

NSC 87-2217-E-002-209

國科會 3C 矽谷考察報告

報告人：微電子學門召集人 陳良基教授
成大電機系 劉濱達教授
晶片中心 李鎮宜主任

一、考察目的：

鑑於半導體科技及網際網路之快速發展，電腦已不再只是工程師或上班人員之使用工具，它已成為可攜式、個人化、家電化之熱門產品，是一個結合計算(Computer)、通訊(Communication)及一般享受用途(Consumer/Content)之 3C 產品。國科會今年起亦投入大量經費，支持有關「3C 科技」之前瞻性計畫。由於美國矽谷是全世界科技與商業匯集之地，舉凡工程師素質、研發廠商、研發能量皆是世界第一。故特組團至美國矽谷取經，希望能帶回一些矽谷的經驗，以供國內發展的參考。

二、行程安排：

此次參訪，除國科會工程處組團外，另產業發展協進會(NII)亦由夏漢民董事長領軍，率同三位顧問—林寶樹總經理、葉振綸副總經理、周景揚教授一同併團參訪。訪問之行程安排係透過國科會舊金山科學組(TECO)、中華資訊暨網路協會(CINA)及華美半導體協會(CASPA)共同協助安排，詳細行程如附件。行程安排緊湊且豐富，在此要特別謝謝上述各單位之協助，尤其主要聯絡人華美半導體協會副會長陳少民博士之精心策劃。此次收穫相當豐碩，茲將每項參訪之所見所聞，敘述於下：

參訪 NET LOGIC Microsystems

時間：九月廿七日上午九時卅分

地點：NetLogic Microsystems, Inc 公司會議室 (465, Fairchild Drive, Suite 101, Mountain View, CA 94043, Tel: 650-961-6676)

接待人：郭燦輝 (Board Director CFO)、Varad Srinivasan (Vice President, CTO)，
透過華美半導體協會 (CASPA) 所安排。

心得：

NetLogic Microsystems, Inc. 設立於 1996 年，以設計和提供高速資料搜尋、比較、辨識等應用所需高性能半導體的解決方案為主要訴求，目前員工 50 人。公司的核心競爭力在於矽搜尋引擎 (Silicon Search Engine or SSE)，並透過國內臺積電的 CMOS 製程來實現，可提供未來超高速網路的快速查表需求。目前該公司亦和國內清華大學資工系有建教合作的計畫進行。根據最新的網際網路統計資料分析顯示，隨著用戶數的增加，資料流量每一百天增加一倍，而網路頻寬每十二個月增加一倍，而矽元件密度每十八個月才增加一倍，因此在網路應用上必須有不同的思維方式，方能滿足與日俱增的資料流量。此意味著矽關鍵元件的設計，必須和系統產商有密切的合作關係，方能提供符合系統規範下的最佳硬體實現方案，因此該公司在未來會漸漸增加軟體工程師的比例，同時考量在不減損效能的情形下，提供一類似矽編譯器的自動合成方式，透過參數化的設定方式，直接產生所需求的佈局。

目前該公司的主要產品為 Binary CAM (NCAM) 和 Ternary CAM (IPCAM, SyncCAM, ...)，容量最大可達 64Kx128，速度最快達 83MHz，未來配合網際網路的應用需求，增加 longest Prefix Match 和 Packet Classifier with Table Management 等輔助處理器。相關的產品設計，該公司曾於 1999 年透過 CIC 介紹給國內學校單位，並免費提供 IC 元件讓學術單位從事研究。未來在網路的 SOC 領域中，SSE 將繼續扮演極重要的角色，而該公司也很有意願和國內學術研究單位建立合作關係，以及提供必要的技術支援。

參訪 Arcadia Design System 公司

時間：九月廿七日下午一時卅分

地點：Arcadia Design System 公司會議室

接待人：賈偉剛 (President & CEO)、Herman Li (Vice President)

心得：

Arcadia Design System 設立於 1995 年，總部設在加州聖荷西，台灣新竹有設計中心，日本東京有業務處，目前員工 120 人。公司在 1996 年開發出 Data Path 之設計軟體 Mustang，可以整合 Random Placement 及 Structured Placement，受到許多公司歡迎，例如 IBM、Sun Microsystem、Lucent、Hitachi、Integrated Communications Design。1997 年開始代為設計 CPU，1998 年代為設計 DSP，1999 年進入 Methodologies 開發，2000 年從事 Process Migration 探討，預定 2001 年從事 IP/SOC 整合，2003 年開發出系統平台。

公司目前之設計案在通訊方面有：手機、網路處理器、無線網路。民生用品方面有：數位電視、數位相機、DVD、遊戲機、繪圖晶片。資訊家電方面有：PDA、Set-Top Box、數據機、繪圖晶片等。客戶群有 Hitachi、NEC、Fujitsu、Sony、Panasonic、Intel、TI、IBM、ST、Siemens、Compaq 等大公司，其中 90% 以上設計服務收入為 CPU 及 DSP 方面。

