REMOTE LAB

Practical Exercise 38

Managed Switch Configuration

Version 1.0

Hardware List:			
Switch	Weidmuller IE-SW-M-Wave		
Software List:			
MIB Browser	ManageEngine MibBrowser		
Remote Lab PC:	RL1	Remote Lab Type:	A

Remote Lab Type: A - EIT PC with hardware
Remote Lab Type: B - EIT PC with Simulation Software
Remote Lab Type: C - Cloud PC with software
Remote Lab Type: D - Student/Home PC

Created By:	Deon R	Date:	28/10/13
Checked By:	Edwin W	Date:	15/11/13
Released on:	18/11/13	Next Review Date:	

EIT ENGINEERING INSTITUTE OF TECHNOLOGY

1. Objectives

In this exercise we will perform basic configuration and diagnostics on a Weidmuller IE-SW-M-Wave managed switch. These include:

- Checking the IP configuration
- Setting up a trunk
- Mirroring a port
- Setting up a VLAN
- Performing basic diagnostics with SNMP

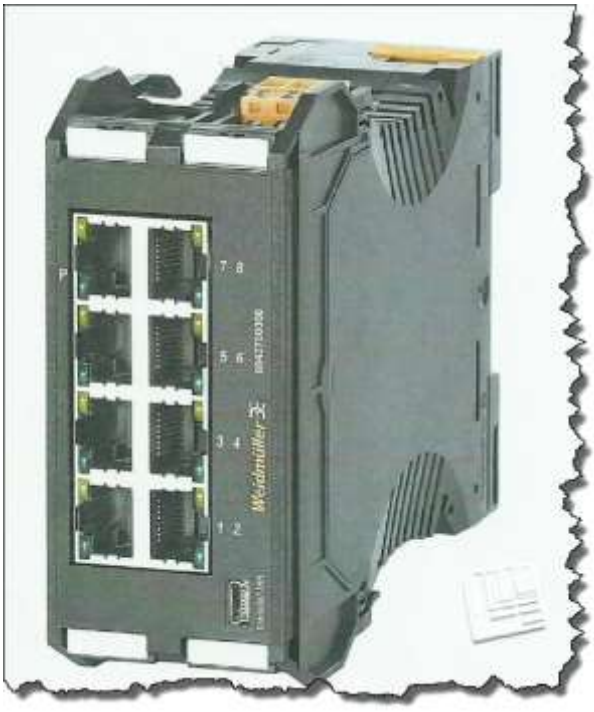
NB Whereas it is possible to follow the instructions in this document blindly without understanding the underlying theory, very little learning will take place. We therefore recommend that you first familiarize yourself with this assignment before logging into thr Remote Lab, and where necessary consult the manual (*IE-SW-M-Wave.pdf)* just as you would do in the actual workplace.

2. Background

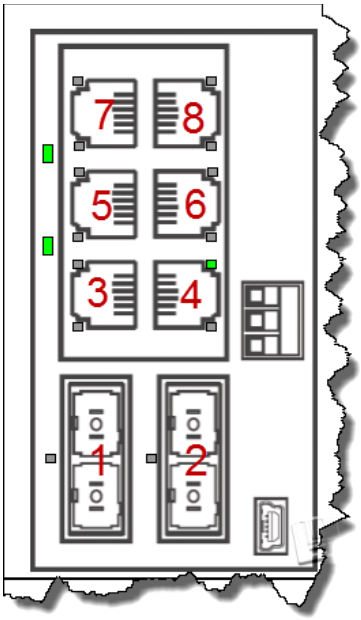
The Weidmueller IE-SW-M-Wave is an 8-port managed switch with port trunking, VLAN, Rapid Ring and other capabilities.

You may refer to para 1.2 on p8 of the switch manual for an overview of its functionality.

The figure below shows a generic version of the switch (8x RJ-45) and comes from the front page of the manual. Note the numbering of the ports.



For this paricular exercise we will use a version with 2 fiber ports (SC) and 6 copper ports (RJ-45) as per the following figure. The port numbering scheme remains unchanged. The Remote Lab 1 computer is connected to port 4, which will serve as our management port.



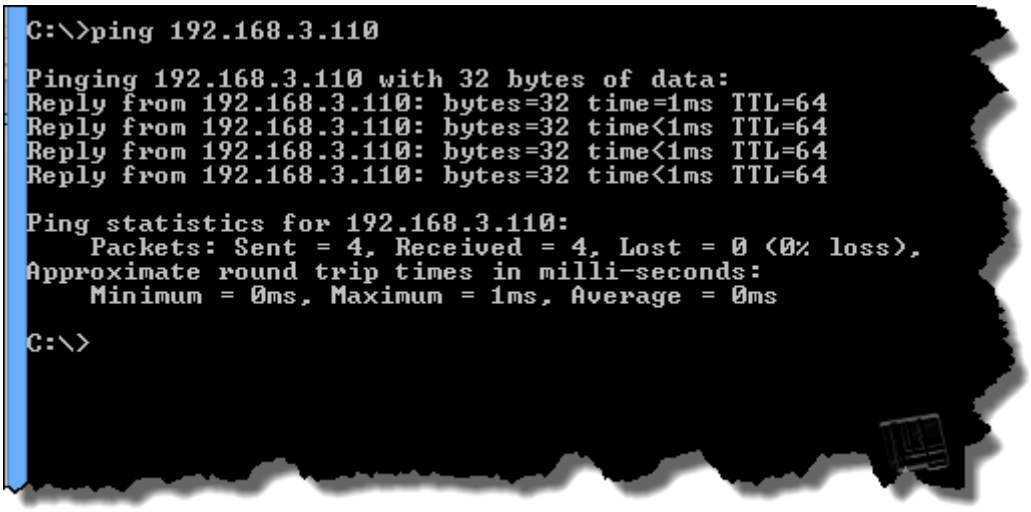
Also refer to the photograph below. This depicts the actual switch in the Remote Lab. Notice the Cat5e flylead connecting the switch with the Remote Lab computer. On one side of the switch you will see the 24V power supply (with the bright green LED), and on the other side is a Weidmuller IE-ARM industrial router, not used for this particular exercise.

3. Instructions

3.1 Logging into the switch

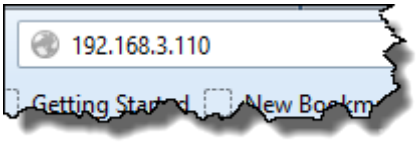
Log into the Electromeet and open Remote Lab 1.

Ping the switch to ensure that it is present on the lab network. Note the IP address of the switch, below. The factory default IP address is 192.168.1.110, but this has been changed to 192.168.3.110.

