

STR9 Ethernet SpeedWay



Hands-on Session 1

2007



STM EMMA Prague
Silica TMC

Blinky Exercise

Blinky Exercise

We are going to learn how to

Use Keil tool to create your own application

- 📁 Step 1: Create new project
- 📁 Step 2: Setup Startup Code
- 📁 Step 3: Add and Compile Source Code
- 📁 Step 4: Simulate Application
- 📁 Step 5: Debug the Code
- 📁 Step 6: Going to Hardware
 - 📁 (Flashing and debugging the device)

Step 1: Create New Project

Create New Project

File – New – uVision Project ...

Create Folder

Blinky

In the folder enter project name

blinky

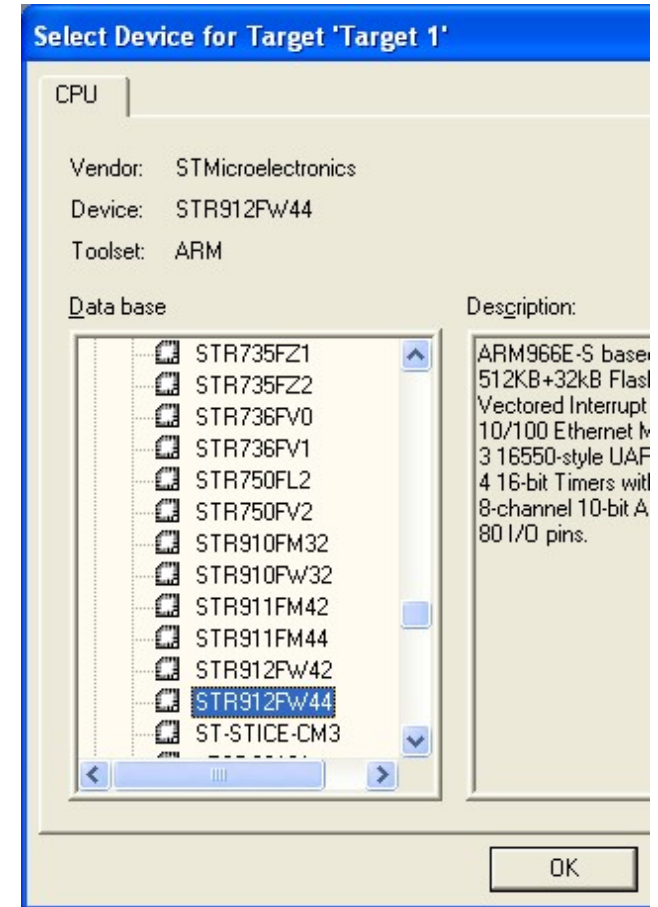
Select Device

STMicroelectronics

STR912FW44

Copy STR91x Startup Code

YES



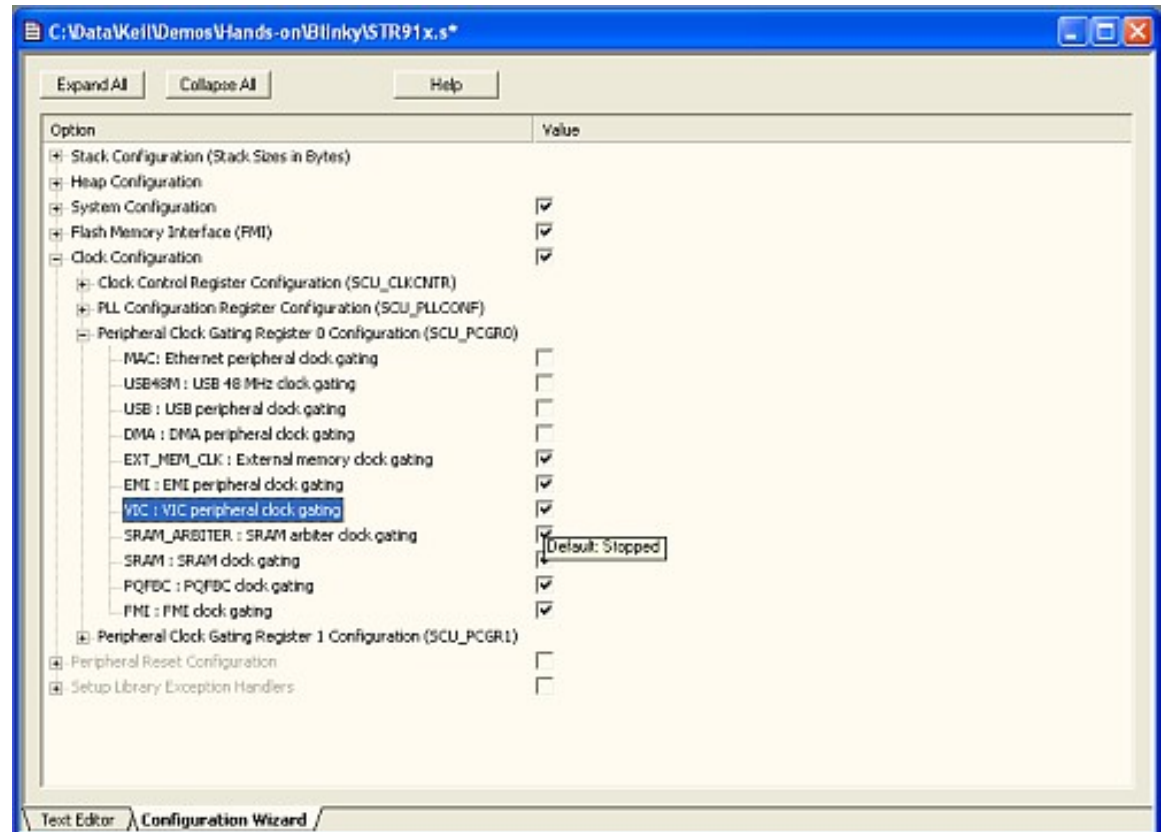
Step 2: Setup Startup Code [1/2]

Open Configuration Wizard

In the left column
Project Workspace
Target1 – Source
Group 1
STR91x.s

Enable Clocks for Peripherals

Clock Configuration
SCU_PCGR0
VIC
SCU_PCGR1
GPIO06
TIM01



Step 2: Setup Startup Code [2/2]

