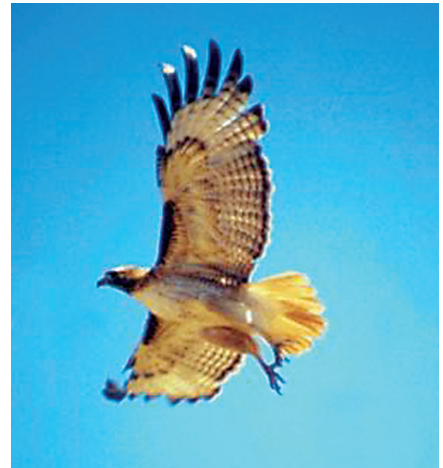## Wireless LAN with 54 MBit/s to IEEE 802.11g standard

# Air Power

The IEEE 802.11g wireless standard should run at half the speed of a wired Ethernet while maintaining compatibility to 11 Mbit/s 802.11b devices. Linux Magazine tested a 54 Mbit/s card. Read on to find out if the claims are true, and for a description of setting up the card on Linux. **BY MIRKO DÖLLE**

**W**ireless LAN is convenient, but enterprises and organizations still tend to opt for 2.4 GHz, IEEE 802.11b standard cards when upgrading laptops or mobile devices. One major disadvantage of this approach is the low data transfer rate of 11 MBit/s, especially when one considers that, at the most, half of that bandwidth is available for the data payload, assuming perfect reception conditions. And if you need to transfer higher volumes of data back and forth to the fileserver, the WLAN bottleneck will be particularly noticeable.

Doubling the bandwidth to 22 Mbit/s looked promising at first. But this extension was proprietary, and only Texas Instruments was able to supply WLAN chips with this capability. IEEE 802.11a, which runs at a nominal 54 MBit/s is even quicker, but these devices use the 5 GHz frequency band, and this would require operators to migrate their entire wireless infrastructure. Also, the range drops drastically to achieve this speed.

IEEE 802.11g devices provide a more useful solution. They are downwardly compatible to 802.11b and use the 2,4 GHz frequency range, but more channels than the comparable 11 Mbit/s technology, and can thus achieve a gross data transfer rate of 54 Mbit/s. Of course this restricts you to four 802.11g networks on a single site, assuming 13 WLAN channels.

Extraneous 802.11b networks in the same reception area can also be an obstacle to 54 Mbit/s devices. In the worst case, the slower networks will occupy the available channels, preventing channel bundling from providing more bandwidth. Bluetooth devices, which also occupy the 2.4 GHz frequency range can also be an obstacle.

Shortly before this issue went to press, Linux Magazine tested the SMC2835W PC card (see Figure 1), which has SMC's Inter-

sil Prism Duette chipset. We used an SMC2804WBR WLAN Access Router as the access point.

### Special Kernel Configuration

Once more, the manufacturer left it to the Linux Community to provide Linux drivers for the Intersil Prism Duette Chipset. You can download them from Luis Rodriguez' homepage at [1]. Kernel 2.4 and 2.6 integration is in progress, but the current patches are for developers only, and as could be expected, did not work in our lab.

In contrast to this, the PCMCIA card services with added Prism Duette driver support, which are also available from Rodriguez' homepage at [2], worked fine. Some preparation work is required before you can install the card services on your distribution. For example, you need to disable kernel-based PCMCIA and cardbus support in *General setup |*



Figure 1: SMC's SMC2835W 54 MBit/s WLAN card costs a mere $US 60, and can be used on both IEEE 802.11b and IEEE 802.11g networks. Giving you the choice of when to upgarde the rest of your network. The Prism Duette chipset is supported by the extended PCMCIA card services.



Figure 2: The SMC2804WBR Wireless Access Router includes an internal switch with four Ethernet ports, and a 10/100 Mbit Ethernet port for DSL or network attachment. The firmware provides both packet filtering and a firewall, and a Web front-end for administration tasks

## SMC2835W PC Card and SMC2804WBR Access Router

| | |
|---|---|
| **Description:** | PC-Card (Cardbus) and Wireless Access Router to IEEE 802.11g spec. with 54 MBit/s (gross) |
| **WLAN standards:** | IEEE 802.11b and 802.11g |
| **Encryption:** | WEP 64/128 Bit, Wi-Fi Protected Access (WPA), IEEE 802.1x |
| **Chipset (PC-Card):** | Intersil Prism Duette |
| **Connectors (Router):** | 1 WAN (10/100 MBit/s), 4 Switches (10/100 MBit/s), 2 SMA (antenna), mains adapter |
| **Special features (router):** | Packet Filter, DSL and Ethernet router with NAT, DHCP server, Web front-end |
| **Price:** | PC Card: approx. US$ 60 |
| **Router:** | approx. US$ 125 |

*PCMCIA/CardBus support | PCMCIA/CardBus support*, and then re-compile Linux. Following the developers' recommendations, we used the plain vanilla kernel 2.4.22 in our lab.

