ETRX2 and ETRX357 Wireless Mesh Networking Modules

Application Note – Accessing Modules over the Internet

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1 Introduction

The serial port of the ETRX2 and ETRX357 modules can be connected to an Ethernet network via a suitable adaptor such as a Lantronix XPort Direct+, which is the basis of the EAP-E device. It is then simple to communicate with the module, either using a HyperTerminal connection directly to its IP address or by using the Lantronix COM Port Redirector to map the IP address to a virtual COM port.

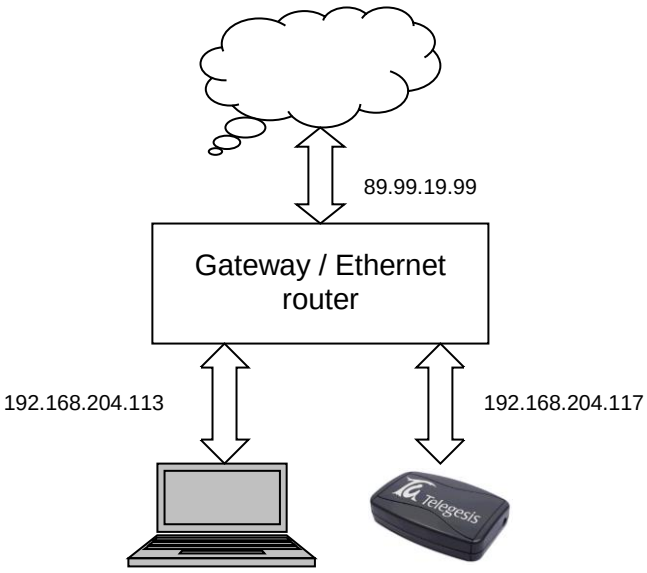
This is straightforward on a local sub-net, but it is less clear how to achieve this over longer range. This note describes the general principles of configuring a gateway such as a broadband router so that a local PC can connect to a remote EAP and open a TCP connection. Aspects such as firewall security and creating a web server are beyond the scope of this note, which just details the first steps in forming a simple connection from a PC to a remote EAP. It gives examples using a typical domestic gateway device (a Thomson ST546) but others will be similar.

This application note was originally written with regard to the EAP-E Ethernet Access Point which is now obsolete, but the same principles apply to its replacement, the Communications Gateway.

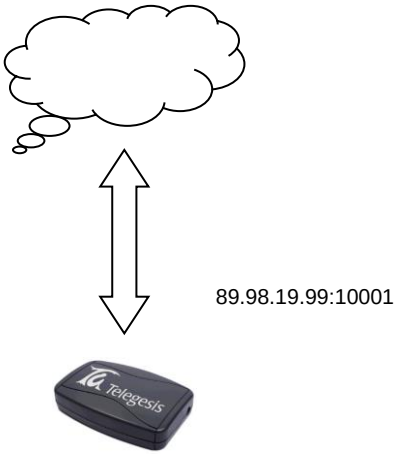
2 Obstacles

Gateway devices use Network Address Translation (NAT) to hide the local network from public view. Local devices acquire an IP address from the gateway/router which are typically 192.168.x.x for a private network, but the gateway translates this to its own address assigned by the Internet Service Provider. In this way the gateway can provide a firewall which hides the local devices and only allows incoming packets in response to an outgoing request, and it allows multiple PCs to access the Internet while the ISP only has to provide a single IP address.

The difficulty is then that an EAP gets an IP address from the gateway but a remote user has no way of connecting to it directly. A solution is to drill a hole in the gateway's firewall by using port forwarding (or port mapping). In this way, packets addressed to a specific port or range of ports of the gateway are always routed to the EAP. A remote user then just needs the IP address of the gateway and the relevant port number.



