行政院國家科學委員會專題研究計畫　期中進度報告

子計畫三：後三代全 IP 無線網路技術(2/4)

計畫類別：整合型計畫
計畫編號：NSC94-2752-E-009-005-PAE
執行期間：94 年 04 月 01 日至 95 年 03 月 31 日
執行單位：國立交通大學資訊工程學系(所)

計畫主持人：林一平
共同主持人：簡榮宏，曾煜棋，張明峰

報告類型：完整報告
報告附件：出席國際會議研究心得報告及發表論文
處理方式：本計畫可公開查詢

中　華　民　國 95 年 4 月 12 日

COVER

Program for Promoting Academic Excellence of Universities（Phase II）

Midterm Report

子計畫三：後三代全 IP 無線網路技術(1/4~2/4)

Beyond-3G All-IP Wireless Network Technologies

Serial No.：NSC 94-2752-E-009 -005- PAE

Overall Duration: April 2004 - March 2008

Midterm Duration: April 2004 - March 2006

National Chiao Tung University

2006.2.28

I. BASIC INFORMATION OF THIS SUB-PROJECT (FORM 1)

<table>
<tr><td colspan="6">Project Title: Beyond-3G All-IP Wireless Network Technologies(後三代全 IP 無線網路技術)</td></tr>
<tr><td colspan="3">Serial No.: NSC 94-2752-E-009 -005- PAE</td><td>Affiliation</td><td colspan="2">National Chiao Tung University
交通大學</td></tr>
<tr><td rowspan="4">Principal Investigator</td><td>Name</td><td>Yi-Bing Lin 林一平</td><td rowspan="4">Project Coordinator</td><td>Name</td><td>Rong-Hong Jan 簡榮宏</td></tr>
<tr><td>Tel:</td><td>(03)5712121-31842</td><td>Tel:</td><td>(03)5712121-31637</td></tr>
<tr><td>Fax:</td><td>(03)5724176</td><td>Fax:</td><td>(03)5724176</td></tr>
<tr><td>E-mail</td><td>liny@cs.nctu.edu.tw</td><td>E-mail</td><td>rhjan@cs.nctu.edu.tw</td></tr>
</table>

	Expenditures[1] (in NT$1,000)		Manpower[2]:Full time/Part time(Person-Months)	
	Projected	Actual	Projected	Actual
FY2004	7,432	7,237.879	12/192	15/361**
FY2005	8,856	7,170.027	12/200	24/410**
FY2006	8,000	-	24/196	-
FY2007	8,266	-	12/200	-
Overall	32,554	14,407.906	60/788	39/771**

Notes: [1,2] Please explain large differences between projected and actual figures.

**** We hired more part time students with lower salaries. Therefore, the actual student number is larger than the projected student number.**

Principal Investigator's Signature:

II. Executive Summary on Research Outcomes of this Project (Form 2)

(Please state the following concisely and clearly)

1. General Description of the Project: Including Objectives of the Project (Maximum 3 pages)

In Beyond-3G environments, mobile and wireless networks will be integrated together under an all-IP core network to support global roaming and services. Issues such as mobile security, QoS, and mobility management need to be investigated. For mobile ad hoc and sensor networks, critical issues include power saving, routing, sensing, MAC, and integration with other mobile networks. In terms of application, context-aware services and environmental monitoring applications need to be developed. In PAEU-I, we have made several major contributions. For example, Prof. Y.B. Lin proposed novel 3G core network protocols for mobility management, authentication, fault tolerance, and mobile database overflow control. Due to these contributions, he was awarded IEEE Fellow and ACM Fellow in 2003. The works of Prof. Y.C. Tseng on routing, MAC, and power-saving protocols for ad hoc and sensor networks have been well recognized internationally. Based on this established research energy, in PAEU-II the objective of Sub-project 3 is to build B3G all-IP core and access networks, including HSS, CSCF and OSA, and to invent advanced location determination and energy conservation technologies. Specific goals include:

- Issues on IP Multimedia Core Network Subsystem such as Fault tolerance of IMS, design and implementation of OSA (service network for IMS), IMS services (including prepaid, Voice over IP, and wireless data), all-IP mobility (including location management and packet re-routing), application-level security (including identity-based cryptosystem and end-to-end security mechanisms for SMS), IMS session management, IMS-related architectures (including WGSN push mechanism, ad-hoc andinfrastructure dual-mode mobile networks, and softswitch).

- Issues on Access Networks (i.e., Ad hoc, WLAN/WiMax, and Cellular networks) including load balance, security and authentication, multi-channel or multi-antenna access points, QoS support for VoIP and location-sensing will be investigated.

- Issues on B3G applications include seamless IP/PLMN integration, P2P technologies, and novel mobile data applications. The integration of IP networks and PLMN has to be done on both the network and the service layers. We will focus on the integration on the service layer, which requires novel designs and has more profound impacts on the user experience. Skype has demonstrated how P2P technologies can be used to provide a world-wide VoIP communication platform. P2P technologies can also be used in other mobile data applications, such as multimedia communications, and device-to-device communications and collaboration.

- Issues on ad hoc and mesh networks, including topics on routing, MAC, power-saving, multi-channel, and fair scheduling protocols. We will also investigate critical issues, such as efficient contention protocols, fast handoff, and resource scheduling. In addition, suitable analytical methodologies for these works are also required. By investigating these topics, we expect to make significant contributions to these issues. Due to the fast advance of VoIP services, we will develop novel multi-channel MAC protocols for multi-hop ad hoc networks, and study how to integrate ad hoc networks with mobile VoIP services.

2. BREAKTHROUGHS AND MAJOR ACHIEVEMENTS

Our studies (OSA and all-IP network related protocols) have been well recognized by the international research society. Because of these contributions, Yi-Bing Lin was awarded Fellow of AAAS (American Association for the Advancement of Science) and IEE Fellow in 2004 . Lin is Taiwan's first AAAS Fellow in the IT and communications area. Lin was also invited to serve as co-guest editor for IEEE Wireless Communications special issue on Mobility and Radio Resource Management appeared in 2004. The relationship of research topics addressed in this subproject are illustrated in Fig. 3.1.

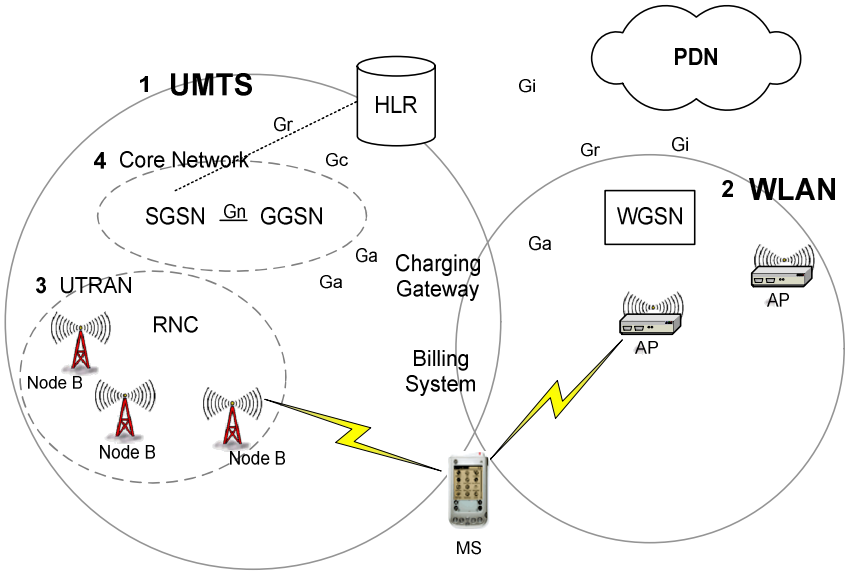

Figure 3.1. Phase I WGSN Architecture (dashed lines: signaling; solid lines: data and signaling)

- 3G Core Network protocol

In PPAEU-I, we proposed novel 3G core network protocols for mobility management, authentication, fault tolerance, and mobile database overflow control. Based on this established research energy, in PPAEU-II we are building B3G all-IP networks, including HSS, CSCF, and OSA. With collaboration with ICL/ITRI, we have completed HSS and CSCF prototypes. These prototypes will be further polished and then commercialized by ICL/ITRI. Specifically, We will focus on fault tolerance issues for IMS.

