   ```
   Find other Access Servers in the network.
   ```

8. Upload a software update [/tmp/obex]

   ```
   Upload a software update file (*.wpk).

   Access Server supports a special management packet format (wpk), which
   can be used to update Access Server software components or to install
   custom software and configuration files. Please consult User's and
   Developer's Guide for more information.
   ```

B.6.1. Bluetooth commands

```
This submenu contains advanced Bluetooth commands.
```

1. Inquiry for Bluetooth devices [/usr/bin/btcli inquiry]

   ```
   This command runs a standard inquiry command and lists found devices.
   See User's and Developer's Guide for more information about inquiry.
   ```

2. Set Bluetooth radios to class 1 [/usr/sbin/btclass 1]

   ```
   This commands sets Bluetooth radios to class 1 power levels, max. +20dBm.
   ```

3. Set Bluetooth radios to class 2 [/usr/sbin/btclass 2]

   ```
   This commands sets Bluetooth radios to class 2 power levels, max. +4dBm.
   ```

4. Set Bluetooth radios to class 3 [/usr/sbin/btclass 3]

   ```
   This commands sets Bluetooth radios to class 3 power levels, max. 0dBm.
   ```

B.6.2. System information

```
This submenu contains tools to retrieve system status information.
```

1. Hardware information

   ```
   Displays hardware and software identification information (output of
   command "wrapid").
   ```

2. List installed software components [/usr/bin/dpkg -l]

   ```
   Lists currenty installed software components and their version numbers.
   ```

3. List running processes [/bin/ps ww]

   ```
   Lists running processes (output of command "ps").
   ```

4. List memory status [/usr/bin/free]

   ```
   Lists memory status (output of command "free").
   ```

5. List free disk space [/bin/df -h]

   ```
   Lists free disk space (output of command "df -h").
   ```

6. Show syslog file [/var/log/messages]

   ```
   Shows syslog file.
   ```

7. Show boot log file [/var/log/dmesg]

   ```
   Shows boot log.
   ```

8. Collect info for support request [/usr/sbin/supportinfo]

   ```
   This page contains collectively all the system status and configuration
   information.

   Include this information when sending a support request to
   support@bluegiga.com

   WARNING: All classified information, like passwords, should be automatically
   excluded. It is still recommended to manually check that all such information
   is really removed.
   ```

B.6.3. Reboot system (confirm)

```
Reboot Access Server. Confirmation will be asked.
```

1. Reboot now! [/sbin/reboot]

   ```
   Reboot Access Server immediately!

   WARNING: There is no confirmation for this!
   ```

