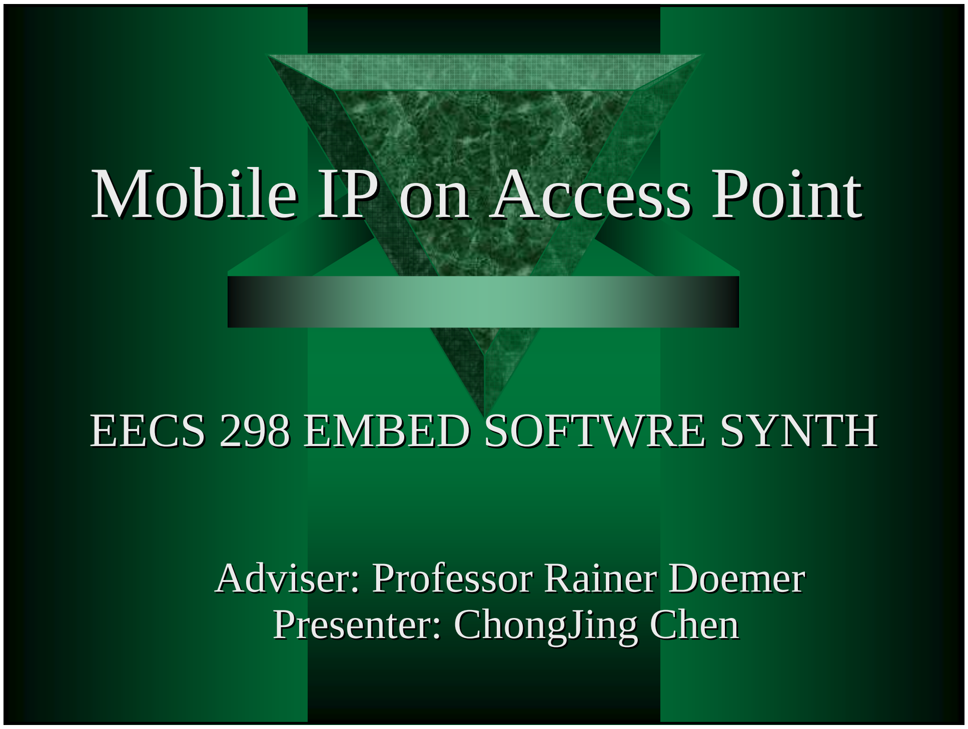
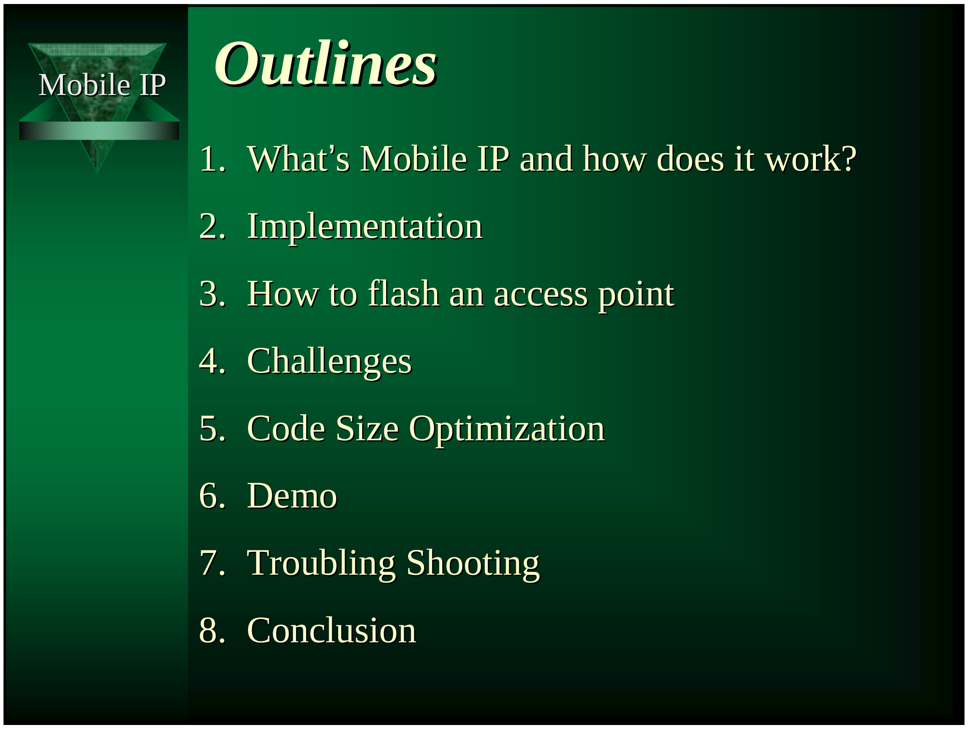


