2025 Mobileheroes { CHANGES FOR THE BETTER }

Antenna Systems Design Competition for 5G/5G-A Communication

www.facebook.com/communicationantenna

Competition Guidelines Ver: 2025.4.26

REGISTRATION PERIOD	CLOSING AT
2025.05.01	**2025.06.30**

Organizer:
Industrial Development Administration Ministry of Economic
Co-organizer:
Institute of Antenna Engineers of Taiwan 、National Sun Yat-sen University Antenna Lab
Implementer:
Communications Industry Development Project Office、 National Sun Yat-sen University

Platinum Sponsor	Gold Sponsor	Silver Sponsor	Partner
WNC 啓碁科技股份有限公司 MEDIATEK auden 耀登集團 Auden Techno Corp	仁寶電腦 COMPAL 英業達 Inventec awan 連騰科技股份有限公司 廣達電腦 Quanta Computer wistron	工業技術研究院 Industrial Technology Research Institute SIMUTECH 士盟科技 CYBERNET 思渤科技 CYBERNET SYSTEMS TAIWAN	MYTEK 稜研科技

(Sponsor list is sorted alphabetically by Mandarin)

Contents

01 2025 Antenna Competition 3

02 5G-A Application Competition Description 25

03 5G Application Competition Description 32

Competition Theme

The Antenna Systems Design Competition has entered its 12th year, covering topics ranging from 3G, 4G, 5G, and 5G-A antenna design. The Competition has consistently stayed ahead of communication trends, advancing Taiwan's antenna technology domain.

2 Track

Track A【5G/5G-A Communication Application Competition】

Focusing on challenges such as **next-generation 5G-A/6G extended frequency bands (e.g., 6–15 GHz)**, **NTN (Non-Terrestrial Network) antenna technology**, **improving system throughput low/mid/high-frequency MIMO antenna technologies**, and **the integration of antennas across 4G/5G frequency bands**.

Participating teams have the opportunity to compete for high-value prizes, participate in talent matching, and get internships or full-time job opportunities with Taiwan companies.

Track B【Deepening Cooperation】

Based on industry trends and demands, Participating teams can challenge antenna design by **companies spec**, or **custom categories**. The Deepening Cooperation emphasizes encouraging participating teams to align with international communication trends and industry trends, focusing on antenna system development tailored to end-product application scenarios.

Participating teams may have the opportunity to **collaborate with Taiwan ICT companies for 6 months of industry-academia exchange** and compete for the Deepening Collaboration Award or the Co-Creation Collaboration Award.

Competition Architecture

Antenna Systems Design Competition

REGISTRATION OPEN NOW

	1 5G/5G-A Communication Application Competition		2 Deepening Cooperation
Name			
Theme	5G-A Application Competition	5G Application Competition	Deepening Cooperation
Axis	1.Next-generation 5G-A/6G Antenna challenge. 2.Integration of Non-Terrestrial Network and terrestrial network antenna technologies.	1.Industry trends. 2.Communication system integration.	1.Company and team one by one does technical exchange for 6 months.
category			1.Companies specifications challenge. (please refer to page 9) 2.Custom categories.
Call for submissions	• Actual antenna work is required, the "Smart AI Collaborating" category is except. • (Bonus) 5G-A/6G extended frequency bands (e.g., 6–15 GHz) challenges. • (Bonus) NTN (Non-Terrestrial Network) antenna technology. • (Bonus) Improving system throughput low/mid/high-frequency MIMO antenna technologies.	• To Integrate of 4G/5G antennas frequency bands. • (Bonus) Providing actual antenna work.	• Proof-of-concept research and development for technologies with [illegible] potential. • Products or applications tailored to specific situation [illegible]. • Optimization of antenna systems for existing device or fabricated antenna.
Eligibility	Undergraduate Students 1~2 members (Thesis advisor is not included)		Undergraduate Students 3~4 members (Thesis advisor is included) Startup Company /Social People 2~4 members
Registration	May 1~12:00 noon on Jun 30		late of Jan~12:00 noon on Mar 10
Frequency	Operating frequency as long as your antenna application scenario.		

Registration Closed
(Event in progress)

※ Undergraduate Students are pursuing Graduate/ Master' s/ Doctor/ International degrees.
※ The Organizers/ Implementer reserves the right of final decision of the competition.

Competition Procedure

	1 5G/5G-A Communication Application Competition		2 Deepening Cooperation
Theme	5G-A Application	5G Application	Deepening Cooperation
Dec	Formulating Competition		Registration Closed (Event in progress)
Jan-Feb	Guidelines Launch		Guidelines Launch and Register
Mar	-		Register deadline 12:00 noon on Mar 10 Pitch on Mar 29
Early of Apr	-		Non-Selected / Selected
Late of Apr	Competition Campaign		1st Collaboration (Student team: advisors must participate)
May	Guidelines Launch and Register		
Jun	Register Deadline 12:00 noon on Jun 30		
Jul			Non-checked / Checked
Aug	Actual Antenna work Deadline 12:00 noon on Aug 29		2nd Collaboration (Student team: advisors must participate)
Late of Sep	Notification of Finalist Teams		
Early of Oct	Final: Antenna Report Presentation Determine Award & Prizes by Jury		Results Review Determine Award & Prizes by jury
Late of Oct	Awards Ceremony & Achievements Exhibition		

※ The Organizers/ Implementer reserves the right of final decision of the competition.