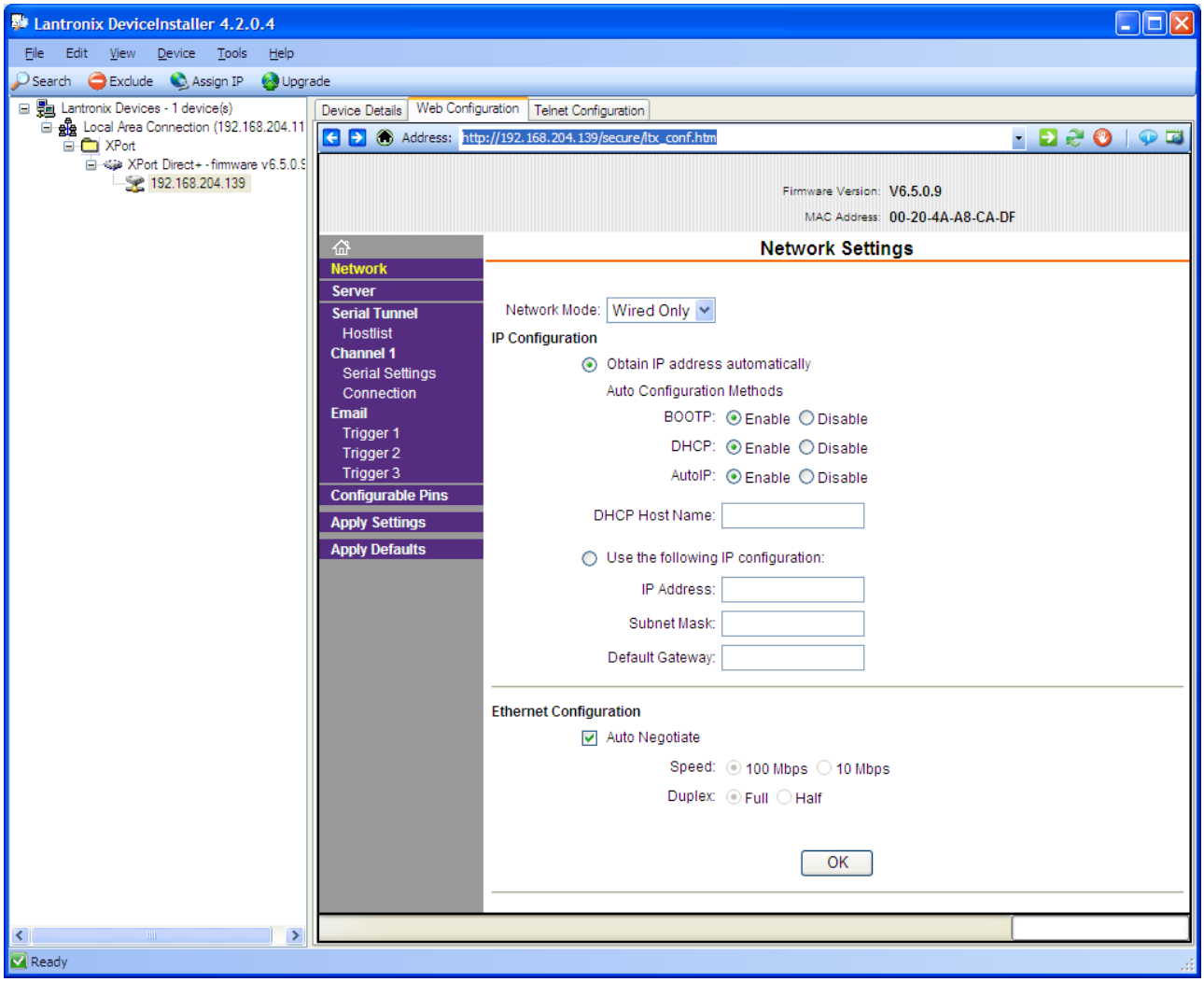
1. Network devices with example addresses



