Remote Control for Network Devices

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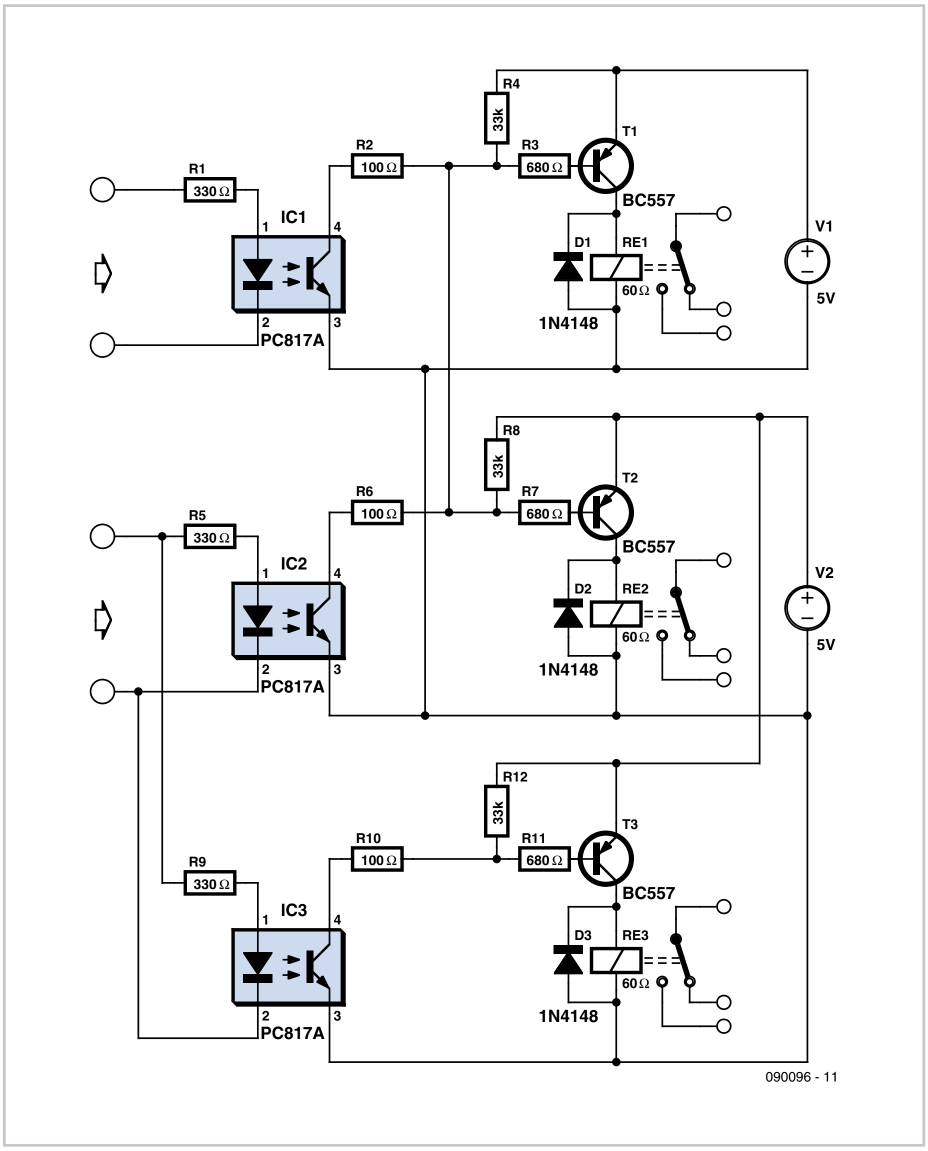
Many devices connected to a local area network (LAN) are left on continuously, even when they are not needed, including DSL and cable modems, routers, wireless access points, networked hard drives, printer servers and printers. The power consumption of all these devices can add up to a considerable fraction of one's electricity bill. With the simple circuit described here we can ensure that all these devices are only powered up when at least one selected host device (such as a PC or a streaming media client) is turned on. We insert a relay in the mains supply to the devices whose power is to be switched, along with a driver circuit controlled from the host device over a two-wire bus. Optocouplers provide galvanic isolation. One way to implement the bus is to use the spare pair of conductors that is often available in the existing LAN cable.



The circuit diagram shows an example configuration where there are two controlling host devices (a streaming media client and a PC) and three network devices (a DSL router, a networked hard drive and a networked printer). We will assume that all the media files are held on the networked hard drive. The DSL router (to provide an internet connection) and the hard drive are to be powered up when either the PC or the media client is powered up; the printer only when the PC is powered up.

We can think of the devices as being in two groups, the first group consisting of the DSL router and the hard drive, the second just the printer. An optocoupler is powered from each of the controlling host devices: these ensure that the devices are isolated from one another and from the rest of the circuit. The relay circuit, located close to the networked devices, is controlled from the outputs of the optocouplers. The relay circuits are powered from (efficient) mains adaptors: modified mobile phone chargers do an admirable job.

In the circuit shown a 5 V supply from the controlling devices is used to drive each optocoupler. Host 1 (the streaming client) drives optocoupler IC1, host 2 (the PC) drives optocouplers IC2 and IC3.

Optocouplers IC1 and IC2 both control the networked devices in group 1: networked device 1 is the DSL router, switched by relay RE1, and networked device 2 is the hard drive, switched by relay RE2.

Optocoupler IC3 controls the networked device in group 2, namely the printer. This is switched by relay RE3.

The connections between the optocouplers and the relay stages can be thought of as a kind of bus for each group of devices. The devices in a given group can be switched on by simply shorting its bus, and this gives an easy way to test the set-up. Resistors R2, R6 and R10 at the collectors of the transistors in the optocouplers protect them in case power should accidentally be applied to the bus.

The supply voltages V1 and V2 shown in the example circuit diagram are derived from the mains adaptors as mentioned above and are used to power the relays. We have assumed that the networked hard drive and the printer are located near to one another, and so it is possible to use a single mains adaptor to provide both voltages. Another possibility would be to add a third wire to the bus to carry power: this would allow all relays, wherever they were located, to be powered from a single supply.

It is worth noting that network attached storage (NAS) devices such as networked hard drives normally require an orderly shutdown process before power is removed. Devices that use Ximeta's NDAS technology do not suffer from this problem.

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