Mobile IP on Access Point

EECS 298 EMBED SOFTWRE SYNTH

Adviser: Professor Rainer Doemer
Presenter: ChongJing Chen



Mobile IP

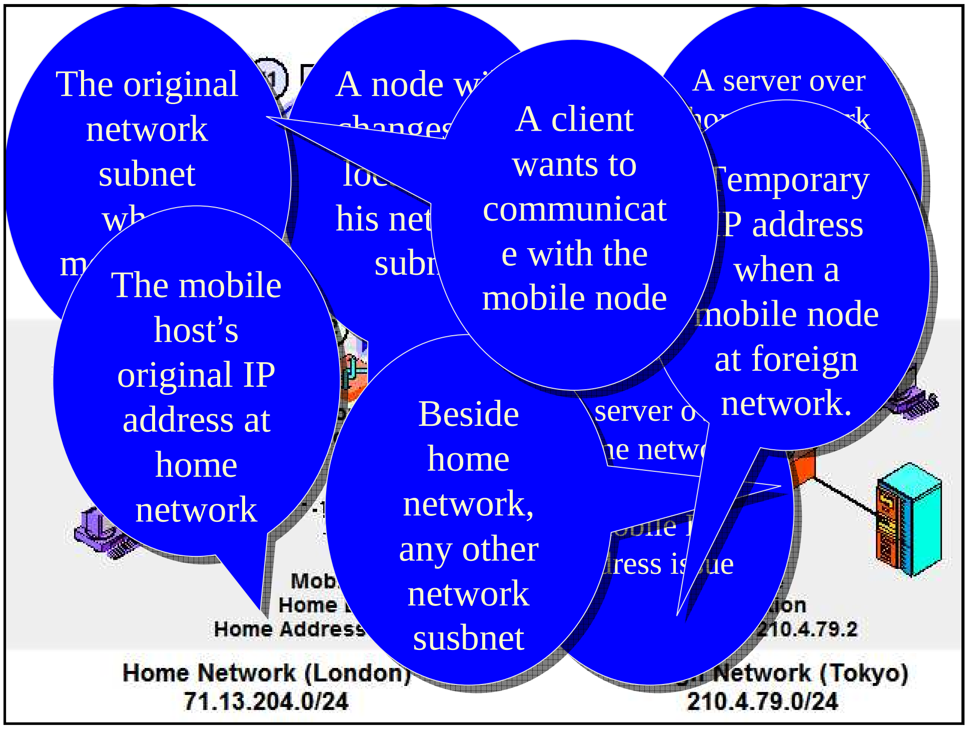
Outlines

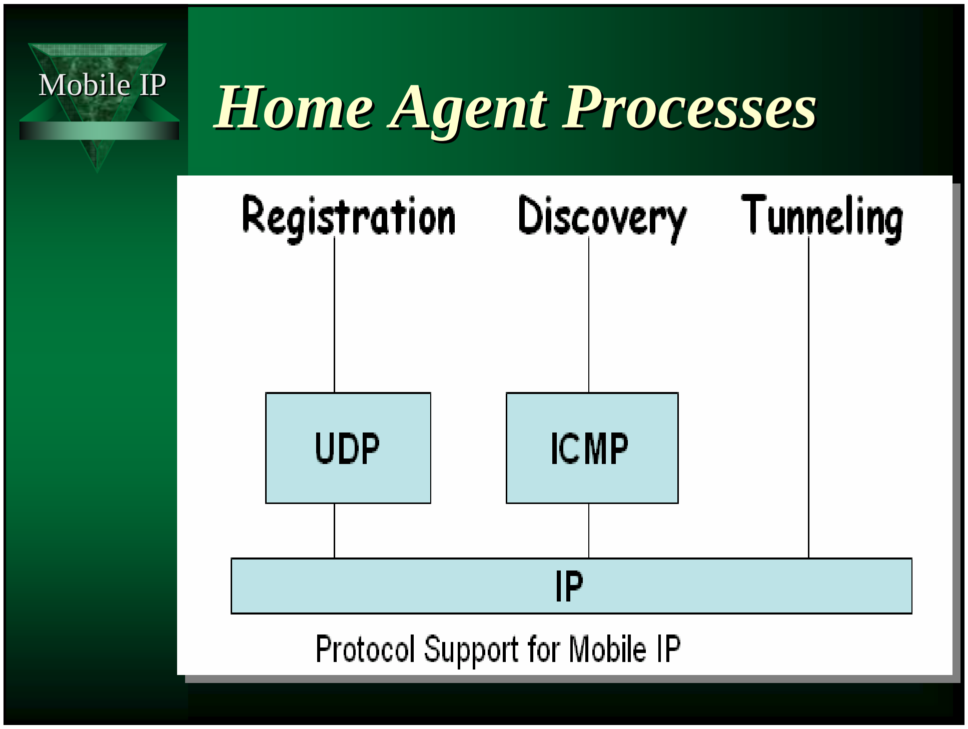
1. What's Mobile IP and how does it work?
2. Implementation
3. How to flash an access point
4. Challenges
5. Code Size Optimization
6. Demo
7. Troubling Shooting
8. Conclusion

Mobile IP

What is Mobile IP

- ➢A.K.A IP Mobility
- ➢To solve data transfer and communication in different subnet and network environment
- ➢Using one IP address to roam over whole world


The original network subnet wh... m...
A node w... changes ... loc... his net... subn...
A client wants to communicate with the mobile node
A server over ho... ...k
Temporary IP address when a mobile node at foreign network.
The mobile host's original IP address at home network
Beside home network, any other network susbnet
server o... ...e netw...
...obile I... ...ress is...ue
Mob...
Home ...
Home Address
...ion
210.4.79.2
Home Network (London)
71.13.204.0/24
...n Network (Tokyo)
210.4.79.0/24