2. EAP after port mapping

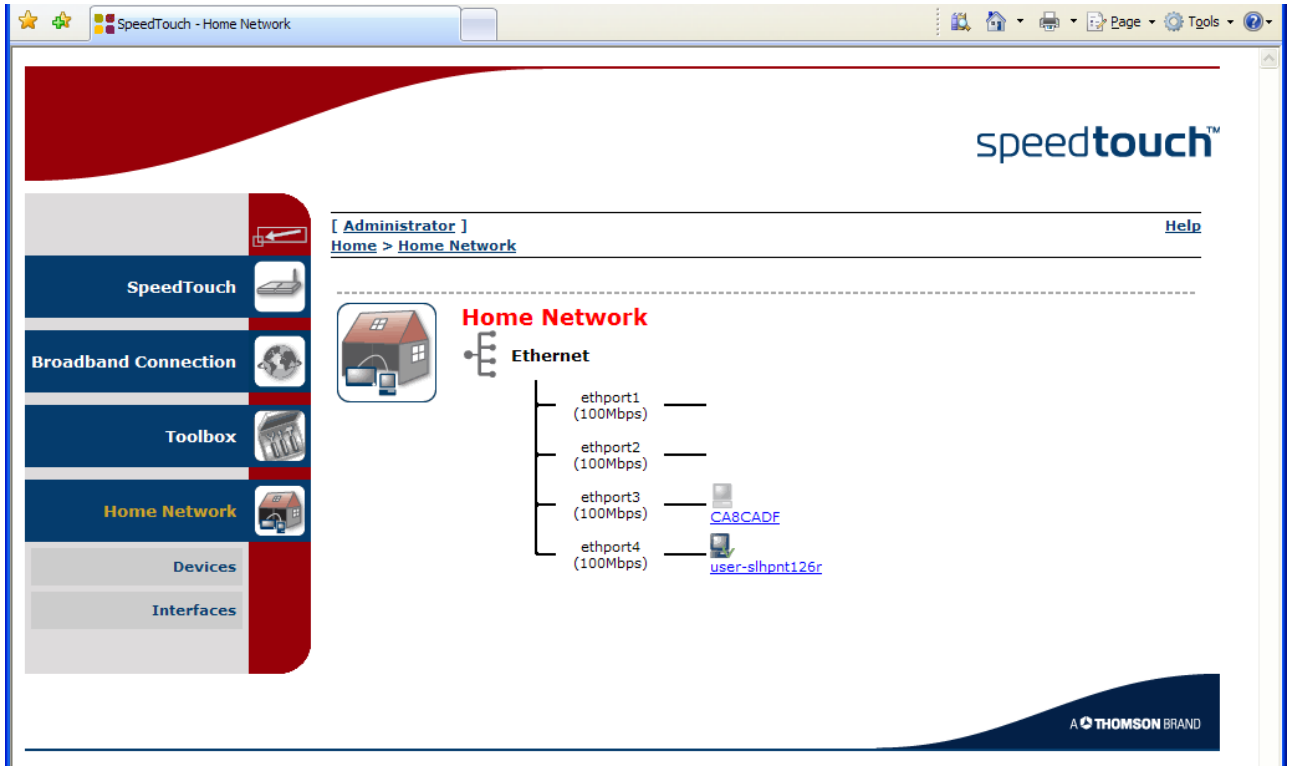
3 Configuring a gateway

First it is necessary to know the local IP address and port number of the EAP. The standard port number is 10001 for a Lantronix XPort Direct+. The EAP is usually configured to use DHCP and will acquire its IP address from the gateway/router, and it is important to ensure that this does not change. The address can often be obtained from the maintenance web pages of the router, which often allows you to fix the address. Otherwise the EAP can be configured to use static IP addressing; the Lantronix Device Installer tool is the easiest to use since it can discover the devices and report their IP address. It allows you to change the device settings via Telnet or a web browser, and the web page for the address settings look like this:



3. EAP address settings

The exact procedure for setting up port mapping on your gateway depends on the model, but it will usually start by accessing the maintenance pages from a web browser. For example, a particular Thomson gateway displays a map of the local network:



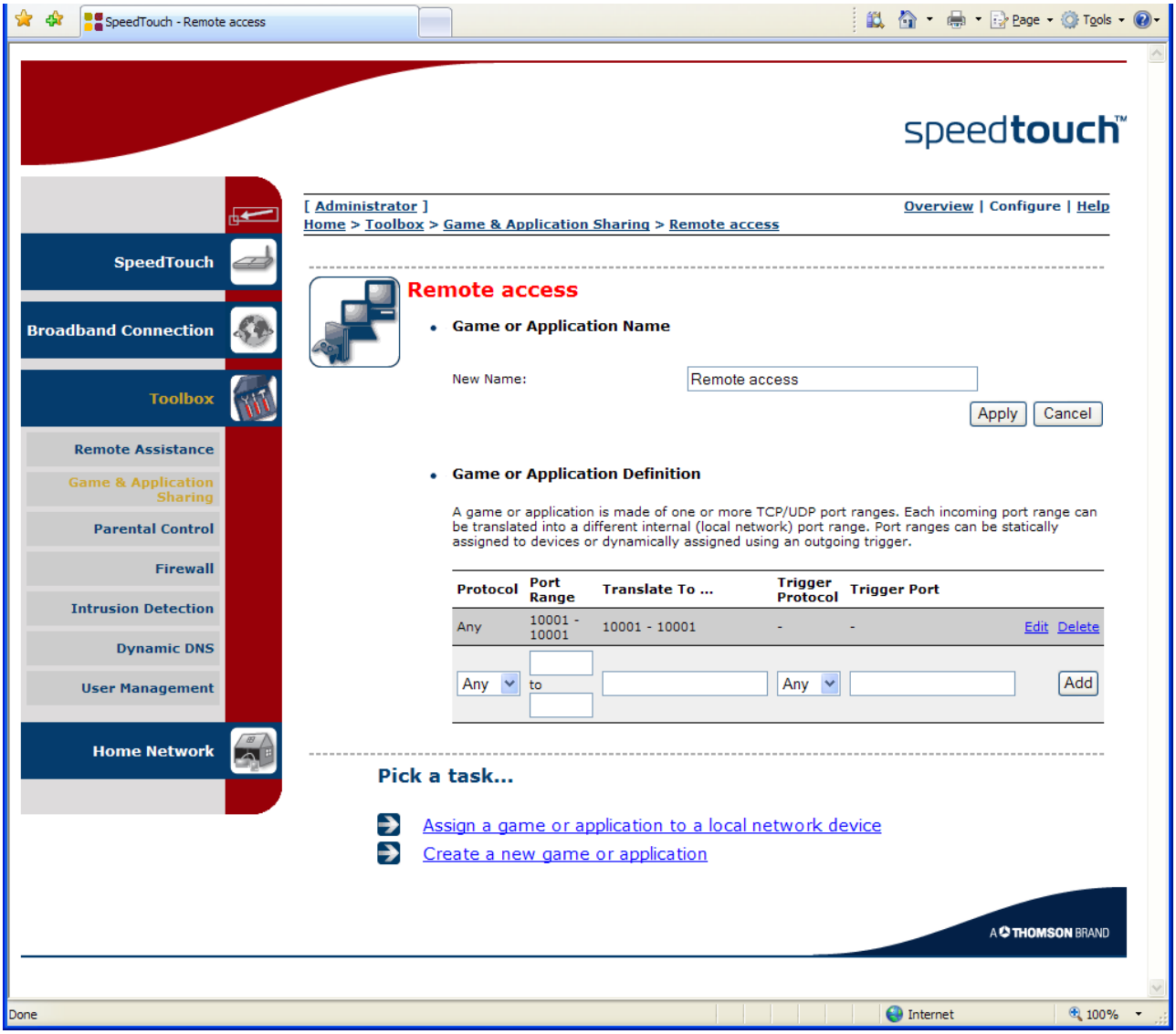
4. Local network map

It has assigned the name CA8CADF to an EAP based on the MAC address of the Lantronix module. Clicking on that device icon brings up all the relevant information including its IP address.

Port forwarding may be described in different ways such as “Port Mapping”, “Gaming” or “Application Sharing” but the end result is the same. There is likely to be a predefined set of mapping rules for various applications but it is simpler to add a new one. There will be typically three stages to this:

1. Create a new rule and give it a name

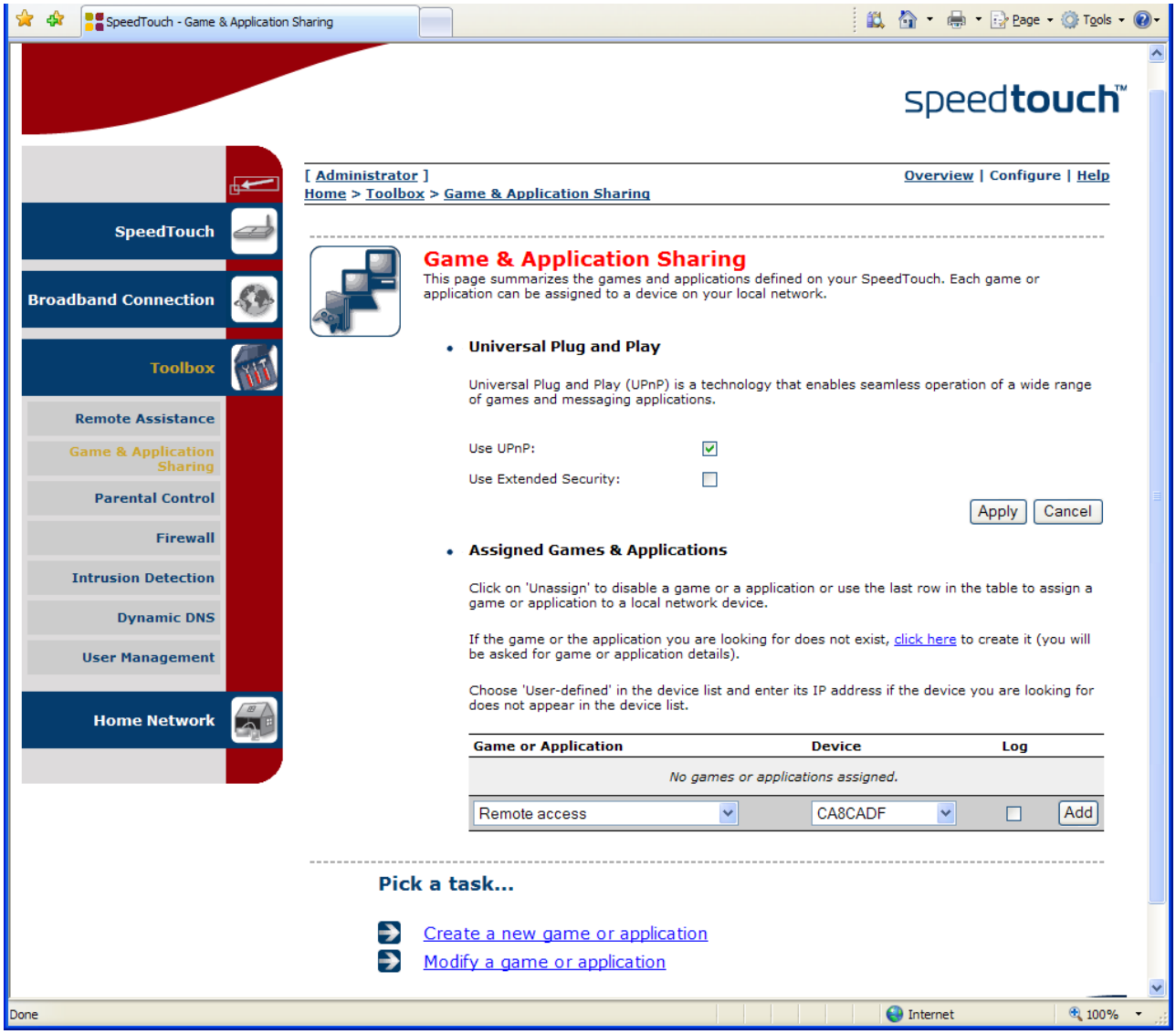
2. Define the mapping rule for the port or range of ports. Port 10001 is not used very much on the Internet so it should be safe to retain the same port number on the public and private sides of the gateway. On the Thomson example there is a form to define the port mapping (the map in this instance has already been defined; this is the page to edit it but it is essentially the same):