B.7. Summary of Setup Options

```
Security settings
    Root password                         [buffy]
    Setup password                        [buffy]
    iWRAP password                        [buffy]
    Allow local clients without password  [Yes]
    Bluetooth PIN code                    []
```

```
    Root user password for FTP            [buffy]
    Allow anonymous FTP login             [Yes]
    wpkgd autoinstall password            []
    wpkgd hotplug password                []

Generic settings
    Root password                         [buffy]
    Description of this unit              [Access Server #1611280191]
    Use local syslog service              [Yes]
    Size of syslog file                   [63]
    Number of rotated syslog files        [3]
    IP address of the remote syslog server          [192.168.42.1]
    Swap to NFS server                    [No]
    Hostname and directory for NFS swap   [swap.localdomain:/var/swap]
    NFS swap size in megabytes            [64]
    System clock tick                     [10000]
    System clock frequency                [0]
    Set system clock                      [No]
    Year                                  [2007]
    Month                                 [7]
    Day of month                          [19]
    Hour                                  [11]
    Minute                                [17]
    Second                                [16]

Network settings
    Hostname of the unit                  [wrap]
    Domain of the unit                    [localdomain]
    Default interface settings
        Use dynamic network configuration           [Yes]
        IP address                        [192.168.42.3]
        Subnet mask                       [255.255.255.0]
        IP address of the default gateway           [192.168.42.254]
        List of name server IPs           [192.168.42.1 192.168.42.2]
    Enable Ethernet cable interface       [Yes]
    Ethernet cable settings
        Assign to default interface       [Yes]
        Use dynamic network configuration           [Yes]
        IP address                        [192.168.43.3]
        Subnet mask                       [255.255.255.0]
    Enable Wi-Fi interface                [Yes]
    Wi-Fi settings
        Act as a Wi-Fi Access Point       [No]
        ESSID                             []
        Nickname                          []
        WEP encryption key                []
        Extra commands for Access Point mode        [/etc/sysconfig/ifup-wlan0]
        Assign to default interface       [No]
        Use dynamic network configuration           [Yes]
        IP address                        [192.168.44.3]
        Subnet mask                       [255.255.255.0]
    Enable GPRS interface                 [No]
    GPRS settings
```

```
            Dial on demand                    [Yes]
            SIM card PIN code                 []
            Username                          [blue]
            Password                          [giga]
            Internet APN                      [internet]
            Extra parameters for pppd         []
        Time server (rdate)                   []
        Update current time now (ntp)         [/sbin/service ntpd sync]
        Zeroconf interface                    [nap]

    Applications
        Default startup applications          []
        FTP server settings
            Root user password                [buffy]
            Root user directory               [/]
            Root user instances               [5]
            Allow anonymous login             [Yes]
            Anonymous user password           [*]
            Anonymous user directory          [/tmp/obex]
            Anonymous user instances          [5]
            Allow anonymous user to do everything       [No]
            Allow anonymous user to download  [Yes]
            Allow anonymous user to upload    [No]
            Allow anonymous user to overwrite           [No]
            Allow anonymous user to multiple login      [No]
            Allow anonymous user to erase     [No]
            Edit configuration file           [/etc/ftpd.conf]
        ObexSender settings
            Bluetooth friendly name           [W$S_$p]
            Minimum RSSI value before sending           [-80]
            Whitelist RSSI limit              [0]
            Require pairing                   [No]
            Timeouts and delays
                Delay between inquiries       [10]
                Delay between reply scans     [10]
                If previous was ok, timeout before sending again  [36000]
                If previous was fail, timeout before sending again          [86400]
                Delay between retrying call   [120]
                Delay after scanning          [5]
                Tester delay                  [60]
                Pair expire timeout           [0]
            Logging
                Logfile name                  [-]
                Log prefix                    [-]
                If sending was failure, log it too      [Yes]
                Verbosity level               [0]
                Block list save delay         [0]
                Block list file name          [/var/lib/obexsender/blocklist.dump]
            Delete non-matching requests      [Yes]
            Register to watchdog daemon       [Yes]
            Upload a new file                 [/usr/local/obexsender/files]
            List files                        [/usr/local/obexsender/files]
            Edit configuration file           [/etc/obexsender.conf]
            Inquiry and calculate hash        [/usr/sbin/obexsender-hash --download]
            Restart ObexSender                [/sbin/service obexsender restart]
            View log                          [-]
            Delete log (confirm)
                Delete log now!               [/bin/false]
        Connector settings
            Delay between calls               [20]
            Logfile name                      [-]
            Register to watchdog daemon       [Yes]
            Verbosity level                   [0]
            Edit configuration file           [/etc/connector.conf]
            #1 Bdaddr                         [-]
            #1 Channel                        [-]
            #1 Command                        [-]
        wpkgd settings
            wpkgd's autoinstall directory     [@]
            Password for autoinstall packages           []
            Delete processed autoinstall packages       [Yes]
            Process hotplug packages          [Yes]
            Password for hotplug packages     []
            Delete processed hotplug packages           [No]
            Extra parameters for wpkgd        []
        SMS gateway settings
            Modem device                      [/dev/ttyS0]
            Log file name                     [-]
            SMSC number                       [+358405202000]
            Edit configuration file           [/etc/smsgw.conf]

    iWRAP settings
        iWRAP password                        [buffy]
        Allow local clients without password  [Yes]
        Friendly name                         [W$S_$p]
        Connectable and discoverable mode     [3]
        Master/slave role switch policy       [1]
        Default PIN code                      []
        Power save mode and parameters        [4]
        Use literal replies in SDP            [Yes]
        Optional command line parameters      []
        Edit startup script                   [/etc/bluetooth.conf]
        Bluetooth profiles
            Enable Device ID profile          [Yes]
            Enable LAN access profile         [No]
            LAN access profile settings
                Login name and password       []
                Service channel               [4]
                Service name (shown in SDP)   [LAN Access]
                Defaultroute modification policy        [0]
                First IP for LAP clients      [192.168.160.0]
            Enable PAN user profile           [No]
            PAN user profile settings
                Service name (shown in SDP)   [PAN User]
                Enable zeroconf when calling  [No]
                Enable zeroconf when answering          [No]
            Enable PAN generic networking profile       [No]
            PAN generic networking profile settings
                Service name (shown in SDP)   [Generic Networking]
                Use dynamic network configuration for local IP address      [No]
                Local GN interface IP address           [192.168.161.1]
                Local GN interface subnet mask          [255.255.255.0]
                Start DHCP server for remote users      [Yes]
                First IP for lease block      [192.168.161.2]
                Last IP for lease block       [192.168.161.254]
                Subnet of lease block         [255.255.255.0]
                Lease time                    [86400]
            Enable PAN network access point profile     [No]
            PAN network access point profile settings
                Service name (shown in SDP)   [Network Access]
            Connection forwarding
                #1 Command                    [0.0.0.0:0]
                #1 Service UUID               [SERIALPORT]
                #1 Service channel            [5]
                #1 Service name (shown in SDP)          [Serial Port]
            Serial port profile settings
                Act as the calling device     [No]
                BPS rate                      [115200]
                Data bits                     [8]
                Parity                        [0]
                Stop bits                     [1]
                Hardware flow control (RTS/CTS)         [Yes]
                Software flow control (XON/XOFF)        [No]
                Bluetooth address of the remote device  [00:07:80:80:bf:01]
                Service channel               [2]
                Service name (shown in SDP)   [Serial Port]
                Optional command line parameters        []
            Enable object push profile        [Yes]
            Object push profile settings
                Service channel               [3]
                Service name (shown in SDP)   [Object Push]
                Root directory                [/tmp/obex]
                Optional parameters for server          [--bdaddr $b --prefix $b-$P-]
            Enable file transfer profile      [Yes]
            File transfer profile settings
                Service channel               [3]
                Service name (shown in SDP)   [File Transfer]
                Root directory                [/tmp/obex]
                Optional parameters for server          [--bdaddr $b --prefix $b-$P-]

    Advanced settings
        System startup script                 [/etc/rc.d/rc.local]
        Default user profile                  [/etc/profile]
        Setup access                          [/etc/setup.conf]
        Edit other configuration files        []
        Browse /tmp/obex files                [/tmp/obex]
        Browse all files                      []
        Find other Access Servers             [/usr/sbin/finder]
        Upload a software update              [/tmp/obex]
```

```
Bluetooth commands
    Inquiry for Bluetooth devices     [/usr/bin/btcli inquiry]
    Set Bluetooth radios to class 1   [/usr/sbin/btclass 1]
    Set Bluetooth radios to class 2   [/usr/sbin/btclass 2]
    Set Bluetooth radios to class 3   [/usr/sbin/btclass 3]
System information
    Hardware information
    List installed software components          [/usr/bin/dpkg -l]
    List running processes            [/bin/ps ww]
    List memory status                [/usr/bin/free]
    List free disk space              [/bin/df -h]
    Show syslog file                  [/var/log/messages]
    Show boot log file                [/var/log/dmesg]
    Collect info for support request  [/usr/sbin/supportinfo]
Reboot system (confirm)
    Reboot now!                       [/sbin/reboot]
```