Mobile IP

Home Agent Processes

Registration

Discovery

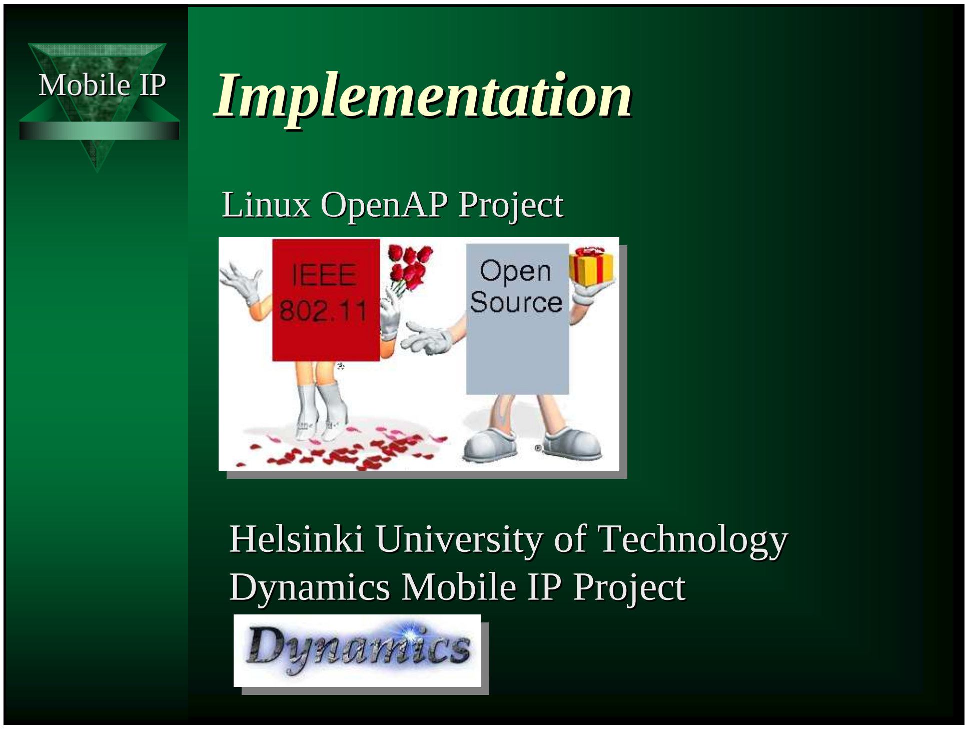
Tunneling

UDP

ICMP

IP

Protocol Support for Mobile IP



Mobile IP

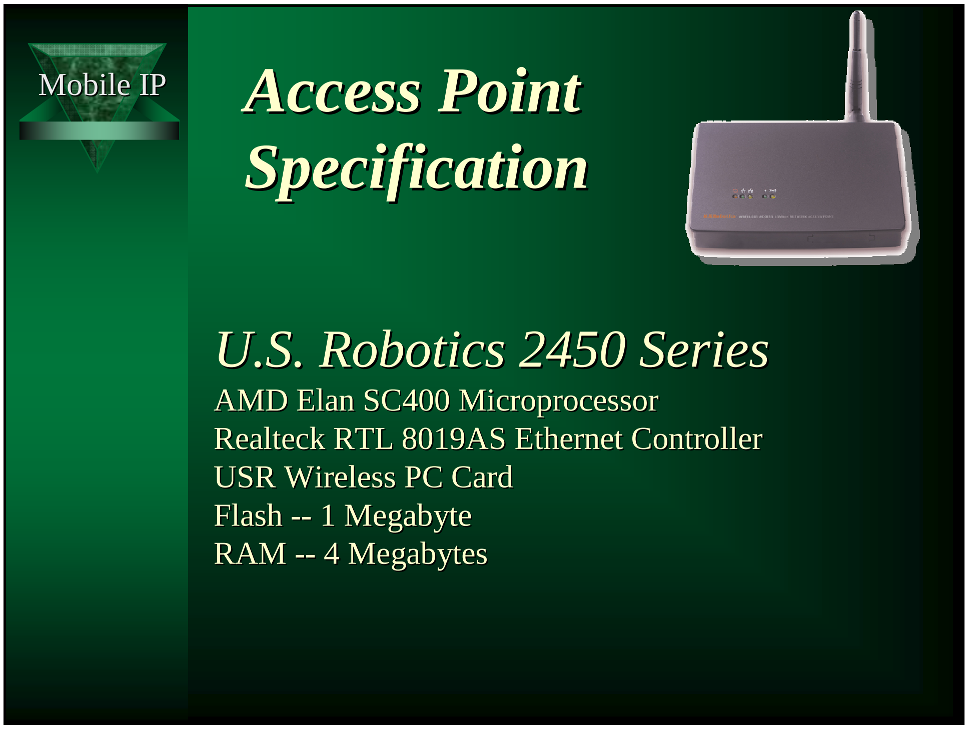
Implementation

Linux OpenAP Project

IEEE
802.11
Open
Source

Helsinki University of Technology
Dynamics Mobile IP Project

Dynamics

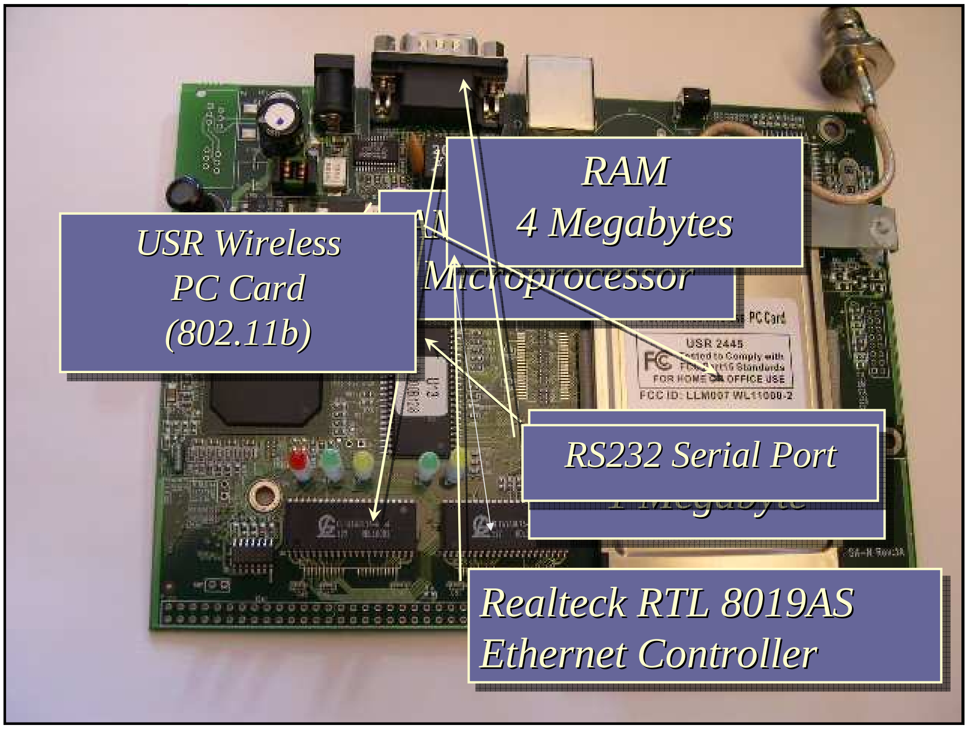


Mobile IP

Access Point Specification

U.S. Robotics 2450 Series

AMD Elan SC400 Microprocessor
Realteck RTL 8019AS Ethernet Controller
USR Wireless PC Card
Flash -- 1 Megabyte
RAM -- 4 Megabytes



RAM
4 Megabytes

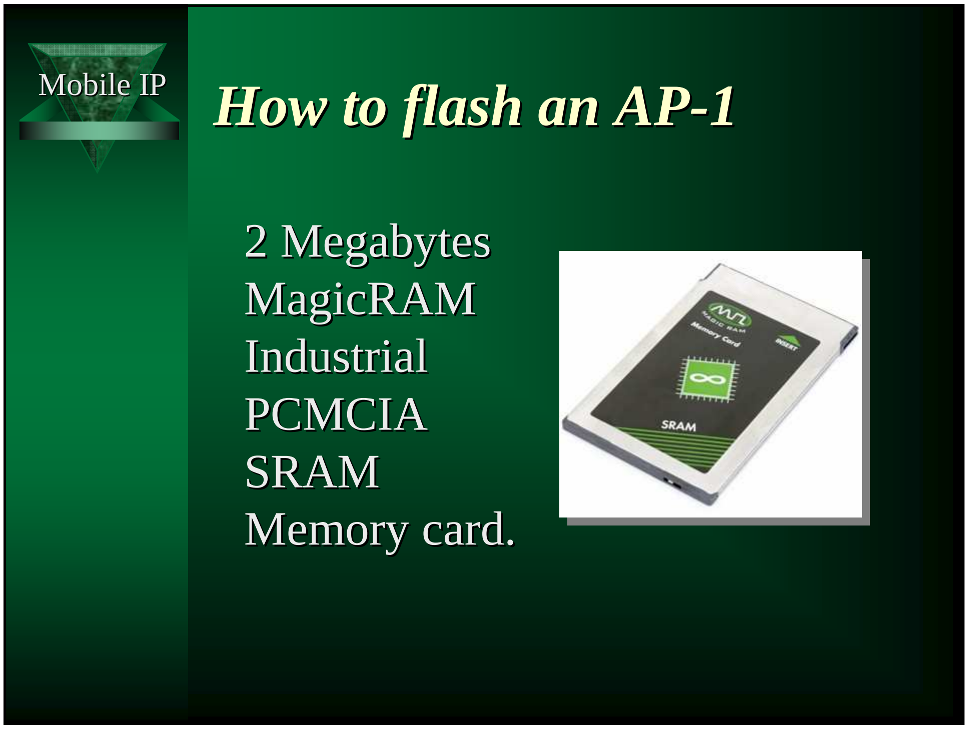
USR Wireless
PC Card
(802.11b)

