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科技部　函

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受文者：國立暨南國際大學

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密等及解密條件或保密期限：
附件：「學研合作5G產業技術開發專案計畫」徵求公告　1件，附件一「學研合作5G產業技術開發專案計畫」重點推動研發項目　1件（105D2006974.PDF，105D2006975.PDF）(105D2006974.PDF、105D2006975.PDF)

主旨：本部工程司推動「學研合作5G產業技術開發專案計畫」，自即日起接受申請，申請機構請於105年5月20日（星期五）下午5時前檢附相關申請文件並備函送達本部，逾期送達者不予受理，請查照轉知。

說明：

一、依本部補助專題研究計畫作業要點規定辦理，申請機構及計畫主持人務必先行詳閱各項規定。

二、本計畫之執行期限自105年8月1日至106年7月31日止。

三、本計畫研究內容必須符合公告所列研發項目，於計畫提出前須與法人洽談計畫內容及共同研發之進行方式，並簽署合作意願書(請附於申請書表CM03研究計畫內容最後一頁)。

四、本申請案全面實施線上申請，各類書表請務必至本部網站（https://www.most.gov.tw）進入「學術研發服務網」製作。

五、本計畫相關申請規範與研究範疇等說明，請參閱本部網站(https://www.most.gov.tw)-最新消息：科技部工程司「學研合作5G產業技術開發專案計畫」徵求公告。

六、本案聯絡人：

(一)有關電腦操作問題，請洽本部資訊系統服務專線，電話：0800-212-058、(02) 2737-7590、7591、7592。

(二)相關規定如有疑義，請洽本部工程司承辦人林怡君助理研究員，電話：(02) 2737-7529。

正本：專題研究計畫受補助單位（共296單位）
副本：本部綜合規劃司、工程司(均含附件) 電2016-03-24交15:28:28章

部長徐爵民

擬：一.奉核後影印一份送科技學院，並請轉知所屬系所教師研提。

二.上傳文件公告系統及本處計畫徵求專區周知.

三.申請人請於105年5月16日下午5時前完成線上申請作業。

四.文陳閱後存查.

秘書室專門委員徐朝堂 105/3/25

國立南大學國際校長蘇玉龍(乙) 105.03

專任助理陳熙文 105.03.25

研發處綜合企劃組組長林玉溪

教授兼研發長楊德芳 105-03-28

科技部工程司「學研合作5G產業技術開發專案計畫」

徵求公告

壹、計畫目的

為解決國內5G技術研發人才不足問題，科技部(以下簡稱本部)擬加強與經濟部資源結合，合作進行5G產業技術開發，以擴大整體綜效。期透過本合作機制，整合學界與法人研發能量，以經濟部「5G產業技術拔尖計畫」規劃產出之技術項目為目標，共同進行5G產業技術開發，綜整國家資源快速展現成效。

貳、計畫研發重點

一、本專案重點推動之研發項目請參考**附件一**，若需進一步了解各研發項目之主要研究內容，請逕洽各項目聯絡人。

二、申請人研提之計畫內容必須符合本專案所列研發項目，於計畫提出前須與法人洽談計畫內容及共同研發之進行方式，並簽署合作意願書(正式用印)。計畫書內如未附合作意願書，恕不予受理審查。

參、計畫審查重點

一、主持人近五年於計畫相關領域與產業技術研發之整體表現。

二、計畫研究內容與本專案所列研究項目是否符合。

三、計畫規劃與法人5G計畫之實質合作方式是否確實。

四、計畫預期完成之工作項目及成果是否明確、計畫研究成果與法人研究計畫之整合性。

肆、計畫申請、審查及核定

一、申請注意事項

1. 申請機構及計畫主持人資格須符合本部補助專題研究計畫作業要點之規定。
2. 本計畫研究型別以一年期個別型研究計畫為限。執行期限自105年8月1日至106年7月31日止。
3. 申請經費以每年100萬元為上限。
4. 本計畫不接受申請共同主持人；計畫不核給國外學者來台費用、

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國外差旅費（執行國際合作與移地研究及出席國際學術會議）、博士後研究經費，亦不得個案申請延攬博士後研究補助。

5. 申請程序：

(1) 計畫申請作業，自即日起接受申請，請申請人依本部補助專題研究計畫作業要點規定，研提計畫申請書(採線上申請)。申請機構須於105年5月20日(星期五)下午5時前備函送達本部(請彙整造冊後專案函送)，逾期送達者不予受理。

(2) 計畫申請書請採用本部專題研究計畫申請書格式，並將法人合作意願書附於申請書表 CM03 研究計畫內容最後一頁。計畫類別點選「一般型研究計畫」；研究型別點選「個別型」；計畫歸屬點選「工程司」；學門代碼點選「E9841-學研合作 5G 產業技術開發專案計畫」，以利作業。