 Disable Reset for Peripherals

Peripheral Reset Configuration

Enable (check) it first

Select "Not in reset" for:

SCU_PRR0

VIC

SCU_PRR1

GPIO06

TIM01

Step 3: Add and Compile Source Code

- Write the code... ;o)
or copy it from [\[exercises\] main.c](#) to your project directory
- Add the code to project

Target1 – Source Group 1

Right click or Double click

[main.c](#)

- Compile the source code

Project – Build target

or

Project – Rebuild all targets



```
31 }
32
33 TIMO->SR = ~TIM_FLAG_OC2;
34 VICO->VAR = 0;
35 }
36
37 // main functions: sets peripherals at
38 int main(void)
39 {
40
41 /* configure GPIO6 for LEDs */
42 SCU->GPIOOUT[6] = 0x0055;
43 SCU->GIPIOTYPE[6] = 0x0F;
44 GPIO6->DDR = 0x0F;
45 GPIO6->DR[0x0F*4] = 0x0F;
46
47 /* configure TIM01 to generate max.
```

Step 4: Simulate Application

Go to Debug mode

Debug – Start/Stop Debug Session

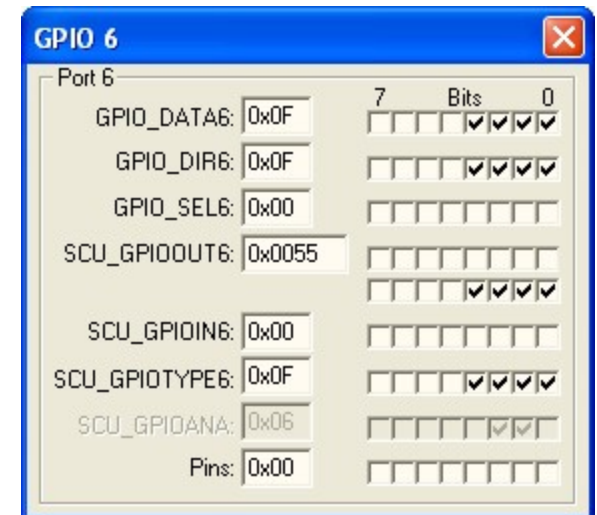


Observe Peripherals

Peripherals – I/O Ports – GPIO6

Peripherals – Timers – Timer0

...