Appendix C. Open Source Software Licenses

Some Access Server software components are licensed under the terms and conditions of one or more open source licenses, listed in Table C-1 below.

License Appreviation	Description	URL
CMU/UCD	Carnegie Mellon University & Regents of the University of California's BSD style license (in net-snmp)	
GPL1	GNU General Public License Version 1, February 1989	http://www.fsf.org/licenses/info/GPLv1.html
GPL2	GNU General Public License Version 2, June 1991	http://www.opensource.org/licenses/gpl-license.php
GPL2+	GNU General Public License Version 2 or later	http://www.opensource.org/licenses/gpl-license.php
LGPL2	GNU Library General Public License Version 2, June 1991	http://www.gnu.org/copyleft/lgpl.html
LGPL2.1	GNU Lesser General Public License Version 2.1, February 1999	http://www.opensource.org/licenses/lgpl-license.php
BSD	Revised BSD License (without the advertising clause)	http://www.opensource.org/licenses/bsd-license.php
BSDorig	Original BSD License (with the advertising clause)	http://www.fsf.org/licenses/info/BSD_4Clause.html
MIT	MIT License (only one version exist, also known as X11 style license)	
MPL1.1	Mozilla Public License Version 1.1	http://www.mozilla.org/MPL/
OpenSSL	OpenSSL License (similar to BSDorig)	http://www.openssl.org/source/license.html
SSLeay	SSLeay License (similar to BSDorig)	http://www.openssl.org/source/license.html
ZLIB	ZLIB License (only one version exist)	http://www.gzip.org/zlib/zlib_license.html

Table C-1. Open Source Licenses in Access Server Software Components

The details of the open source software components and the license under which they are distributed are listed below in Table C-2. Software components not listed are licensed under Bluegiga's License Agreement.

