

i2Chip makes the difference!

TCP/IP Chip



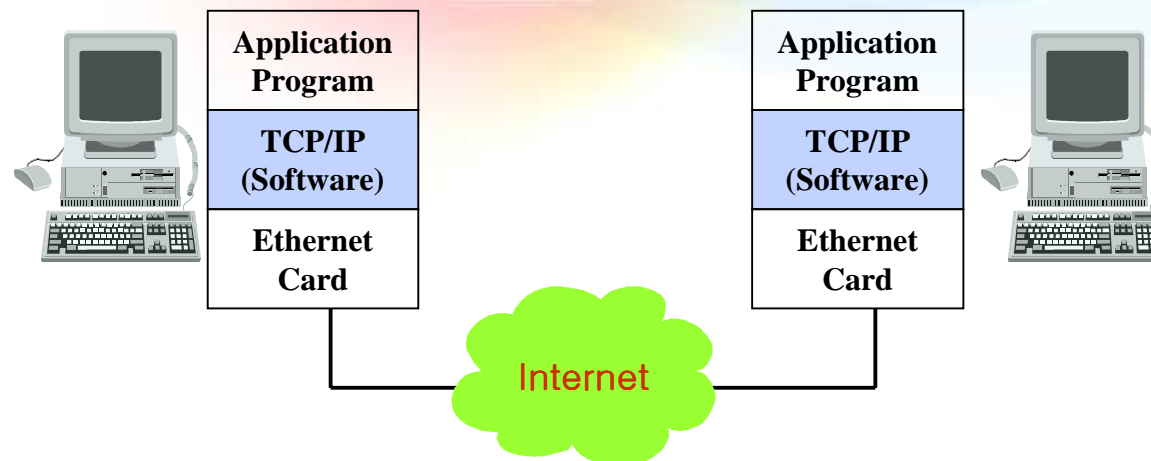
Marketing Presentation

Sept, 2001
WIZnet Inc.



TCP/IP Protocol

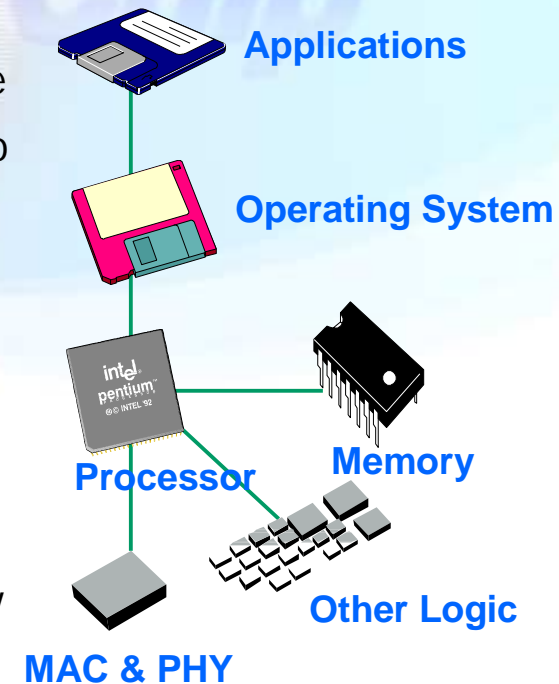
- International standard communication protocol to connect to the Internet
- All devices requiring Internet connectivity must use TCP/IP Protocol
- Currently, software version is available.





Limitations of Software TCP/IP Solution

- High Cost
 - Needs real-time OS (license fee & royalty)
 - Needs high performance processor for the OS
 - Additional memory for the OS and program code
 - Additional time and human resources required to develop OS and TCP/IP software for the processor
 - Expensive development tools
- Low Performance
 - Frequent memory access(4 times access)
 - OS overhead
 - Jitter effect in multimedia applications caused by irregular processing time



▶ **Hardware Solution is needed**



Hardware TCP/IP Solution

■ Cost Benefits

- Minimal requirement for MCU & memory (Saving code ROM and working RAM for OS and TCP/IP stack)
- Saving development time and cost because it's no need for OS porting, TCP/IP programming and network module development

