

Cooperative Agreement

In the framework of the Memorandum of Understanding to promote academic cooperation between UNIVERSIDAD POLITÉCNICA DE MADRID, hereafter UPM, and BEIJING INSTITUTE OF TECHNOLOGY, hereafter BIT, the undersigned parties, Prof. Dr. César Sanz, director of the UPM Electronic and Microelectronic Design Group, hereafter GDEM, and Prof. Dr. Kuang Jing-Ming, director of the BIT Research Institute of Communications Technology, hereafter RICT, come to a cooperative agreement as stated below:

1. Field and Topics of Interest

To deeply and efficiently strengthen the short-term and mid-term cooperation between UPM and BIT, we agree that the contents for student and academic exchange, cooperation and project application shall be chosen from the field of Software-Defined Radio (SDR). The list of specific topics we agree in is collected in Table 1 of Annex I.

2. Student Exchange

We agree to promote the exchange of graduate and PhD students for short stays and project cooperation according to the *Sino-Español* and *Hispano-Chino* programs.

1. The intended duration of each exchange between BIT and UPM shall be six months.
2. BIT shall provide the cost of international travel and living for students whose destination is UPM and GDEM shall provide the cost of international travel and living for students whose destination is BIT.
3. GDEM shall make its best efforts to provide BIT students the suitable living and research conditions during their stay at UPM and BIT shall make its best efforts to provide UPM students the suitable living and research conditions during their stay at BIT.



3. Academic Exchange

To enhance each other technical knowledge on the common topics of interest, we agree to promote academic exchange between UPM and BIT.

1. BIT shall invite UPM professors to visit China for academic exchange and UPM shall invite BIT professors to visit Spain for academic exchange.
2. BIT shall provide the cost of international travel and living for professors whose destination is UPM and GDEM shall provide the cost of international travel and living for professors whose destination is BIT.
3. GDEM shall make its best efforts to provide BIT professors the suitable living and research conditions during their stay at UPM and BIT shall make its best efforts to provide UPM professors the suitable living and research conditions during their stay at BIT.

4. Cooperation and Project Application

To foster technological cooperation between the People's Republic of China and the Kingdom of Spain that shall enhance their citizens living conditions and welfare, we agree to cooperate and jointly apply to national and international projects.

1. UPM shall assist BIT to develop international relationships with other universities and research institutes in Europe and BIT shall assist UPM to develop international relationships with other universities and research institutes in China.
2. BIT and UPM may organize jointly international conferences or workshops.
3. UPM and BIT may publish papers jointly in international journals and conferences.
4. BIT and UPM may act as contact points for Spanish and Chinese companies willing to introduce their products into the Chinese and Spanish markets.
5. BIT and UPM may jointly apply to projects of the Sino-EU international cooperation program, Chinese technological cooperation program, Spanish-government funded programs and Chinese-government funded programs.

97

5. Duration, Revision and Termination of the Agreement

We both agree to review this Cooperative Agreement after two years following the date of signing, and acknowledge that this Agreement is subject to revision and termination at any time by mutual consent or by three months' notice by either party.

UPM: Prof. Dr. **César Sanz**, Director,
Electronic and Microelectronic Design
Group, Universidad Politécnica de
Madrid

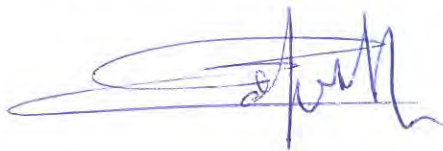


Signature:

Date: *Mardi 15th 2010*



*EUIT Telecommunications,
Universidad Politécnica de Madrid*



Signature:

Date: *Mardi 15th 2010*

BIT: Prof. Dr. **Kuang Jing-Ming**, Director,
Research Institute of Communications
Technology, Beijing Institute of Technology



Signature:

Date: *03.16.2010*

*School of Information and Electronics,
Beijing Institute of Technology*



Signature:

Date:

ANNEX I. Topics of Interest

Table 1 classifies the list of topics of interest we agree in according to two criteria: SDR Application and Wireless Multimedia Node. As far as the Application criterion concerns, two different issues are considered: DVB-H Multimedia Broadcasting and Cooperative Networks. Regarding the Wireless Multimedia Node criterion, eight issues are taken into account: Architecture, Development Platform, Open-Source Tools, Proprietary Tools, Modulation, Source Coding, Receiver Node and Transmission Protocols. A list of acronyms is included in Annex II.

		SDR APPLICATIONS	
		DVB-H MULTIMEDIA BROADCASTING	COOPERATIVE NETWORKS
WIRELESS MULTIMEDIA NODE	ARCHITECTURE	PC GPP & DSP GPP & DSP & FPGA GPP & MULTI-DSP	
	DEVELOPMENT PLATFORM	USRP Lyrtech SFF SDR DP Beagle Board	
	OPEN-SOURCE TOOLS	GNU Radio Linux Kernel & Android OS	
	PROPRIETARY TOOLS	Simulink & Matlab	
	MODULATION	OFDM Synchronization	BPSK QPSK Superposition Modulation
	SOURCE CODING	SVC MVC 3DVC	N/A
	RECEIVER NODE	Energy/Power Reduction Techniques	Combining Algorithms at Receiver
	TRANSMISSION PROTOCOLS	N/A	Distributed Transmission (3 nodes, Two-Hop Transmission)

Table 1. Topics of Interest Categorized by Application and Wireless Multimedia Node Criteria

ANNEX II. List of Acronyms

- 3DVC:** 3D Video Coding
- BPSK:** Binary Phase-Shift-Keying
- DP:** Development Platform
- DSP:** Digital Signal Processor
- DVB-H:** Digital Video Broadcasting - Handheld
- FPGA:** Field Programmable Gate Array
- GNU:** GNU is Not Unix
- GPP:** General Purpose Processor
- MVC:** Multiview Video Coding
- MULTI-DSP:** Multiple Digital Signal Processors
- OFDM:** Orthogonal Frequency-Division Multiplexing
- OS:** Operating System
- PC:** Personal Computer
- QPSK:** Quadrature Phase-Shift Keying
- SFF:** Small Form Factor
- SDR:** Software-Defined Radio
- SVC:** Scalable Video Coding
- USRP:** Universal Software Radio Peripheral

97