Awards and Prizes

Total prizes up to NT$1,000,000

5G/5G-A Communication Application Competition

Superb Award
Trophy & Maximum NT$300,000

Outstanding Award
Trophy & NT$150,000

Wonderful Award
Trophy & NT$100,000

Company Special Award
Communication Application Award
Jury Special Award
Certificate of merit & NT$60,000

✓**Finalist Teams** NT$10,000/per team

Deepening Cooperation

Deepening Cooperation Award
Trophy & Maximum NT$300,000

Collaborate Award
Certificate of merit & NT$100,000

✓**Checked team by company** NT$30,000/per team
✓**The** winning Deepening Cooperation award **team includes foreign students**. Additional maximum prizes NT$60,000/per team.

※「5G/5G-A Communication Application Competition」detail matter:
①The jury panel will adjust the awards and the number of finalist teams according to the level of the actual antenna work.
②The Superb, Outstanding and Wonderful Award must has actual antenna work.
③The "Smart AI Collaborating" category can compete Superb, Outstanding and Wonderful Award without actual antenna work.
※「Deepening Cooperation」detail matter:
①The jury panel evaluates the awards and prizes based on the results of collaboration achievements and subsequent derivative cooperation, such as: technology transfer, continuous technology development, talent recruitment, provision of laboratory resources, intern teaching cooperation, etc.

※The Organizers/ Implementer reserves the right of final decision of the competition.

Competition Resource (For all theme competition)

DAK-TL Material Characteristic Measurement

1. Prior reservation is required to provide on-site measurement.

The DAK Dielectric Assessment System is used for accurately and non-destructively measuring the real and imaginary parts of the relative permittivity of liquids, solids, and semi-solids over a wide frequency range.
It finds wide application in communications, materials science, bioelectromagnetics, and biomedical research, as well as the automotive, electronics, and food industries.

auden
耀登集團
Auden Techno Corp.

Sim4Life (Recommended Software by 2025 Antenna Systems Design Competition)

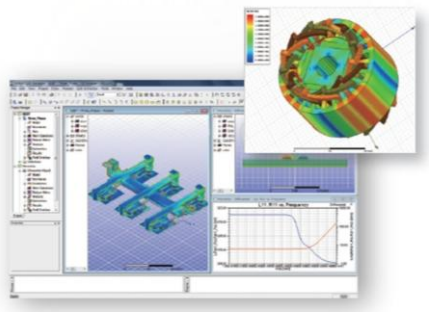
(Short-term license, need to apply in advance. Contact the organizer for more info)

※ All measurement resources are only provided for the participating teams, and the measurement parameters should be confirmed by each team.
※ The measurement resources provide form multiple laboratories of the companies, participating teams should be show up if teams apply for it.
※ To apply for competition resources, please register through the Register Website process, and contact Mr. Wu at 07-9700910 ext.66 or Mr. Chen at ext.34.

Competition Resource: Simulation(For all theme competition)

Ansys HFSS + optiSLang (Recommended Software by 2025 Antenna Systems Design Competition)

CYBERNET 思渤科技
CYBERNET SYSTEMS TAIWAN



Ansys HFSS: High Frequency Structure Simulator

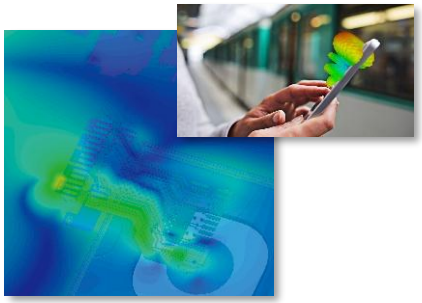
- Support multiple EM system solver and analysis sensitivity.
- Supports mixed calculations with multiple algorithms.
- high-frequency and radiation simulations.
- Double-sided coupling simulations with circuit & system
- More info: https://reurl.cc/qVzGdR

Ansys optiSLang: Process Integration & Design Optimization

- Accelerate searches for the most robust design configuration by automating the search process with interavisualization and AI technologiesctive.
- Experimental Design and Sensitivity Analysis
- Optimization and Uncertainty Quantification
- More info: https://reurl.cc/269gW9

CST Studio Suite (Recommended Software by 2025 Antenna Systems Design Competition)

SiMUTECH
士 盟 科 技



Antenna Application Module (Multiple Solvers + Full Bandwidth Support)