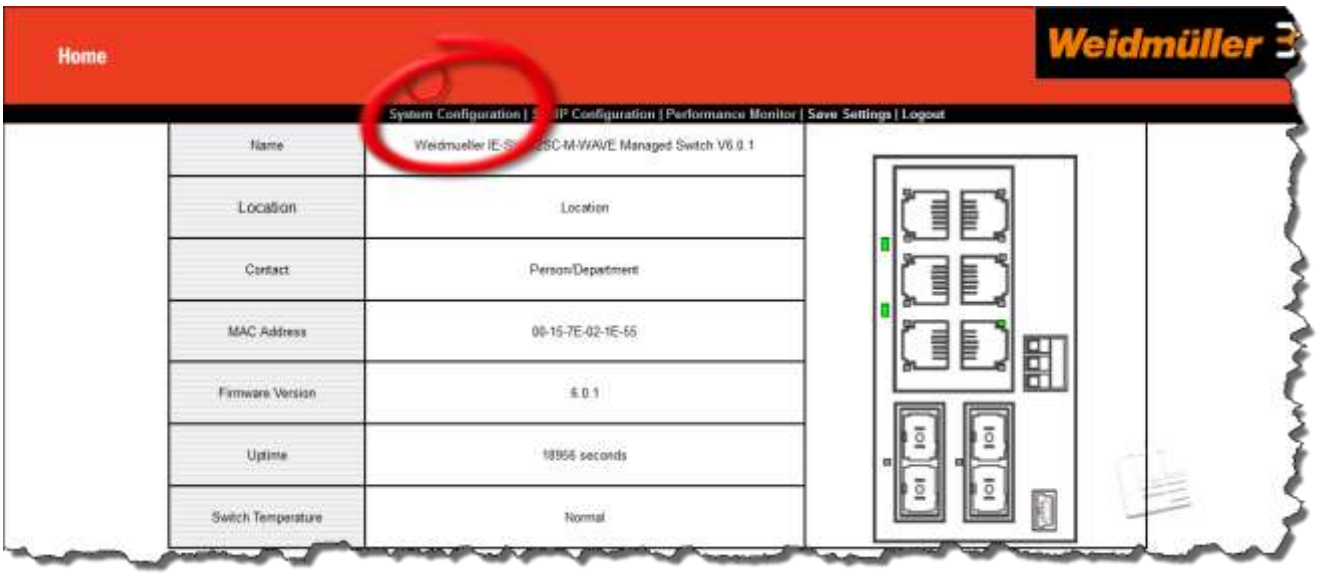


Unlike the Cisco router in Exercise 39 that uses Telnet for configuration via its Ethernet port, this device uses a browser (as in the case of ADSL routers and most wireless Access Points). This switch can also be configured via its USB port connected to the serial port of the configuring PC (with a suitable cable and driver software) and a utility such as PuTTY, in which case the Web interface cannot be used.

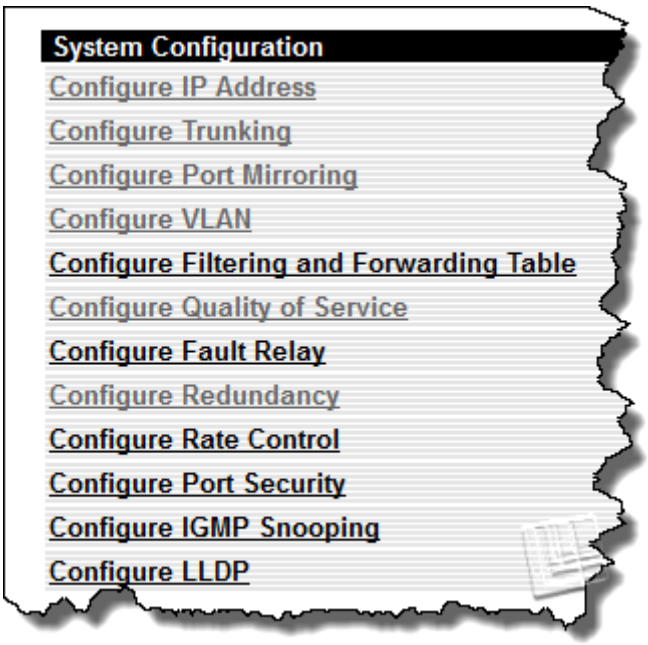
Now open the browser (Internet Explorer) and type the IP address of the switch in the search bar. No need for 'http://'.



When prompted, enter username `admin` and password `detmold`. The home page of the firmware will open. Be patient of the characters you type don't want to 'echo'.



Click on `System Configuration.`



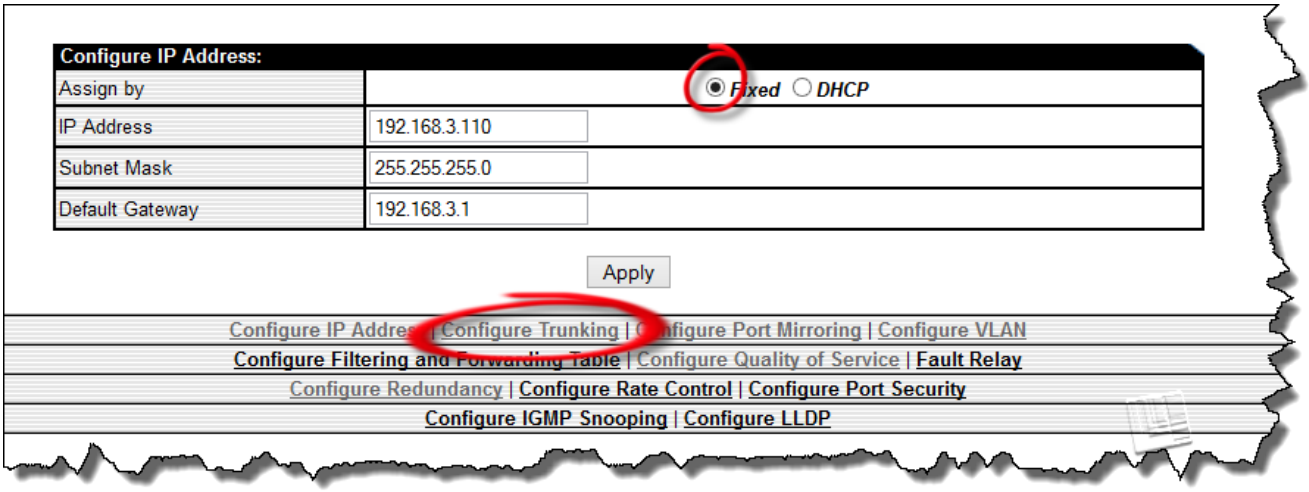
3.2 Checking IP Address Configuration

PLEASE DO NOT CHANGE THE IP ADDRESS OR ANY OTHER SETTINGS

We are not going to touch this setting, but there is no harm in having a quick look. Click on `Configure IP Address` (first item in the System Configuration menu). The IP configuration page will open.

In the screenshot below, note the fixed IP address of 192.168.3.110 with subnet mask 255.255.255.0

TAKE A SCREENSHOT OF THIS IMAGE ON YOUR COMPUTER SCREEN. We will refer to it as Figure 38.1.