未來希望整合 Hitachi、Panasonic、Sony、NEC 等公司之 IP，Synopsys、Cadence、Avant! 等公司之設計軟體，以及 IBM、TSMC、UMC、LSI Logic 之晶圓代工，進行製程轉移及整合服務。另外正進行協商取得 Hitachi 的 CPU (SH4) 作為 IP，經過驗證及授權之後，加以大力推廣，以便如 Arm 之普及。

公司積極與各大學合作研究，目前參與者有台灣交大張耀文及周景揚教授、清大吳中浩及黃婷婷教授、大陸清大 Xian-Long Hong 教授、復旦大學 P.S. Tang 教授，是極有潛力投入 SOC 設計的公司。因在台擴充時，人力增聘不易，有意到印度招聘 30 人，若要打消此意，必須由政府相關單位予以協助。

參訪 Symmetry Communicaticn Systems 公司

時間：九月廿八日上午

接待人：公司總裁暨總經理 高啟明先生及公司研發主管、財務主管等多人。

心得：

Symmetry Communication Systems 創立於 1997 年，經多年增資，目前資本額約 5 千萬美金，2000 年之營業額約 5~10 百萬美金，預計明年度可達 100 百萬美金。投資法人包括交大思源基金，宏碁創投等國內外創投公司，現有員工約 120 人。

公司創立之目標是為因應無線通信及 Internet 之成長，以提供 Mobile Telecommunication System 之核心解決方案為目標。初期以 GPRS 之 2.5 代手機之交換機為切入點。主要基於兩項特點：i) 2.5 代 GPRS (General Packet Radio Switch) 被許多通信大廠認定為過渡產品，並未投入研發。ii) GPRS 使用 Packet Switch 技術，有別於第 1 及 2 代手機之 Circuit Switch，正好可為公司準備未來走向第 3 代手機做準備，而這兩項特點也成為公司蓬勃發展之主因。目前產品已獲通信大廠評估採用，每月約可出貨 2~3 套，利潤及進入之技術難度皆非常高。

公司願景為提供進入 Internet 之 Mobile Network，由於此已為未來無線通信之主流，前景不可限量。如有機會，高總裁亦強調極有意願與國內產學界合作。

參訪 Global Center 公司

時間：九月廿八日下午一時三十分

地點：Global Center 公司會議室, 141 Caspian Court Sunnyvale, CA 94089, tel: 408.543.4708

接待人：蔡佳璋先生 (Network Engineer)，由中華網路協會 (CINA) 所安排
心得：

Global Center 為 Global Crossing Telecommunications 的一個子公司，主要是藉由其母公司在全球所鋪設的光纖網路，建構出多媒體資料中心(Data Center)，避免流量過大造成網際網路的瓶頸。目前除了美國本土已有數個 Data Center，歐洲的倫敦、巴黎、法蘭克福、阿姆斯特丹，澳洲的墨爾本、亞洲的東京、香港等，透過這些資料中心，不僅可提供主機代管的 ISP 服務，避免流量壅塞的現象發生，同時可提供客戶式的需求服務，如 Tape-on-Demand (a fully managed tape backup and disaster-recovery service), Disk-on-demand (hard-disk storage for the digital economy), 此外 Global Center 也提供相當有利於網路流量管控的軟體，如 FreeFlow(a high-performance global content delivery service), Keynote Perspective (assess web site's performance from users' viewpoint)。

另外，所參觀的資料中心 提供基本的硬體資源和網路頻寬，確保網路流量的品質和主機代管的服務，都有可能成為下一波的新興產業，不過重點還是在於超高頻寬的光纖網路基礎建設和相關的光電轉換設備，而不是在於建築物本身。因此，類似的資料中心在未來的網際網路所帶動的相關產業上，勢必扮演舉足輕重的重要角色，而所帶動的相關產業，亦值得國內產官學研的重視。

參訪 Transmeta 公司

時間：九月廿九日上午九時

地點：Transmeta Corporation 公司會議室

接待人：David R. Ditzel (CEO)、George R. Ellis (Strategic Program Manager)、
Benny Sin (Strategic Program Manager)

心得：

Transmeta Corporation 公司在 1995 年成立於加州 Santa Clara，目前員工 350 人，專注於行動電腦(mobile computing)、主要產品為 x86 相容之超低耗電 Crusoe 處理器，號稱是全球唯一結合 FC 及 Internet 相容軟體之高性能超低耗電處理器。口號是相容度高 (compatibility)、高性能 (performance)、低功率 (low power)，所謂相容性高是指與 x86 相容、與 PC 晶片組相容、可跑 PC 作業系統、與其他非 x86 低功率處理器相容；高性能是指速度最高可達 700MHz；低功率部分如後所述。技術的核心所在是四分之三 Instruction set 以軟體 (稱為 Code Morphing 軟體) 處理，其餘四分之一由 VLIW (Very Long Instruction Word) 擔任，因此比一般 CPU 處理器電晶體數少很多，功率消耗也就低很多。公司在展示間以 TM5400 為例，播放 DVD 時，不必風扇，溫度只有 48°C，而一般 CPU (Pentium III) 溫度則高達 105°C。展示櫃上並有台灣廣達電腦代工之 web pad。