Microprocessor

RS232 Serial Port

1 Megabyte

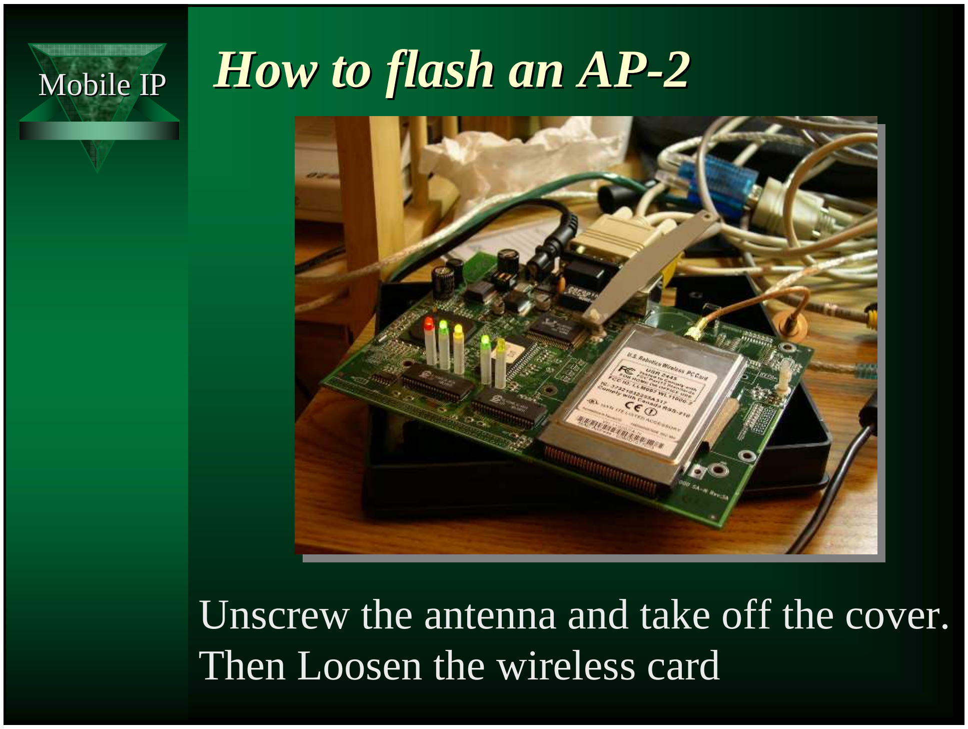
Realteck RTL 8019AS
Ethernet Controller



Mobile IP

How to flash an AP-1

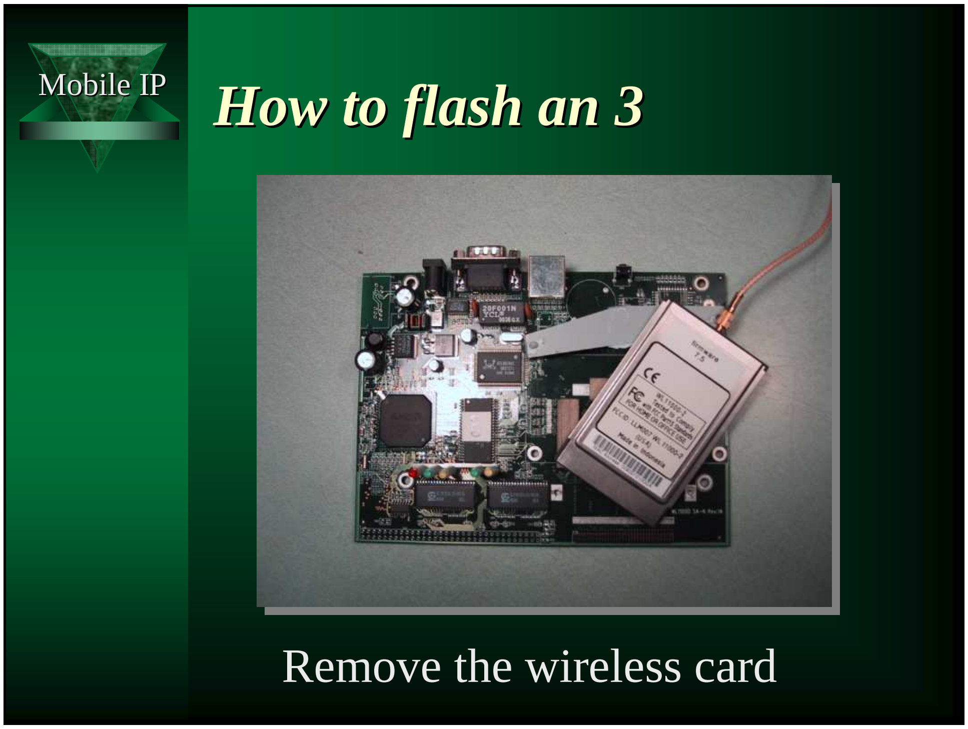
2 Megabytes MagicRAM Industrial PCMCIA SRAM Memory card.



Mobile IP

How to flash an AP-2

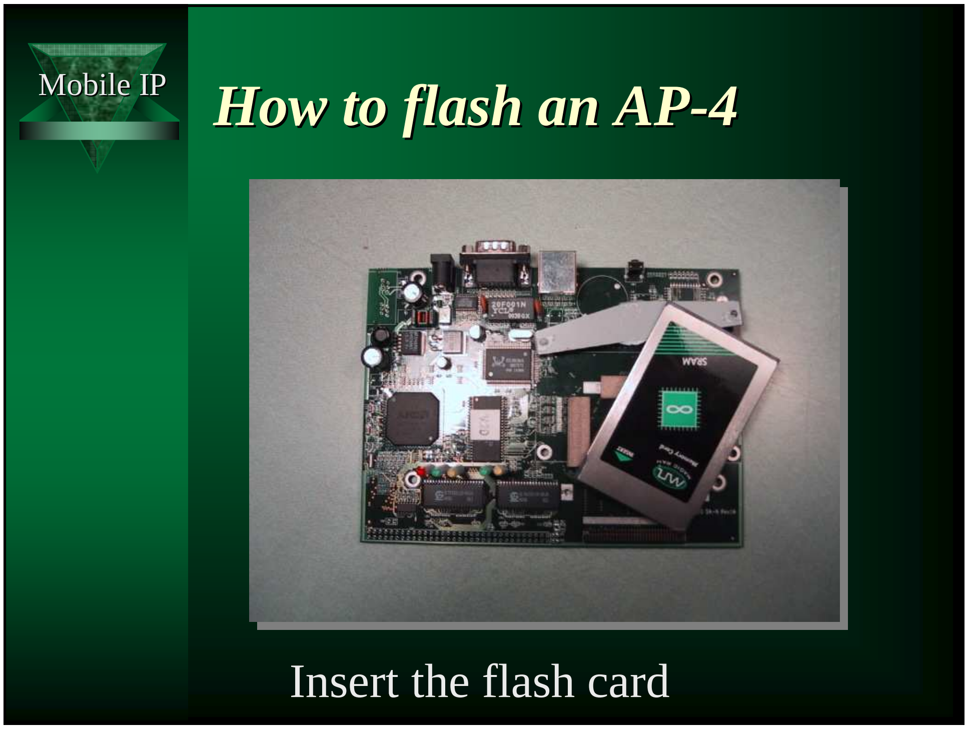
Unscrew the antenna and take off the cover. Then Loosen the wireless card