- **Framework Integration:** GUI, Modeling, Solving, Result Visualization
- **Solver Technologies:** Frequency Domain / Time Domain / Method of Moments (MOM) / Transmission Line Matrix (TLM) / Hybrid Solver Framework
- **Multi-type/Broadband Design & Optimization:** Simulate performance across various frequency bands, integrate with circuit analysis, rapidly adjust impedance and 3D field pattern functionalities.
- **Polarization & Efficiency Analysis:** Radiation Pattern/Gain/Axial Ratio outputs; S-parameter calculation and analysis.
- **Antenna Array Design:** Supports beamforming, phase control, analysis of coupling effects between elements.
- **System Integration Simulation:** Import PCB/Mechanical files, study antenna performance variations in different environments.
- **SAR Analysis:** Integration with human body models, simulation of near-field Specific Absorption Rate (SAR) and regulatory compliance assessment.
- For more information：https://reurl.cc/AMM1dj

Intelligent Automated Design Features

- **Python Scripting:** Control modeling, simulation, and post-processing workflows.
- Parameter Sweep + Heuristic Optimization Algorithms (GA, PSO)
- High-Performance Computing (HPC) Support

※ Available as a short-term software licenses until 31 August 2025, limited to one application per laboratory ※

※ To apply for competition resources, please register through the Register Website process, and contact Mr. Wu at 07-9700910 ext.66 or Mr. Chen at ext.34.※

Companies Suggestions and Challenge(Continuously Updated)

No.	Theme	Content	Companies
Suggestion 1	5G-A Application Competition 5G Application Competition	Hybrid Application	WNC
Suggestion 2		5G/6G Terminal Antenna System Design	MEDIATEK
Suggestion 3		5G/5G-A Mobile Antenna System Design	AUDEN
Suggestion 4		Full-scale Hybrid Antenna Design Challenges	INVENTEC
Suggestion 5		Sub-6 GHz & B5G MIMO Antenna Design	AWAN
Suggestion 6		5G-A/6G New Antenna Design for Terminal Handheld Devices (Slim Industrial Phone)	WISTRON

Registration：May 1~12:00 noon on Jun 30

Challenge 1	Registration Closed (Event in progress) The 9 companies challenge can still be referenced, and registration is open from May 1 to June 30 at 12:00 noon.	High Gain Antenna for 5G C-band Private Network (MIMO/Filtenna/Antenna Filter Unit)	WNC
Challenge 2		Unlimited, Encourage to Think Towards 6G	MEDIATEK
Challenge 3		5G/5G-A Laptop/Tablet Antenna System Design	AUDEN
Challenge 4		Ground Station Antenna of Satellite Communication	COMPAL
Challenge 5		AI Evaluation System of Antenna Performance	INVENTEC
Challenge 6		Anti-system Noise Antenna	INVENTEC
Challenge 7		Antenna Design on Metallic Environment & Antenna Performance Optimization Technology	AWAN
Challenge 8		Wi-Fi 7 Slot Antennas for Full-Metal Backed Tablet	QUANTA
Challenge 9		Directional Finding Antenna Array	WISTRON

Sort according to the level of sponsorship and the Chinese name of the company

Companies Suggestions

Suggestion 1	Hybrid Application
The suggestion of antenna work	Today's wireless technology is booming, with the application of new frequency bands and a wide variety of communication technologies More opportunities for development. It is recommended to refer to the application blueprint of 5G/6G and the industry's innovative product design to solve the new frequency band application The technical challenges are used to propose antenna design ideas for specific problems. For example, how to put NTN antennas into small devices and maintain high performance, high-precision GPS for the Internet of Vehicles, antenna design for Internet of Things-assisted positioning devices, or solutions that integrate multiple wireless technologies are all directions that can be creative and show technological breakthroughs.
other	1. Explain the design principle of antenna work, the reasons for the optimization of the performance of the antenna work, and the comparison of data results to support the advantages of the design or achieve the improvement of certain technical indicators. 2. In order to be close to the spirit of the 5G-A Application Competition, it is recommended to use the commercially available products as a benchmark as a comparison to show the advantages and selling points of antenna work.

WNC 啓碁科技股份有限公司

Companies Suggestions

Suggestion 2	5G/6G Terminal Antenna System Design
The suggestion of antenna work	Please define antenna work communication systems that are expected to be supported (e.g., Cellular, Connectivity, Satellite), Terminal type (e.g., Mobile Phone, CPE), Band(See below), to propose an innovative antenna system design. Reference frequency band： 1. Cellular： ■ 3GPP n96：5,925 MHz – 7,125 MHz ■ 3GPP n104：6,425 MHz – 7,125 MHz ■ WRC-23 Approve the research section：7 – 8.4 GHz、15GHz ■ FCC Expand the use of mobile broadband：12.7 – 13.25 GHz 2. Satellite： ■ 3GPP FR1-NTN： ➢ n254：UL: 1,626.5 – 1,660.5 MHz; DL: 1,525 – 1,559 MHz ➢ n255：UL: 1,626.5 – 1,660.5 MHz; DL: 1,525 – 1,559 MHz ➢ n256：UL: 1,980.0 – 2,010.0 MHz; DL: 2,170 – 2,200 MHz ■ 3GPP FR2-NTN (VSAT)： ➢ n510：UL: 27,500 MHz – 28,350 MHz; DL: 17,300 MHz – 20,200 MHz ➢ n511：UL: 28,350 MHz – 30,000 MHz; DL: 17,300 MHz – 20,200 MHz ➢ n512：UL: 27,500 MHz – 30,000 MHz; DL: 17,300 MHz – 20,200 MHz ■ More： ➢ IEEE Ku band: 12 – 18 GHz ➢ Proprietary system example: UL: 14.0 – 14.5 GHz; DL: 10.7–12.7 GHz
other	Encouraged Participating teams to focus on 6G development under the compatibility of 4G/5G/6G, expand from antenna single design thinking to antenna system/module design, and think from the perspective of improving consumer experience and application, solve the pain points of existing applications or create breakthrough applications, and then create technical highlights that are felt by users.