■ High performance

- TCP/IP protocol stack is processed by hardwired logic
- Reduce memory copy to just one time

■ Enhanced QoS in multimedia application

- Reduced jitter effect due to fixed processing time

■ Easy to use

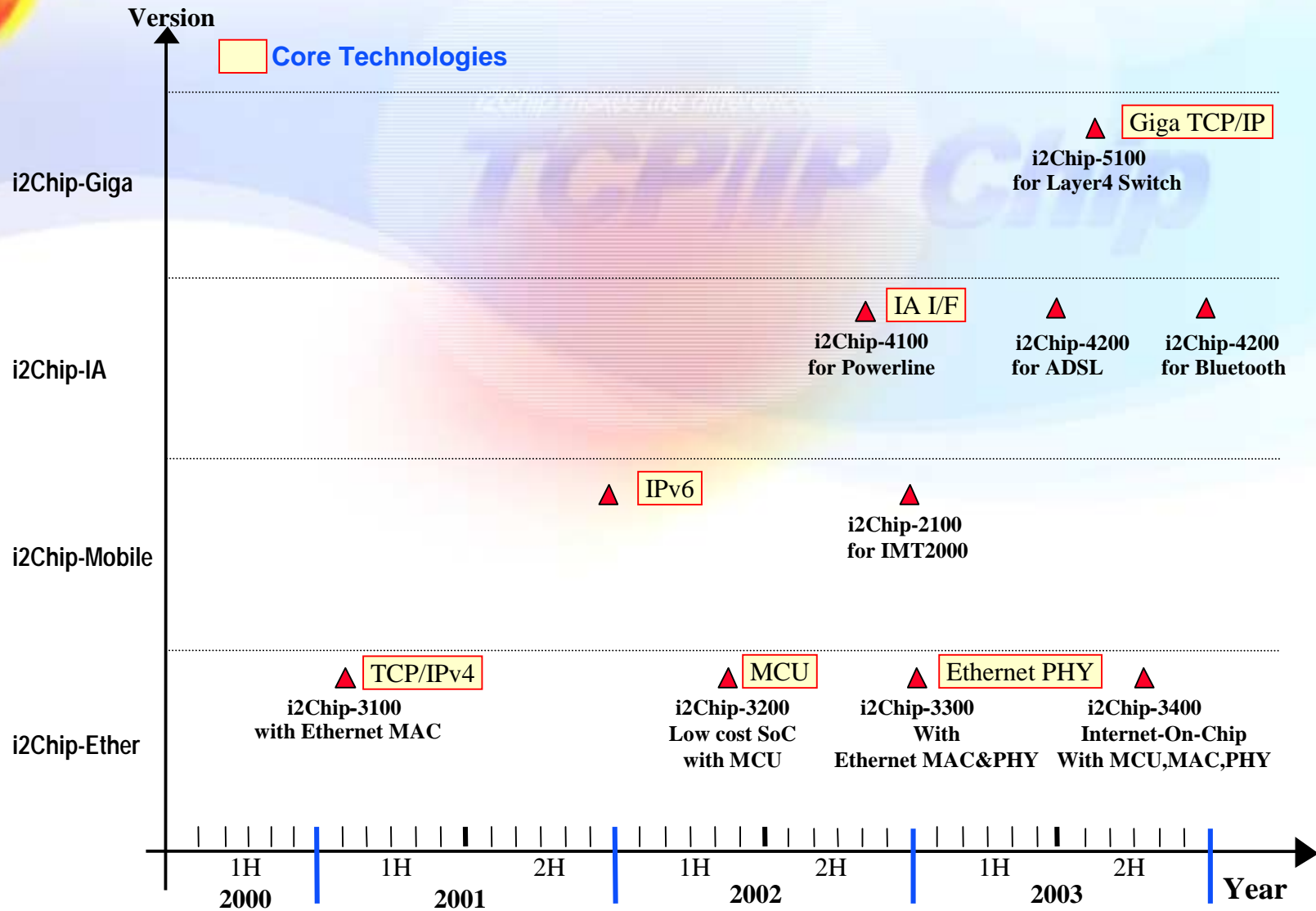
- Just add a chip, and use it like a memory chip
- Simplest way for Internet connectivity