Crusoe 晶片省電秘訣何在？根據功率消耗公式 $P = CfV^2$ ，電容 (C) 跟電晶體數有關，電晶體只佔有四分之一，當然功率變小，另外以 Code Morphing Software 機動調整頻率 (f) 與電壓 (V) 之關係，例如：200MHz 時用 1.1V，300MHz 時用 1.5V，700MHz 時用 1.65V。

該公司生產之 Crusoe 晶片有二種系列，5400 系列適合 Notebook 電腦，3200 系列適合 Mobile Internet Appliance。用 0.18 μ m 製程的 54 系列採 L1 Cache 128KB，L2 250KB，記憶體 SDRAM，474 BGA 包裝，晶片面積 73mm²；用 0.22 μ m 製程的 32 系列採 L1 Cache 96KB，記憶體 SDRAM，474 BGA 包裝，晶片面積 77mm²。

近日 Sony 採用 Crusoe 處理器之 Vaio PictureBook 筆記型電腦在日本問世，因溫度不高，所需絕緣體較少，且不需風扇，所以輕薄，重量僅 2.2 磅，厚度不到一吋，在單一電池下，使用時間達 2.5~5 小時，是 Intel CPU (使用時間 1.5~2.5 小時) 的 1.6~2 倍。

未來將整合南橋、繪圖晶片、DVD 驅動器成為單一晶片，消耗功率在 1W 以下。合作廠商有 Sony、Compaq、AOL、Gateway、Samsung、Hitachi、Fujitsu。

參訪 Empowertel

時間：九月廿九日下午

接待人：CTO，Raj Saksena 及研發部主管 Dr. David Chang

心得：

公司創立於 1997 年，資本額約 70 百萬美金。主要股東為三位印裔美籍工程師，現有員工約 250 人，其中在加州總部約 150 人，從事軟、硬體系統研發，在加拿大 Ottha 大約有 70 人從事軟體開發，另在印度新德里約有 20 人主要進行軟體測試。

技術目標主要是開發傳輸級 (Carrier grade) VOIP 交換機之硬體平台解決方案，以增強下一代通信系統之 IP 伺服器功能，技術特點為：i) 搜尋引擎核心技術：公司創立之初即擁有自行開發 CAM 之能力及技術，可完全掌握搜尋及交換之硬體技術。ii) VOIP/VOATM 等軟體規格技術，對 Regional Access Network 等 Protocol 有充分之基礎。也因此公司提供之解決方案可從通信層級 Layer 2 至 Layer 3、4、5 不等，為未來下一代通信系統之必要技術。

公司願景為公司目前掌握許多關鍵技術，含交換線路之 SOC、Mix-Speed Gateway 等。雖有 Cisco、Lucent 等大廠之競爭對手，但目前技術領先許多，是此領域之領先者，公司也極有意願在 SOC 及 Protocol 等與國內產學界共同研發。

參訪 Lara Networks 公司

時間：九月廿九日下午四時

地點：Lara Networks 公司會議室, 2345 North First Street, Suite 100, San Jose, CA 95131.

接待人：Kamal Gunsagar (Founder & CEO), Jayan Ramankutty (President & COO), Suneel Rajpal (Vice President), Peter C.P. Sun (Senior Director), 由中華網路協會 (CSIA) 所安排。

心得：

Lara Networks 和 empowertel 這兩家公司，原屬於同一家，後來因母公司的發展策略，將 IC 設計部門和系統設計部門分別獨立出來成立兩家公司。其中 Lara Networks 的主要訴求為 "technology solutions for a better Internet"，顧名思義即針對網際網路的通訊協定和資料處理，提供一快速的實現方案，目前主要的產品系列包含 Emerald 系列：支援 1Gb/s 和 10Gb/s 乙太網路，Diamond 系列：支援 10Gb/s 和更高頻寬的乙太網路，Sapphire 系列：支援 1Gb/s 的企業型交換器和路由器。由於有完整的系統設計背景，在相關關鍵 IC 元件的規格制訂上，可循著主流市場的需求，迅速提供符合網際網路發展趨勢的系統 IC。基本上，該公司的關鍵技術和 NetLogic 相近，皆以 CAM 為發展核心，提供網路系統廠商所需求的高速、高頻寬的 IC，然而 Lara Networks 更因為公司核心成員具有系統設計的背景，因而在產品的行銷上，有較大的發揮空間。最近，更併購了 WarpCom 公司（以 LAN 交換器 IC 設計為主），藉以擴大該公司在網際網路市場上的競爭優勢。

目前該公司，並未和國內學術界有任何建教合作的計畫，不過公司高層也並不排斥此一可行性，若能定義出名確的系統方塊和設計規格，從這些現有的產品系列或未來新網路處理器的研發上，在所謂 SOC/IP 議題上，應有相當大的合作空間。另外值得一提的是，在所謂 IP 或 SOC 的設計上，若能先掌握到系統規格的制訂，由上而下，將更能發揮系統 IC 所扮演的關鍵角色。