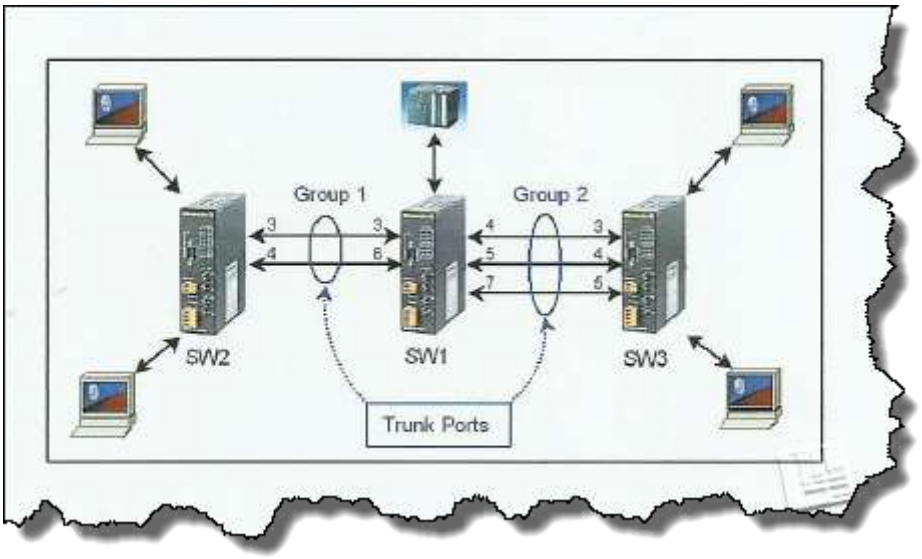


From here (see the red circle above) we can go to Port Trunking. Note that you do not have to go back to the main manu to access other functions, as the menu is repeated on every page, as in the screenshot above.

3.3 Trunking

PLEASE DO NOT SAVE ANY SETTINGS

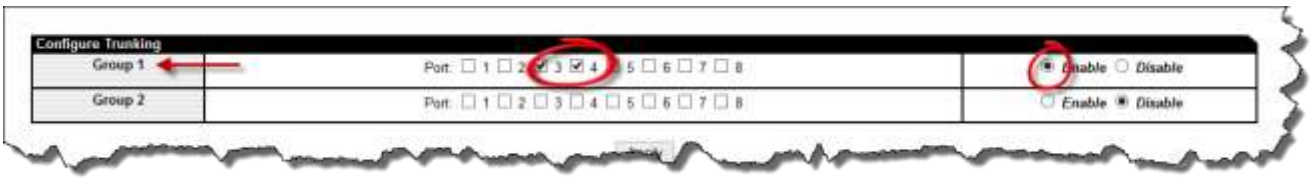
If you are not familiar with trunking, first read section 4.1 on pages 14, 15 and 16 in the switch manual to obtain a better understanding of the trunking concept. Refer to the figure on p14, reproduced here.



For the sake of simplicity we are going to assume that 'our' switch is SW2 in the figure above, hence we are only going to configure one group (Group 1) consisting of ports 3 and 4. That's it! In real life we would now click 'Apply', and also proceed to configure trunking on SW3 and SW4. The creation of a trunk from SW2 to SW3 gives us a 200 Mbps data rate between the switches in Group 1. It also creates redundancy in case one of the links fail.

Create a 'Group1' for ports 3 and 4, and set the 'enable' radio button.

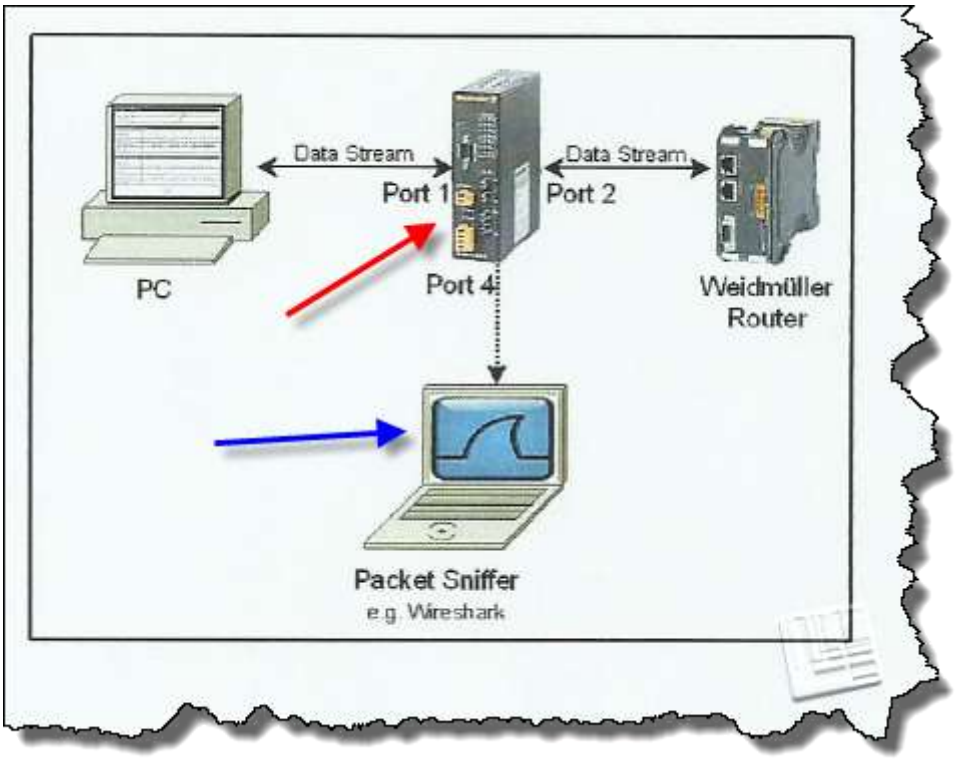
TAKE A SCREENSHOT OF THIS IMAGE ON YOUR COMPUTER SCREEN. We will refer to it as Figure 38.2.



3.4 Port Mirroring

PLEASE DO NOT SAVE ANY SETTINGS

If you are not familiar with the idea of port mirroring, first read section 4.2 on pages 16 thru 19 in the switch manual to obtain a better understanding of the concept. Refer to the following figure (from p16 in the manual).