Step 5: Debug the Code

Set breakpoint

Go to line 25 in `main.c`

```
25 blink = 1 - blink;
```

Press F9 or double click the left column

Debug the code

Run

Step into

Step over

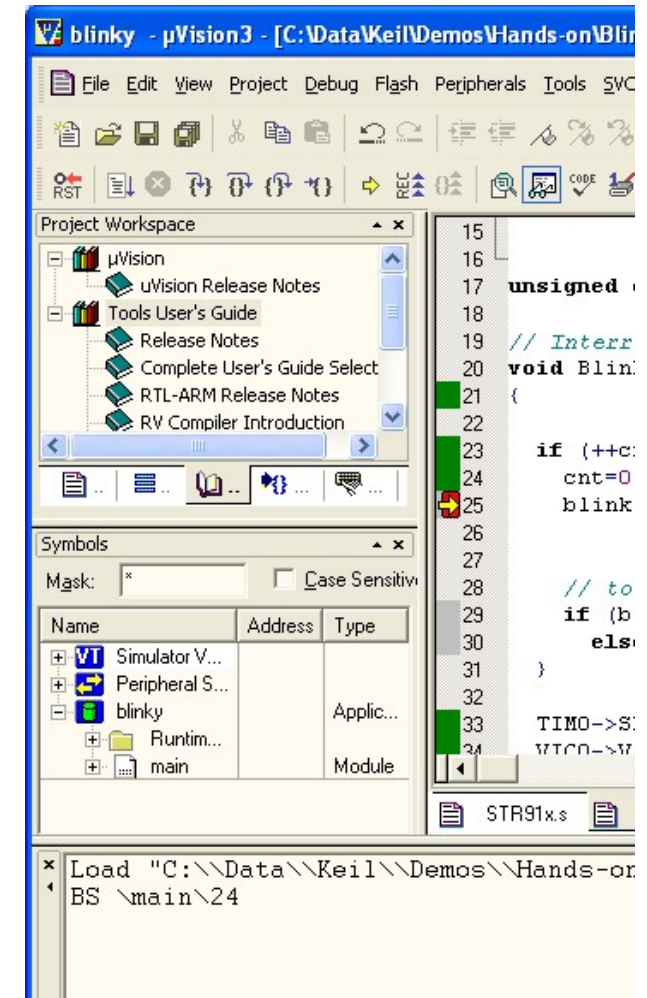
...

Go further:

Add watch

View Symbols

...



Step 6: Going to Hardware [1/2]

 Change Options to HW Debug

Project – Options for Target 'Target1'

Select **Debug** tab sheet

Use **ULINK ARM Debugger**

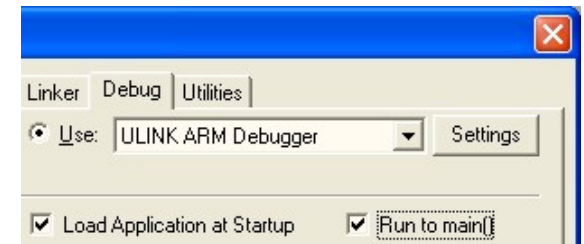
Select **Run to main()**

Select **Utilities** tab sheet

Settings

In Flash Download Setup

Check Bank0 and Bank1 Sizes



Description	Device Type	Device Size	Address Range
STR91xFxx4 Flash Bank0	On-chip Flash	512k	00000000H - 00087FFFH
STR91xFxxx Flash Bank1	On-chip Flash	32k	00400000H - 00407FFFH

Step 6: Going to Hardware [2/2]

Flash the Device

Flash – Download



Do not forget to connect STR9 DONGLE to ULINK2 and power the board

Go to Debug mode

Debug – Start/Stop Debug Session



Debug the code as if you were in Simulation

Run
Step into
Step over
...



EasyWEB Exercise

STR9 Ethernet Speedway

Marinoni Enrico

2007



EasyWEB Exercise

We are going to learn how to

Run a web server

- 📄 Step 1: Open Project and Flash the Device
- 📄 Step 2: Configure Your PC
- 📄 Step 3: See the Web Page
- 📄 Step 4: PING the DONGLE
- 📄 Step 5: See Network Traffic with Analyzer
- 📄 Step 6: Modify the Web Page
- 📄 Step 7: Look inside the Web Server

Step 1: Open Project and Flash the Device

Copy EasyWEB project from archive.
You can find it in [\[exercises\] EasyWEB.zip](#)

Open Project

Project – Open Project ...
Open project
[EasyWEB/easyweb](#)

Flash the Device



Flash – Download
Do not forget to connect STR9 DONGLE to ULINK2 and power the board.
Connect the DONGLE to your PC using network cable.