Mobile IP

How to flash an 3

Remove the wireless card

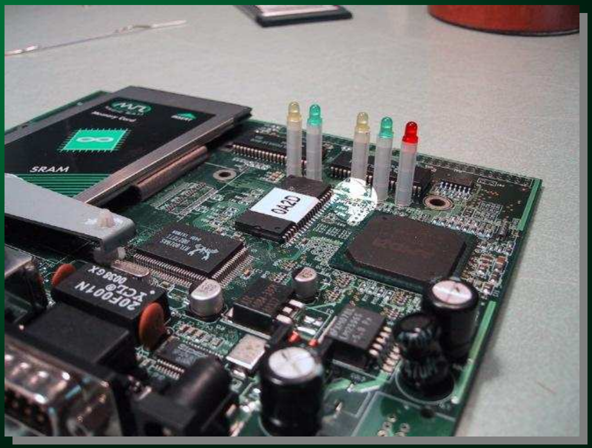


Mobile IP

How to flash an AP-4

Insert the flash card

How to flash an AP-5

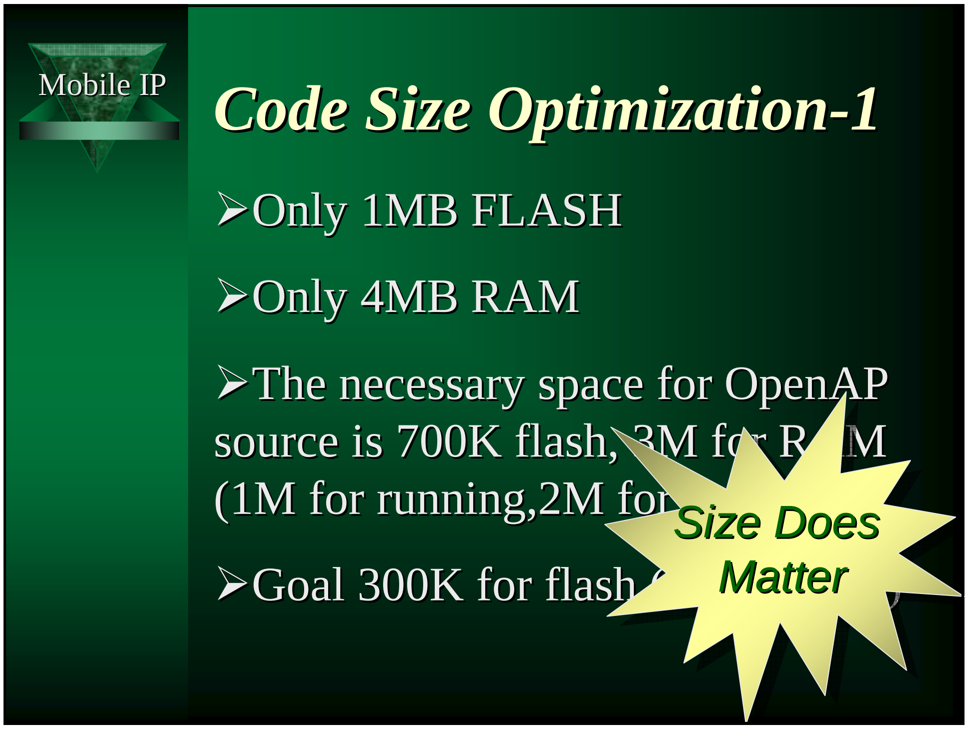


Short "the jumper"

Challenges

- ➢Code size and ruining space
- ➢Need to include other dynamic link library and configure file
- ➢Library compatibility issue

  GMP Library 3.3.1 vs 4.0.1 vs 4.1.1
- ➢Unexpected flash crash
- ➢Kernel support issue

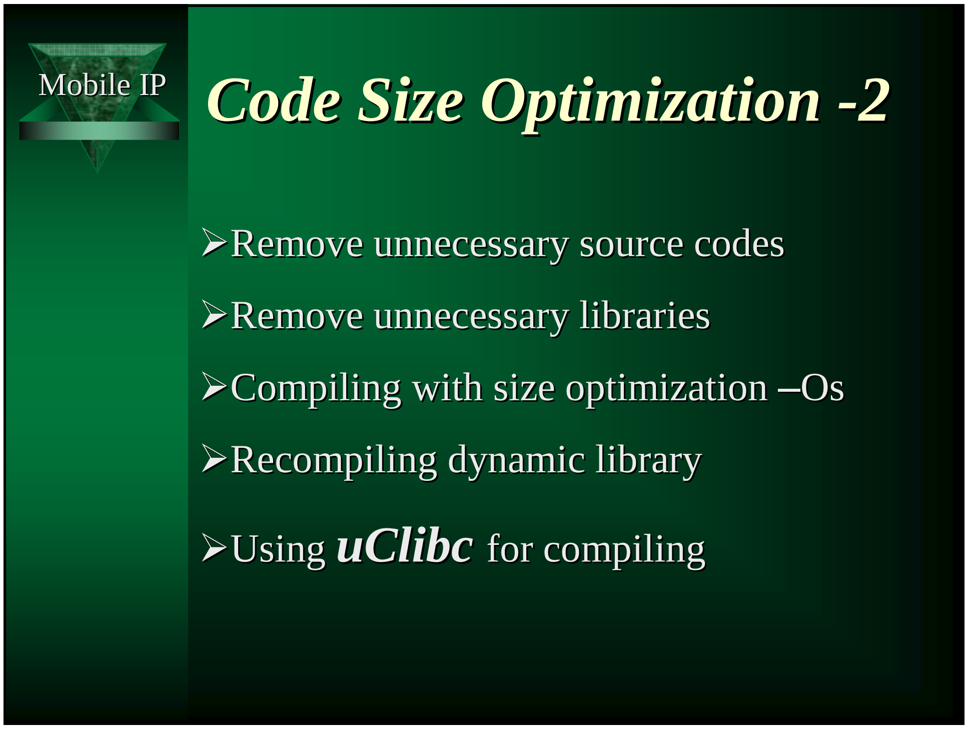


Mobile IP

Code Size Optimization-1

- ➢Only 1MB FLASH
- ➢Only 4MB RAM
- ➢The necessary space for OpenAP source is 700K flash, 3M for RAM (1M for running,2M for
- ➢Goal 300K for flash (