參訪 Clarinet System 公司

時間：九月卅日上午九時

地點：Clarinet System 公司會議室

接待人：張文豐（執行長）、余方正（技術總監）

心得：

Clarinet System 公司於 1997 年 1 月設立於加州 Milpitas，目前員工廿人。主要產品為整合乙太網路及紅外線傳輸之 EthIR LAN，採用 IrDA 紅外線國際標準，對手提電腦之資料傳輸而言，省電、方便、便宜、不必常插卡，傳輸速度 4Mbps，一張數位相機之照片只需 30 秒。有關短距離資料傳輸方面，目前最熱門者應為 Bluetooth，但採用 RF 的缺點為各國開放 RF range 不同，如法國、南非與其他地區不同，標準亦不同。對紅外線而言，則全球統一，此為有利之處。

近來 PDA 益形普遍，預估 1999 年賣出 1.5 億台，2000 年賣出 3.2 億台，2003 年可達 13 億台，利用紅外線，可互傳個人名片資料或其他資料，不必如往常交換名片後尚需逐字輸入。公司開發之 EthIR LAN 多埠機種，可供掌上型 PC、桌上型 PC、網路家電、有 LAN 卡之手提電腦使用，未來應用範圍包括企業內部與伺服器之資料同步(synchronization)、醫院內醫師及護士藥方傳送、學校講義習題分發、機場或貴賓室接收電子郵件、餐廳點菜。公司以報載新加坡樟宜機場為例，設有類似電話亭的 e-Booth，稱為 Infrared Internet Access Kiosk，只要將 Palm PDA 對準該裝置，即可下載電子郵件，方便旅客。支援該項產品的軟體有 Windows 95/98/2000/CE、Apple Mac OS、Palm OS 303+、Palm VII 3.2+、Linux、EPOC 等，非常方便。未來希望整合 Arm Core 及 16M DRAM 形成 SOC 晶片作為核心，同時兼具紅外線及 Bluetooth 功能。

SOC & IA Symiposinm

時間：九月卅日下午

研討會準時於下午 12：30 在華美半導體協會會長王國凱博士主持下展開，大約有 200 人參加，包括國科會舊金山科學組周龍章組長、矽谷科技記者多人皆出席會議。除分別由半導體協會（CASPA）、網路協會（CINA）、NII 產業協進會（夏漢民董事長）及舊金山科學組致辭外，共安排了 6 場技術專題。詳細內容如下：

System on Chip & Internet Appliance Symposium

DATE : **Saturday, September 30, 2000**

TIME : **12:30 pm to 5:30 pm**

PLACE : **Santa Clara Conventional Center, 5001 Great America Parkway, Santa Clara**

CONFERENCE CHAIRS : **Michael Chen, Department Manager, Lattice Semiconductor Co.
George Chen, Member of Consulting Staff, Cadence Design Systems**

SPEAKERS:

- Topic: **Engineering & Deploying a Global Broadband Network**
Jonathon Plonka, VP of IP engineering at Global Crossing
- Topic: **Internet Appliance Solutions**
Johnny Wang, Senior Manager at NEC Electronics
- Topic: **ADVANCED BROADBAND TECHNOLOGIES FOR HOME NETWORKING**
Paul Chin, CEO and Founder of Rainmaker Technologies
- Topic: **MxP- Media Express Processor for VoIP Networks**
David Chang, Senior Director at empowerTel Networks
- Topic: **Bluetooth Wave**
The Last 10 meter Wireless technology - Potential and Challenges
Albert Chen, CEO/ President of ALinks Communications
- Topic: **Wireless IP networking for the Business Internet**
Cees van der Stoep, VP of Sales at CALY Networks

SCHEDULE:

12:30	Opening and Welcome
12:30	TECO, CINA and CASPA Introduction Dr. Chou TECO, Sheldon Wu of CASPA, Roger Liao of CINA
12:45	NII President's Words Han-Min Hsia, President, NII-EPA
13:00	Jonathon Plonka, VP of IP Engineering, Global Crossing
13:35	Johnny Wang, Sr. Engineering Manager at NEC Electronics
14:10	Paul Chin, CEO and Founder of Rainmaker Technologies.
14:45	David Chang, Senior Director at empowerTel Networks
15:20	Albert Chen, Founder of ALinks Communication/ISSC (Integrated System Solution Corp)
15:55	Cees van der Stoep, VP of Sales, CALY Networks
16:30	Panel Discussion

Han-Min Hsia, President

National Information Infrastructure Enterprise Promotion Association

Speaker Profile and Topics

Name: **Jonathon Plonka**

Title: **Vice President of IP Engineering for Global Crossing Communications**

Topic: **Engineering & Deploying a Global Broadband Network**

As Vice President of Global IP Engineering for Global Crossing Communications, Jonathon Plonka manages the design, construction and implementation of the industry-leading Global Crossing Internet Protocol network. Jon has been with Global Crossing Communications for over six years, joining the company, formerly Frontier, at its Rochester, NY headquarters, as Chief Technologist where he oversaw the generation of the corporate IS infrastructure. Prior to joining Global Crossing, Jon was a consulting network/systems engineer for the Fortune 500 market with MicroAge.

Jon attended the University of Michigan in the field of Physical Chemistry. He is a member of the Association of Computing Machinery and the Institute of Electrical and Electronics Engineers.

Jon and his family reside in San Jose, California.

Engineering & Deploying a Global Broadband network

A presentation of the Engineering decisions in the growth and deployment of the Global Crossing broadband IP network.

