



**UK-China Science Bridges:
R&D on (B)4G Wireless Mobile Communications (UC4G)**



Notes of UC4G Hardware Demonstrator Meeting at BUPT Workshop 2010

John Thompson, Harald Hass, and Xuemin Hong

Date/time: 2:30-4:30pm, Tue. 24th August 2010

Venue: High-Tech Mansion, BUPT, Beijing, China

Introduction

Prof Harald Haas chaired the meeting. He started by making some observations concerning WP4 in the UC4G project. This WP has £100k of funding for testbed but there is no specific staffing in HW University, apart from some of Xuemin Hong's time as the network manager on the project.

WP4 Proposal

Harald then made a proposal concerning WP4 of the UC4G project. He believes that one or more specific goals need to be identified for the proposed demonstrator and that this would help to define what testbed is actually required at HW. He suggests a further round of proposal submissions should be made by project partners similar to what is already in place for exchange visits. As there is only 21 months left on the project, the deadline for proposals should be by the end of 2010. It is hoped to convene a panel of industrialists to help with the assessment of proposals.

The proposal should identify the UK and Chinese partners involved and the algorithm(s) or techniques that they wish to demonstrate, preferably based on results from existing exchanges and/or workshop presentations. The proposal should also indicate if the demonstration will be done in the UK at Heriot-Watt or at a Chinese University. Not all of the existing funding for exchange visits has been allocated. So this funding could be requested in the proposal to support further visits of PhD students/post-docs to UK or China to help code and test algorithm implementations. The proposed ideas should be implementable and sensible to industry. It was suggested that the proposal should also indicate clearly why hardware implementation is necessary and what additional results may be obtained over software-only simulations.

Harald indicated that a key positive outcome for the project would be if an idea that had been demonstrated in the project was taken forward by a company into a future wireless standard.

Existing Hardware Platforms and Test Facilities in China

Prof Xiaofeng Tao from BUPT described the platforms available in China. They constitute three main types: (1) Testbenches of algorithms in FPGA using VHDL coding at BUPT, (2) SORA platform of Generic CPUs which can be coded in C at BUPT and (3) Equipment based approach available at WICO in Shanghai.

The FPGA platform at BUPT is difficult to code as it requires VHDL expertise and there is little current support for this at BUPT. The SORA platform may be easier to open up but does require C code optimisation for algorithms to run fast. BUPT and Microsoft have recently run training courses on OS and programming development for the SORA platform. On the current SORA platform, the physical layer algorithms are coded



UK-China Science Bridges: R&D on (B)4G Wireless Mobile Communications (UC4G)



directly to the CPU, while higher layer protocols are programmed on top of Microsoft Windows operating system. Collaboration from Microsoft to open the CPU instruction library is crucial to implement the physical layer algorithms. It is possible for BUPT to open up the SORA platform for the UC4G project.

Dr Yang Yang from WICO discussed the arrangements there. In general, it has proved relatively difficult to support new algorithms on instrument based testbeds because the instrument vendors do not provide an open architecture for implementation. However, WICO has good relationships with test equipment vendors, which have given them extra access to significant equipment resources. WICO is leading a national project, the goal of which is very similar to WP4. In this project, Chinese researchers from different institutions come to WICO and test their algorithms there. Usually the researcher provides an initial proposal which is then refined via telephone meeting before the researcher comes to try out their algorithms. The time to test an algorithm varies significantly, depending on the nature of the algorithm. In a recent collaboration with China Mobile they managed to test 4 algorithms within one day. WICO also has a software platform to try out algorithms and also has a remote internet facility for accessing resources. Such an arrangement already exists between WICO and Montreal. A student has also come from UCL to try out multihop routing techniques.

Discussion

There was some discussion of Harald's proposal and the resources available in China. There were no alternative proposals or suggestions put forward to his idea of a call for proposals. The idea of using spare funding to enable students to travel to China or the UK to code algorithms was agreed to be a good idea.

Matching Funding in China

There are two main potential funding bodies in China: MOST and MIIT. The MIIT has funding for B4G, but this funding focuses more on the industry and is difficult for the universities to get. The MOST has a special scheme to fund international collaboration. This funding is to support collaboration with all countries and across all areas. Therefore it is very competitive. The consortium in China had put together a bid for matching funding to MOST. The lead institution was Tsinghua University, but the proposal was not successful due to high levels of competition for funding amongst Beijing Universities. A new proposal will be submitted by Shandong Univ. which has a good link with its local government who need to support it. This proposal will be submitted through them in May 2011 with the result known in August 2011. If funded its value will be at least 5M RMB. Surrey university and Tsinghua university have just secured such international collaboration funding from MOST. This may make it difficult to get further funding from MOST for collaborative B4G research between UK and China.

Industrial Support in UK/China

There was discussion of whether suitable industrial support could be obtained in the UK or China. The MIIT organisation has programmes targeting 4G development but this is really aimed at industry where standards activity is measured as a key output. There was discussion of whether to approach UK or Chinese Industry to support the demonstrator activity to increase the funding available. However, it was felt that the project would be best placed to do this as a follow-on activity once the results of WP4 are available, as this would increase the credibility and hence chances of funding. Follow on funds from EPSRC could also be used to support initial



**UK-China Science Bridges:
R&D on (B)4G Wireless Mobile Communications (UC4G)**



commercialisation activities.

Discussion of the Demonstrator

Cheng-Xiang would like to have a physical demonstrator at Heriot-Watt to show EPSRC, so this is an important activity. So a small scale demonstrator could be used for initial concepts, possibly followed up by larger size demonstrations in China at BUPT/WICO. There was some discussion of whether remote access to the hardware platform in Heriot-Watt University would be a good idea. While this would be a useful resource to the UK community, in general it was felt that it is more important to devote available man-power to developing and demonstrating algorithms in the platform. Once resources at Heriot-Watt are developed, it may be possible to request further funding for open access from EPSRC etc, if this would be a useful resource. Making the demonstrator research friendly (e.g. programmable via MATLAB) is an important concern but this can be addressed once the general form of the demonstrator is clear.

Any Other Business

Cheng-Xiang wishes to make a video of progress to date for EPSRC. Prof Tao has recorded the workshop at BUPT and there is also a video of the workshop at Tsinghua from Summer 2009. It was suggested that Cheng-Xiang contact either University production facilities to make a video or at a lower cost contact a Media dept at a University to contact suitable students.

Prof Tao is looking for key people to serve on a panel discussion at Shanghai workshop. There is one open position for the meeting on Mon13th Sept.