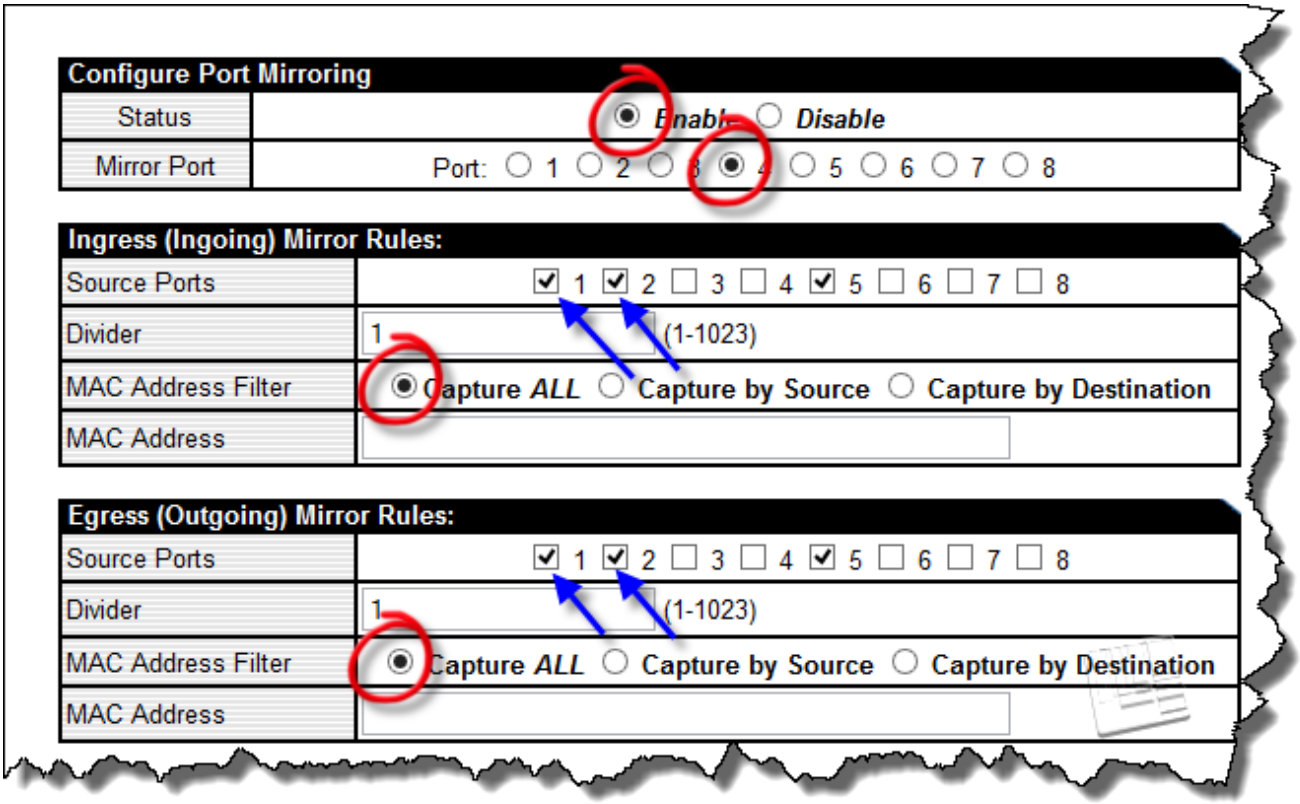
In the figure above you are logged into the 'Packet Sniffer' (RL1) running Wireshark (blue arrow), and you are connected to the managed switch (Red arrow). The other PC and the router are not connected at present, but imagine that they are connected to ports 1 and 2 as per the figure.

The problem is that Wireshark would not 'see' any traffic between the PC and the router, because of the way in which a switch operates. The solution is to mirror ports 1 and 2 to port 4. Note the following:

- We can mirror any ports we want to
- We can set various 'filters', as follows:
    - We can set rules for both traffic going into the switch (ingress) and traffic going out of it (egress)
    - We can capture all packets, or filter on source/destination MAC address (entered in hex without colons or dashes)
    - In cases of very heavy traffic we can set a 'divider' so we do ot capure all packets and overload the switch in the process.

In the following example we are mirroring ports 1 and 2 onto port 4, with no filters.

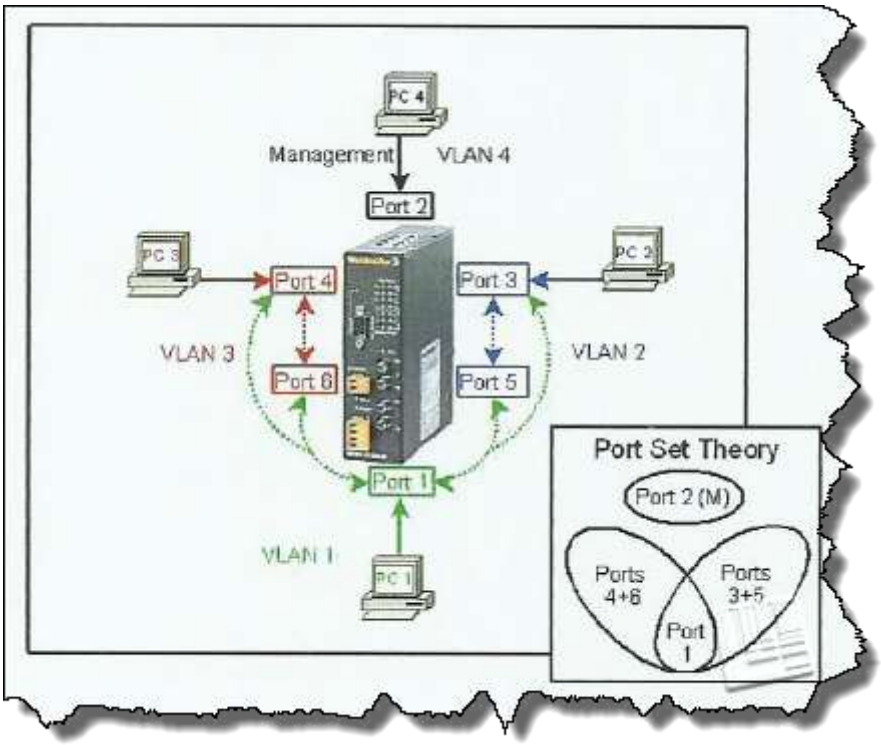
TAKE A SCREENSHOT OF THIS IMAGE ON YOUR COMPUTER SCREEN. We will refer to it as Figure 38.3.



3.5 Virtual LAN (VLAN)

PLEASE DO NOT SAVE ANY SETTINGS

First read section 4.2 on pages 19 thru 23 in the switch manual. Refer to the following figure on p21. You may want to read it several times to 'get the hang of it'.