- Authentication for IMS

Another major contribution is the invention of the one-pass authentication for IP Multimedia Subsystem (IMS). In 3GPP, all-IP networks duplicate authentication procedures in both the mobile network level and the application level. We have proved that in our all-IP environment, the two-level authentication can be consolidated to significantly cut the network signaling overhead. This work was published in IEEE JSAC and is in the patent application process. We have completed the WGSN prototype with SS7-based signaling and SIP ALG with push mechanisms. SIP-based VoIP platform (founded by National Telcommuications Program or NTP) has been built

on top of WGSN. The WGSN and 3G all IP architecture is illustrated in Fig. 3.2.

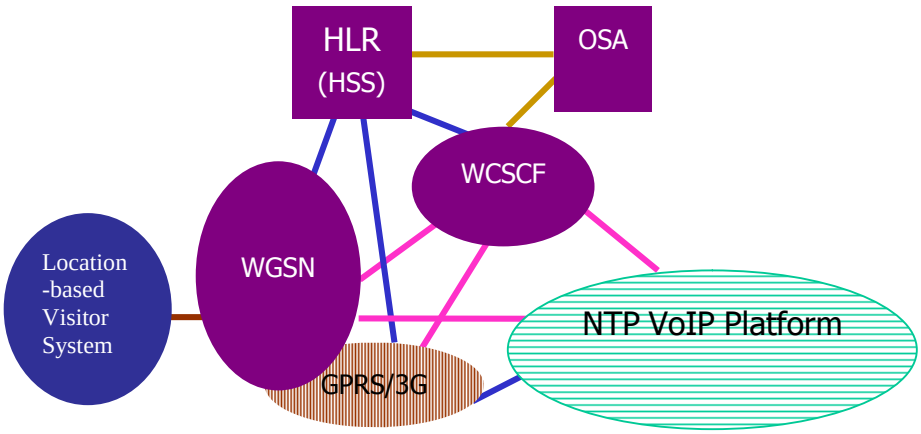

Figure 3.2. 3GPP All-IP Approach for Integrating WGSN and VoIP

- Novel VoIP Call Routing

We have developed a novel method for handling telephone calls from the PSTN to a private telephone network and/or an IP telephony network through a VoIP gateway and/or a PBX (Private Branch Exchange). The design is applicable to VoIP trunking/access gateway, PBX, MGCP call agent, and MEGACO media gateway controller. The method is in the patent application process. In addition, we have developed a novel, simple method for a dual-mode (WiFi and PLMN) device to register its E.164 number and IP address into a location registrar. The location register verifies the registration information by requesting the device to place a phone call to a caller ID receiver on the PSTN/PLMN, and check whether the received call ID is the same as the E.164 number specified in the registration request. The major advantage of this method is the location registrar can be deployed independent of the PLMN operators. The location registrar can be used as the core element for VoIP, multimedia message over IP, and mobile data applications. The method is also in the patent application process.

- Broadband Wireless Access Networks

In the access network part, we have addressed the important OVSF code assignment problem in 3G networks. We are the first group in the world to identify the importance of managing OVSF codes in WCDMA systems. We have built a cross-NTHU-and-NCTU mobile ad hoc network to connect

the two campuses. The ad hoc network is also connected to our core network. The platform allows us to verify research ideas generated from the project. To improve the network access efficiency and reduce roaming overhead, we have developed a centralized WLAN server with thin access points and implemented a light-weight access protocol. This centralized WLAN architecture reduces the handoff delay and cuts management overhead significantly. We developed a power-saving scheduling for WLAN to extend the network lifetime and a hybrid routing method for multi-hop wireless LANs to improve the routing efficiency. In wireless Internet applications, we developed a web content adaptation model which can be formulated as a linear multi-choice knapsack problem. A solution method based on the dynamic programming was also proposed for solving it.

- Prepaid PCS Charging

Prepaid PCS users have outnumbered post-paid users. We have studied the charging issues of prepaid services, where a single prepaid account provides a user both voice and data services. The call setup and charging procedures for the 3G network are designed using the CAMEL network architecture. To reduce the probability of terminating both on-going voice and data calls, we suggest that no new call be admitted when the user credit is below a threshold. An analytic model has been developed to evaluate the performance of the approach. The numeric results indicate that the forced termination probability can be significantly reduced by choosing an appropriate threshold of the user credit.

- Multi-channel MAC for Ad Hoc Networks

The IEEE 802.11 standard defines multiple channels at the physical layer. However, most ad hoc networks assume that all nodes are operating under the same channel. By exploiting multiple channels, we can achieve a higher network throughput than using one single channel, because multiple transmissions can take place without interference. We have proposed several multi-channel MAC protocols for multi-hop ad hoc networks, which can improve network throughput significantly. In addition, we have developed a simple prototype in which a mobile node

can dynamically switch its operational channel.

- Mobile VoIP Services Based on Ad-Hoc Networking Technologies

We have developed a mobile VoIP solution based on ad hoc networking technologies. A group of mobile nodes (MNs) form a mobile ad hoc network (MANET). One MN in the MANET serves as the VoIP gateway, which may have multiple cellular interfaces to dial up to cellular networks (such as GSM, GPRS, WCDMA, and PHS interfaces). Thus, the system supports mobility and can extend VoIP services to mobile ad hoc networks. We also propose a push mechanism so that the VoIP gateway can disconnect its cellular interfaces from the Internet when there is no calling activity, and "wake up" some of these interfaces as necessary. The method not only guarantees availability but also saves large cost.

3. Categorized Summary of Research Outcomes. In each research area, please give a brief summary of the research outcomes associated with the area. Note that the summaries should be consistent with the statistics given in Form 3. Please list and number of each research outcomes in order in ppendix II, and list all the publications in top conferences and journals in Appendix III.

- 3G Core Network Protocol

Due to our fruitful results in both PPEAU-I and PPEAU-II, we were invited to guest editing an IEEE Wireless Communications special issue on Mobility and Resource Management published in 2004 [C.1]. By focusing on GPRS/UMTS research issues, we have developed a UMTS discontinuous reception mechanism for power saving [C.2]. We also developed a bandwidth-on-demand strategy for GPRS [C.4]. Based on the above studies, we developed a useful tool NCTUns 2.0 for wireless Internet simulation [C.6] (the major contributor is Prof. S.-Y. Wang in PPEAU-I). We investigated the UMTS short message mechanism and have invented a statistic approach for deriving the short message transmission delay distributions [C.7]. Based on the above study, we developed an efficient multicast mechanism for UMTS through collaboration with ICL/ITRI, and received ROC Patent 205010 [patent1] (major work in PPEAU-I). In GPRS/UMTS

mobility management, we have conducted signaling traffic analysis for multi-tier wireless mobile networks [C.5], and developed a per-user checkpointing for mobility database failure restoration [C.3]. To improve prepaid user experience and protect operator's revenue, we presented a real-time charging method for prepaid users with integrated voice and data services. An analytic model has been developed to evaluate the performance [C.44].

- Novel VoIP Call Routing

In Wireless VoIP, we have developed the VoIP services for GSM circuit switched data, GPPRS, and UMTS environments [C.8][C.9]. Through collaboration with ICL/ITRI. We received a patent for wireless VoIP [patent 2] (major work in PPEAU-I). We proposed an effective VoIP call routing mechanism in WLAN and cellular integration [C.35]. To integrate existing VoIP protocols, we developed an integrated call agent that is capable of establishing calls between SIP, H.323, MGCP/MEGACO users [C.45]. In addition, we developed a novel method enable one-stage dialing from the PSTN to a private telephone network and/or an IP telephony network through a VoIP gateway and/or a PBX (Patent [7]). We have developed a novel, simple method for a dual-mode device to register with a location registrar the device's E.164 number and IP address (Patent [8]).

- Performance Issues for IMS

By continuing PPEAU-I's work on WGSN, we have developed a mobile service platform using proxy technology [C.11], and a caching mechanism in I-CSCF of UMTS IP multimedia subsystem (IMS) [C.12]. Then we developed a GPRS-based WLAN authentication and auto-configuration for WGSN [C.13]. We further investigated the IMS authentication defined in 3GPP, and proposed an one-pass GPRS and IMS authentication procedure for WGSN. We developed the first connection failure detection mechanism of UMTS charging protocol [C.16], and the first checkpointing schemes for UMTS mobility database failure restoration [C.25]. We collaborated with ITRI to develop the first CORBA-based OSA service platform in Taiwan [C.18], devised the first credit allocation algorithm for UMTS services [C.19], and consistent wireless data access algorithms [C.36,C.37].We proposed a serving radio network controller relocation for UMTS all-IP network

[C.20], investigated the impact of mobility on UMTS mobile telecommunications networks [C.21, C.23,C.24, C.26], and invented a novel random number generation for excess life of mobile user residence times [C.22,C.25]. We developed a fast identity-based cryptosystem mechanism for end-to-end mobile security [C.27] and applied this mechanism for SMS end-to-end security [C.28]. We designed and implemented a UMTS session management tool for he user equipment [C.29], and proposed new schemes for frame synchronization for UMTS HSDPA [C.30]. We also investigated IP connectivity for gateway GPRS support node [C.31].