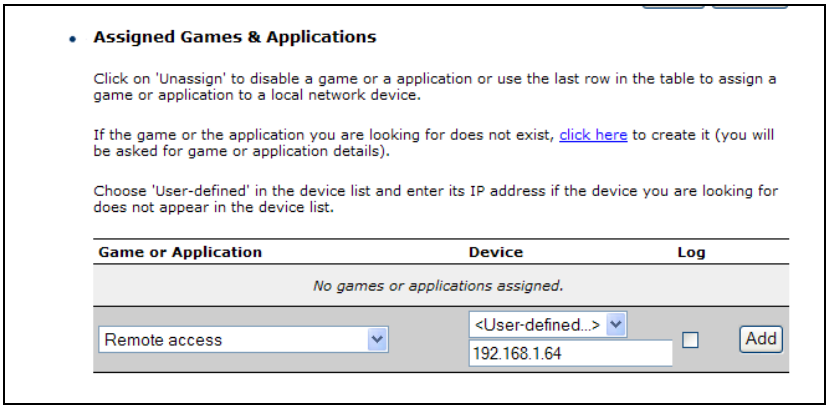
5. Port mapping rule

At this stage the mapping rule is not assigned to any particular device.

3. Define the local device to which the rule applies. This will involve selecting it from a list of discovered devices (figure 6) or by typing in the EAP's IP address (figure 7):



6. Assign rule to a discovered device



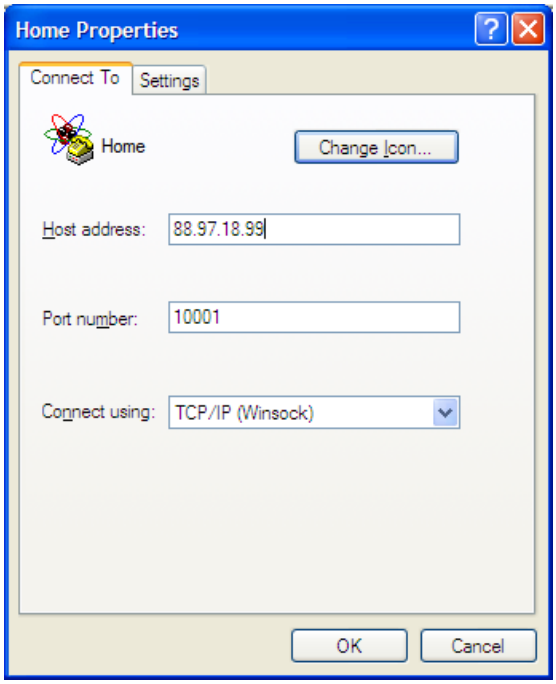
7. Assign rule to an IP address

Finally, note the IP address that the gateway uses on its public side. This is unlikely to change over a few days, but you could use a dynamic DNS service to track the changes. Consult the manual of your gateway for more details.

You should now be ready to access the EAP from the outside world.

