4. Program Management

Collaboration and Integration have been the core concept for Program Management. In addition to the Integration Effort across subprojects as summarized in Section 2.1 and other integration work among the subprojects within the College of Electrical Engineering and Computer Science, the CIET also has close collaboration with the related institutes of other Colleges, such as the Colleges of Liberal Arts, Science, Medicine, Engineering, Management, Public Health, and Life Science. Specific topics of cooperation are summarized in the following.

4.1 Subproject 1 (SP1)

- We have started the integration project among subprojects 1,2, 3 and 4, aiming to integrate the research results into a complete wireless, interactive browser system. Two phases are planned to achieve this compact and highly integrated browser system. In phase I, packaged modules and FPGA are used to establish a prototype. A 60-GHz RF TR modules, 802.11a wireless card, video encoder and decoder, and im-top are integrated into this system. We started phase I from Dec. 2009 and the integration has be completed in March 2011. Regarding phase II, we plan to integrate a GFSK transceiver into a single chip and the browser system will be more compact and energy-saving. We will utilize TSMC 90-nm low power process provided from CIC. The designs of individual components have been tapped out for first run. After the verification of each component, we will try to integrate the entire system into a single chip.

- The microwave group in subproject 1 successfully formed the Taiwan Electromagnetic Industry-Academia Consortium in 2010. Highly appreciated by other universities inclusive of NTUT, NTUST, NCU, YZU, NCTU, NCCU, and NSYSU, the Consortium has quickly gained the support from 12 industry, including TSMC, MediaTek, Ralink, Garmin, WNC, ASUS, Quanta, Intel, Himax, MTI, Realtek, and Chunghwa Telecom. With the participation of 69 professors and nearly 600 graduate students, it has become a powerful engine to advance and promote the electromagnetic developement and applications. The Consortium is missionary to attract more talents, promote innovative research, preempt industry-academia barriers, and stimulate the cutting-edge technologies in electromagnetic area. It has held a grand opening in Dec. 17, 2010 and started its operation in Jan. 1, 2011.

4.2 Subproject 2 (SP2)

- Subproject 2 has been working with subprojects 1, 3 and 4 on multimedia applications of 60 GHz wireless broadband communication. The goal is to demonstrate a portable interactive 3D viewer closely working with an interactive multi-resolution tabletop over the 60 GHz wireless communication.

- Subproject 2 has involved in a project on applying NTUcloud to elderly care, which integrats the research of different subprojects and has focused on two applications: daily activity recognition and cognitive stimulation. Both applications has demostrateted the usefulness of the large scale computing power and storage capacity of NTUCloud for elderly care.

4.3 Subproject 3 (SP3)

We have successfully combined the hardware and software research teams to facilitate this subproject. The hardware part is administrated by the Graduate Institute of Electronics Engineering (GIEE), while the software part is administrated by the Department of Computer Science and Information Engineering (CSIE). We believe that the strength and the capability of this integrated team with the help of the administrative service provided by GIEE and CSIE will be much stronger than individual efforts.

This subproject has also been working very closely with the MMIC subproject and the wireless communication subproject on topics such as 60-GHz transceiver and MIMO OFDM wireless communication systems, and with Institute of Information Science, Academia Sinica, in the area of multicore architecture research and also on the development of multicore simulation techniques with the goal of creating an open-source multicore simulator that produces accurate performance results with superior simulation speed. The software team has also worked with National Tsing Hua University and National Chao-Tung University on the development of system software for heterogeneous multicore systems. The collaboration also involves industrial parteners such as the Industrial Technology Research Institute, Andes, and SunPlus.

From 2010 to 2011, we (subproject 3) supported a joint projects "Cloud Service for Elderly Care", together with subproject 2 and subproject 4. The goal of this joint project was to utilize NTUCloud large-scale computing power and storage capacity for elderly care both physical and mental health. We supported this joint project by providing energy-efficient smart device capability and cloud computing resources. The energy-efficient client devices provide users in the cognitive stimulation application a display as human-machine interfaces, and is able to reduce power consumption by 15%-25%, using power management daemons provided by our subproject. The cloud computing resources include computing power, network bandwidth, and disk storage. We provided these resources under the management of our cloud operating system, Roystonea, a prototype cloud operating system developed by NTU that supports Hadoop file system, MapReduce computation model, and Hbase cloud database.

4.4 Subproject 4 (SP4)

- This team have collaborated with the National Center for High performance Computing of NARL, Taiwan, in establishing and maintaining a cross campus wireless LAN roaming mechanism across 130 universities, colleges, and schools in Taiwan, with collaboration with EDUROAM of EU. Now this cross campus roaming center is also in collaboration with the MOE computer center.

- The members of the project have attempted to collaborate with each other by exchanging research ideas in different research fields to make the project compact and novel. For instance, members have been exchanging research ideas related to social network, super resolution, and error concealment technologies.

- The members of this team actively and continuously participate the standardization progress of LTE/LTE-A to engage in applying and pushing developed technologies to LTE/LTE-A.

- Our platform provides real-time spectrum sensing results to upper layer so that cross-layer optimization in other subprojects (such as those using game theories) can be made. The algorithms and protocols developed by other subprojects can also be implemented in our platform for feasibility study.

- The member of the sub-project has instrumented a living lab, hereafter referred as the CoreLab, for the evaluation of our proposed approaches. Regarding the topic of healthcare, the subproject member has cooperated with researchers of the College of Medicine, and the College of Electrical Engineering & Computer Science. This Corelab serves as a center to integrate various human-centric technologies from associated subprojects and it also provides infrastructure, spaces and facilities for facilitating cooperation (or discussion) within this project to improve a more complete life healthcare, especially for elderly.

4.5 Subproject 5 (SP5)

In addition to collaborate with colleagues in other laboratories, such as the Institute of Atomic and Molecular Sciences, Academia Sinica, and the Center for Condensed Matter Sciences, NTU, on advanced photonics studies, members of the subproject 5 have been having close interactions and exchanging research ideas. For example, members have been paying attention together to the current important research issues related to energy photonics technologies.