Deploying: Hub Architecture Guidelines

SONET/DWDM Overview

Current Hub Architecture

A quick overview of current status of fiber and IP Hub Builds Using MPLS for fine grained traffic engineering.

Name: **Johnny Wang**

Title: **Senior Engineering Manager at NEC Electronics**

Topic: **Internet Appliance Solutions**

Johnny Wang is a senior engineering manager at Internet Platform Laboratory of NEC Electronics. His major job responsibilities are leading hardware engineers team and software engineers team to build Internet reference design, based on NEC's VR MIPS CPUs and chipsets, for NEC's customers.

His current job focus is 'Internet Appliance' and 'Digital Set Top Box' reference design. In the past several years, his team had built pocket PC and hand held PC reference design with complete OS, peripheral device drivers and application programs ported.

To help NEC's customers to reduce time to market, his team makes reference design very close to production ready prototype with finished mechanical mockup run by rechargeable battery.

The major targeted OS for their reference design boards were based on WindowsCE. The newly targeted OS is Linux OS.

Due to his job requirements, he had many chances to talk to worldwide IA vendors to jointly define appropriate system architecture for various Internet appliance platform.

In order to get better system integration, he has to talk to various hardware software vendors to understand new available technologies on the market so that he can recommend best suitable solutions for NEC's IA customers.

He has BSEE and MSEE degrees.

Internet Appliance is becoming major post-PC product. The nature of IA - it is a service product. The estimated sales volume will exceed PC before year 2005. Besides OEM manufacturers, there are lots of new players, such as Internet Service Provider and Software / System Integrator etc.

Internet Appliance is not a PC product. PC is a standard product with WinTel solutions. For IA products, there are too many integration options with different CPU chipset peripherals OS GUI Browser etc. to fit different applications.

Due to time to market pressure, there is no way for IA manufacturers to study all of different approaches. They need good partners. The first step is to select CPU manufacturer as a partner.

CPU manufacturers have to provide complete solutions (System integration: CPU & chipset, peripherals & components selection: Software porting: OS, peripheral drivers and application programs) to get their customers' design win done faster.

From CPU manufacturer' point view, the speaker would suggest IA manufactures select right partners to make successful IA products. The CPU chipset partner's choice should be the IC company who can provide good reference design. For OS selection, 'open source code' is the trend. There are many integration options for IA to include communication, multimedia features as well. To select right technology for different application is another key factor.

In summary, IA is a 3C (Computer, Communication and Consumer) in one service product. There are lots of different applications with huge sales potential. To be successful in this great new market requires good partners to make win-win business.

Name: **Paul W. Chin**

Title: **President and co-founder of Rainmaker Technologies, Inc.**

Topic: **ADVANCED BROADBAND TECHNOLOGIES FOR HOME NETWORKING**

Paul W. Chin is President and co-founder of Rainmaker Technologies, Inc., a provider of broadband network communications chips for PCs and Internet, consumer electronics, and entertainment appliances in the Home Networking and SOHO LAN market spaces. Adhering to the vision of "no-rew-wires", Rainmaker's Wavelet-enabled integrated silicon solutions offer *native* "multi-service networking" connectivity for the 10/100 Mbps phoneline, powerline, and wireless LAN markets. He is also Advisor for SMC's new venture fund, and is a member of the Advisory Board of the MIT/Stanford Venture Lab. He was managing general partner of Makarios Petroleum LP, a petroleum and energy trading and risk management firm. He was Vice President and co-founder at Chaotix, Inc., a medical device IP company involved in pioneering the application of wavelets

for cardiovascular applications. He was Director and co-founder of Xinix, Inc., a high technology thin-film semiconductor instrumentation leader, including 5 years directing overall management and responsible for venture capital financing. He holds S.B., S.M., and Ph.D. degrees from Massachusetts Institute of Technology, and an M.B.A. degree from the Stanford University Graduate School of Business. He has authored several papers and publications in the networking communications, energy, and systems control engineering sectors, the most recent entitled "Wavelet Modulation For High-Bandwidth Networking Connectivity", for the North America Taiwanese Engineers Association (NATEA) 1999 Annual Conference, October, 1999. He has been honored by Dr. Paul E. Gray, former President of M.I.T., as an M.I.T. alumni company founder.

Exposé

The "myths" surrounding scalability of kilobit technologies in terms of performance, cost, power and complexity are dislodged, along with an examination of what's lacking in modems today. The state of today's Home SOHO networks is assessed.

Disruptive Technology

The emergence of Wavelet technologies, proven in analysis and imaging and compression applications (e.g. JPEG2000), is presented. Its application to the broadband pipe is next! This technology leadership enables a triple paradigm shift — the trilogy of fatter pipes, flexible pipes, and cheaper pipes — and illustrates the scalability of the Wavelet modulation breakthrough.

Divide and Conquer

A comparative review of today's broadband technologies reveals that multiband approaches eclipse single band methods. Why is "divide and conquer" multiband QAM (OFDM) overtaking single band QAM? And why does Wavelet OFDM (multiband Wavelets) surpass OFDM (multiband QAM)? These timely questions are answered.