- Broadband Wireless Access

In [C.15] and [C.16] we proposed original overflow control schemes for UMTS high speed downlink packet access. We are the first research team to identify and attack this problem. In [C.47], we have developed an adaptive mechanism for soft handover in OVSF WCDMA systems. We are the first group to identify the importance of managing OVSF codes in WCDMA systems, which has significant impact on the utilization of the system. Several strategies, such as leftmost and crowded-first schemes, were proposed. [C.52] [C.53]. These works have been used and cited by several other researchers. In terms of access networks, we have analyzed performance of multi-piconet Bluetooth networks. New analytical methodologies were developed, which can more accurately predict Bluetooth network performance. In addition, new enhancements to IEEE 802.11 access control MAC protocol have been proposed. A new multi-chain scheme was proposed to reduce packet collision probability. These pioneer works have been published in pritigeous journals such as IEEE Journal on Selected Areas in Communications and IEEE Transactions on Vehicular Technology [C.49, C.51, C.54]. In [C.55], we have further proposed a Multi-rate wireless Fair Queueing (MR-FQ) algorithm which allows a flow to transmit at different rates according to its channel condition and lagging degree. MR-FQ takes both time and service fairness into account. It not only guarantees fairness and bounded delays for packet flows but also increases the overall system throughput. In [C.67], we have showed how to integrate SIP and 802.11e to conduct call admission control and resource reservation to support VoIP's QoS in IEEE 802.11e WLANs. We have also suggested some adjustments and MAC enhancements to 802.11e to facilitate VoIP traffics over WLANs. This work received the Best Paper Awards in NCS 2005. In [C.68], we have

also proposed a Fast Handoff Mechanism for IEEE 802.11 and IAPP networks, which can significantly reduce wireless handoff latency in IEEE 802.11 WLANs.

- Ad-Hoc and Mesh Networks

In [C.48] and [C.56], we have proposed multi-channel MAC protocols for multi-hop ad hoc networks. We proposed a novel MAC protocol with on-demand channel assignment for multi-hop ad hoc networks [C.48]. We have developed an efficient MAC protocol for multi-channel mobile ad hoc networks based on location information [C.56]. Then an efficient reliable broadcasting protocol for wireless mobile ad hoc networks has been developed [C.57]. In [C.64], we have proposed several cluster-based semi-asynchronous power-saving protocols for multi-hop MANETs. We showed how to cluster neighboring hosts such that synchronous power-saving protocols can be adopted within individual clusters, and asynchronous power-saving protocols can be adopted between clusters. New analytical method to evaluate the expected throughput of a given routing path was developed in [C.63], which assumes that hosts move following the discrete-time, random-walk model.

- Ad Hoc networks and WLANs

We proposed a hybrid routing method that combines the advantages of Hierarchical Routing Tree (HRT) and Ad-hoc On-demand Distance Vector (AODV) routing for multi-hop wireless LANs [C.38]. We proposed a mobility support for mobile host roaming between WLAN and GPRS networks via a handoff decision model to reduce the latency [C.39]. A power-saving method for WLAN is also developed [C.40]. A ring based information collection architecture were presented to improve the power efficiency for wireless ad hoc sensor networks [C.42]. A two-phase localization algorithm was also developed for location sensing in wireless sensor networks [C.43]. In wireless Internet applications, we proposed a web content adaptation model which is formulated as a linear multi-choice knapsack problem [C.41]. A dynamic programming method was designed for solving it.

4. A SUMMARY OF THE POST-PROJECT PLAN （IF THERE ARE ANY PLAN OR BUDGET ADJUSTMENT FOR FY 2006, PLEASE PROVIDE DETAILED DESCRIPTION AND ASSOCIATION WITH THE PROJECT IN APPENDIX I）

- **The 3rd Year:**

(1) We will study how the all-IP core network can connect to WiMAX, and investigate service IOT related issues. (2) We will develop a Media Independent Handover and a Seamless Handover mechanism for 802.16e Networks. (3) A P2P platform for device-to-device communications will be also developed. This platform will support device/user authentication using telephone numbers, email addresses, and other popular user identifiers, such as Skype and MSN user identifiers. (4) We will continue on developing multi-channel protocols for wireless mesh networks. Both single-interface and multi-interface models will be derived. (5) We will design a cross-layer multi-path routing protocol integrated with novel medium access scheme and channel assignment scheme. (6) We will continue our work on developing ad hoc network based mobile VoIP services. Based on our prototype, we will complete the implementation of the platform.

- **The 4th Year:**

(1) We will transfer the enhanced WGSN prototype to the domestic industry; we will complete WGSN VoIP platform tailored for university education. (2) A novel location-based web access control mechanism will be developed; (3) Tracking and sensing applications will be developed on our sensor network platform. (4) We will analyze our work on developing multi-channel protocols for wireless mesh networks. (5) We will implement our work on multi-path routing protocols over multi-channel mesh networks. (6) We will analyze our work on ad hoc network based mobile VoIP services.

- the Description of Adjusting Budget and Plans of FY2006

原 核 定 補 助 情 形		擬申請變更用途及金額情形	
項　目	經　　費	項　目	經　　費
研究設備費	1,835,000 元	變更後研究設備費	1,035,000 元 (見說明 1)

<table>
<tr><td>出席國際會議</td><td>240,000 元</td><td>變更後出席國際會議</td><td>0 元 (見說明 2)</td></tr>
<tr><td>人事費</td><td>4,350,000 元</td><td>變更後人事費</td><td>6,023,072 元 (見說明 1、3)</td></tr>
<tr><td>國外差旅費</td><td>60,000 元</td><td>變更後國外差旅費</td><td>300,000 元 (見說明 2)</td></tr>
<tr><td>變更情形說明</td><td colspan="3">1. 原研究設備費 1,835,000 元，變更後其爲 1,035,000 元；其餘 800,000 元撥入人事費。
2. 原出席國際會議 240,000 元，變更爲 0 元，全部 240,000 元撥入國外差旅費，國外差旅費金額變更爲 300,000 元。
3. 原人事費爲 4,350,000 元，變更爲 6,023,072 元；包含原研究設備費轉入 800,000 元和子計畫四轉入的博後一名人事費用 876,072 元，轉入金額用途說明如下:

(1) 碩、博士班研究生研究助學金原 1,872 獎助單元，變更爲 2,266 獎助單元。
(2) 臨時工資原 5,604 元，變更爲 17,604 元。
(3) 博士後研究一名。
• 薪資：57,000*9.5=541,500；59000*2.5=147,500
年終：57,000*1.5=85,500 小計：774,500
• 勞健保費：（1,936+2,809)*10=47,450
（1,936+2,955）*2=9,782 小計：57,232
• 公提離職儲金：57,000*0.06*9.5=32,490
59,000*0.06*2.5=8,850
小計：41,340
總計：873,072</td></tr>
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5. INTERNATIONAL COOPERATION ACTIVITIES (OPTIONAL)

- Collaborate with France Telecom and INT to establish inter-operability for SIP VoIP.
- Collaborative research issues include SIP Mobility, Peer-to-Peer Voice over IP and IMS Application Server.
- Founded by STIC Asia Programme of Franch Government. Will receive 400,000NT per year for two years.

III. STATISTICS ON RESEARCH OUTCOMES OF THIS PROJECT (FORM 3)

[1] Indicate the number of items that are significant. The criterion for "significant" is defined by the PIs of the program. For example, it may refer to Top journals (i.e., those with impact factors in the upper 15%) in the area of research, or conferences that are very selective in accepting submitted papers (i.e., at an acceptance rate no greater than 30%). Please specify the criteria in Appendix IV.
[2] Indicate the number of citations. The criterion for "citations" refers to citations by other research teams, i.e., exclude self-citations.
[3] Refers to the workshop and conferences hosted by the program.
[4] Includes Laureate of Nobel Prize, Member of Academia Sinica or equivalent, fellow of major international academic societies, etc.
[5] Refers to industry standards approved by national or international standardization parties that are proposed by PIs of the program.
[6] Refers to research outcomes used to provide technological services, including research and educational programs, to other ministries of the government or professional societies.