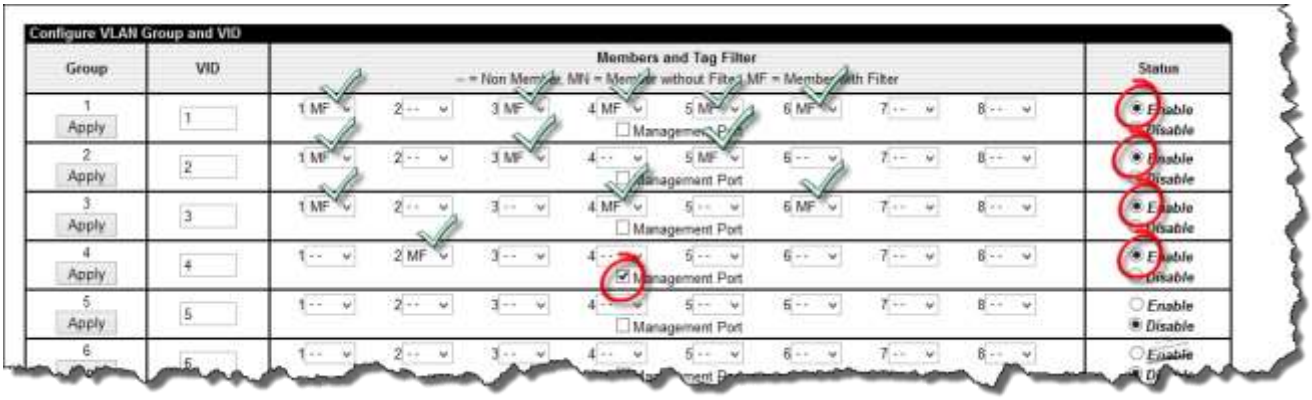


In order to keep things simple (and make it easier for you) we are going to follow the example in the IE-SW-M-Wave manual, and set up four VLANs as follows. Port 2 is the management port. VLAN 1 allows port 1 to send packets to 3, 4, 5 and 6, and VLANs 2/3 create return paths for 3,5 and 4,6 respectively.

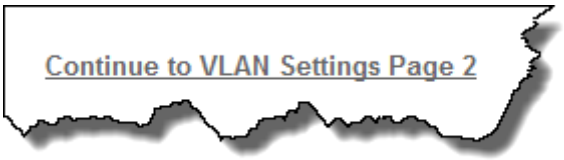
VID (VLAN ID)	Ports	Can send packets to
1	1	3, 4, 5, 6
2	3,5	1
3	4, 6	1
4	2 (M)	None

First we have to create the VLANs.

TAKE A SCREENSHOT OF THIS IMAGE ON YOUR COMPUTER SCREEN. We will refer to it as Figure 38.4(a).

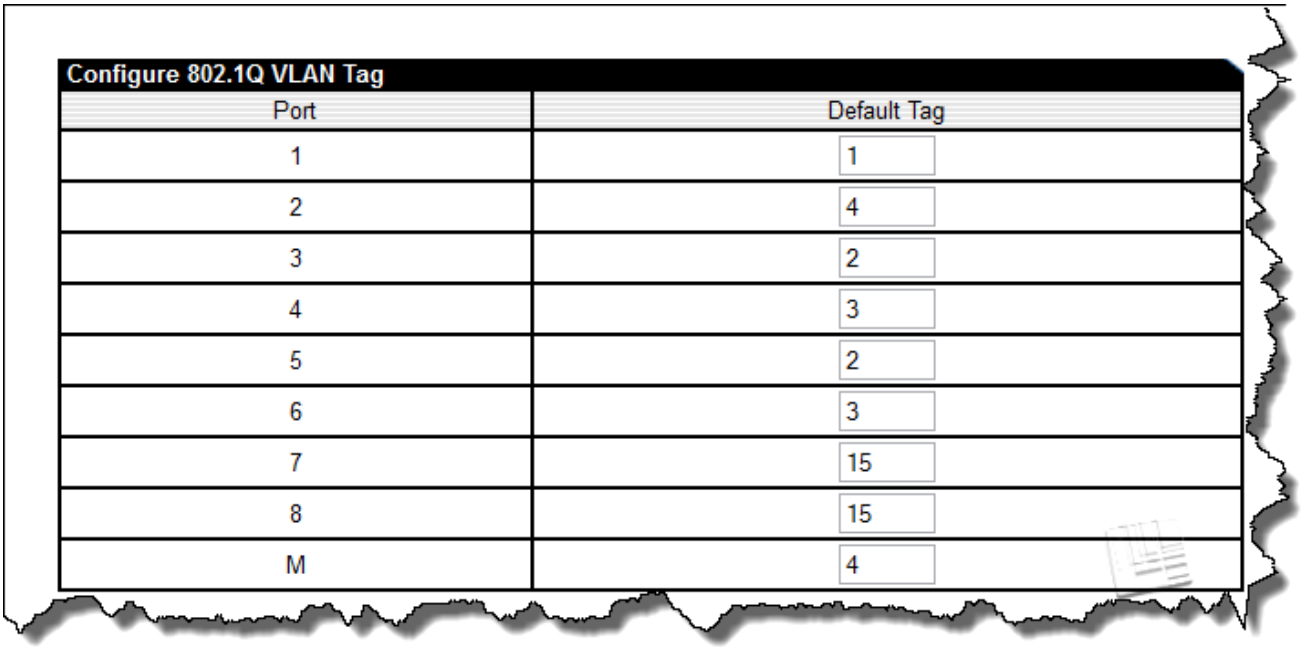


Continue to page 2 of the VLAN settings.



Then we have to set the IEEE802.1Q VLAN Tag or 'VID' for each port as per the following example, so that they match our previous allocation.

TAKE A SCREENSHOT OF THIS IMAGE ON YOUR COMPUTER SREEN. We will refer to it as Figure 38 4(b).



Configure 802.1Q VLAN Tag

Port	Default Tag
1	1
2	4
3	2
4	3
5	2
6	3
7	15
8	15
M	4

Note that port 2 appears twice, because it is also the management port. We are not allocating ports 7 and 8 to any VLAN.

3.6 SNMP

If you want to do some background reading on the topic; here are a few links:

http://en.wikipedia.org/wiki/Simple_Network_Management_Protocol
http://oreilly.com/perl/excerpts/system-admin-with-perl/twenty-minute-snmp-tutorial.html
http://www.manageengine.com/network-monitoring/what-is-snmp.html

Unfortunately SNMP (Simple Network Management) is anything but simple (for beginners, at least) and often its implementation on a specific device is poorly documented as well. This switch is no exception. However, let's see what information we can extract from the switch.