- Green LED indicates that the DONGLE is ready to use.
- When you plug the Ethernet cable, the network connection will be established

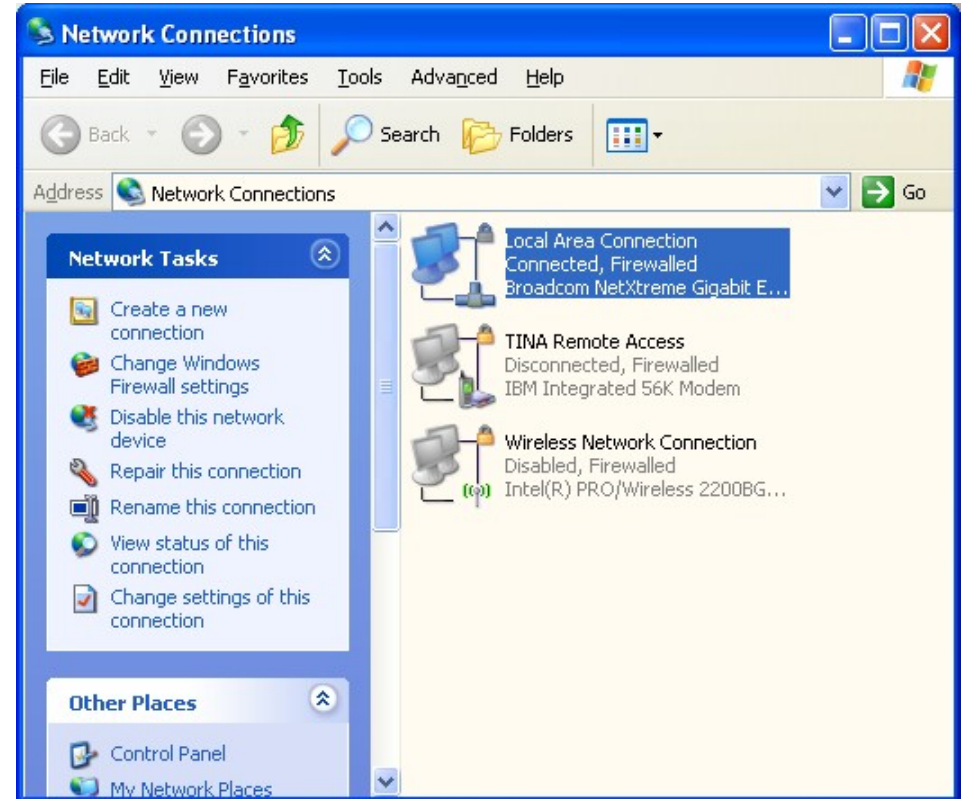


Step 2: Configure Your PC [1/2]