LISTING		TOTAL	DOMESTIC/ INTERNATIONAL	SIGNIFICANT[1]	CITATIONS[2]	TECHNOLOGY TRANSFER
PUBLISHED ARTICLES	JOURNALS	57	D: 0 I: 57	33	54	
	CONFERENCES	11	D: 3 I: 8	4		
	TECHNOLOGY REPORTS	0	0			
PATENTS	PENDING	6	D: 3 I: 3	6		
	GRANTED	4	D: 4 I: 0	4		
COPYRIGHTED INVENTIONS	ITEM					
WORKSHOPS/ CONFERENCES[3]	ITEM	8	D:6 I: 2			
	PARTICIPANTS	726	D:526 I:200			
TRAINING COURSES (WORKSHOPS/ CONFERENCES)	HOURS	62	62			
	PARTICIPANTS	360	360			
PERSONAL ACHIEVEMENTS	HONORS/ AWARDS[4]	23	D: 20 I: 3			
	KEYNOTES GIVEN BY PIS	3	D: 3 I: 0			
	EDITOR FOR JOURNALS	21	D: 3 I: 18			
TECHNOLOGY TRANSFERS	ITEM					
	LICENSING FEE					
	ROYALTY					
INDUSTRY STANDARDS[5]	ITEM	0	0			
TECHNOLOGICAL SERVICES[6]	ITEM			-	-	-
	SERVICE FEE			-	-	-

IV. List of Works, Expenditures, Manpower, and Matching Supports from the Participating Institutes (Form 4)

Serial No.: NSC 94-2752-E-009 -005- PAE	Program Title: Beyond-3G All-IP Wireless Network Technologies(後三代全 IP 無線網路技術)										
Research Item (Include sub projects)	Major tasks and objectives	Expenditures (in NT$1,000)					Manpower (person-month)					Matching Supports from the Participating Institutes (in English & Chinese)
		Salary	Seminar/ Conference-related expenses	Project-related expenses	Cost for Hardware & Software	Total	Principal Investigators	Consultants	Research/ Teaching Personnel	Supporting Staff	Total	
Sub-Project3: Beyond-3G All-IP Wireless Network Technologies	1. System design of B3G core networks	4,452.687	157.525	644.265	1,323.177	6,577.653	48	0	337	19	404	1. ICL/ITRI NTD$1,000,000 2. JRC NTD$ 1,392,000 3. NTP NTD$ 8,024,564 4. NTP International Cooperation NTD$1,613,570
	2. Broadband wireless access	2,671.612	94.515	386.559	793.906	3,946.592	29	0	203	12	244	1. III NTD$1,000,000 2. Intel Donation NTD$1,000,000
	3. Applications and services in B3G networks	1,781.075	63.010	257.706	529.271	2,631.061	19	0	135	8	162	1. JRC NTD$1,200,000 2. Intel NTD$60,000
SUM		8,905.374	315.049	1,288.529	2,646.354	13,155.306	96	0	675	39	810	

V. APPENDIX I

DESCRIPTION OF BUDGET AND PROJECT ADJUSTMENTS FOR FY 2006

<table>
<tr><td colspan="2">原 核 定 補 助 情 形</td><td colspan="2">擬申請變更用途及金額情形</td></tr>
<tr><td>項　目</td><td>經　　費</td><td>項　目</td><td>經　　費</td></tr>
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<tr><td>人事費</td><td>4,350,000 元</td><td>變更後人事費</td><td>6,023,072 元 (見說明 1、3)</td></tr>
<tr><td>國外差旅費</td><td>60,000 元</td><td>變更後國外差旅費</td><td>300,000 元 (見說明 2)</td></tr>
<tr><td>變更情形說明</td><td colspan="3">1. 原研究設備費 1,835,000 元，變更後其爲 1,035,000 元；其餘 800,000 元撥入人事費。
2. 原出席國際會議 240,000 元，變更爲 0 元，全部 240,000 元撥入國外差旅費，國外差旅費金額變更爲 300,000 元。
3. 原人事費爲 4,350,000 元，變更爲 6,023,072 元；包含原研究設備費轉入 800,000 元和子計畫四轉入的博後一名人事費用 876,072 元，轉入金額用途說明如下:

(1) 碩、博士班研究生研究助學金原 1,872 獎助單元，變更爲 2,266 獎助單元。
(2) 臨時工資原 5,604 元，變更爲 17,604 元。
(3) 博士後研究一名。
● 薪資：57,000*9.5=541,500；59000*2.5=147,500
年終：57,000*1.5=85,500　　小計：774,500
● 勞健保費：（1,936+2,809)*10=47,450
（1,936+2,955）*2=9,782　　小計：57,232
● 公提離職儲金：57,000*0.06*9.5=32,490
59,000*0.06*2.5=8,850
小計：41,340
總計：873,072</td></tr>
</table>

VI. APPENDIX II

1. PUBLICATION LIST (CONFERENCES, JOURNALS, BOOKS, BOOK CHAPTERS, etc.)

Journal papers

[C.1] Y. Fang, P. Lin, and Y. -B. Lin, Mobility and Resource Management, IEEE Wireless Communications, 11(4): 4-5, 2004.

[C.2] S.-R. Yang, and Y.-B. Lin, Modeling UMTS Discontinuous Reception Mechanism. IEEE Transactions on Wireless Communications, 4(1), 2005.

[C.3] Y.-B. Lin, Per-user Checkpointing for Mobility Database Failure Restoration. IEEE Transactions on Mobile Computing, 4(2): 189-194, 2005.

[C.4] Y.-R. Haung, and Y.-B. Lin, A Bandwidth-on-demand Strategy for GPRS. IEEE Transactions on Wireless Communications, 4(4): 1394-1399, 2005.

[C.5] M. Fang, and Y.-B. Lin, Mobility Management and Signaling Traffic Analysis for Multi-tier Wireless Mobile Networks. IEEE Transactions on Vehicular Technology, 54(5): 1843-1853, 2005.

[C.6] S.-Y. Wang, and Y.-B. Lin, Wireless Internet Simulation Using NCTUns 2.0: An Innovative Network Simulator and Emulator. Wireless Communications and Mobile Computing, 5(8): 89-916, 2005.

[C.7] H.-N. Hung, Y.-B. Lin, M. -K. Lu, and, N. -F. Peng. A Statistic Approach for Deriving the Short Message Transmission Delay Distributions. IEEE Transactions on Wireless Communications., 3(6): 2345-2352, 2004.

[C.8] A. -C. Pang, and Y. -B. Lin, VoIP Services for Mobile Networks, Upgrade, the European Journal for the Informatics Professional, 5(1): 8-11, February, 2004. http://www.upgrade-cepis.org

[C.9] A. -C. Pang, and Y. -B. Lin, VoIP Services for Mobile Networks, Novatica, Redes I nalambricas: una nueva era en las Telecomunicaciones, 167, Jan. -Feb., 2004.

[C.10] Chen, M.F., Lin, Y.-B., Rao, R. C.-H., Wu, Q.C.A Mobile Service Platform Using Proxy Technology,Wireless Communications and Mobile Computing Journal, 6: 17-34, 2006.

[C.11] Lin, Y.-B., Tsai, M.-H.Caching in I-CSCF of UMTS IP Multimedia Subsystem.IEEE Transactions on Wireless Communications,5(1): 186-192, 2006.

[C.12] Y.-B. Lin, M.-H. Tsai, Caching in I-CSCF of UMTS IP Multimedia Subsystem. IEEE Transactions on Wireless Communications, 5(1): 186-192, 2006.

[C.13] Y.-B. Lin, M.-F. Chang, M.-T. Hsu,, and L.-Y. Wu, One-Pass GPRS and IMS Authentication Procedure for UMTS. IEEE Journal on Selected Areas in Communications, 23(6): 1233-1239, 2005.

[C.14] P. Lin, Y. -B. Lin, and Chlamtac, I. Module Count-Based Overflow Control Scheme for UMTS High Speed Downlink Packet Access. IEEE Transactions on Vehicular Technology, 53(2): 2004.

[C.15] P. Lin, Y. -B. Lin,, and Chlamtac, I. Overflow Control for UMTS High-Speed Downlink Packet Access. IEEE Trans. on Wireless Communications, 3(2): 524-533, 2004.

[C.16] H.-N. Hung, Y.-B. Lin, N.-F. Peng, and S.-I Sou, Connection Failure Detection Mechanism of UMTS Charging Protocol. IEEE Transactions on Wireless Communications (to appear).

[C.17] S.-I. Sou, and Y.-B. Lin, Modeling of Mobility Database Failure Restoration using Checkpoint Schemes. IEEE Transactions on Wireless Commun (to appear).