▶ **i2Chip can eliminate the risk, cost and time**



i2Chip Roadmap

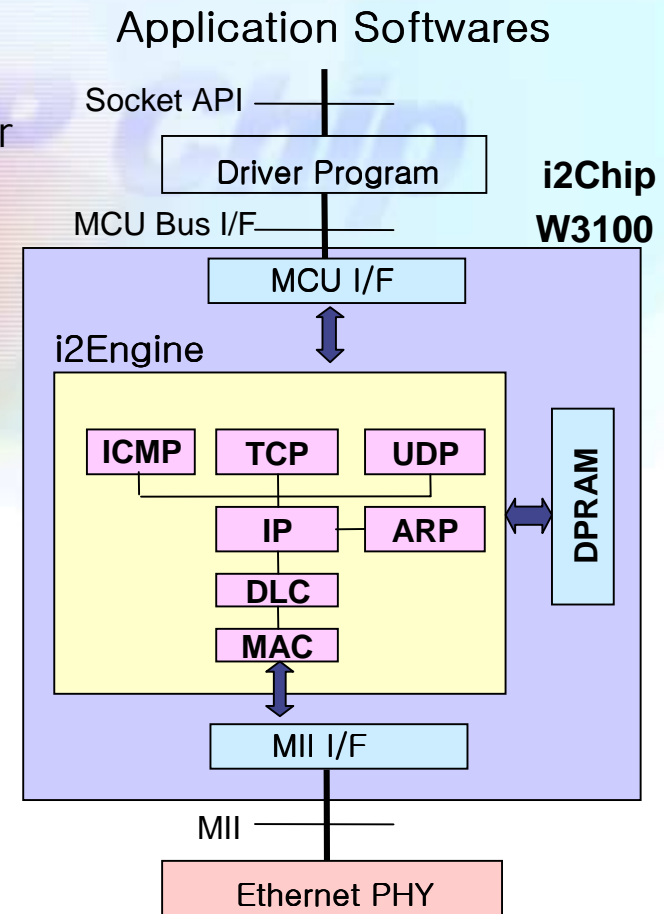




i2Chip Core and W3100

- i2Chip W3100
 - World first Ethernet based TCP/IP Chip
 - Contains all Internet connectivity modules for devices
- i2Chip Core (named i2Engine)
 - Modularized hardwired Internet protocols TCP, IPv4, UDP, ICMP, ARP/RARP
 - Hardware Ethernet protocols DLC, MAC
 - Memory
24Kbyte Dual-port SRAM for data buffer

- TCP : Transmission Control Protocol
- IP : Internet Protocol
- UDP : User Datagram Protocol
- ICMP : Internet Control Message Protocol
- ARP : Address Resolution Protocol
- DHCP : Dynamic Host Configuration Protocol
- DLC : Data Link Control
- MAC : Media Access Protocol





i2Chip W3100 Features

- Supports 4 independent connections concurrently
- Protocol processing speed: full-duplex 5 Mbps (i386 MCU : 3 Mbps)
- MCU Interface : 15 bit address bus (32Kbyte) and 8 bit data bus
- Standard MII Interface for under-layer physical chip
 - 10/100 Mbps Ethernet environments including "Cable Modem" and ADSL without PPPoE
 - Does not support PSTN or serial interface
- Socket API support for easy application programming
- 0.35 μm CMOS technology
- 3.3V internal operation & 5V tolerant 3.3V IOs
- Small 64 Pin LQFP Package



W3100 Evaluation Boards

i2Chip makes the difference



8051 EVB

- RS232-Ethernet Gateway
- Factory Automation
- Powerline-Ethernet Gateway
- Web Camera (Low-end, 2 FPS)
- IP Phone



i386 EVB

- Web Camera
(High-end, 15 FPS)



PIC EVB

- RS232-Ethernet Gateway
- MP3P



SH-3 EVB

- Internet Audio
- Web Camera
- STM PHY
- * Under Development



Performance of W3100

- W3100 Simulation Performance
 - Max 5 Mbps FDX
- Actual Performance depends on processor speed used