### New PCMCIA Card Services

You will need to replace the PCMCIA card services supplied by your distributor with version 3.2.4 from [2]. The simplest way of doing this is to unpack the sources (again from [2]) in the */usr/src* directory and then use *make config all install* to install. This will overwrite your distribution's card services.

The advantage this approach provides is that your distribution's package manager will still recognize the card services as being installed, and not kick up a fuss, when you install packages with PCMCIA card service dependencies later. On the other hand, using your package manager to de-install or update the PCMCIA card services may cause some issues, as some traces of the package may not be removed cleanly.

To provide an absolutely clean approach, you might prefer to remove the older card services before installing the new version. Your only other alternative would be to create a RPM or Debian package of your own – this is a tidy, but time-consuming approach.

### Configuration

The configuration file for the SMC card's WLAN parameters is called */etc/pcmcia/wireless.opts*: Listing 1 shows a typical configuration for non-encrypted operations. Line 3 contains the first 3 bytes of the MAC address, *00:04:E2:*, in colon-separated, hexadecimal notation. This allows you to add different configu-

rations for cards from different manufacturers to your *wireless.opts* file.

Of course, this is not necessary for a single WLAN card. You can leave out the first 3 bytes in this case. On the other hand, this would allow you to specify the MAC address more precisely if you had IEEE 802.11a and 802.11g cards from the same manufacturer and needed different WLAN configurations. After you insert the card, the card services use the Wireless Tools [3], which should be included with any recent distribution, to set the parameters you specified.

### Card Calling Base Camp

The first contact between the card and the SMC2804WBR Wireless Access Router was a little strange. Although we had configured the WLAN card to use the IP address 192.168.2.109, and the

### Listing 1: Excerpt from *wireless.opts*

```
01 case "$ADDRESS" in
02 03 *,*,*,00:04:E2 )
04 INFO="SMC EZ Connect g ⤵
(SMC2835W)"
05 ESSID="SMC"
06 NWID=""
07 MODE="Managed"
08 FREQ=""
09 CHANNEL=""
10 SENS=""
11 RATE="auto"
12 # KEY="0102-0304-0506-0708-⤵
090a-0b0c-0d"
13 RTS=""
14 FRAG=""
15 IWCONFIG=""
16 IWSPY=""
17 IWPRIV="set_port3 1" 18 ;;
```

Access Router was set to 192.168.2.1 by default, the router did not respond when pinged.

In fact, we had to issue a DHCP request, which caused the Access Router to assign the WLAN card the IP 192.168.2.101, before the router would respond to ping packets. It appears that the Access Router uses an Access Control List when its DHCP server is enabled, and that the DHCP server populates this list.

As was to be expected, the FTP data transfer rate was around 22 MBit/s, measured at a distance of about 2 meters between the two devices. But this is not necessarily the last word, as faster (and slower) transfer rates may be possible, depending on ambient conditions.

### An All Round Solution?

IEEE 802.11g access points are unlikely to achieve maximum performance in city center hotspots. There are simply too many slower WLANs around for that. But this technology is interesting for use in office buildings where little or no external interference occurs. 802.11b access points can be reconfigured or replaced to prevent them hogging the available channels, and your workstations will not notice the transition from IEEE 802.11b to 802.11g as the latter is downwardly compatible.

At US$ 60 for the PC card and US$ 125 for the router, prices are not far above the level of 11 Mbit/s devices, and that makes this technology well worth looking into if you are planning to invest. Having said that, 54 Mbit/s WLANs cannot, at present, be seen as a fully fledged replacement for your tried and trusted wired Ethernet. The transfer rate is just about twice what coaxial Cheapernet provides. So, for the time being at least, it does make sense to keep those file-servers wired.  ∎

### INFO

[1] Driver and documentation for the Prism-Duette-Chipset: *http://ruslug.rutgers.edu/~mcgrof/802.11g*

[2] Extended version of the PCMCIA-Cardservices: *http://ruslug.rutgers.edu/~mcgrof/802.11g/packages/ISL3890-0.1.0.tar.gz*

[3] Wireless Tools : *http://www.hpl.hp.com/personal/Jean_Tourrilhes/Linux/Tools.html*