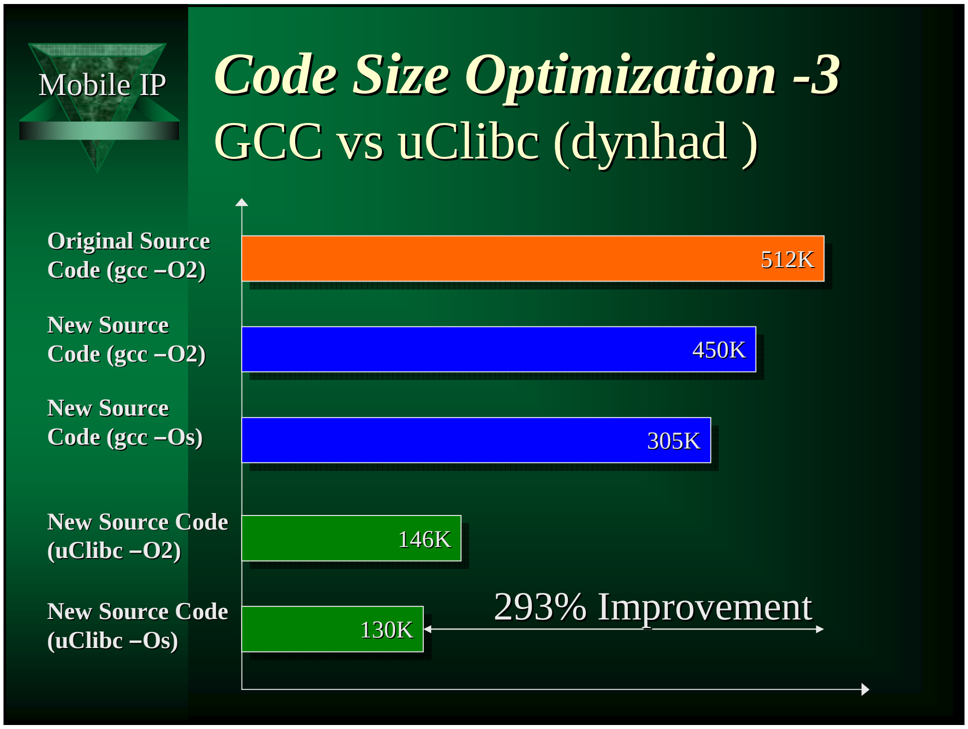
Size Does Matter



Mobile IP

Code Size Optimization -2

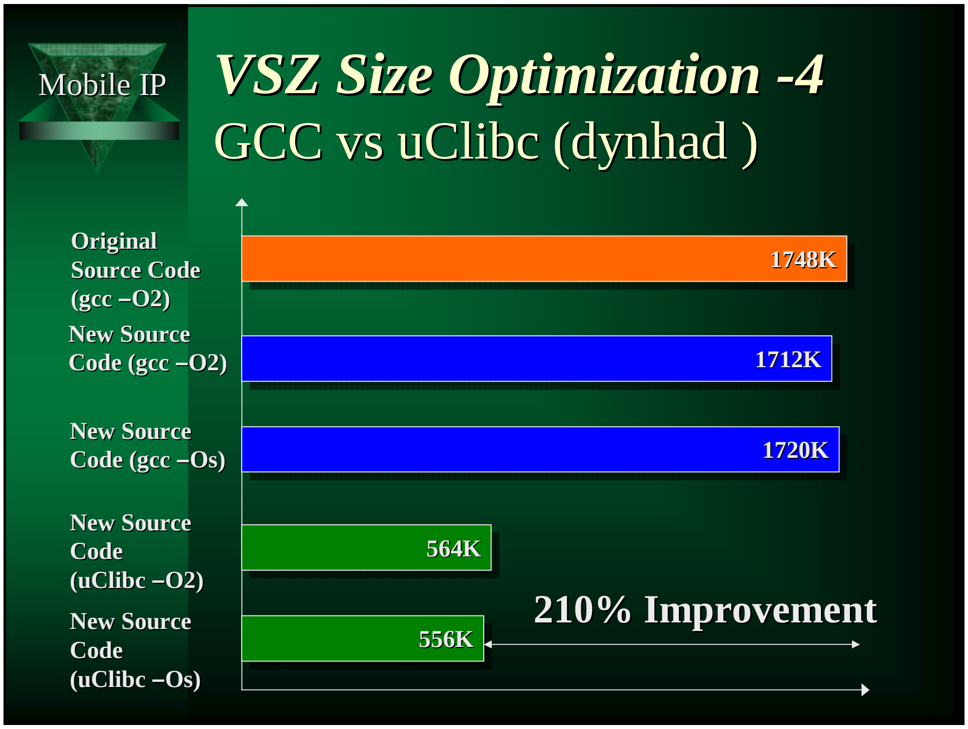
- ➢Remove unnecessary source codes
- ➢Remove unnecessary libraries
- ➢Compiling with size optimization –Os
- ➢Recompiling dynamic library
- ➢Using ***uClibc*** for compiling



Mobile IP

Code Size Optimization -3

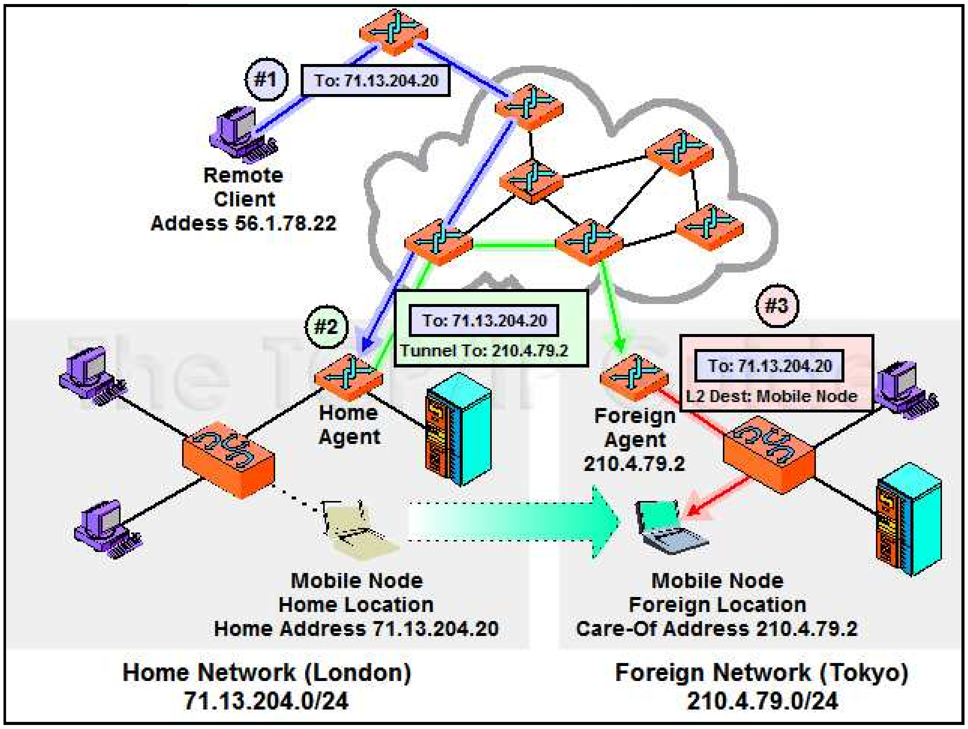
GCC vs uClibc (dynhad)