[C.18] C.-M. Chou, S.-F. Hsu, H.-Y. Lee, Y.-C. Lin, Y.-B. Lin, and R.S. Yang. ICL OSA: A CORBA-based Open Service Access System. International Journal of Wireless and Mobile Computing (to appear).

[C.19] P. Lin, Y.-B. Lin, C.S. Yen, and J.-Y. Jeng, Credit Allocation for UMTS Prepaid Service, IEEE Transactions on Vehicular Technology (to appear).

[C.20] A.-C. Pang, Y.-B. Lin, H.-M. Tsai, and P. Agrawal, Serving Radio Network Controller Relocation for UMTS All-IP Network. IEEE Journal on Selected Areas in Communications, 22(4); 617-629, 2004.

[C.21] Y.-B. Lin, and A.-C. Pang, Impact of Mobility on Mobile Telecommunications Networks. Wireless Communications and Mobile Computing Journal (to appear).

[C.22] H.-N. Hung, P.-J. Lee, and Y.-B. Lin, Random Number Generation for Excess Life of Mobile User Residence Time, IEEE Transactions on Vehicular Technology(to appear).

[C.23] S.-R. Yang, and Y.-B. Lin, Performance Evaluation of Location Management in UMTS IEEE Transactions on Vehicular Technologies (to appear).

[C.24] Y. Xiao, M. Fang, and Y.-B. Lin, Hierarchical Implicit Deregistration with Forced Registrations in 3G Wireless Networks. IEEE Transactions on Vehicular Technologies (to appear).

[C.25] H.-N. Hung, P.-C. Lee, Y.-B. Lin, and N.-F. Peng, Modeling Channel Assignment of Small-Scale Cellular Networks. IEEE Transactions on Wireless Communications, 4(2): 646-652, 2005.

[C.26] Y.-C. Wong, T.-P. Wang, and Y.-B. Lin, Effects of Route Optimization on Out-of-Order Packet Delivery in Mobile IP Networks. Information Sciences, 169 (3-4): 263-278, 2005.

[C.27] J.-S. Hwu, R.-J. Chen, and Y.-B. Lin, An Identity-based Cryptosystem for End-to-end Mobile Security. IEEE Transactions on Wireless Communications (to appear).

[C.28] J.-S. Hwu, S.-F. Hsu, Y.-B. Lin, and R.-J. Chen, End-to-end Security Mechanisms for SMS. International Journal of Security and Networks (to appear).

[C.29] C.-H. Gan, Y.-B. Lin, and S.-H. Chen, Design and Implementation of UMTS Session Management in the User Equipment. Wireless Communications and Mobile Computing Journal (to appear).

[C.30] P. Lin, Y.-B. Lin, I. Chlamtac, Modeling Frame Synchronization for UMTS High-Speed Downlink Packet Access. IEEE Transactions on Vehicular Technology (to appear).

[C.31] Y.-K. Chen, and Y.-B. Lin, IP Connectivity for Gateway GPRS Support Node. IEEE Wireless Communications, 12(1):37-46, 2005.

[C.32] V. W.-S. Feng, L.-Y. Wu., Y.-B. Lin, and W.E. Chen, WGSN: WLAN-based GPRS Environment Support Node with Push Mechanism. The Computer Journal, 47(4):405-417, 2004.

[C.33] Y. H. Chen, H.-N. Hung, Y.-B. Lin, and N.-F. Peng, Modeling of Ad-hoc and Infrastructure Dual Mode Mobile Networks. Intl. J. of Automation and Computing, 2(1), 2005.

[C.34] V. Feng, Y.-B. Lin, and S.-L. Chou, Design and Implementation of A Softswitch for Third Generation Mobile All-IP Network, Wireless Communications and Mobile Computing Journal (to appear).

[C.35] Y.-B. Lin, W.-E. Chen, and C.-H. Yen, Effective VoIP Call Routing in WLAN and Cellular Integration. IEEE Communications Letters, 9(10): 874-876, 2005.

[C.36] Y. Fang, and Y.-B. Lin, Strongly Consistent Access Algorithms for Wireless Data Networks, ACM Wireless Network, 11 (3): 243-254, 2005.

[C.37] Y. Fang, Y. Haas, B. Liang, and Y.-B. Lin, TTL Prediction Schemes and Effects of Inter-Update Time Distribution on Wireless Data Access. ACM Wireless Network, September, 2004.

[C.38] Rong-Hong Jan and Yu-Lung Lin, "A hybrid routing method for multi-hop wireless area networks," IEICE Trans on Communication, vol. e87-b, no. 10, Oct., 2004, pp. 2939-2945.

[C.39] Rong-Hong Jan and Wen-Yueh Chiu, "An approach for seamless handoff among mobile WLAN/GPRS integrated networks," Computer Communications (to appear), 2005.

[C.40] Hsiao-Po Lin, Shih-Chang Huang and Rong-Hong Jan, "A Power-Saving Scheduling for Infrastructure-Mode 802.11 Wireless LANs," Computer Communications (to appear), 2006.

[C.41] Rong-Hong Jan, Ching-Peng Lin, and Maw-Sheng Chern, "An optimization model for Web content adaptation," Computer Networks (to appear), 2006.

[C.42] Shih-Chang Huang, Rong-Hong Jan, and Wuu Yang, "RICA - A Ring-based Information Collection Architecture in Wireless Sensor Networks," International Journal of Sensor Networks (to appear), 2006.

[C.43] Yu-He Gau, Hung-Chi Chu, and Rong-Hong Jan, "A Weighted Multilateration Positioning Method for Wireless Sensor Networks" International Journal of Pervasive Computing and Communications (to appear), 2006.

[C.44] W.-Z. Yang, F.-S. Lu, Ming-Feng Chang, “Performance Modeling of an Integrated Mobile Prepaid Services," IEEE Trans. on Vehicular Technology (to appear).

[C.45] Hung-Hsin Chang, Meng-Ta Hsu and Ming-Feng Chang, “An Integrated Call Agent of the Converged VoIP Network,” Journal of Information Science and Engineering (to appear).

[C.46] Ming-Feng Chang, L.-Y. Wu, and Y.-B. Lin, “Performance Evaluation of a Push Mechanism for WLAN and Mobile Network Integration”, IEEE Trans. on Vehicular Technology (to appear).

[C.47] K.-J. Lin and Y.-C. Tseng, "Adaptive Selection Combining for Soft Handover in OVSF W-CDMA Systems", IEEE Communications Letters, Vol. 8, No. 11, Nov. 2004, pp. 656-658. (SCI, EI)

[C.48] S.-L. Wu, C.-Y. Lin, Y.-C. Tseng, and J.-P. Sheu, "A Novel MAC Protocol with On-Demand Channel Assignment for Multi-Hop Mobile Ad Hoc Networks", Int'l J. of Electrical Engineering, Vol. 11, No. 4, Nov. 2004, pp. 361-374. (EI)

[C.49] T.-Y. Lin, Y.-K. Liu, and Y.-C. Tseng, “An Improved Packet Collision Analysis for Multi-Bluetooth Piconets Considering Frequency-Hopping Guard Time Effect”, IEEE J. on Selected Areas in Communications, Vol. 22, No. 10, Dec. 2004, pp. 2087-2094. (SCI, EI)

[C.50] L.-C. Wang, S.-Y. Huang, and Y.-C. Tseng, "Interference Analysis and Resource Allocation for TDD-CDMA Systems to Support Asymmetric Services by Using Directional Antennas," IEEE Trans. on Vehicular Technology, Vol. 54, No. 3, May 2005, pp. 1056-1069. (SCI, EI)

[C.51] Y.-C. Wang, S.-R. Ye, and Y.-C. Tseng, “A Fair Scheduling Algorithm with Traffic Classification in Wireless Networks”, Computer Communications, Vol. 28, 2005, pp. 1225-1239. (SCIE, EI)

[C.52] C.-M. Chao, Y.-C. Tseng, and L.-C. Wang, "Reducing Internal and External Fragmentations of OVSF Codes in WCDMA Systems with Multiple Codes", IEEE Trans. on Wireless Communications, Vol. 4, No. 4, July 2005, pp. 1516-1526. (SCIE)

[C.53] C.-M. Chao, Y.-C. Tseng, and L.-C. Wang, "Dynamic Bandwidth Allocation for Multimedia Traffic with Rate Guarantee and Fair Access in WCDMA Systems", IEEE Trans. on Mobile Computing, Vol. 4, No. 5, Sep./Oct. 2005, pp. 420-429. (SCI)

[C.54] S.-R. Ye and Y.-C. Tseng, “A Multi-Chain Backoff Mechanism for IEEE 802.11 WLANs”, IEEE Trans. on Vehicular Technology (to appear). (SCI, EI)

[C.55] Y.-C. Wang, Y.-C. Tseng, and W.-T. Chen, “MR-FQ: A Fair Scheduling Algorithm for Wireless Networks with Variable Transmission Rates”, Simulation: Transactions of The Society for Modeling and Simulation International (to appear). (SCI)

[C.56] Y.-C. Tseng, S.-L. Wu, C.-M. Chao, and J.-P. Sheu, "An Efficient MAC Protocol for Multi-Channel Mobile Ad Hoc Networks Based on Location Information”, Int’l Journal Communication Systems (to appear). (SCI)

[C.57] C.-S. Hsu, Y.-C. Tseng, and J.-P. Sheu, "An Efficient Reliable Broadcasting Protocol for Wireless Mobile Ad Hoc Networks", Ad Hoc Networks (to appear).