Companies Suggestions

Suggestion 3	5G/5G-A Mobile Antenna System Design
The suggestion of antenna work	1. The actual antenna work needs to have a multi-antenna, multiband system design. The 4G working frequency band must be included, and the specific operating frequency must include the following listed frequencies: 617 – 960 MHz / 1,427 – 1,510 MHz / 1,695 – 2,690 MHz 3,300 – 5,000 MHz / 5,150 – 5,925 MHz 2. The actual antenna work joins the 5G-A working frequency band, and the antenna can be added to the lower working frequency band of 5G-A first. Such as 6.4 – 7.1 GHz or 7.1 – 8 GHz. 3. It is recommended to add two Wi-Fi 7 antennas, it would make the antenna work more complete. Both Wi-Fi antennas must operate in the frequency band 2.4 – 2.5 G/5.15 – 7.125 GHz. 4. The antenna work could be considered to add the band of non-terrestrial-network satellites.
other	1. It is hoped that the participating teams will come up with antenna system works that can break through the technical bottleneck. 2. It is suggested that in the early stage of antenna design, refer to and study the design and configuration of the conventional antenna system of various mobile phones on the market, put forward the design concept, principles and practices of the work, and use test data to prove that the proposed antenna work will have more advantages than the conventional design. 3. The antenna work must contain at least one main and secondary antennas and two MIMO antennas, of which the main and secondary antennas should contain all operating frequency bands. The MIMO antenna design does not need to include the low-frequency 617~960 MHz frequency band, but it needs to include all the working frequency bands in the future. 4. If the antenna work includes a non-terrestrial NTN network satellite direct to cell antenna, the antenna does not need to include all NTN operating frequency bands, but it is hoped that the antenna work can achieve excellent satellite direct connection signal quality.

auden
耀登集團
Auden Techno Corp

Companies Suggestions

Suggestion 4	Full-scale Hybrid Antenna Design Challenges
The suggestion of antenna work	1. Plastic Window 1：89x8. 2. Plastic Window 2：110x8. 3. PCB1：88 x 7.5 x 2.2 mm with 2 antennas. (#1, #2). 4. PCB2：108 x 7.5 x 2.2mm with 4 antennas. (#3, #4, #5, #6). 5. Wire length 300 mm Coaxial cable O.D. 1.13 LLS with IPEX4.
other	1. 617 – 960 MHz, 1,710 – 5,925 MHz. 2. 1,710 – 5,000 MHz. 3. 617 – 960 MHz (RX), GNSS, 1,805~5,925 MHz (RX). 4. 1,805 – 5,000MHz (RX). 5. Wi-Fi 7 full band support.

英 業 達
Inventec

Companies Suggestions

Suggestion 5	Sub-6 GHz & B5G MIMO Antenna Design
The suggestion of antenna work	Design of high-performance antennas in the Sub-6 GHz or B5G MIMO antenna technology (frequency support up to 7.125 GHz), which can be used for design thinking and research in different aspects. For example: high-gain, low-loss, multi-band and wideband designs.
other	Contextual applications can consider long-distance coverage and in-vehicle, long-range communication and other application scenarios. Device applications can be considered for a variety of different devices, such as: mobile phones, vehicles, drones... Wait.