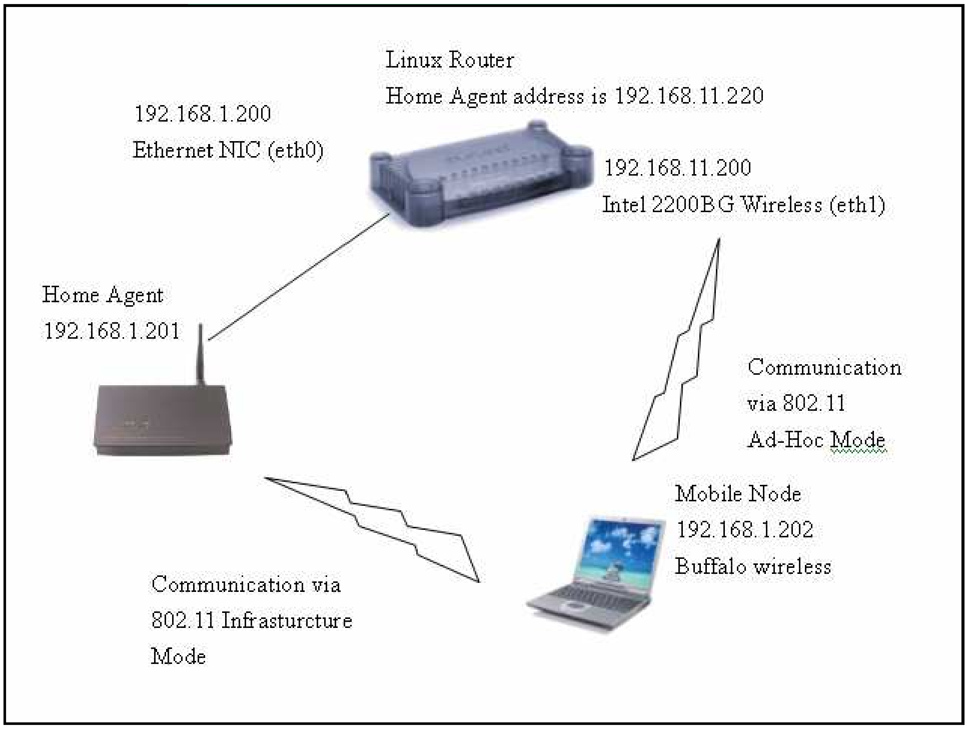


Mobile IP

VSZ Size Optimization -4

GCC vs uClibc (dynhad)


#1
To: 71.13.204.20
Remote
Client
Addess 56.1.78.22
#2
To: 71.13.204.20
Tunnel To: 210.4.79.2
#3
To: 71.13.204.20
L2 Dest: Mobile Node
Home
Agent
Foreign
Agent
210.4.79.2
Mobile Node
Home Location
Home Address 71.13.204.20
Mobile Node
Foreign Location
Care-Of Address 210.4.79.2
Home Network (London)
71.13.204.0/24
Foreign Network (Tokyo)
210.4.79.0/24


Linux Router
Home Agent address is 192.168.11.220
192.168.1.200
Ethernet NIC (eth0)
192.168.11.200
Intel 2200BG Wireless (eth1)
Home Agent
192.168.1.201
Communication
via 802.11
Ad-Hoc Mode
Mobile Node
192.168.1.202
Buffalo wireless
Communication via
802.11 Infrasturcture
Mode

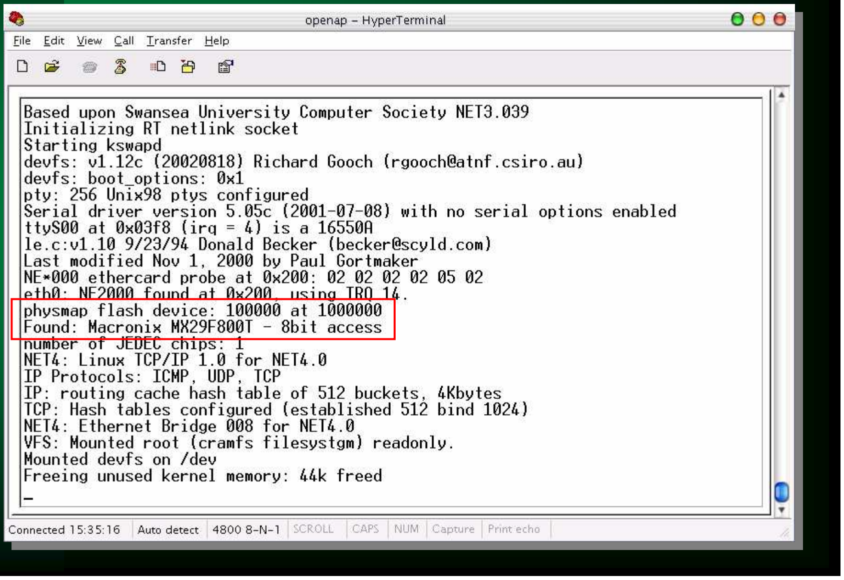
Mobile IP

Trouble Shooting from Kernel Support Issue

- ➢Original OpenAP Linux kernel doesn’t support AF_LOCAL socket protocol.
- ➢The home agent used UNIX domain sockets protocol to communicate through their API interfaces.

Mobile IP

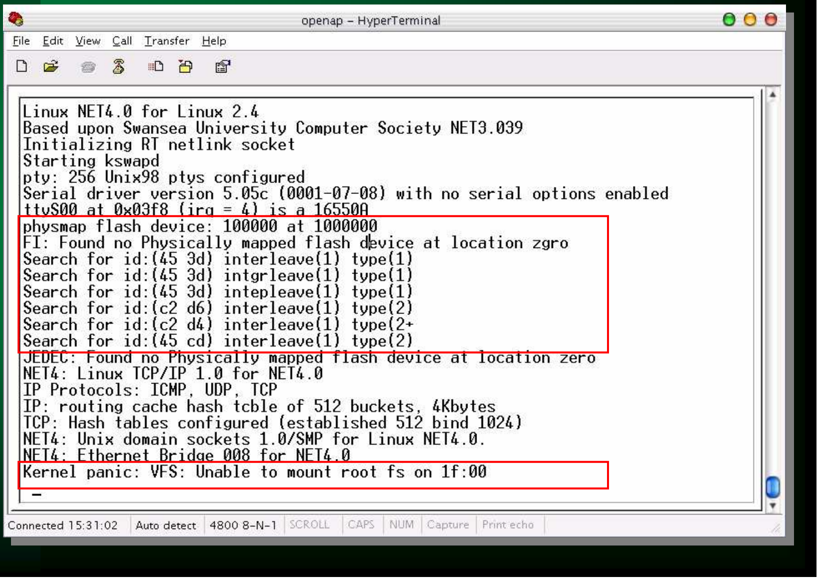
Kernel Support Issue



```
Based upon Swansea University Computer Society NET3.039
Initializing RT netlink socket
Starting kswapd
devfs: v1.12c (20020818) Richard Gooch (rgooch@atnf.csiro.au)
devfs: boot_options: 0x1
pty: 256 Unix98 ptys configured
Serial driver version 5.05c (2001-07-08) with no serial options enabled
ttyS00 at 0x03f8 (irq = 4) is a 16550A
le.c:v1.10 9/23/94 Donald Becker (becker@scyld.com)
Last modified Nov 1, 2000 by Paul Gortmaker
NE*000 ethercard probe at 0x200: 02 02 02 02 05 02
eth0: NE2000 found at 0x200, using IRQ 14.
physmap flash device: 100000 at 1000000
Found: Macronix MX29F800T - 8bit access
number of JEDEC chips: 1
NET4: Linux TCP/IP 1.0 for NET4.0
IP Protocols: ICMP, UDP, TCP
IP: routing cache hash table of 512 buckets, 4Kbytes
TCP: Hash tables configured (established 512 bind 1024)
NET4: Ethernet Bridge 008 for NET4.0
VFS: Mounted root (cramfs filesystgm) readonly.
Mounted devfs on /dev
Freeing unused kernel memory: 44k freed
_
```