 Select network settings

Control Panel – Network Connections

Right click on your network card and open Properties



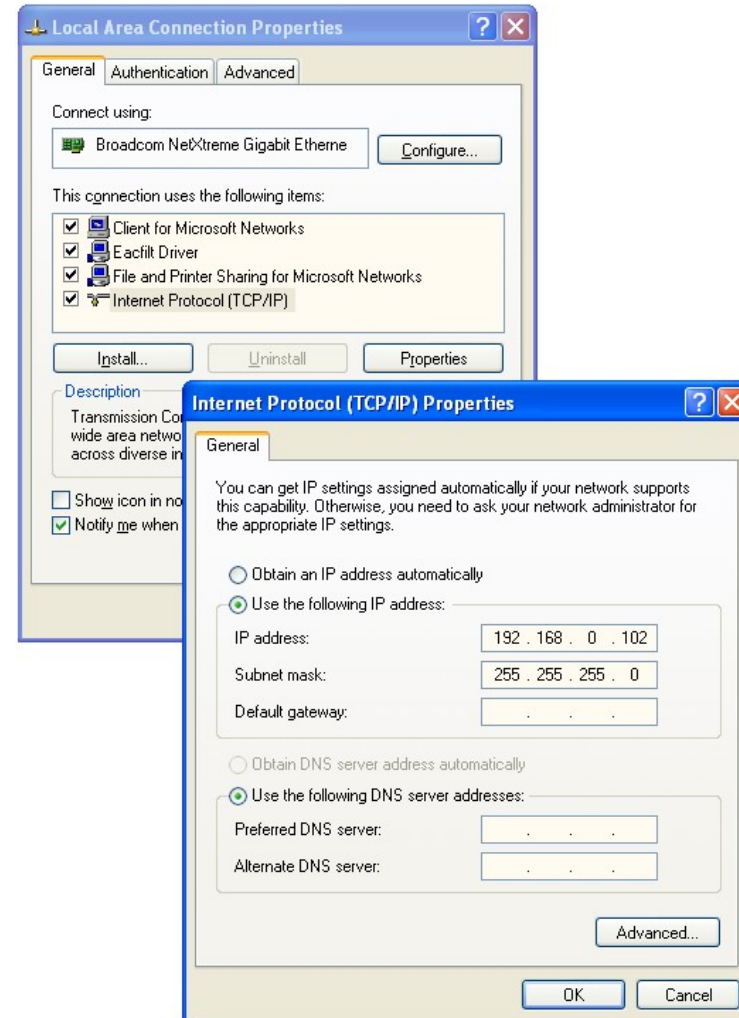
Step 2: Configure Your PC [2/2]