Conference papers

[C.58] Shih-Chang Huang and Rong-Hong Jan, "Energy-aware, load balanced routing schemes for sensor networks," Proceeding of the International Conference on Parallel and Distributed Systems, July 7-9, 2004, pp.419-425.

[C.59] Shih-Chang Huang and Rong-Hong Jan, "An implementation of LWAPP protocol," The 11th Mobile Computing Workshop, Taoyuan, Taiwan, Mar. 2005.

[C.60] Hung-Chi Chu and Rong-Hong Jan, "A GPS-less self-positioning method for sensor networks," International workshop on distributed, parallel and network applications (DPNA), 2005.

[C.61] A.A.K. Jeng and R.H Jan, "An adjustable structure for topology control in wireless ad hoc network, " Proceedings of the 2005 International Conference on Wireless Network Communication and Mobile Computing, Maui, Hawaii, America, June 2005.

[C.62] Y.-C. Wang, S.-R. Ye, and Y.-C. Tseng, “A Fair Scheduling Algorithm with Traffic Classification in Wireless Networks”, Int'l Symp. on Performance Evaluation of Computer and Telecommunication Systems (SPECTS) 2004.

[C.63] Y.-C. Tseng, W. Chu, L.-W. Chen, and C.-M. Yu, “Route Throughput Analysis for Mobile Multi-Rate Wireless Ad Hoc Networks”, Broadband Wireless Networking Symp. (BroadNet), 2004.

[C.64] C.-S. Hsu and Y.-C. Tseng, “Cluster-base Semi-asynchronous Power-Saving Protocols for Multi-hop Ad Hoc Networks”, IEEE Int’l Conf. on Communications (ICC), 2005.

[C.65] Y.-C. Wang, Y.-C. Tseng, and W.-T. Chen, “MR-FQ: A Fair Scheduling Algorithm for Wireless Networks with Variable Transmission Rates”, Int’l Conf. on Information Technology: Research and Education (ITRE), 2005.

[C.66] S.-R. Ye and Y.-C. Tseng, “A Multi-Chain Backoff Mechanism for IEEE 802.11 WLANs”, Workshop on Wireless, Ad Hoc, and Sensor Networks, 2005, Taiwan.

[C.67] P.-Y. Wu, Y.-C. Tseng, and H. Lee, “Design of QoS and Admission Control for VoIP Traffics over IEEE 802.11e WLANs”, National Computer Symposium, 2005, Taiwan. (recipient of the Best Paper Awards in NCS 2005)

[C.68] P.-J. Huang, Y.-C. Tseng, and K.-C. Tsai, “A Fast Handoff Mechanism for IEEE 802.11 and IAPP Networks”, IEEE Vehicular Technology Conf., 2006-Spring.

Book Chapters :

[C.69] Y. -C. Wang and Y. -C. Tseng, " Packet Fair Queuing Algorithms for Wireless Networks" (a book chapter in " Design and Analysis of Wireless Networks" , Nova Science Pub., edited by Y. Pan and Y. Xiao, 2004, ISBN: 1-59454-186-8)

[C.70] Y. -C. Tseng and S. -R. Ye, " Wireless LAN MAC Protocols Using Busy Tones and Jamming Signals" (a book chapter in " Wireless LANs and Bluetooth" , Nova Science Pub., edited by Y. Xiao and Y. Pan, expected 2005).

[C.71] Y.-C. Wang and Y.-C. Tseng, “Attacks and Defenses of Routing Mechanisms in Ad Hoc and Sensor Networks” (a book chapter in Security in Sensor Networks, CRC Press, 2006, ISBN: 0849370582, edited by Y. Xiao).

Books:

[C.72] Y.-B. Lin, and A.-C. Pang, Wireless and Mobile All-IP Networks (528 pages). John Wiley and Sons, 2005.

2. PATENT LIST

[1] Y.-C. Tseng and T. Ren, “Methods and Systems for Dynamic Load Balance in WLAN”, No. 229521, Taiwan (2005.03-2024.1). (曾煜棋,阮騰輝, “動態網路負載平衡方法以及系統”) (granted)

[2] 曾煜棋,阮騰輝, “動態網路負載平衡方法以及系統”, USA (pending)

[3] Yi-Bing Lin, Mobility Management Method and System for Wireless Data Networks.(with ICL/ITRI), R.O.C. patent temporarily approved, U.S. pending, Germany pending.

[4] Y.-B. Lin, A.-C. Pang, T.-S. Chen, and V. Feng, Multicast Mechanism for Mobile Networks (with ICL/ITRI) ROC Patent 205010(June, 2004-March, 2022).

[5] A.-C. Pang, Y.-B. Lin, and Y.-R. Haung, System and method of providing voice communications for radio network(with ICL/ITRI). ROC Patent No. 185594, 2004.

[6] M,-F, Chang, Y.-B. Lin and C.-F. Liang, “Method and Apparatus for a PSTN User Calling back a User on a Private Telephone Network,” USA and ROC (pending)

[7] M.-F. Chang, Y.-B. Lin, W.-N. Tsai, H.-H. Chang, “Method for Integrated device to register telephone number and IP address with location register,” ROC (pending)

[8] Y.-C. Tseng, C.-Y. Lin, and B.-R. Lin, “Methods and Systems of Dynamic Channel Allocation for Access Points in Wireless Networks”, USA (pending).

[9] 曾煜棋，林致宇，林炳榕，“無線網路以及無線基地台頻道的動態配置方法與系統”, Taiwan (pending).

3. INVENTION LIST

4. LIST OF WORKSHOPS/CONFERENCES HOSTED BY THE PROJECT

[1] Y. -C. Tseng, Vice Chair, Int' l Conf. on Distributed Computing Systems (ICDCS), 2004, Japan. (Participants : 200)

[2] Chair: Yi-Bing Lin Co-chair: Whai-En Chen, 2004 Training Course , 14 hours, (Participants : 100)

[3] Chair: Yi-Bing Lin Co-chair: Whai-En Chen, 2005 Training Course, 21 hours, (Participants : 100)

[4] Y.-B. Lin and Y.-C. Tseng, General Chairs: Mobile Computing Workshop, 2005, Taiwan. (Participants : 120)

[5] Y. -C. Tseng (Demo/Exhibition Chair) and R.H. Jan (Special Session Chair): Int'l Conf. on Information Technology: Research and Education (ITRE), 2005. (Participants :100)

[6] Dharma P. Agrawal, From Cell Phones to Ad hoc/Sensor Networks, NCTU, 2005/3/14 (Participants : 82)

[7] Anish Arora, Project ExScal: Extreme Scaling of Wireless Sensor Networks, NCTU, 2005/3/21 (Participants : 77)

[8] Yu-Chee Tseng, Training Course Wireless ad hoc and sensor networks: technologies and applications, 2005/07/25~2005/07/27(Participants : 84)

[9] Next generation wireless networks:Security and Qos quarantee, NCTU, 2005/10/25 (Participants : 63)

[10] Program Chair, Int'l Workshop on Wireless Security and Privacy (WiSPr), 2006, Columbus, USA (to be held in conjunction with ICPP 2006).

[11] Y.-B. Lin , R.H. Jan , General Chair: Mobile Computing Workshop, 2006, Taiwan. (to be held in 03/2006).