Vo New Wires

Wavelets are applicable to multiple transmission media and Home Networking standards. They enable "no new wires" broadband networking connectivity over phone line, powerline, and wireless media. They provide high bandwidth network communications chips for PCs and Internet, consumer electronics, and entertainment appliances in the Home Networking SOHO LAN markets. These solutions integrate vertically up the OSI stack (MAC higher networking protocols, VoHPNA, VoHomePlug, ...) and horizontally into reference platforms, gateways, and the PORTAL into the Home and SOHO space. In addition to the LAN markets, Wavelet enabled products can also deliver breakthrough systems performance for remote access networking applications including digital subscriber line, coax cable, optical communications and networking, LMDS and satellite transmission.

Name: David C. W. Chang,
Title: Sr. Director, empowerTel Networks
Topic: MxP- Media Express Processor for VoIP Networks

David Chih-Wei Chang received a M.S. degree in Computer Engineering and a Ph.D. degree in Electrical Engineering from the University of Southern California, Los Angeles, in 1984 and 1988, respectively.

He is currently Sr. Director of VoIP System-on-Chip Engineering and is responsible for the Media Express Processors development at empowerTel Networks. From 1997 to 1999, he was Director of Engineering of Desktop Graphics and Integration Graphics (with VLA, ALI) at Trident Microsystems. From 1991 to 1997, he was Sr. Manager at Fujitsu/HAL Computer Systems, where he worked on 64-bit super-scalar, speculative

out-of-order execution CPU/MMU chips. From 1988 to 1991, he was a Sr. Staff Engineer at Siemens/Pyramid Technology, where he worked on RISC-based multiprocessor design. From 1985 to 1988, he was a Design Engineer at Citicorp/Quotron,

designing tightly-coupled multiprocessors.

Dr. Chang was a part-time professor in the Electrical Engineering Department at the San Jose State University from 1989 to 1993. He holds four patents and has published fifteen technical papers in VLSI-computer networking areas. His research interests include telecommunication/networking, computer architecture, multimedia, and VLSI/CAD.

MxP – Media Express Processor for VoIP Networks

Voice over Internet Protocol (VoIP) represents the convergence of Voice and Data over Packet Networks. Packet Networks are more efficient than the Public Switched Telephone Network (PSTN), and VoIP will be able to handle more calls efficiently. At the core of USX1000, empowerTel Networks' VoIP carrier-class switch, is an innovative SoC (System-on-a-Chip) referred to as MxP.

MxP is a very high performance, high capacity voice-processing engine designed to move seamlessly DS3 capacity (672 channels) of voice traffic from Circuit-Switched Network to Packet Networks and vice-versa at low latencies. This high speed SoC is the industry's first silicon-based wire-speed VoIP solution. At the heart of the MxP is a rule based, table driven architecture implemented using multiple RISC processor cores and proprietary fast content addressable memory (CAM). This architecture provides a highly optimized yet flexible flow-engine dedicated entirely to processing of RTP (Real-Time Transport Protocol) packets and bridges VoIP with TDM (Time Division Multiplexed) trunks. The flow engine incorporates a proprietary binning algorithm to pack sub-milliseconds of voice samples going to a common destination and having the same quality of service (QoS) requirements into a single packet. This result is to amortize the overhead of packet header across multiple channels for a more efficient packet creation to guarantee optimized usage of network bandwidth.

The MxP implements every standard interfaces used by telephony and networking industries for maximum interoperability: PCI, H.110 and 10/100 Mb/s Ethernet. To achieve all of the functionality, the MxP contains a Time Slot Interchanger (TSI), Ethernet engine with hardware-accelerated multi-layer filtering, MIPS32 4Km processor cores, hardware accelerated jitter buffer, embedded CAM and compiled SRAMs.

Name: **Albert Chen**

Title: **CEO/President of ALinks Communications**

Topic: **Bluetooth Wave**

The Last 10 meter Wireless technology - Potential and Challenges

2000 has been an acceleration in excitement at the semiconductor, telecommunication companies and PC industry. The advances in DSP, micro-controller and IC technologies made wireless connection a reality. However, the challenge lands into replacing all the cables and wires by low cost wireless device, ease of use, and high data rate.

In this talk, we like to explore the old Viking King – Bluetooth. The expanding membership of Bluetooth Special Interest Group (SIG), now numbering over 2000, suggests that the global electronics industry is ready to embrace the standard. We like to share with you the potential market and products. Finally, a few challenges will be discussed.

Albert Chen is the founder of ALinks Communications Inc.: a San Jose-based start-up specialized in wireless communication system/IC IP solutions Provider Company. (Founded in Sep 1999)

Dr. Chen held a strategic position in Ericsson R&D. He jointly developed satellite GSM handset mobile systems and worked on a multi-million dollars' hybrid CDMA/GSM handheld terminal projects. He was also a senior system engineer staff in Satellite Phone Division working on GSM like handset development. His responsibility was in the area of baseband system algorithms development including RF/IF design issues, modulation, synchronization, equalization, channel coding and vocoder. Dr. Chen was also a delegate program manager in Telecommunication Industry Association (TIA).