Select IP Properties

Select
Internet Protocol (TCP/IP)
Click
Properties

Change you IP Settings

IP Address:
192.168.0.102
Subnet mask:
255.255.255.0



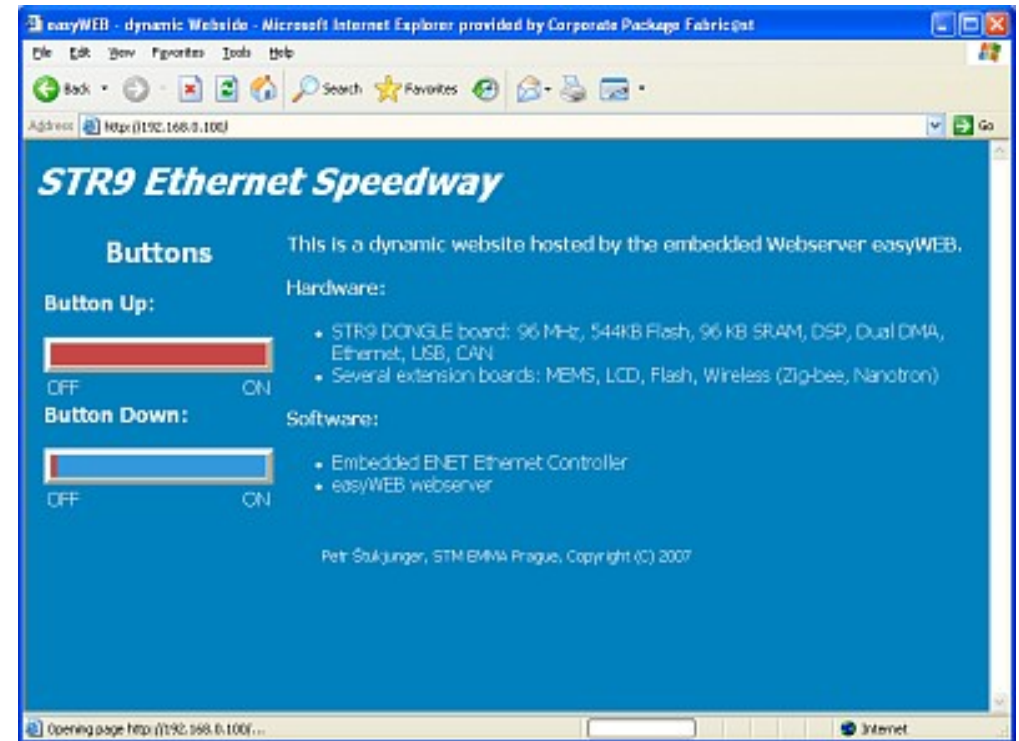
Step 3: See the Web Page

Open web browser

Enter address

<http://192.168.0.100>

Press UP or DOWN button on the DONGLE



Step 4: PING the DONGLE

Run DOS prompt

Start – Run ... - cmd

PING the DONGLE

ping 192.168.0.100

See ARP records

Display records

arp -a

Delete all records

arp -d *

```
C:\WINDOWS\system32\cmd.exe
C:\Documents and Settings\Petr Stukjunger>arp -a
No ARP Entries Found
C:\Documents and Settings\Petr Stukjunger>ping 192.168.0.100
Pinging 192.168.0.100 with 32 bytes of data:
Reply from 192.168.0.100: bytes=32 time<1ms TTL=64
Reply from 192.168.0.100: bytes=32 time<1ms TTL=64
Reply from 192.168.0.100: bytes=32 time<1ms TTL=64
Reply from 192.168.0.100: bytes=32 time<1ms TTL=64
Ping statistics for 192.168.0.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\Documents and Settings\Petr Stukjunger>arp -a
Interface: 192.168.0.102 --- 0x2
    Internet Address      Physical Address      Type
    192.168.0.100         00-30-6c-00-00-02    dynamic
C:\Documents and Settings\Petr Stukjunger>
```

ARP Address Resolution Protocol

Perchè due host possano comunicare con successo su un segmento di rete, devono risolvere gli indirizzi hardware l'uno dell'altro. Questa funzione viene svolta attraverso ARP

Step 5: See Network Traffic with Analyzer [1/2]

Run Ethereal Analyzer

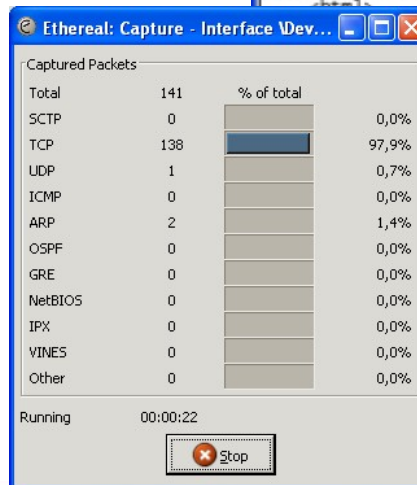
To start packet capture

- Select your NIC
- Press Ctrl+K
- Press Start



Analyze packets

Press **Stop** and see the received packets



(Untitled) - Ethereal

File Edit View Go Capture Analyze Statistics Help

Filter: Expression... Clear Apply

No.	Time	Source	Destination	Protocol	Info
5	0.000603	192.168.0.102	192.168.0.100	TCP	1492 > http [ACK] Seq=1 Ack=...
6	0.000742	192.168.0.102	192.168.0.100	HTTP	GET / HTTP/1.1
7	0.002223	192.168.0.100	192.168.0.102	TCP	http > 1492 [ACK] Seq=1 Ack=...
8	0.002248	192.168.0.102	192.168.0.100	HTTP	Continuation
9	0.003216	192.168.0.100	192.168.0.102	HTTP	HTTP/1.0 200 OK (text/html)
10	0.003581	192.168.0.100	192.168.0.102	TCP	http > 1492 [ACK] Seq=1 Ack=...
11	0.105012	192.168.0.102	192.168.0.100	TCP	1492 > http [ACK] Seq=379 A...
12	0.107105	192.168.0.100	192.168.0.102	HTTP	Continuation
13	0.306198	192.168.0.102	192.168.0.100	TCP	1492 > http [ACK] Seq=379 A...
14	0.308250	192.168.0.100	192.168.0.102	HTTP	Continuation

Frame 9 (566 bytes on wire, 566 bytes captured)

Ethernet II, Src: 00:30:6c:00:00:02, Dst: 00:16:41:53:87:cf

Internet Protocol, Src Addr: 192.168.0.100 (192.168.0.100), Dst Addr: 192.168.0.102 (192.168.0.102)

Transmission Control Protocol, Src Port: http (80), Dst Port: 1492 (1492), Seq: 1, Ack: 379

Hypertext Transfer Protocol

Line-based text data: text/html

```

equiv="refresh" content="1">
<meta http-equiv="refresh" content="1">
<title>EasyWeb - dynamic websites</title>
</head>
<body>
<h1>EasyWeb - dynamic websites</h1>
</body>
</html>
    
```