4 Communicating with the EAP

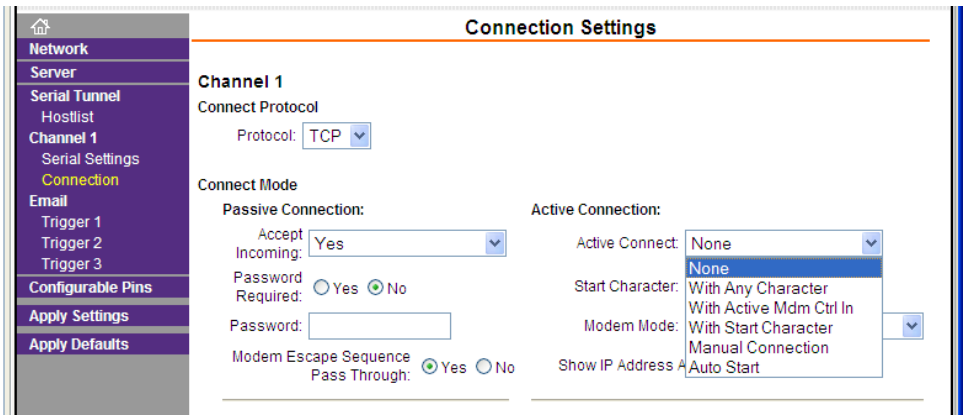
Telegesis Terminal may be suitable as the latest version can access IP addresses. HyperTerminal works if you have it on your machine (for some reason Microsoft dropped it after Windows XP), otherwise use your favourite terminal application or a basic tool such as Telnet. In HyperTerminal, start by creating a new connection and enter the connection data:



The host address is obviously the public IP address of your gateway. The connection should then open automatically and you can type in the commands appropriate to the ZigBee firmware – the AT command set of the R3xx firmware for example, or start receiving data from a device programmed to transmit automatically.