Early, Dr. Albert was employed at Delco Electronics, a Subsidiary of Hughes Electronics working on automotive

communication products. He was an advanced engineer and assisted program manager in Intelligent Vehicle Highway System (IVHS) program. His work ranged from developing advanced automotive electronics systems such as digital radio (Digital Audio Broadcasting), ETTM (Electronics Toll Traffic Management), Collision Avoidance systems to OEM productions. As an advanced engineer, he worked on Digital Signal Processor (DSP) and VHDL in DAB development and digital FM.

Dr. Chen also worked for Philips, Telecommunication Terminal IC Division, and Innovation Center. His projects include third generation communication chip-set, personal communication system (CDMA/GSM) development. He is also a delegate to Third Generation (3G) mobile systems standard. Dr. Chen has published over 10 papers in IEEE wireless communication conferences and a number of patents in wireless area. He was also an adjunct professor in Silicon Valley University.

Albert finished his Ph.D. in EE at University of Wisconsin-Madison and MSMA from Purdue University, West Lafayette and MSEE from University of Missouri. He was a GM/Delco Fellowship award.

He was a member of Tau Beta Pi, Eta Kappa Nu EE Honor Society and is invited in reviewing leading edge proposals and papers. Invited speech in 1999-2000 by I) NII Taiwan, 1999 3C SOC integration Application Workshop "on " 3C SOC in the wireless application". II) The 9th Annual Wireless and Optical Communication conference on "Global wireless communication toward SOC" in New Jersey III) A number of PC/Laptop/PDA Communications OEMs and Philips R&D in Taiwan on wireless product directions.

Name: **Cees van der Stoep**
Title: **Vice President of Sales, CALY Networks**
Topic: **Wireless IP networking for the Business Internet**

Cees van der Stoep is Vice President Sales, acting Marketing, for CALY Networks, a Silicon Valley start-up founded in 1998. CALY Networks integrates advanced wireless IP with innovative internetworking thereby creating an economical broadband wireless access solution.

Prior to CALY Networks, Cees was Regional Director at Netro, a wireless access company. Cees has gained more than 20 years of IT and networking experience at companies such as: Philips Telecommunications & Information Systems, Unisys and SynOptics Bay Networks.

Synopsis: The Business Internet is all about Delivering 'Lots of' Reliable and Predictable Bandwidth & Delivering Real Broadband Bandwidth is all about Wireless

Communication networks are experiencing a dramatic increase in IP traffic. Bandwidth in the WAN core and the LAN is increasing while the MAN Access network is suffering a "bandwidth squeeze". The access network must deliver lots of bandwidth, which is why wireless solutions are emerging as the most cost effective solution. Still bandwidth by itself is not enough, the access network must be able to deliver the the appropriate QoS (Quality of Service) to ensure reliable and predictable delivery.

There are two viable solutions for delivering QoS in the wireless access network: 1) Existing IP over ATM based implementation; 2) Advanced QoS-aware IP based implementation.

1. Existing IP over ATM based implementation

4 ATM based implementations are connection-oriented, provide fast switching capability, and guarantee QoS. However, it involves high cell tax and significant signaling overhead.

4 ATM establishes virtual circuits, which may either be set permanently (Permanent Virtual Circuit-PVC) or be created tempo rally (Switched Virtual Circuit-SVC). Such connectivity can not ensure an optimal utilization of network resources. An active virtual circuit may not fully utilize the allocated resources at all times.

2. Advanced QoS-aware IP based implementation

- 4 Today's IP-based networks are connection-less, simple, and low cost but lack QoS provisioning capability. However, there are on-going efforts to render IP networks QoS aware.
- 1 IETF propositions such as IntServ, DiffServ and MPLS ensure an adequate QoS in an IP network. It enables the network to be aware of the fact that "all packets are not equal".
- 1 Emerging policy-based resource management solutions (Common Open Policy Service- COPS, Bandwidth Broker) deliver flexible control over resource provisioning. Moreover, the signaling overhead is kept minimal.
- 1 Inter-domain Service Level Agreements link adjacent IP domains to offer end-to-end IP services.
- 4 IP provides packet-by-packet based connectivity that results in highly efficient utilization of network resources. The resources are shared statistically while no connections are created, thus avoiding signaling overhead.
- 4 As opposed to the standard-based services defined by ATM, IP offers policy-based resource management thereby creating custom-preferred services. For example, IP can offer "on the fly" qualitative services (such as Gold, Silver, Bronze) in addition to "a priori reserved" quantitative services (such as Constant Bit rate-CBR, Variable BitRate-VBR).

Summary: "Advanced QoS-aware IP based implementation" relieves the bandwidth squeeze of MAN wireless access networks. In addition to offering robust QoS, it provides enhanced customer-preferred service features.

Target Audience

IP Service Providers & LMDS License Holders

Proposed Efforts and/or Special Resources

Caly Networks is willing to help with mailing lists and other possible marketing efforts. Please contact Laura Geary, Director of Marketing Communications, to discuss further.