The following is a snippet from the IE-SW-M-Wave MIB documentation.

```
ieswSwitchFaultStatus OBJECT-TYPE
    SYNTAX INTEGER {
        fault(1),
        noFault(2)
    }
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "A value which indicates the fault status of the switch.
        The meanings of the values are:
         fault(1) - fault has occured.
         noFault(2) - no fault has occured."
        ::= { ieswFault 1 }
```

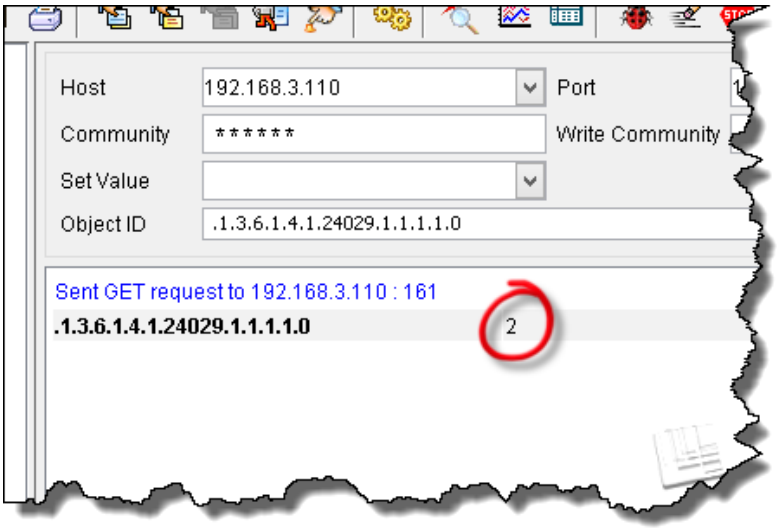
Note that 1= fault, and 2=no fault.

The OID (Object Identifier) for Switchfault (as per p41 of the manual) status is .1.3.6.1.4.1.24029.1.1.1.1.0.

Start the ManageEngine Free MIB Browser Tool.

Enter the IP address of the switch ('Host'), as well as the Object ID ('OID') for Switchfault status.

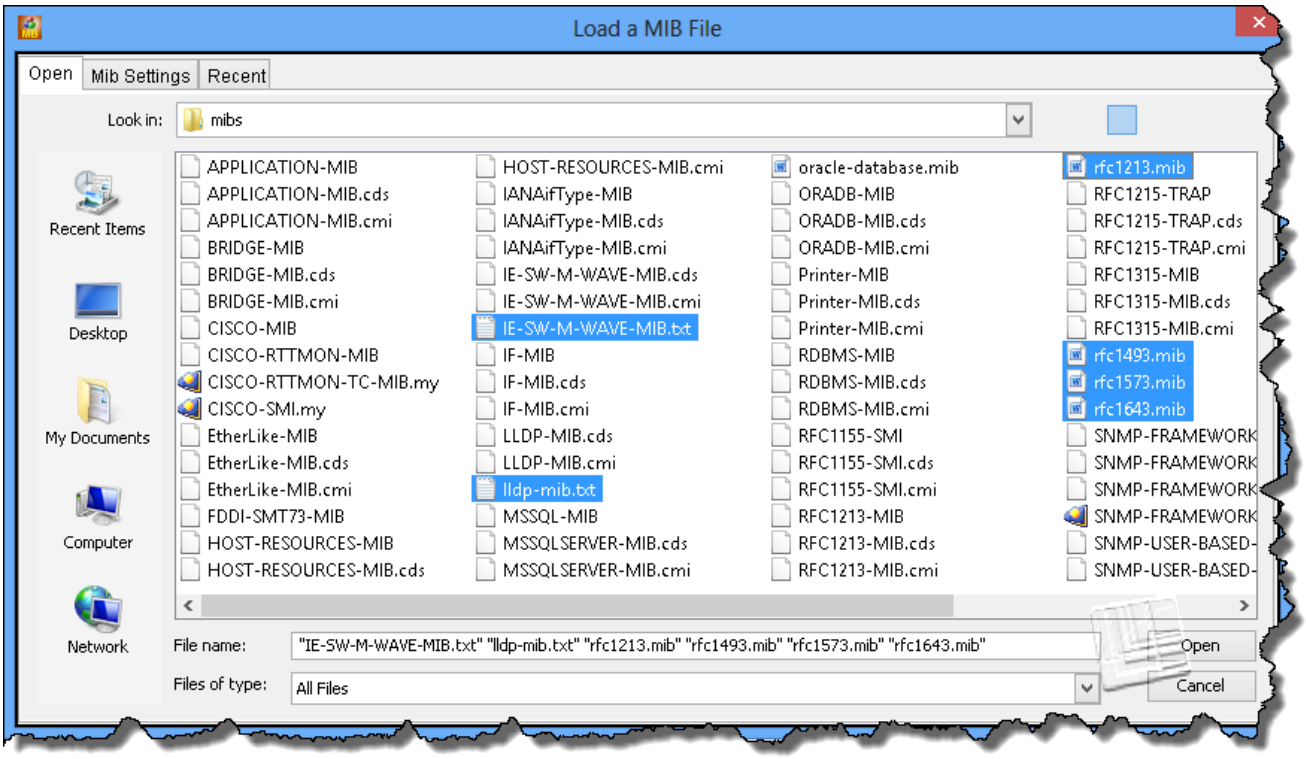
Click on the icon for 'GET SNMP Variable' (circled in previous screenshot). Note the returned value of 2 (= no fault).



Now this is all fair and well, but because we do not have the appropriate MIBs loaded, hence the information we can retrieve is rather sketchy and in numerical format only.

In order to extract more user-friendly unformation from the switch, we need to load six MIBs, viz. IE-SW-M-WAVE.MIB.txt, lldp-mib.txt, rfc1213.mib, rfc1493mib, rfc1573.mib, and 1643.mib as supplied by Weidmuller.