6. 有關計畫頁數限制請務必依照本部公告之「專題研究計畫申請書表 CM03 研究計畫內容頁數限制一覽表」內工程司之規定，個別型一年期計畫 CM03 內容至多 20 頁，超出部分將不予審查。

二、審查及核定

1. 本計畫預定開發之 5G 產業技術須為法人所需，故計畫是否確與法人進行共同開發工作為重要之審查指標。

2. 審查方式包括初審及複審，如有必要將安排計畫申請人簡報計畫內容。

3. 審查未獲通過者，恕不接受申覆。

4. 本計畫經核定補助後，列入本部專題研究計畫件數計算。

伍、執行與考評

一、本計畫須配合本部及專案計畫推動辦公室進行成果追蹤、查核及考評，計畫申請書及成果報告將提供予相關管考單位進行評估考核。

二、計畫書內需明列查核點及評量指標，以為評審委員查核之依據。年度計畫執行結束前兩個月須繳交期中進度報告，年度計畫結束後須繳交期末報告，其餘執行中查核時間依管考單位要求繳交進度報告，必要時將安排進行口頭報告或成果實體展示。前一年度成果報告及成果審查意見將列為下一年度計畫審查之重要參考依據。

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三、除前開事項外，本計畫之簽約撥款、經費結報及研究成果報告繳交等應依本部補助專題研究計畫作業要點、本部補助專題研究計畫經費處理原則、專題研究計畫補助合約書與執行同意書及其他有關規定辦理。

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附件一：「學研合作 5G 產業技術開發專案計畫」重點推動研發項目

〔註〕下表為法人各單位所提之實務研發議題。請直接與擬合作單位聯絡，並據以提出計畫申請書。

項次	法人合作單位	主題	研究內容	聯絡人及聯絡方式
1	工業技術研究院資訊與通訊研究所-M 組	Channel estimation (CHEST) and measurement feedback for the advanced receiver	Channel estimation and measurement feedback are critical components in the receiver chain from link performance/system capacity and joint precoding for MU-MIMO or network MIMO point of view. In this task, the potential contributor is expected to design efficient channel estimation and measurement feedback algorithms for the next generation 5G system to support features such as network MIMO, massive MIMO, with competitive performance. The channel estimation and measurement feedback schemes shall be realizable/implementable by DSP or FPGA with efficiency from computation complexity point of view. Participants will work with ITRI counter-parts on CHEST and measurement feedback from design, link performance evaluation for both floating and fixed point to final implementation. *Note 1: CHEST for UE and cell sites can be different. We are looking for individuals who can contribute to both will be the best. *Note 2: Measurement	許仁源 03-5914850 jyhsu@itri.org.tw

項次	法人合作單位	主題	研究內容	聯絡人及聯絡方式
			shall include CQI, PMI, RI and noise/interference power measurements.	
2	工業技術研究院資訊與通訊研究所-M 組	RF calibration procedure	RF impairments such as I/Q imbalance in both Tx/Rx paths, carrier frequency offset & transmit timing adjustment, transmit/receiver gain, magnitude & group delay equalization for analog filters, sampling timing error, phase noise correction, etc require RF calibration procedures to compensate them. Some RF compensations can be done at the factory (e.g. equalization for analog filters), others are to be performed at power up or on-the-fly. In this task, we expect to build a digital RF front-end simulation platform for both Rx and Tx paths including modeled RF impairments, and then implement the needed on-the-fly RF calibration procedures in this platform. The simulation platform can be either Matlab or C-based. The calibration procedures developed in this task will be deployed in the HW platform for verification and testing.	陳正中 03-5914844 m400ccchen@itri.org.tw
3	工業技術研究院資訊與通訊研究所-K 組	UDN system architecture & configuration	Next generation 5G system is envisioned to include services provided by ultra-dense networks (UDNs). Various system deployment scenarios for UDN are still under evaluation. Indoor vs. outdoor, macro-cell	劉家隆 03-5917188 CLLiu@itri.org.tw

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項次	法人合作單位	主題	研究內容	聯絡人及聯絡方式
			overlay with cluster of small cells, CRAN, distributed vs. centralized antenna system are areas being tackled to address capacity, spectrum efficiency, and feasibility of the UDN system. In this task, we will focus on developing a system architecture and deployment strategies for an enterprise UDN system where solutions for inter-cell interference mitigation, for dynamic clustering/reconfiguring distributed antennas for a logical cell, and for support of both coordinated distributed antenna system (network MIMO) and centralized massive antenna system (massive MIMO with >= 128 antennas, mmWave node). A system simulation model shall be developed to evaluate (1) the target UDN architecture, its corresponding capacity and spectrum efficiency; (2) the efficiency of the interference mitigation scheme; (3) algorithms for dynamic reconfiguration of a distributed antenna system based on the traffic loading & propagation environments.	
4	工業技術研究院資訊與通訊研究所-K 組	IMEC software architecture & its configuration	Next generation 5G network is expected to provide various vertical services with diverse QoS requirements. To support heterogeneous configuration of	廖彥彰 03-5914618 yjliao@itri.org.tw