Companies Suggestions

Suggestion 6	5G-A/6G New Antenna Design for Terminal Handheld Devices (Slim Industrial Phone)
The suggestion of antenna work	1. Each antenna operating frequency: ■ Wireless WAN: ➢ LTE/NR LB: 617–960 MHz (2x2 MIMO) ➢ LTE/NR MHB: 1,710~2,690 MHz (4x4 MIMO) ➢ NR UHB: 3,300 – 4,200 MHz; 4,400 – 5,000 MHz (4x4 MIMO) ➢ NR NTN: 1525 – 1660.5 MHz; 1,980 – 2,200 MHz (2x2 MIMO) ➢ 6G: 7,125 – 8,500 MHz (8x8 MIMO) ■ UHF RFID: 860~960 MHz (Dual Polarization-V/H) ■ Wireless LAN: Wi-Fi 2.4G/5G/6G (2x2 MIMO) ■ GNSS: GPS L1/L2/L5 2. Size description: ■ Model appearance: L 165mm x W 77mm x H 17mm ■ Antenna design environment: L 155mm x W 70mm x H 11mm
other	1. The goal is under 9 antennas, and cover following operating frequency ■ NR sub-6G/RFID: 4~6 antennas ■Wireless LAN/GNSS: 2 antennas ■6G: 1 antenna 2. LTE/NR LB/RFID could use the aperture tuner/switch for more bandwidth. 3. It should consider the position of NFC antenna. 4. WAN NR Sub-6G & NR NTN/LAN/GNSS reflection loss <-10 dB, antenna performance >-4dB, antenna isolation >20 dB 5. WAN NR Sub-6G ECC <0.2; 6G antenna ECC < 0.1. 6. 6G antenna reflection coefficient <-6 dB, antenna performance >-4 dB, antenna transmission coefficient <-25 dB. 7. RFID reflection loss <-10 dB, antenna performance >-3 dB, antenna isolation >20 dB. 8. RFID 3D radiation pattern focuses on Theta 0~90 degrees and Phi 210~330 degrees, with the radiation direction towards the -X axis. (The display panel is at +X axis, Phi 90 degrees; the phone back cover is at -X axis, Phi 270 degrees.)

Companies Challenge

Challenge 1	High Gain Antenna for 5G C-band Private Network (MIMO/ Filtenna/ Antenna Filter Unit)
The topic of antenna work	With the development of communication systems, from millimeter wave focusing to practical C-band, FR3 or new frequency between 6~15GHz. Because the expansion of bandwidth has different challenges for antennas. The topic is aimed at base Antenna, such as massive MIMO antenna structure, the Filtenna of antenna combine filter, the common Cavity Filter using in Integrated base station, phase shifter design etc. There have many opportunity to develop new design, Being able to have breakthrough design that solves practical problems is the direction and goal that is expected to be seen.
other	Expect the actual antenna work have highlights that provide solutions to specific problems, such as: 1. Maximize antenna bandwidth while satisfying the requirements of 13, 16 or 18 dBi high gain. 2. Integrate the technologies included in base station antennas, ex: RET(remote electric tilt)+phase shifter design, filter, antenna array. 3. Maintain high performance characteristics while miniaturizing the antenna size or using new material antennas.

WNC 啓碁科技股份有限公司

Companies Challenge

Challenge 2	Unlimited, Encourage to Think Towards 6G
The topic of antenna work	Please refer to page 11. MEDIATEK
other	Non.

Companies Challenge

Challenge 3	5G/5G-A Laptop/Tablet Antenna System Design
The topic of antenna work	1. Refer to the size of 10~14 inch laptops or tablets on the market as the antenna design platform. 2. The position and method of antenna design can be proposed by yourself, but the radiation characteristics, SAR, radiation pattern should be considered Properties. Based on the requirements, it is better to put forward than usual conventional designs, such as: high-performance miniaturized designs, metal-in-body integrated antennas, Cavity antenna technology, broadband antenna design with integrated FM circuit, innovative process technology or Special material applications. 3. Antenna Name and Number Requirements: ■ WWAN at least four antennas: Main, Aux, MIMO 2, and MIMO 3. ■ Wi-Fi at least one Main and one Aux antenna. 4. Each antenna operating frequency: ■ WWAN for 4G/5G/5G-A: ➢ Main/Aux Antenna: 617 – 960 MHz/1,427 – 1,510 MHz/1,695 – 2,690 MHz 3,300 – 5,000 MHz/5,150 – 5,925 MHz/6.4 – 7.1GHz ➢ MIMO 2/MIMO 3 Antenna: 1,427 – 1,510 MHz/1,695 – 2,690 MHz/3,300 – 5,000 MHz 5,150 – 5,925 MHz/6.4 – 7.1 GHz ■ Wi-Fi Main/Aux Antenna 2,400 – 2,500 MHz, 5,150 – 5,850 MHz, 5,925 – 7,125 MHz
other	It is necessary to put forward the design concept of antenna works, design principles and practices, performance optimization reasons and test data comparison to prove that antenna works have more advantages than conventional designs.

auden 耀登集團 Auden Techno Corp

Companies Challenge

Challenge 4	Ground Station Antenna of Satellite Communication
The topic of antenna work	1. Frequency Band: K/Ka band, Tx-27.530 GHz, Rx-17.5~20 GHz. 2. Antenna Polarization (Choose one of the following options): ■ Dual-feed V/H linear polarization to RHCP/LHCP ■ Single-feed Circular Polarization. 3. Antenna Array: 256 elements up to 1024 elements. 4. Antenna Gain: >27dBi@256 array, >33dBi@1024 array. 5. Beam Scanning: AZ-360deg, EL-90~30deg. 6. Beam Scanning Resolution: Provided by the team. 7. Beam Width: Provided by the team. 8. Material Setting: Provided by the team, with a suggested dielectric constant εr close to 3.5.
other	Participating teams are requested to provide details, such as phase calibration technology, BFIC/PA/LNA setting, etc,.