Software Component	Version	License	Source URL
Das U-Boot	1.0.0 and git-060720	GPL2	http://sourceforge.net/projects/u-boot/
The bootloader. Initialized system, holds system configuration, loads and launches the Linux kernel.			

Software Component	Version	License	Source URL
Kernel			
Linux kernel	2.6.17	GPL2	http://www.kernel.org/
The Access Server kernel, responsible for resource allocation, low-level hardware interfaces, security etc.			
kernel at91 patches	2.6.17	GPL2	http://maxim.org.za/AT91RM9200/2.6/
ARM-Linux patches for the Linux kernel.			
Userland			
bash	2.05b	GPL1 & GPL2	http://www.gnu.org/software/bash/bash.html
GNU Project's Bourne Again SHell, interactive shell with Bourne shell syntax.			
binutils	2.15	GPL2 & LGPL2	http://www.gnu.org/software/binutils/
GNU Binutils, collection of binary tools, like GNU linker and GNU assembler.			
bluez-hcidump	1.32	GPL2	http://www.bluez.org/
Bluetooth packet analyzer			
bluez-libs	3.7	GPL2	http://www.bluez.org/
Bluetooth libraries needed by bluez-hcidump			
bridge-utils	1.2	GPL2	http://bridge.sourceforge.net/
Linux Ethernet bridging utilities, needed to manage bridging for WRAP Bluetooth PAN profiles and WLAN Access Point functionality.			
busybox	1.3.1	GPL2	http://www.busybox.net/
Provides tens of general userland utilities.			
bzip2	1.0.3	GPLorig	http://www.bzip.org/
Compression library.			
cifs-client	3.0.24	GPL2+	
Mount helper utility for Linux CIFS VFS client			
dosfstools	2.11	GPL2	ftp://ftp.uni-erlangen.de/pub/Linux/LOCAL/dosfstools/
DOS filesystem utils.			
crosstool	0.42	GPL2	http://kegel.com/crosstool/
GCC build script.			
e3	2.6.2	GPL2	http://www.sax.de/~adlibit/
Small text editor with different keybindings.			
ed	0.2	GPL2	http://www.gnu.org/software/ed/ed.html
An 8-bit clean, POSIX-compliant line editor.			
gcc	3.4.5	GPL2 & LGPL2	http://gcc.gnu.org/
GNU C/C++ compiler and related tools.			

Software Component	Version	License	Source URL
gdb	6.4	GPL2 & LGPL2	http://www.gnu.org/software/gdb/gdb.html
GNU debugger.			
glibc	2.3.6	GPL2 & LGPL2.1	http://www.gnu.org/software/libc/libc.html
GNU C Library.			
hostapd	0.5.7	GPL2	http://hostap.epitest.fi/
Utility programs for WPA and RSN authenticator.			
hostap-utils	0.4.7	GPL2	http://hostap.epitest.fi/
Utility programs for managing hostap-driver.			
iptables	1.3.6	GPL2	http://www.netfilter.org/
Administration tool for the Linux kernel IP packet filter.			
lighttpd	1.4.15	BSD	http://www.lighttpd.net/
Secure, fast, compliant, flexible and small memory footprint http server			
make	3.81	GPL2	http://www.gnu.org/software/make/
The Make.			
maradns	1.2.0.07.6	BSD	http://www.maradns.org/
DNS server.			
libpcap	0.9.5	BSD	http://www.tcpdump.org/
Provides portable framework for low-level network monitoring. Needed by tcpdump.			
lrzsz	0.12.20	GPL2	http://www.ohse.de/uwe/software/lrzsz.html
Provides X/Y/Zmodem download/upload tools.			
ncurses	5.5	MIT	http://www.gnu.org/software/ncurses/ncurses.html
Library for displaying and updating text on text-only terminals.			
netkit-ftp	0.17	BSDorig	ftp://ftp.uk.linux.org/pub/linux/Networking/netkit/
FTP client application.			
net-snmp	5.2.rc4	CMU/USD & BSD	http://www.net-snmp.org/
Suite of applications used to implement SNMP v1, SNMP v2c and SNMP v3 using both IPv4 and IPv6.			
openntpd	3.9p1	BSD	http://www.openntpd.org/
NTP (RFC-1305) client and server.			
openssl	0.9.8c	OpenSSL & SSLeay	http://www.openssl.org/
Toolkit implementing SSL v2/v3, TLS v1 and general purpose cryptography library.			
openssh	4.5p1	BSD	http://www.openssh.com/