Processor	Functions	Ether-3100 Performance (FDX)
8051 (Atmel)	- Web Server - LCD, LED Control - Loop-back Test	200 Kbps
8051 (Dallas)	- LCD Display - LED Control	500 Kbps
PIC17C756	- Loop-back Test	700 Kbps
Intel 80386	- Web Server - Loop-back Test	3.0 Mbps



i2Chip Opportunity

■ World's First High-speed Hardware TCP/IP Chip

- *i2Chip-W3100*, the first version of i2Chip targeting the Ethernet market, was released in January 2001.
- i2Chip-W3000 family will be followed by i2Chip-IA, i2Chip-Mobile, and i2Chip-Giga that targets the digital appliance market, wireless communications and high-speed markets, respectively.

■ Potential Market Size

- According to IDC (International Data Corporation), the total unit of digital appliance products, including industrial FA, security and medical devices is anticipated to reach 233 million in 2002, surpassing that of computers.
- Such Internet applications must be equipped with TCP/IP, and the demand for comparatively low-cost, high-speed i2Chip is expected to increase dramatically in the near future.

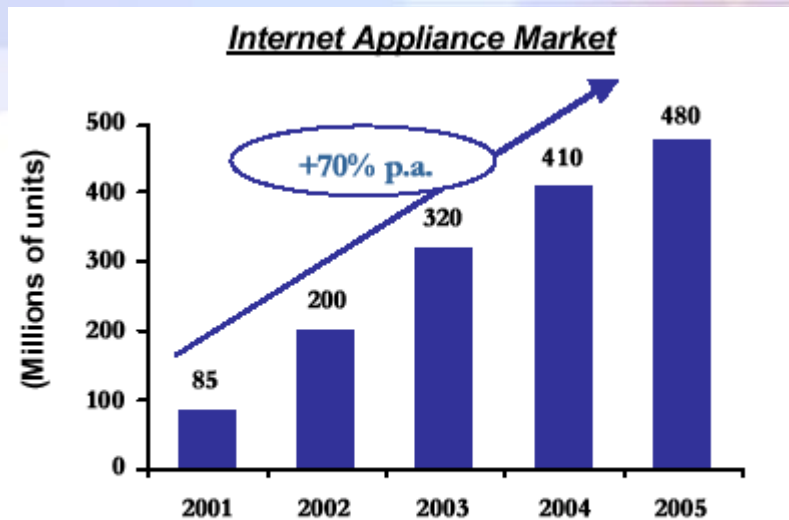
■ Market Dominance

- The Company anticipates to dominate the market for a significant period of time considering the high technical entry barrier and patents pending in the U.S. and other key market places.
- i2Chip cores were developed not only by compacting 16,000 lines of TCP/IP source code but by combining high-speed technology with it



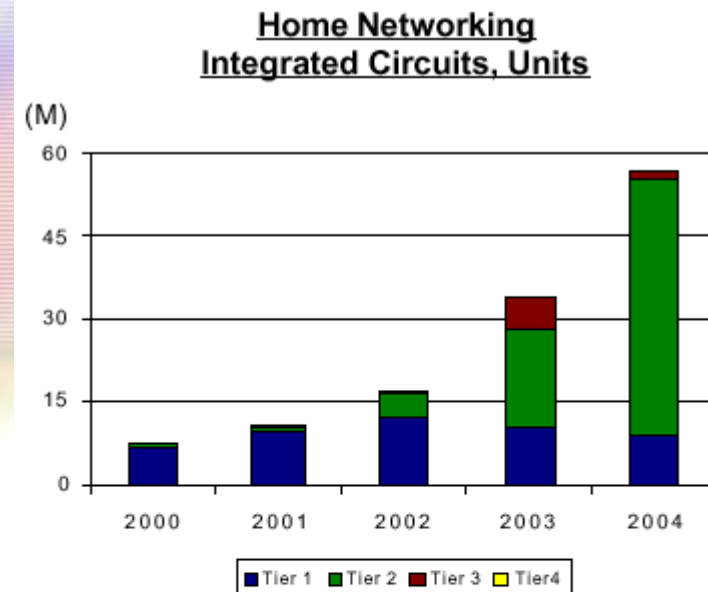
Market Potential

Growth of Internet Appliances



Source : Bear Stearns estimates,
Jupiter Communications, IDC

Growth of ICs for for Consumer Device Networking



- Tier 1** ICs that provide little intelligence to the device (only on/off capabilities)
- Tier 2** ICs that support peer-to-peer networking capabilities (e.g. eDevice SmartStack)
- Tier 3** ICs that provide direct Internet connectivity and control of a device
- Tier 4** ICs that provide direct Internet connectivity as well as peer-to-peer networking