Companies Challenge

Challenge 5	AI Evaluation System of Antenna Performance
The topic of antenna work	1. Under the architecture of AI tools, to do the prediction and debugging work. 2. Predict: In the real system, there is already a designed system or antenna. If you encounter a limited number of institutional changes, you can make a system that can quickly predict the results. 3. Debug: Based on the post-design results, quickly propose possible directions for debugging and propose design changes
other	• The AI platform is informal, and focuses on presenting possible results. • Database creation methods need to be standardized.

Challenge 6	Anti-system Noise Antenna
The topic of antenna work	1. Wi-Fi 7 band is supported. 2. For consumer devices (tablets, laptops, AIOs, wearables), metal housing is recommended. 3. Hidden design, co-constructed design, and miniaturized design are preferred.
other	Cavity antennas or other advanced antenna designs are available.

Companies Challenge

Challenge 7	Antenna Design on Metallic Environment & Antenna Performance Optimization Technology
The topic of antenna work	In the case of hexagonal three-dimensional space, there are five sides that must be metal for antenna design, such as Cavity Antenna design or other designs, but the overall size of the antenna and the metal environment should be as small as possible, and the size may not meet the application requirements of the product if the size is too large.
other	In response to the trend of consumer product design, the product structure is gradually moving towards the development of all-metal materials, but due to the relationship between the antenna design requirements, the non-metallic structure requirements must be retained in the environment, which makes the antenna design requirements contradict the product structure design requirements, so the design balance must be achieved under the minimum requirements of antenna characteristics, and the smaller the size of the antenna, the more conducive to the product structure towards a lighter, thinner and shorter design.

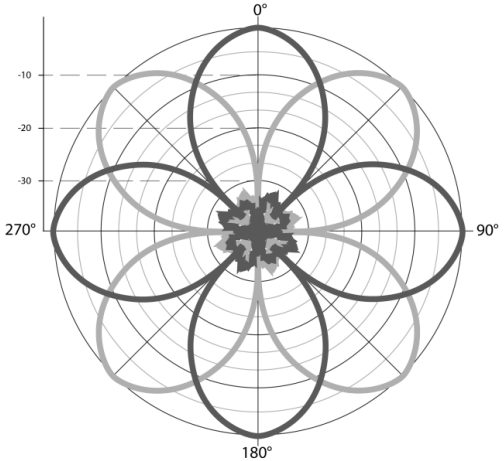
Companies Challenge

Challenge 8	Wi-Fi 7 Slot Antennas for Full-Metal Backed Tablet
The topic of antenna work	1. The Wi-Fi 7 antenna operating frequency: ■ 2.4 ~ 2.5 GHz ■ 5.15 ~ 5.85 GHz ■ 6 ~7.125 GHz 2. Design Require: ■ Option 1: ➢ Design two antenna to support Wi-Fi 7 frequency bands simultaneously on the same slot. ➢ with high isolation (-20 dB) ➢ Environmental: Slot length between 80~110 mm, width 2.5 mm. ■ Option 2: ➢ Design for Wi-Fi 7 antenna frequency bands in a slot with a width of only 1 mm. ➢ Environmental: Width 1 mm.
other	None.

Companies Challenge

Challenge 9	Directional Finding Antenna Array
The topic of antenna work	1. Support Frequency: 400 MHz – 6 GHz 2. Support Polarization: Dual Polarization 3. Antenna numbers：16 4. Scan Angle (Horizontal): 360 degree 5. Scan Angle (vertical): 45 degree 6. Antenna gain：peak gain>2 dBi 7. Dimension: Diameter 900 mm / High 350 mm
other	The array antenna system needs to achieve the radiation pattern requirements as shown photo. A single antenna element should cover 45 degrees, while 8 antenna elements are required to cover 360 degrees.