Software Component	**Version**	**License**	**Source URL**
OpenSSH suite; server and client utilities.			
openvpn	2.0.8	GPL2	http://openvpn.net/
An Open Source VPN daemon.			
pcmciautils	014	GPL2	http://kernel.org/pub/linux/utils/ kernel/pcmcia/pcmcia.html
A suite of userspace tools for PCMCIA support in the Linux 2.6 kernel.			
perl	5.8.8	GPL2	http://www.perl.org/
A programming language.			
picocom	1.4	GPL2	http://efault.net/npat/hacks/picocom/
Minimal dumb-terminal emulation program.			
ppp	2.4.3	BSD & BSDorig & GPL2 & ZLIB	http://ppp.samba.org/
Point-to-Point Protocol userland driver.			
ppp-dhcpc	for pppd 2.4.2	GPL2	ben at netservers.co.uk
DHCP plugin for PPP.			
readline	4.3	GPL2	http://cnswww.cns.cwru.edu/php/ chet/readline/rltop.html
GNU Readline library, providing set of functions for use by applications that allow users to edit command lines as they are typed in.			
screen	4.0.2	GPL2	http://www.gnu.org/software/screen/
Screen is a full-screen window manager that multiplexes a physical terminal between several processes, typically interactive shells.			
strace	4.5.14	GPL2	http://www.liacs.nl/~wichert/strace/
System call trace, i.e. a debugging tool.			
stupid-ftpd	1.4beta	GPL2	http://stupid-ftpd.sourceforge.net/
Simple FTP server.			
sysfsutils	2.0.0	GPL2	http://linux-diag.sourceforge.net/Sysfsutils.html
These are a set of utilites built upon sysfs, a new virtual filesystem in Linux kernel versions 2.5+ that exposes a system's device tree.			
termcap	2.0.8	GPL2	https://www.redhat.com/fedora/
Basic system library needed to access the termcap database.			
tftp-hpa	0.42	BSD	http://www.kernel.org/pub/software/ network/tftp/
TFTP client and server.			
tcpdump	3.9.5	BSD	http://www.tcpdump.org/

Software Component	Version	License	Source URL
Utility to monitor network traffic.			
wireless_tools	28	GPL2	http://www.hpl.hp.com/personal/Jean_Tourrilhes/Linux/Tools.html
Package containing utilities to manage Wireless LAN specific parameters.			
wpa_supplicant	0.5.7	GPL2	http://hostap.epitest.fi/
Utility programs for WPA and RSN supplicant.			
zd1211-driver	r83	GPL2	http://zd1211.ath.cx/
ZyDAS ZD1211 802.11b/g USB WLAN chipset Linux drivers.			
zlib	1.2.3	ZLIB	http://www.gzip.org/zlib/
General purpose compression library.			

Table C-2. Access Server Open Source Software Components and Their Licences

Appendix D. Supported Hardware

Connector	Type	Card	Note
CF	GPRS	Enfora GSM/GPRS Compact Flash Card (GSM 0110)	Multislot class 8.
CF	GPRS	Anycom GS-320 Tri-Band GPRS CF Card	Multislot class 10.
CF	GPRS	AudioVox RTM 8000	Multislot class 8, "same" HW as Fujitsu.
CF	GPRS	Fujitsu Siemens Connect2Air 3GSM	Multislot class 8, "same" HW as Audiovox.
CF	GPS	Pretec CompactGPS™	
CF	WiFi	Ambicom Wireless CompactFlash Card (WL1100C-CF)	Supports both client and access point modes
CF	WiFi	D-Link Air Wireless Network DCF-660W	Seen shipping with 1.7.4 firmware (can be access point without upgrade)
CF	WiFi	Linksys Instant Wireless WCF-12	
CF	WiFi	SMC Networks WLAN EZ Connect	Does not support firmware upgrade
CF	Memory	Any vendor	If you find a card that does not work, please contact `<support@bluegiga.com>`.
USB	EDGE/GPRS/GSM	Falcom Samba 75	Seen as modem device `/dev/ttyACM0`
USB	Memory	Any vendor	If you find a dongle that does not work, please contact `<support@bluegiga.com>`.

Table D-1. Supported Hardware by Access Server