項次	法人合作單位	主題	研究內容	聯絡人及聯絡方式
			ultra-dense RAN with various vertical services, we device an Intelligent Mobile Edge Computing gateway (IMEC) which serves as an ingress point from RAN to the core network as well as performs SON (Self Organization Network) functionality for the RAN, local traffic breakout to offload traffic toward core network. Furthermore, IMEC shall be designed to minimize the end-to-end delay, perform QoS negotiation/management with RAN and SDN/NFV based core network and manage some level of the RAN functional virtualization. An UDN may require several IMEC to support it. And each IMEC is envisioned to manage a group of clusters as described in Task 3. The number of clusters (size) of the IMEC is then determined by the amount of functionalities resided in the IMEC, the corresponding computation power, memory requirement of each function, peripheral, and the underlined HW platform capabilities. In this task, we need to (1) list all functions performed by IMEC; (2) define software architecture to host these functions with efficiency; (3) estimate/profile CPU/memory needs for the dominant functions;	

項次	法人合作單位	主題	研究內容	聯絡人及聯絡方式
			(4) identify potential HW & virtualization platform that IMEC can be implemented.	
5	資訊工業策進會	MTC link simulation platform	3GPP is expected to complete the 1st version of the narrow-band cellular IoT (NB-IOT) specification this year to prepare for the arrival of the massive MTC in the 5G era. New air interface perhaps with new waveform, a more efficient access scheme for short package, co-existence with licensed and unlicensed operation are in the discussions. This task is to build a link level simulation platform (including PHY and lower MAC protocol) for the cellular IoT standard (including NB-IoT) to include functions that can be operated in unlicensed as well as the sub-GHz bands. Functions for MTC end-unit (MTC-EU) Rx/Tx and MTC access point (AP) Tx/Rx shall be included in this simulation platform. Appropriate channel simulator should also be provided in the end-to-end link level simulation. The software architecture of the simulation platform should be designed for smooth migration to DSP implementations. That is, the similar structure (for the digital baseband parts and perhaps some lower MAC parts) can be transferred to DSP	吳明儒 (02)6607-3763 mingzoo@iii.org.tw

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項次	法人合作單位	主題	研究內容	聯絡人及聯絡方式
			implementation with minimum changes. In this way, MTC-EU Tx/Rx chain can then be used as a reference for verification of the DSP/HW implementation. The design of MTC-EU shall be low-power, low complexity and shall be reflected in the link level MTC-EU Tx/Rx operation.	
6	資訊工業策進會	MTC/NB-IoT access protocols	In order to provide massive MTC (mMTC), the air interface protocol for upcoming NB-IoT in 3GPP R13 and beyond would need to be changed significantly from that of the current 4G LTE standard. For instance, NB-IoT devices are allowed to operate in multi-carrier. It will then need to monitor its anchor carrier for receiving control information, such as paging indication and system information blocks, to perform subsequent random access procedure for data transmission in one of the carriers. However, this system may run into a risk of the anchor carrier being accessed by burst NB-IoT devices if scheduling is not done properly at the access point for load-sharing across multiple-carriers. This task is to build a system simulation platform to model the MTC access protocol and its corresponding performance. An enhanced MTC access	許俊彥 (02)6607-2828 jameshsu@iii.org.tw

項次	法人合作單位	主題	研究內容	聯絡人及聯絡方式
			protocol and scheduling algorithm shall be designed to address issues discovered from the simulation results. The system simulation platform shall emulate massive access behavior. The physical layer can be modeled using conventional way via link budget estimation. The enhanced MTC access protocol will be contributed to the 3GPP standard by III, and the scheduling algorithm will be implemented in the MTC HW platform for verification and validation.	
7	資訊工業策進會	vEPC: node vs functional virtualization	EPC virtualization is an essential technology to provide diverse service requirements under one unified core network in 5G era. For example for enterprise eMBB application, the S-GW and P-GW may need to be co-located to minimize GTP tunneling inefficiency; for metering or static mMTC application, mobility management, location update and handover performed in MME can be disabled; for uMTC (ultra-reliable MTC) application, control functions such as session management, authentication will need to be moved closer to the edge of the core network to reduce latency and to meet real time service requirement. The node	紀文瑋 (02)6607-3519 wwchi@iii.org.tw

項次	法人合作單位	主題	研究內容	聯絡人及聯絡方式
			virtualization (i.e. the entire node of MME, HSS, PCRF, and control functions of S-GW and P-GW) has been implemented by several tier-1 manufactures. This task is to (1) provide analysis of the node vs. functional virtualization of the EPC for the above-mentioned three 5G application scenarios; (2) recommend a functional split of the EPC nodes for functional virtualization and its corresponding placement in the network for enterprise application. The recommendation from (2) will be implemented in 5G test platform for verification.	