wistron



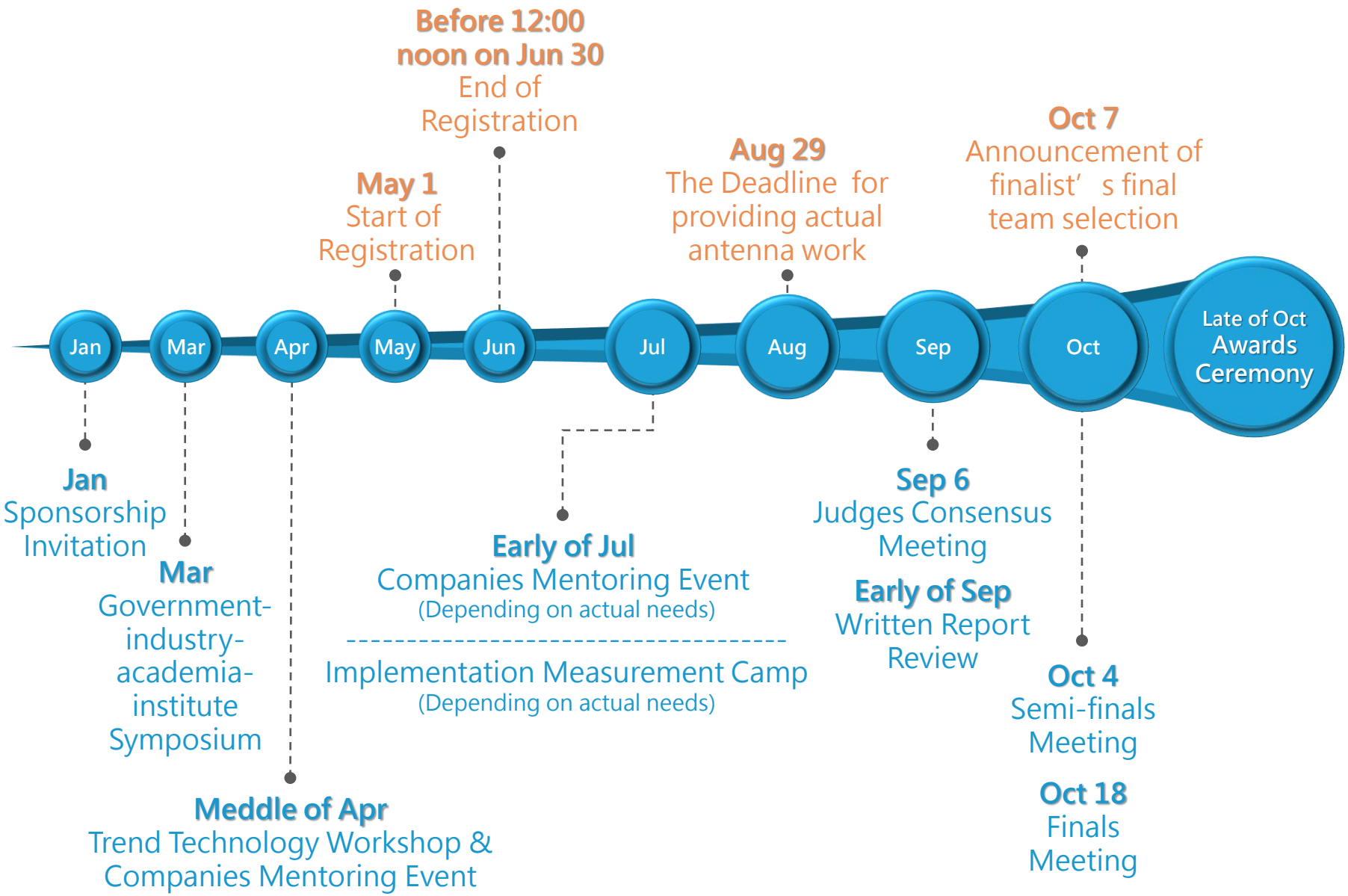
Contents

01 2025 Antenna Competition 3

02 5G-A Application Competition Description 25

03 5G Application Competition Description 32

5G-A Application Competition Schedule



※ The Organizers/ Implementer reserves the right of final decision of the competition.

5G-A Application Competition Description

Focus on the new generation 5G-A/6G Extended Band antenna challenge, non-terrestrial network (NTN) antenna technology challenges, improve transmission rate with low/medium/high frequencies on MIMO Antenna technology, etc. to develop the terminal product for a new generation.

Application Category:
Handheld device, Wearable, Laptop/Tablet, Precision positioning, Biosensor, AR/VR, LEO, V2X, IoT, Small Cell, System Testing, Smart AI Collaborating.

Application Scenarios:
Indoor, outdoor, smart light pole, car, satellite ground station, etc.

Application frequency Band:
Please choose the appropriate operating frequency band based on your specific antenna work scenario.

5G-A/6G Applications:
Please explain how the antenna design surpasses the 5G performance.

Technical highlights:
Highlights of the self-recommendation, such as beamforming technology, MIMO Antenna decoupling technology, the application of Handheld devices, direct-to-cell, V2X, etc.

Participating teams must explain according to the application category, application scenarios, application frequency band, 5G-A/6G application, technical highlights, etc., and consider the design principle, antenna structure, electrical characteristics, innovation, progress, practicability, commercialization, and other factors in the written report.