[12] Chair: Yi-Bing Lin Co-chair: Whai-En Chen, 2006 Training Course ,14 hours, (Participants : 55)

[13] Chair: Yi-Bing Lin Co-chair: Whai-En Chen, Y.-B. Lin , Smartbits Training , 4 hours , (Participants : 55)

[14] Chair: Yi-Bing Lin Co-chair: Whai-En Chen, RADVISION Training, 7 hours, (Participants : 55)

5. LIST OF PERSONAL ACHIEVEMENTS OF THE PIS

Yi-Bing Lin

- K.T. Lee Breakthrough Award, IICM, 2004.
- Fellow, American Association for the Advancement of Science (AAAS), 2004. Citation:Honored for distinguished contributions to the design and modeling of mobile telecommunications networks and for leadership in personal communications services education.
- Recognition of Excellence, Ministry of Economic Affairs, ROC.2004. Citation: In recognition of his significant achievement in setting directions for the wireless communication industry of Taiwan.
- IEE Fellow, 2004
- Member of Editorial Board, IEEE Transactions on Wireless Communications
- Member of Editorial Board, IEEE Transactions on Vehicular Technology
- Member of Editorial Board, ACM/KAP Wireless Networks
- Editor, IEEE Personal Communications Magazine
- Senior Technical Editor, IEEE Network
- Advisory Board, Intl. Journal of Ad Hoc and Ubiquitous Computing
- Guest Editor IEEE JSAC special issue on Mobile Computing and Networking, 2004
- Guest Editor IEEE Wireless Communications special issue on Mobility and Radio Resource Management, 2004
- Guest Editor ACM/Springer Mobile Networks and Applications Special Issue on Broadnets
- 教育部通訊專題製作競賽 大專組 冠軍 (陳懷恩博士帶領), 2004
- NICI IPv6 軟體程式競賽 冠軍 (陳懷恩博士帶領), 2004
- Japan IPv6 Appli-Contest 實作組 冠軍 (陳懷恩博士帶領), 2004
- NCHC 國網盃軟體設計競賽 團體精神獎 (吳坤熹博士帶領), 2004

- 教育部通訊專題製作競賽 大專組 冠軍 (陳懷恩博士帶領), 2005
- Quanta's Outstanding Invention Award, 2005
- Guest Editor IEEE Wireless Communications special issue on Voice over Wireless Local Area Network, 2005
- W.Y. Pan Distinguished Research Award, 2005.
- Teco Award, 2005

Y.-C. Tseng (以下併列子計畫三、四，Form 3 中未計入，以免重覆計算)

- Yu-Chee Tseng, Outstanding Research Award (National Science Council, 國科會傑出研究獎, 2003~2005)
- Editorial Board, Tamsui Oxford Journal of Mathematical Sciences, 2002-present.
- Editorial Board Member, 臺南大學南大學報, 2005.8-2006.7.
- Associate Editor, The Computer Journal, Oxford University Press (2001~present).
- Editorial Board, Journal of Information Science and Engineering, 08/2002~07/2005.
- Editorial Board, Int'l Journal of Ad Hoc and Ubiquitous Computing, 2004-present.
- Editorial Board, Wireless Communications and Mobile Computing, Wiley, 2004-present.
- Editorial Board, Int'l Journal of Pervasive Computing and Communications, Troubador Pub., 2004-present.
- Guest Editor, Journal of Information Science and Engineering, Special Issue on "Mobile Computing", May 2004.
- Associate Editor, Telecommunication Systems, Springer Science Pub. (2005~present).
- Editorial Board Member, Int'l Journal of Sensor Networks (IJSNet), 2005-present.
- Associate Editor, IEEE Trans. on Vehicular Technology (2005~present).
- Distinguished Alumnus Award, 2005, The Ohio State University.
- Elite Information Technology Award, Annual Computer Show Org., Republic of China, 2004. (九十三年資訊月「傑出資訊人才獎」)
- Outstanding EE Professor Award, The Chinese Institute of Electrical Engineering, 2005 (中國電機工程學會，傑出電機工程教授獎).
- Acer Dragon Paper Award, 2005, by Acer Foundation (第十九屆宏碁龍騰知識經濟論文優等

獎, 2005).

- Excellent Paper Award, The 10th Mobile Computing Workshop, 2004 (J.-R. Jiang, Y.-C. Tseng, and B.-R. Linn, “A Mechanism for Quick Bluetooth Device Discovery”).
- Annual Best Paper Award, 1st place, Chinese Institute of EE Society, “Event-Driven Messaging Services over Integrated Cellular and Wireless Sensor Networks: Prototyping Experiences of a Visitor System”, with Y. K. Liu, 2004. (九十三年中國電機工程學會，青年論文獎第一名, “整合行動電話網路及無線感測網路之事件驅動訊息系統”，劉衍谷同學)
- Annual Best Paper Award, 3rd place, Chinese Institute of EE Society, “Decentralized Energy-Conserving and Coverage-Preserving Protocols for Wireless Sensor Networks”, with L.-C. Lo, 2005. (九十四年中國電機工程學會，青年論文獎第三名, “無線感測網路中省電並維持覆蓋程度之分散式協定”，羅立竹同學)
- Best Paper Award, National Computer Symposium, 2005 (P.-Y. Wu, Y.-C. Tseng, and H. Lee, “Design of QoS and Admission Control for VoIP Traffics over IEEE 802.11e WLANs”)
- National Communication Contest, 1st place, Ministry of Education, Taiwan, "An Ad Hoc Network-Based Home VoIP System", with L. Li, P. H. Lee, J. Z. Chen, and Q. Wu, 2004. (教育部九十二學年度大專校院通訊科技專題製作競賽，研究所組，優勝獎，吳坤熹，李淩，李沛鴻，陳建志同學)
- National Communication Contest, 2nd place, Taiwan, 2005, “Indoor Security and Emergency Navigation Services by Wireless Sensor Networks”, awarded by Ministry of Education, with Y. Y. Tsai, C. H. Tsai, M. S. Pan, and C. F. Huang. (教育部九十三年「通訊競賽」研究所組優等獎，蔡岳洋，蔡佳宏，潘孟鉉，黃啓富，題目：以無線感測器網路實作室內安全監控以及緊急逃生導引系統)
- Demonstration in Keynote Speech, Intel Development Forum, Fall 2005, Taiwan: The iMouse System (intelligent mobile surveillance system by wireless sensor networks).
- 國立交通大學 「第 14 屆思源創意競賽」金竹獎，指導教授, 2005 (獲獎學生:游敦皓，吳秉禎，林慧榛，呂依璇，題目:墓仔埔也敢去－異質位置感知導覽系統及其應用平台，Heterogeneous Location-Aware Guide System and Service Platform).
- 國立交通大學 「第 14 屆思源創意競賽」銀竹獎，指導教授, 2005 (獲獎學生:范日中，顏宗信，林素貞，題目：哺(ㄅㄨ)哺(ㄅㄨ)加上小蜘蛛—無線攝影車與室內無線感測網路之應用，The Application of Wireless Controlling Car and Sensor Network).

Rong-Hong Jan

- Guest Editor, International Journal of Ad Hoc and Ubiquitous Computing (IJAHUC) ,Special Issue on "Pervasive Computing through Networked Sensing Devices", 2005.

6. LIST OF TECHNOLOGY TRANSFERS

7. LIST OF TECHNOLOGY SERVICES

VII. APPENDIX III

LIST OF PUBLICATIONS IN "TOP" JOURNALS AND CONFERENCES (LIMIT TO 3-5)

1. The criteria for top journals and conferences should be defined and stated briefly at the beginning of this section.

Journal:

IEEE Transactions on Wireless Communications

IEEE Journal on Selected Areas in Communications

IEEE Transactions on Vehicular Technology

IEEE Communications Letters

ACM Mobile Network and Applications

ACM Wireless Network

IEEE Communications Letters

IEEE Trans. on Mobile Computing

Ad Hoc Networks, Elsevier

ACM Mobile Networks and Applications

Conference:

IEEE Int'l Conf. on Communications (ICC)

IEEE Vehicular Technology Conference

IEEE INFOCOM

ACM MOBICOM

[1] Y.-B. Lin, Per-user Checkpointing for Mobility Database Failure Restoration. IEEE Transactions on Mobile Computing, 4(2): 189-194, 2005.

[2] H.-N. Hung, Y.-B. Lin, M. -K. Lu, and, N. -F. Peng. A Statistic Approach for Deriving the Short Message Transmission Delay Distributions. IEEE Transactions on Wireless Communications.,3(6): 2345-2352, 2004.

[3] Y.-B. Lin, M.-F. Chang, M.-T. Hsu,, and L.-Y. Wu, One-Pass GPRS and IMS Authentication Procedure for UMTS. IEEE Journal on Selected Areas in Communications, 23(6): 1233-1239, 2005.