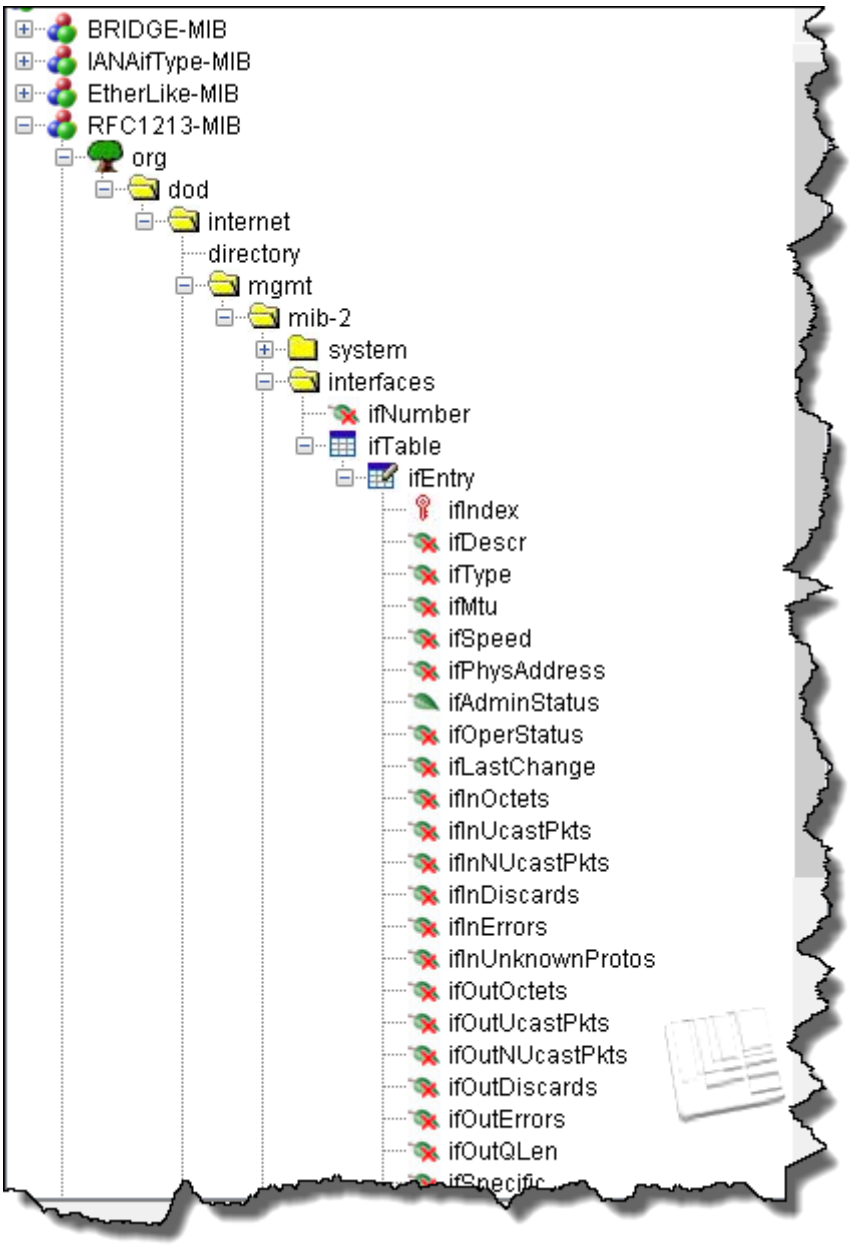
Click `File->Load MIB` and select the supplied MIBs.



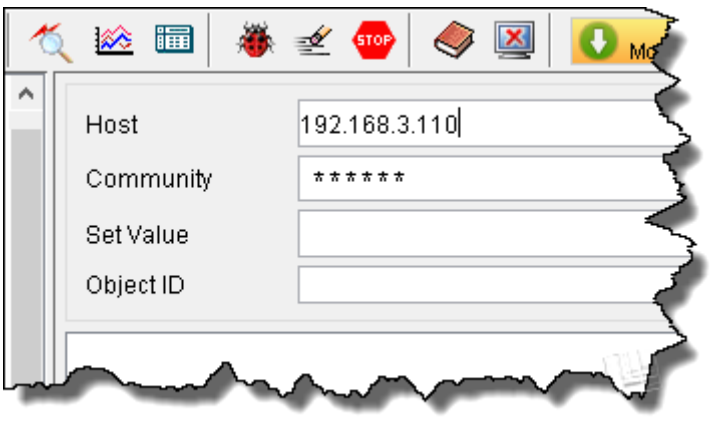
Now click ‘Open’. The dialog box will indicate successful loading of the MIBs.

Start with RFC1213-MIB and ‘drill down’ as follows:

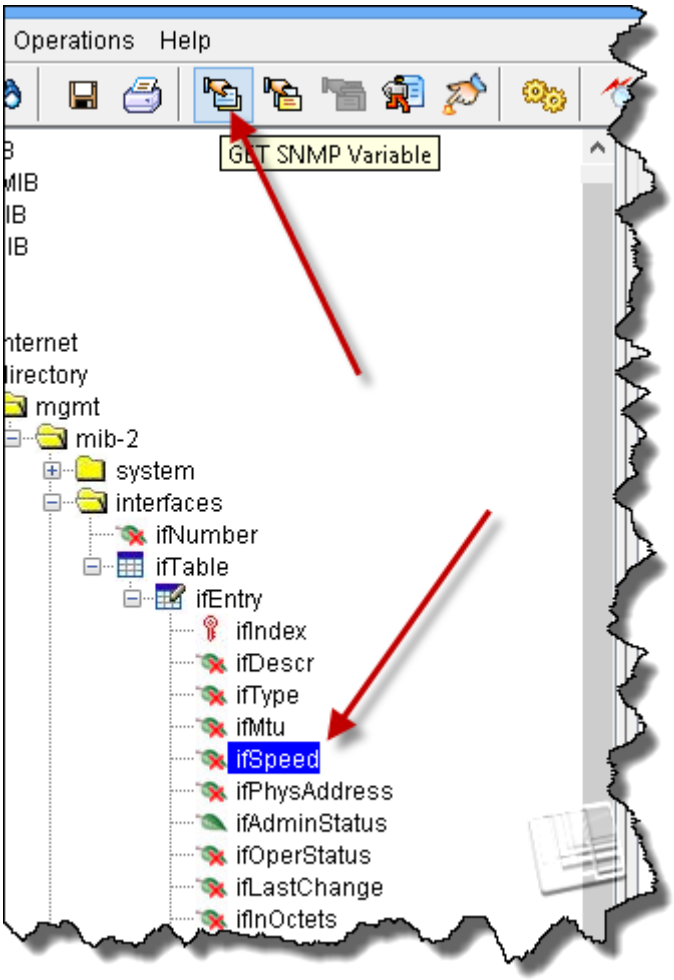
->org
->dod
->internet
->mgmt
->mib-2
->interfaces
->ifTable
->ifEntry



Do not forget to set the 'Host address' to the switch's IP address. It defaults to'localhost' and if you forget to change this, you will be trying to GET values from the Remote Lab computer and not the switch.