附件：

Content of Program

Date	Period	Time	Host or Company	Description	Address/ Phone	Contact Person
Tue, Sep 26	Arrival	Start from 8:05 PM	Rental Bus through Science Division	NA	NA	408-986-8686 X18 RF KU, Jeff Chen
Wed, Sep 27	Morning and Lunch	9:30:00 ~ 1:00 PM	Netlogic Micro	CAM	450 National Ave., Suite 101, Mountain View, CA	Al Kwok, 408-408-472-7581 , 650-961-6676 X120
	Afternoon	1:30 ~ 4:00 PM	Arcadia Design	An IA/IP CPU Company	2801 Orchard Parkway, San Jose, Phone: 408-546-1800	Wei-Kong Chia 408-546-1800
	Dinner	6:30 PM	Arcadia Design		ABC Seafood 768 Barber Lane, Milpitas, CA	Wei-Kong Chia 408-546-1800
Thur, Sep 28	Morning and Lunch	9:00 AM ~ 1:00 PM	Symmetry Comm.	3G Wireless Networking	399 W. Trimble Road, Building 3, San Jose, CA, (408) 456-5500	Chiming Kao: 408-456-5522
	Afternoon	1:30 PM ~ 4:30 PM	Global Crossing	Broadband Networking	141 Caspian Court Sunnyvale, CA 408.543.4700	Robert Tsay 408.543.4700 cctsay@gbx.net
	Dinner	From 7:00 PM	CINA	NII delegation and CINA BODs	Hong-Fu 20588 Stevens Creek Blvd Cupertino, CA	Roger Liao 408.894.7998 roger_r_liao@acer vc.com
Fri, Sep 29	Morning and Lunch	9:00 AM ~ 1:00 PM	Transmeta	An IA/IP CPU Company	3940 Freedom Circle Santa Clara, CA 95054 408-919-6317	Cheryal Sole 408-919-6317
	Afternoon	1:30 PM ~ 3:30 PM	Ernpowertel	Internet Infrastructure Networking	475 Sycamore Dr. Milpitas, CA 95035 408-519-7100	David Chang © 408-202-3757
		4:00 PM ~ 6:00 PM	Lara Networks	Internet Networking Infrastructure	2345 N. First St., Suite 100, San Jose, 408-519-6300	David Chang © 408-202-3757
	Dinner	From 7:00 PM	CASPA / Ernpowertel	NII delegation and CASPA BODs	May Flower in Great Mall 222 Great Mall Dr. Milpitas, CA, 408-935-6999	Sheldon Wu
Sat, Sep 30	Morning & Lunch	9:00 AM ~ 12:00 PM	Clarinet	Internet Infrastructure	1625 McCarthy Blvd. Milpitas, CA 95035 408-468-0400	Wen Cheng 408-468-0400
	Symposium	12:30 PM ~ 6:00 PM	NII, CINA, CASPA, TECO	Open to public	Santa Clara Conventional Center, 5001 Great America Parkway, Santa Clara	NA

夏漢民率台灣高科技參訪團

發展台灣三業合作與加強共同推動發展計畫

【記者高南心綜合報導】國府國家資訊基礎建設(二)產業發展協進會董事長夏漢民表示，此次率領高科技參訪團前來訪谷參觀與舉辦研討會，旨在發展台灣三G產業，並加強與此間企業的合作與交流。此次已與Acadia初步同意共同推展合作計畫，也與Acadia有合作計畫。

夏漢民說，不少公司都是已接觸多次的公司，此次與Acadia在單晶片系統(Single On Chip SOC)已有具體合作計畫，將與台灣的交通與中央大學教授共同合作開發專案。而Acadia是一家不錯的半導體積體電路設計公司，已在台灣成立十人左右的研發團隊，目前也在洽談擴大研發的計畫，讓台灣成為最大的SOC設計中心。

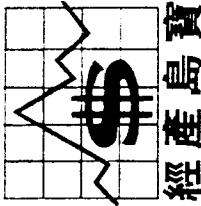
曾擔任國府行政院資政、最高科技行政研究機構國科會主任委員的夏漢民，即使在卸下公職後，仍對高科技產業界相當投入，積極地扮演政府與民間高科技產業政策與實務之間的橋樑。

夏漢民目前擔任三G產業發展協進會的董事長，該協會每年有三千多萬新台幣的營收，旨在協助民間企業技術轉移國家研究機構開發的技術與產品，同時促進海內的各項高科技相關的交流活動。

夏漢民說，今年十一月，必谷的廠商也會率團前往台灣開會，兩國的互動相當密切。

此次夏漢民一行下飛機之後，就馬不停蹄地展開參觀訪問行程。參訪的公司包括了Acadia、Symmetry、Global Crossing，以及Transmeta等。夏漢民說，以Symmetry為例，該公司的無線上網核心技术GPRS(General Packet Radio Service)在第三代行動電話(3G)還未實現之前，頗有機會。夏漢民預估到了二〇〇二年時，3G才會發生，但是發展的情況也難以預測。

參訪團將在九月卅日與駐舊金山台北經濟文化辦事處，以及必谷華裔高科技社團：華美半導體協會(CASPA)與中華資訊網路協會(CZA)共同合辦「兩千年台灣國家資訊基礎建設會議」，時間為十二點半至五點半，地點在聖他克拉拉市會議中心，免費入場，歡迎有興趣人士前往。



經島寶

↑夏漢民(圖中)率領三產業協進會高科技參訪團，向所參觀的Global Crossing資深網路工程師蔡佳璋(右三)贈旗幟以表謝意。
(記者高南心攝)