Step 5: See Network Traffic with Analyzer [2/2]

 See how IP address is translated to MAC address

1. Close your Web browser
2. Run DOS prompt
3. Delete all ARP entries (arp -d *)
4. Start packet capture in Ethereal
5. PING the DONGLE (ping 192.168.0.100)
6. Analyze the packets in Ethereal
7. Check the ARP table (arp -a)

No. -	Time	Source	Destination	Protocol	Info
1	0.000000	192.168.0.102	192.168.0.255	BROWSE	Local Master Announcement PRG000355, workstati
2	3.422675	192.168.0.102	Broadcast	ARP	who has 192.168.0.100? Tell 192.168.0.102
3	3.422920	192.168.0.100	192.168.0.102	ARP	192.168.0.100 is at 00:30:6c:00:00:02

Step 6: Modify the Web Page

Modify HTML page

Edit web page code

[webpage.html](#)

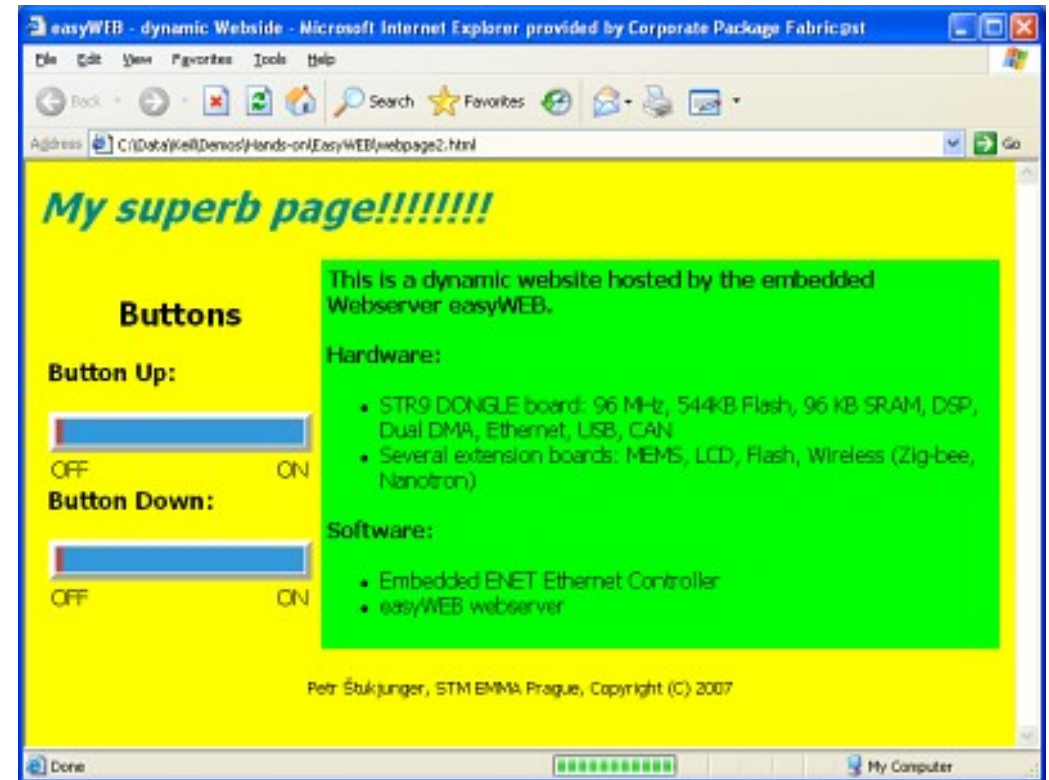
and modify it (be creative ;o)

See the new page

Rebuild the project

Flash the DONGLE

Open web page in browser



Step 7: Look inside the Web Server

 Go to Debug mode

Debug – Start/Stop Debug Session



 Set breakpoint

Go to line 163 in [tcpip.c](#)

```
163 if (IsBroadcast())
```

Press F9 or right double click on the left column

 Debug the code

Run

Step into

Step over



What to see

- Recognition of broadcast address
- Distinguishing the protocol [line 342](#)
- ARP answer [line 658](#) (address resolution)
- TCP frame processing [line 388](#)
- TCP state machine (advanced) [line 409](#)
- HTTP web server file [easyweb.c line 71](#)