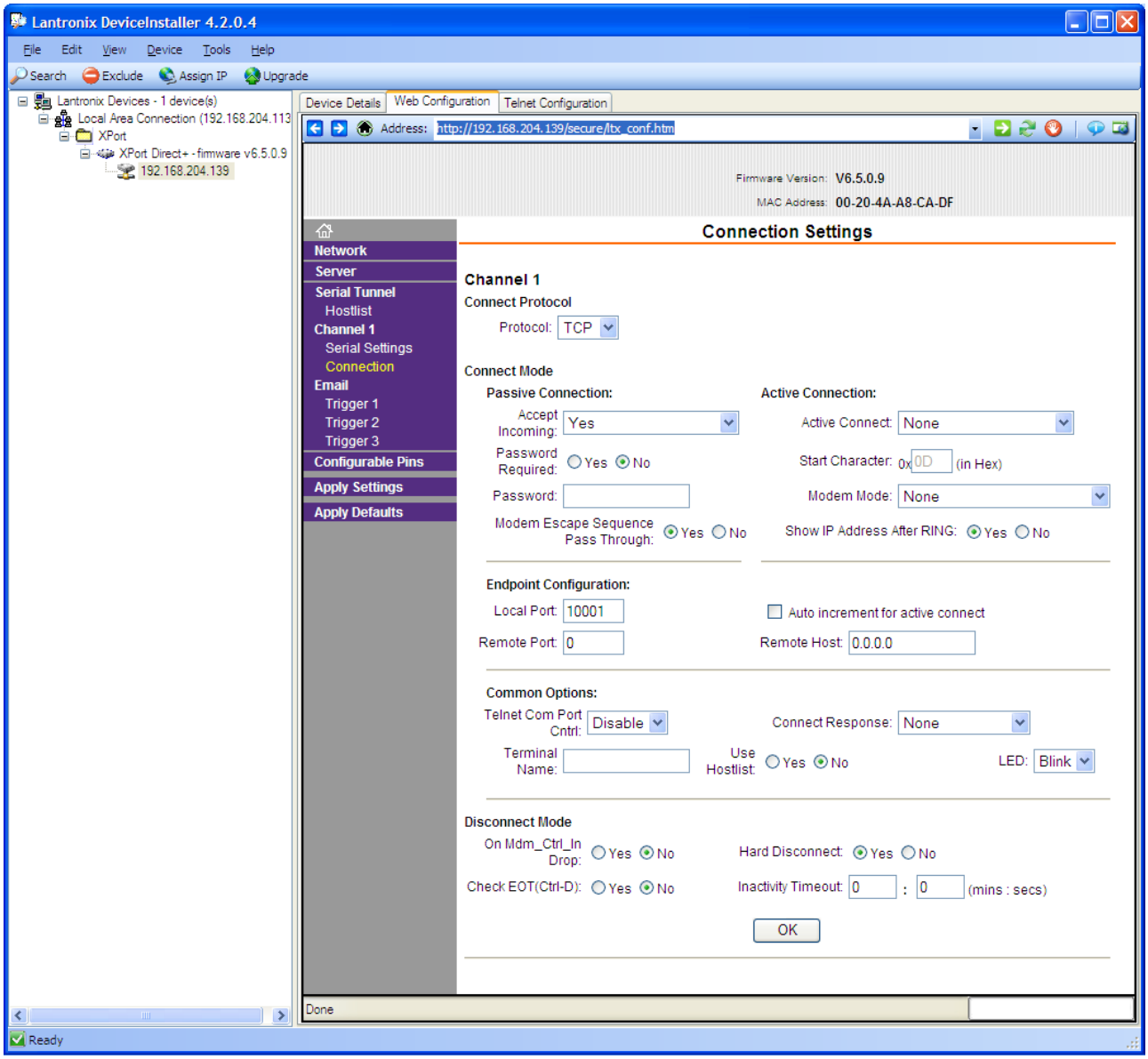
5 Outgoing connections from an EAP

The Lantronix Direct+ module by default accepts any incoming request for a connection, but is otherwise idle. Instead, you can set it to open a connection when it starts up:



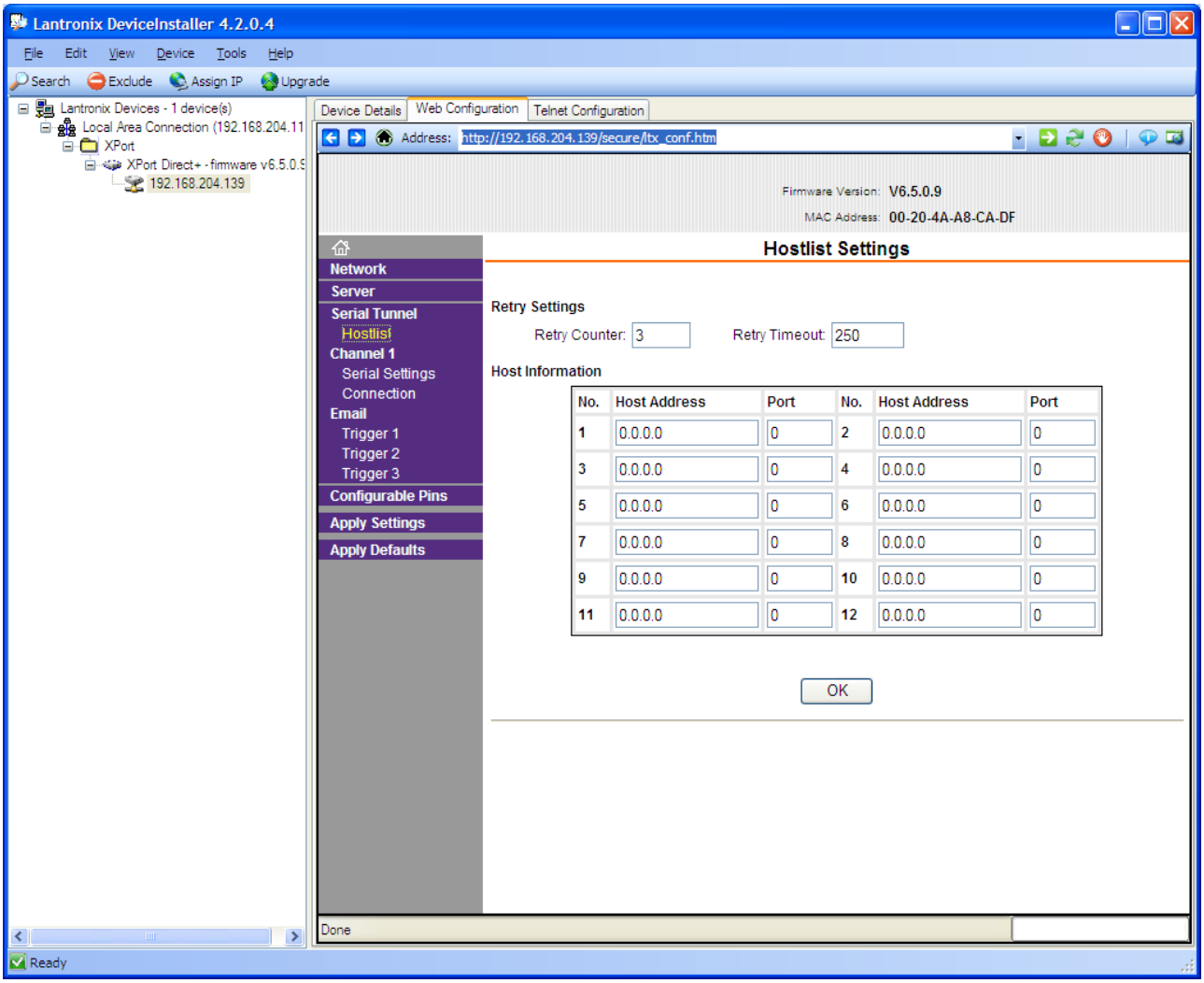
8. Opening an automatic connection

This connection can be a single address, listed here as “Remote host”:



9. Ethernet connection settings

Alternatively you can create a hostlist and the EAP will connect to the first available address:

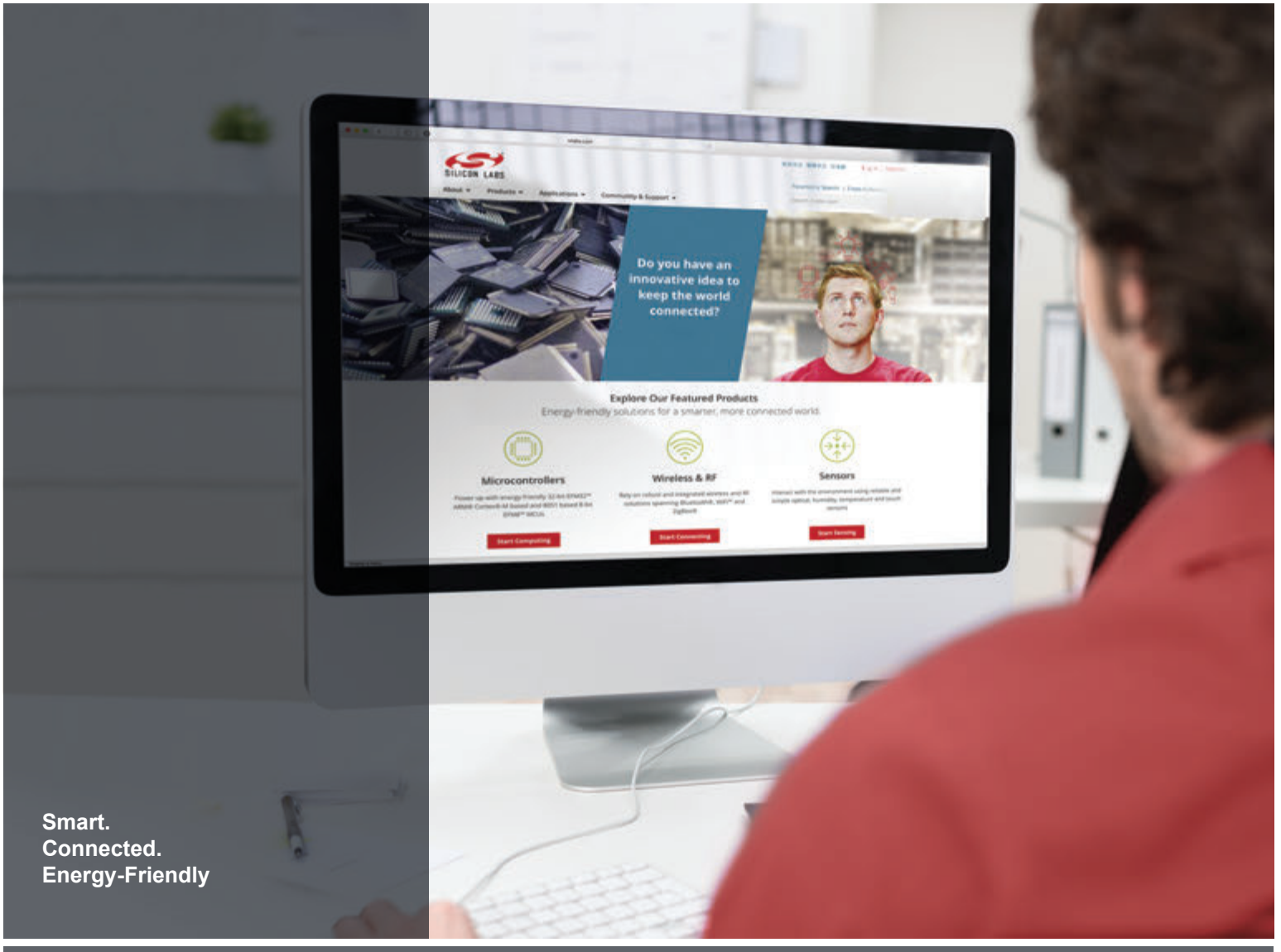


10. Hostlist

Consult the latest user guide for the full details, which is currently downloadable from www.lantronix.com/support/downloads/?p=XPORTDIRECTPLS

6 Warning

Putting a hole in your gateway's firewall has possible security implications which are outside the scope of this note. A malicious port scanner could exploit this hole, but it would only be able to access the EAP unit. There may be critical ZigBee systems where this is not acceptable, but this note is only an introduction to setting up a simple link.



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