Mobile IP

Kernel Support Issue

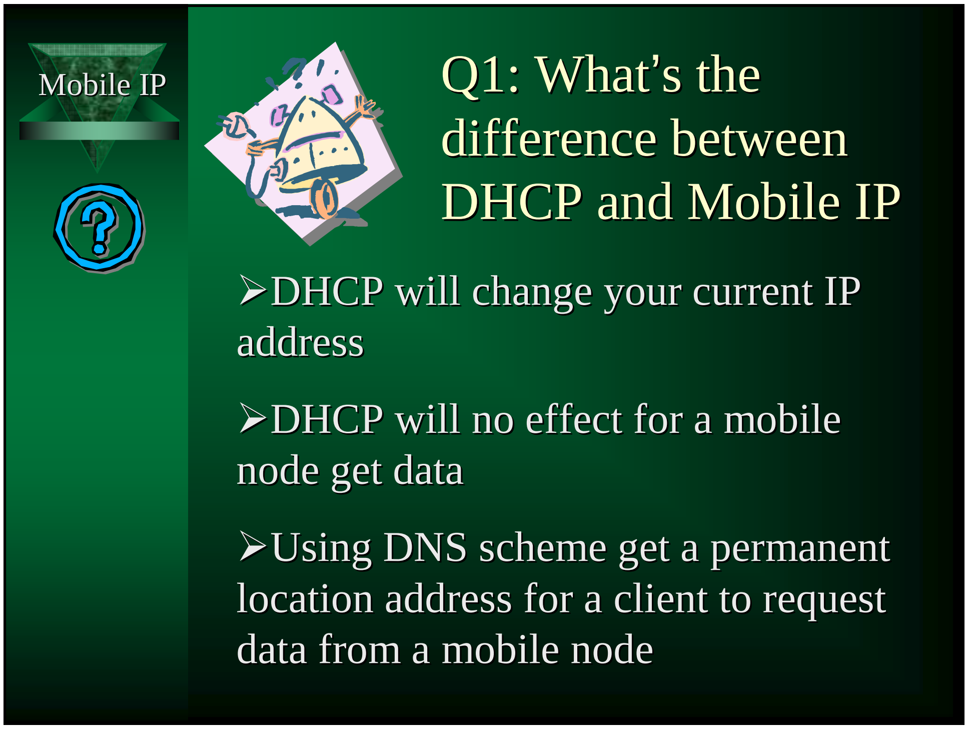


```
Linux NET4.0 for Linux 2.4
Based upon Swansea University Computer Society NET3.039
Initializing RT netlink socket
Starting kswapd
pty: 256 Unix98 ptys configured
Serial driver version 5.05c (0001-07-08) with no serial options enabled
ttyS00 at 0x03f8 (irq = 4) is a 16550A
physmap flash device: 100000 at 1000000
FI: Found no Physically mapped flash device at location zgro
Search for id:(45 3d) interleave(1) type(1)
Search for id:(45 3d) intgrleave(1) type(1)
Search for id:(45 3d) intepleave(1) type(1)
Search for id:(c2 d6) interleave(1) type(2)
Search for id:(c2 d4) interleave(1) type(2+
Search for id:(45 cd) interleave(1) type(2)
JEDEC: Found no Physically mapped flash device at location zero
NET4: Linux TCP/IP 1.0 for NET4.0
IP Protocols: ICMP, UDP, TCP
IP: routing cache hash tcble of 512 buckets, 4Kbytes
TCP: Hash tables configured (established 512 bind 1024)
NET4: Unix domain sockets 1.0/SMP for Linux NET4.0.
NET4: Ethernet Bridge 008 for NET4.0
Kernel panic: VFS: Unable to mount root fs on 1f:00
 _
```

Mobile IP

Conclusion

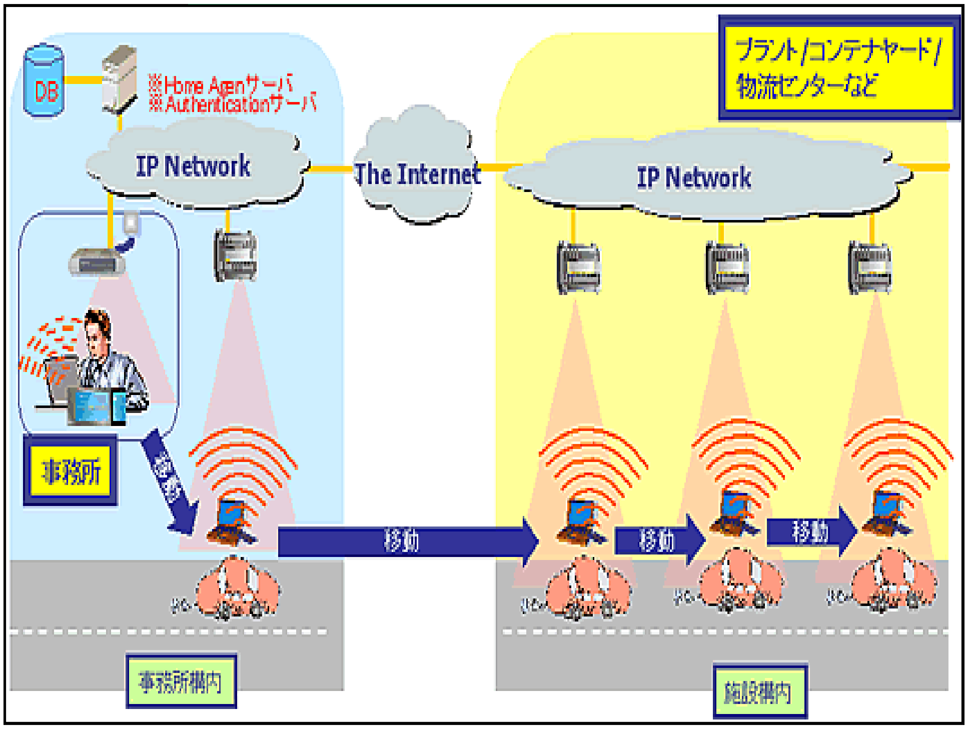
- Programming on Embedded System is time consuming
- Tries and errors
- Compatibility
- Size does matter



Mobile IP

Q1: What’s the difference between DHCP and Mobile IP

- ➢DHCP will change your current IP address
- ➢DHCP will no effect for a mobile node get data
- ➢Using DNS scheme get a permanent location address for a client to request data from a mobile node


DB
※Home Agenサーバ
※Authenticationサーバ
IP Network
The Internet
IP Network
プラント/コンテナヤード/物流センターなど
事務所
移動
移動
移動
移動
事務所構内
施設構内