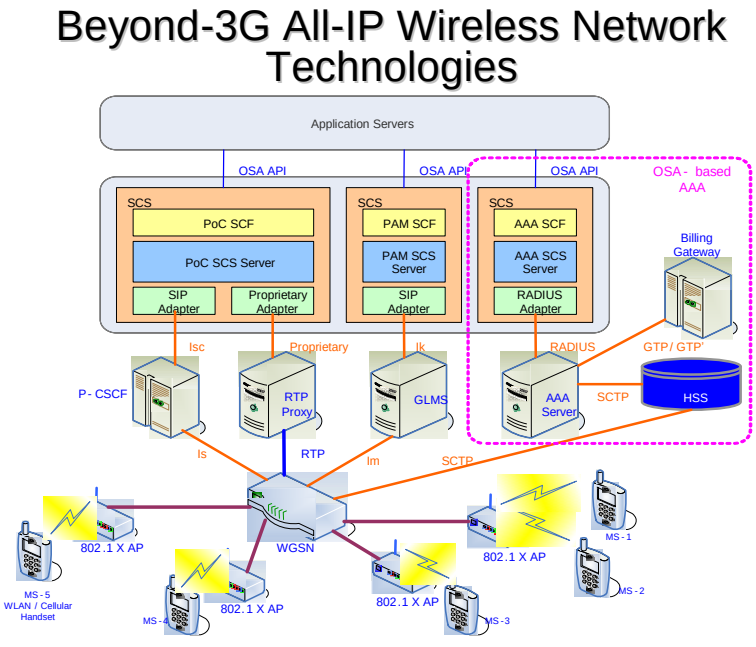
[4] P. Lin, Y. -B. Lin, and Chlamtac, I. Module Count-Based Overflow Control Scheme for UMTS High Speed Downlink Packet Access. IEEE Transactions on Vehicular Technology,53(2): 2004.

[5] P. Lin, Y. -B. Lin,, and Chlamtac, I. Overflow Control for UMTS High-Speed Downlink Packet Access. IEEE Trans. on Wireless Communications,3(2): 524-533, 2004.

2. Please provide electronic files for these publications

VIII. APPENDIX IV

SLIDES ON SCIENCE AND TECHNOLOGY BREAKTHROUGHS (TWO SLIDES FOR EACH BREAKTHROUGH)



The first advanced OSA platform in the University

Novel Features of The B3G Core Network

- One-pass WGSN and WCSCF Authentication
- Location Sensing: GPS-Less low-cost Positioning
- Thin AP Architecture for WLAN
- Power Saving for WLAN
- Load Balance:802.11 Access Points and Clients
- Seamless Handoff Technologies for WLANs

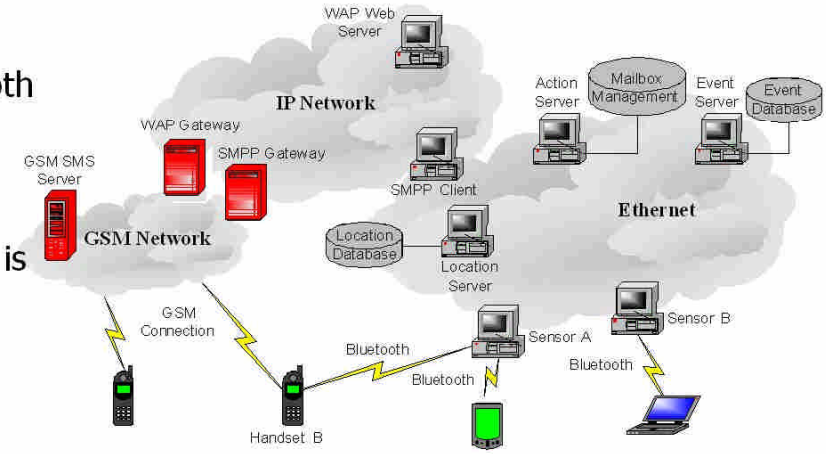
Published 33 first-class journal papers

Received awards from major contests

Received AAAS Fellow and IEE Fellow

Event-Driven Messaging Services over Integrated Cellular and Bluetooth Networks

- an event-driven messaging service over an integrated cellular-and-Bluetooth network.
- A new analytical methodology for multi-piconet Bluetooth networks is presented.
- This work has been published in IEEE JSAC.



A Multi-Chain Backoff Mechanism for IEEE 802.11 WLANs

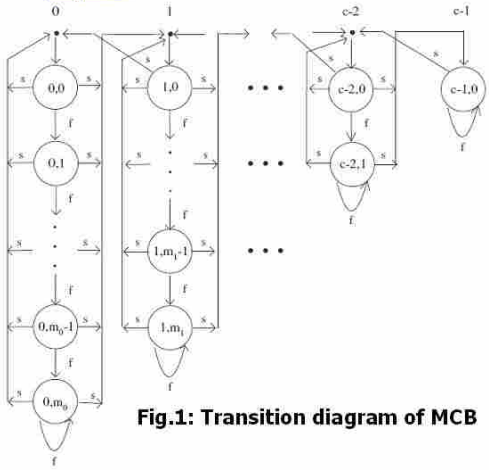


Fig.1: Transition diagram of MCB

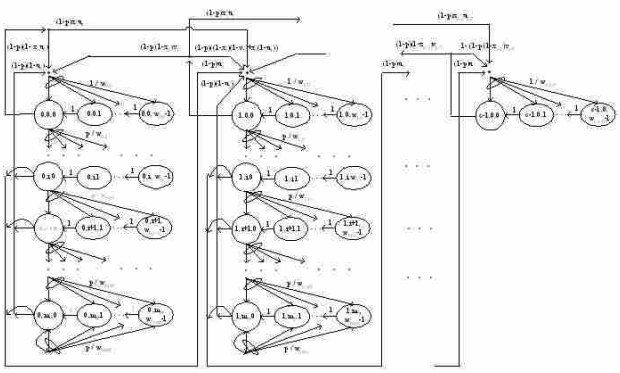


Fig.2: Analysis of saturation throughput

- A new IEEE 802.11 access control MAC protocol called Multi-Chain Backoff has been proposed.
- This work has been published in IEEE TVT.

IX. APPENDIX V: SELF-ASSESSMENT （Meeting Time : 2006/2/15 12:00 - ）

PROJECT TITLE: Beyond-3G All-IP Wireless Network Technologies

	ASSESSMENT SUBJECT	SCORE （1~5, LOW TO HIGH）
PROJECT'S CONTENTS & PERFORMANCE	Importance & Innovation of the Project's Major Tasks	5
	Clarity and Presentation of the Report	5
	Viability of the Project's Approaches & Methodologies	5
	Principle Investigator's Competence for Leading the Project	5
	Interface & Integration with the main project	4
	Interface & Integration with other Sub-Projects	4
	Manpower & Expenditures	5
PROJECT'S RESULTS	Contribution in Enhancing the Institute's International Academic Standing	5
	Impact on Advancing Teaching or on Technology Development	4
	OVERALL	42

Project Reviewer's Signature: 李建業, CEO, Go-Anywhere

REVIEWER'S COMMENTS & SUGGESTION:

題目明確、論文專利、成果有價值，四位教授的專長都有用上在計劃中，有展示的成果，本人非常滿意與愉快的見到這計劃的成果。

PRINCIPAL INVESTIGATOR'S FEEDBACK: (AVAILABLE)

將來的方向，WiMax Core Network 有很多工作要做，VoIP 的品質尤其重要，正是下二年的重點工作。

Project Reviewer's Signature: 李建業, CEO, Go-Anywhere

SELF-ASSESSMENT （MEETING TIME : 2005/12/16 12:00 - ）

PROGRAM TITLE: Beyond-3G All-IP Wireless Network Technologies

	ASSESSMENT SUBJECT	SCORES （1~5, LOW TO HIGH）
PROGRAM'S CONTENTS & PERFORMANCE	**Importance & Innovation of the Program Major Task**	5
	Program Report Redaction	5
	Viability of the Program Approaches & Methodologies	4
	Principal Investigator's Competence for Leading the Program	5
	Interface & Integration between Overall & Sub-Project(s)	NA
	Interface & Integration among All Sub-Projects	NA
	Manpower & Expenditures	NA
PROGRAM'S RESULTS	**Contribution in Enhancing the International Academic Standing**	5
	Impact on Advancing Teaching or on Technology Development	5
	OVERALL	

Program Reviewer's Signature: Prof. Lui Sha, Prof. UIUC