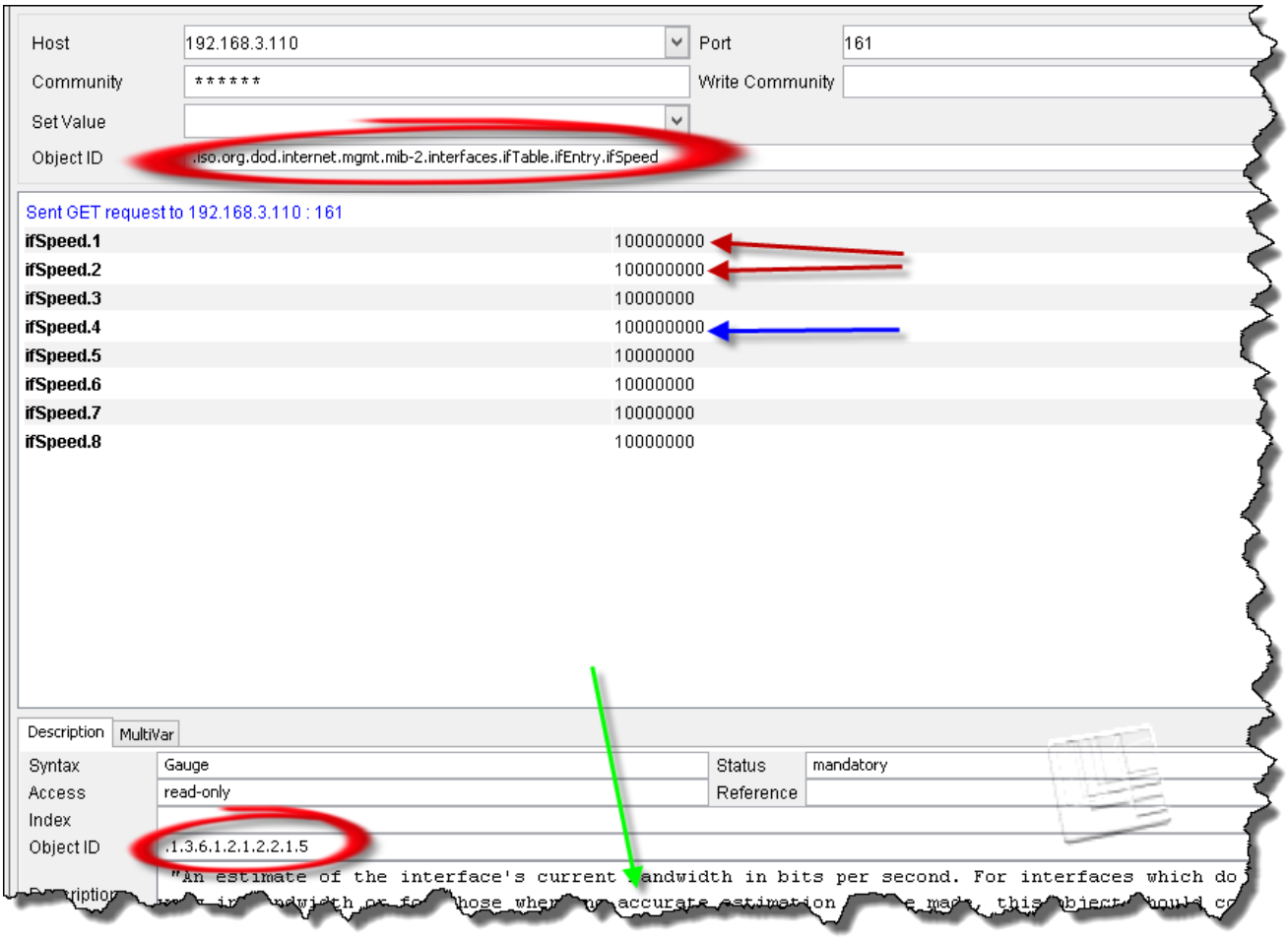
Select ‘ifSpeed’ and click on ‘Get SNMP Variable’. This will get the current speeds (bit rates) of the eight switch ports.



The following results are obtained. Note the description (green arrow) and the OID in numerical format as well as text (circled).

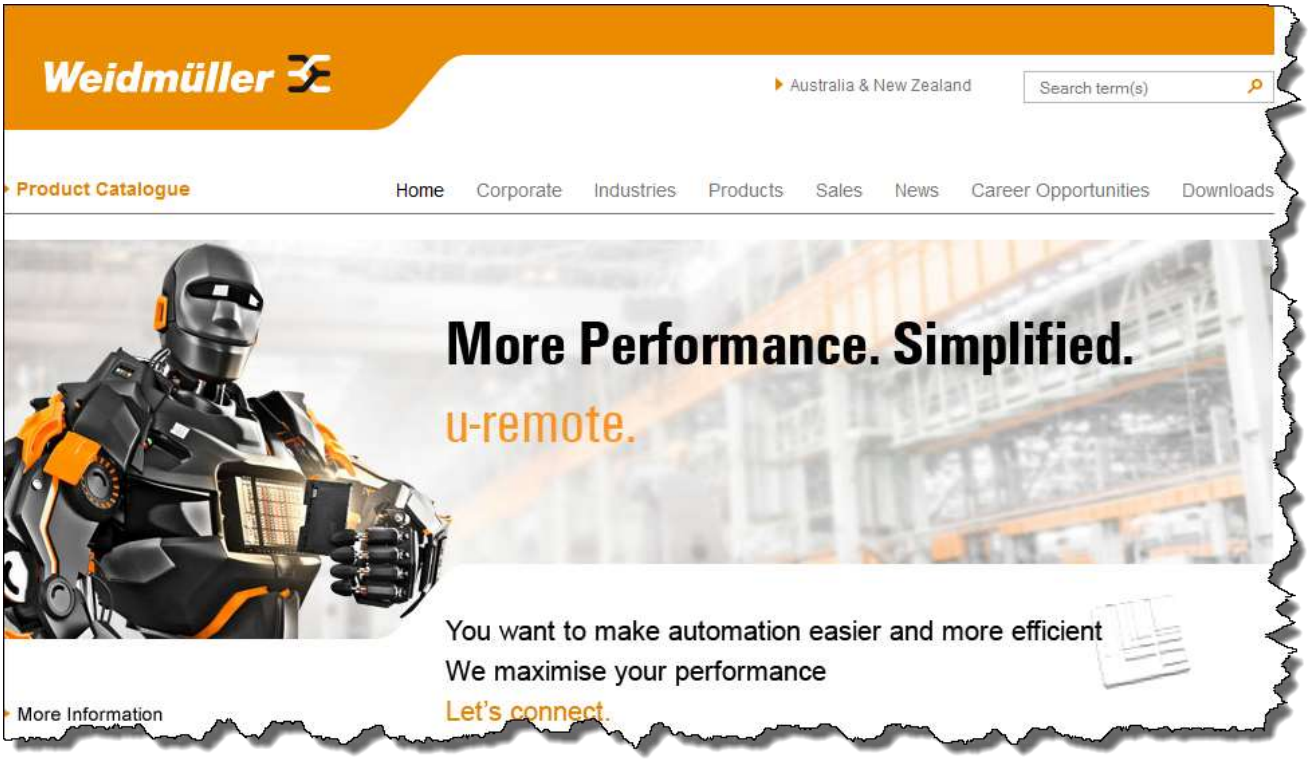
Ports 1 and 2, being fiber (100BaseFX) ports, cannot auto-negotiate and are always running at 100Mbps (red arrows). The copper ports, being able to auto-negotiate, default to 10Mbps since they are not connected. The exception is the management port (#4), connected to the Remote Lab PC, which has connected at 100 Mbps in this particular example.

TAKE A SCREENSHOT OF THIS IMAGE ON YOUR COMPUTER SCREEN. We will refer to it as Figure 38.5.



End of Exercise

ACKNOWLEDGEMENT



EIT wishes to acknowledge the contribution of Weidmuller Australia in donating the quipment for this exercise.

Weidmuller Pty Ltd

43 Huntingwood Drive

NSW, 2148 Huntingwood

PO Box 6944

Blacktown, NSW 2148

+ 61 (0)2 9671 9999 Tel

+ 61 (0)2 9671 9900 Fax