Source: Cahners In-Stat



Market Size for W3100

- W3100 focus on the low-end OS-less Ethernet market
 - The low-end Ethernet devices from OS-less IA devices are the primary target market of W3100 (Low-end devices don't need RTOS)
 - RTOS-less devices have 36% share of total Internet appliances market

Number of Products *(Units : Millions)*

Year	Total IA Devices	RTOS-embedded IA Devices	RTOS-less IA Devices
2001	85	54.4	30.6
2002	200	128.0	72.0
2003	320	204.8	115.2
2004	410	262.4	147.6
2005	480	307.2	172.8

Source: IDC, Bear Stearns Estimates, Jupiter Communications, Dedicated System Magazine 2000



Competitive Analyses

- Customers are now seeking Ethernet interface
 - Users has to select one of 3 way to add Internet connectivity
 - Hardware, Software Stack or Do-it-themselves
 - Most competitors are also developing Ethernet products, but W3100 have competitive edge in cost, speed, and easy-to-use.

Product	Embedded MCU	TCP/IP	MAC	PHY	OS	Features	Price (for 1K)
W3100 (WIZnet)	None	Hardwired	○ (10/100)	×	×	24KB data buffer embedded, 4 Full duplex sockets, 1 Mbps speeds	\$7
S7600A (Seiko,iReady)	None	Hardwired	×	×	×	PPP, Serial & PSTN I/F 128 Kbps speed	\$8
iChip LAN (ConnectOne)	16Bit	S/W Stack	×	×	×	Up to 230Kbps speed, 5 Full duplex sockets, Serial I/F and optional parallel, Next version will support 2Mbps,	N/A
SmartStack (eDevice)	AD DSP	S/W Stack	○ (S/W)	×	×	Serial I/F, 2 or 4 Mbits flash memory required	\$11.5
SX52BD (Uvicom)	SX52BD	S/W Stack	×	×	×	Up to 500 Kbps speed 50 Mhz Clock Rate	\$8



Current Marketing Status

■ W3100's current Ethernet Markets

Type	Applications	Current I2chip Product	MCU Used
Controlling, Data gathering	Utility meters, Automatic Metering	Remote Controller	8051
	Data acquisition & process control	Remote Controller	8051
	Remote Control	Remote Controller	8051
	On-off control	Remote Controller	8051
	Internet Vending Machine	8051 EVB	8051
	Traffic signal control	Remote Controller	8051
	Factory Automation	8051 EVB	8051
	POS Terminal	8051 EVB	8051
Home Security & Automation	8051 EVB	8051	
Management, Protocol Gateway	Serial-Ethernet Gateway	8051 EVB	8051
	PLC-Ethernet gateway	386 EVB	i386
	Parallel-Ethernet Gateway	8051 EVB	8051
	Remote Maintenance	386 EVB	i386
	Remote diagnostics	386 EVB	i386



Current Marketing Status(cont.)

- W3100's current Ethernet Markets

Type	Applications	Current I2chip Product	MCU Used
Multimedia Terminals	Text iTV	iTV (Hynix)	GMS81C4040
	Internet Radio	VoIP Module	8051
	IP Phone	IP Phone Module	8051
	MP3 Player	PIC EVB	PIC17C756
	Internet Audio system	STM EVB	SH-3
	Internet Fax	IP Phone	8051
	Web Camera	WebCam Module	i386
STB, Internet Module	KIOSK	386 EVB	i386
	Internet Game Terminal	PIC EVB	PIC17C756
	Internet STB	iTV	GMS81C4040
	Home Appliances	8051 EVB	8051