5G-A Application Competition Register for Dummies

Step 1 Participating team register **before 12:00 noon on Jun 30**, and submit the following documents.			
Eligibility	Undergraduate students 1~2 members (thesis advisor is not included) 1~2 thesis advisor (thesis advisor can cross different teams, but contestants are not allowed)		
Register Website	https://www.stipc.org/tw/actregister/85 (The Registration is May 1 to 12:00 noon on Jun 30)		
Application documents	A. Written Report of Semi-finals (Write in English, up to 20 pages, PDF file)	• Abstract: Include an antenna structure diagram or system design schematic. • Design Motivation: Describe the motivation behind the design, target users, and the selection of operating frequency bands. • Industrial Applicability: Explain the industrial applications and commercial potential of your antenna. • Simulation and Measurement Data: Provide reports and discussions on simulations and measurements (including S-parameters, antenna efficiency, etc.).For the system testing (design/measurement projects) category, the overall system's cost, including supporting instruments, and the plan for off-site display must be explained separately. • Simulation Software: Specify the name of the simulation software used.	• Structure and Principles: Describe the design's antenna structure and underlying principles. • Please explain how the antenna design surpasses the 5G performance. • (Smart AI Collaborating) Explain how to use commercial software or self-developed software to achieve antenna design or performance optimization. • Innovation and Practicality: Highlight the innovation, progress, and practicality of your ANTENNA WORK. • Literature and Patent Review: Include a review of related research papers and patents. • Conclusion.
	B. Participation Agreement	Attach both sides of your ID card or passport, and Enrollment Letter.	
	C. Matching Resume	Provide a resume for talent matching opportunities with participating companies.	
	D. Antenna Photos	Provide antenna photos of actual antenna work or simulated.	

Note 1: The same antenna work has participated in our previous competitions, it must be pointed out the different items and technology in the written report of semi-finals.

Note 2: The register website couldn’ t upload any files, please email each application document to blacktea1996@g-mail.nsysu.edu.tw on time.

5G-A Application Competition Register for Dummies

Step 2 Participating team renews and submits the following documents before 12:00 noon on Aug 29.		
Application documents	A. Written Report of Semi-finals (Write in English, Maximum 20 pages, PDF file)	• This report can be updated before 12:00 noon on Aug 29.
	B. Send an actual antenna work (The postmark date will be regarded as the date of submission.)	• The actual antenna work must be able to be measured and verified, and it is recommended to use conventional connectors. • Judges of companies may send your actual antenna work to the testing laboratory for checking measurement data (including S-parameters, antenna efficiency, etc.) again if it is necessary. The measurement data results will be reviewed and discussed by all judges in the semi-final meeting. Note 1: If you choose the system testing (design/measurement projects) category, it is allowed to record a 5-minute video (mp4, under 100 MB) to demonstrate the system' s Operation and results. Note 2: If you chose the smart AI collaborating category, sending an actual antenna work is not necessary.

Note 1: The same antenna work has participated in our previous competitions, it must be pointed out the different items and technology in the written report of semi-finals.

Note 2: The register website couldn' t upload any files, please email each application document to blacktea1996@g-mail.nsysu.edu.tw on time.

5G-A Application Competition Register for Dummies

Step 3 The listed teams of finals must submit the following documents before Oct 15.		
Application documents	A. Finals Presentation	• **Abstract of Finals Presentation** A review of the key points from the finals presentation. • **Parametric Study and Optimization Process** Please explain how the relevant parameters of the work (such as antenna length and width) affect characteristics like resonance frequency, impedance matching, and bandwidth. Additionally, indicates how the optimal parameters for the antenna were determined during the design process. • **Process and Material Analysis Applicable to the Work Structure** Analyze the processes applicable for mass production of the work (e.g., FR4 printed circuit boards, ceramic materials, metal processing, etc.), and also propose solutions for potential issues (such as production yield and precision). • **Compatibility Explanation with Communication Devices** Explain the compatibility of the work with communication devices, including the casing and other components or circuits. • **How the Antenna Design Surpasses 5G Performance** Explain how to use commercial software or self-developed software to achieve antenna design or performance optimization. • **Actual antenna work with Smart AI Collaboration** Clarify whether commercial software or self-developed software is used to achieve antenna design or performance optimization. • **Patentability Analysis (Novelty, Inventiveness, and Industrial Applicability)** Analyze the work and determine its patentability. Please attempt to outline the technical scope intended for protection when applying for a patent in the future. • **Relevant Literature and Patent Search Explanation** The team needs to confirm the references and technical sources cited, and specifically explain the advancements of the work compared to previous technologies. • **Conclusion**
	B. Reference Letter of Thesis advisor	• Within one page, explain the performance and division job of team members, as well as the recommended reasons for actual antenna work. • The organizing committee will provide a separate format.

Note 1: The same antenna work has participated in our previous competitions, it must be pointed out the different items and technology in the written report of semi-finals.

Note 2: The register website couldn’ t upload any files, please email each application document to blacktea1996@g-mail.nsysu.edu.tw on time.

5G-A Application Competition Judging Method

【Jury Panel】

Invite professionals from industry and academia to form the Jury Panel. They will first conduct a written report review based on the registration categories and the submitted Written Report of Semi-finals. Each judge will provide a list of recommended participating teams. Subsequently, during the Semi-finals Meeting, they will discuss the nominations together and select outstanding teams to advance to the finals.

【Written Report Review & Semi-finals】

Criteria	Description	Weight
Design Innovation	Antenna design effectiveness, system integration, and space utilization.	40%
Practical Functionality	Applicability in the industry or potential for commercialization	40%
Technical	Difficulty of the design and manufacturing process	20%

When registering, please conduct a self-assessment on design innovation and practical functionality, totaling 100%, limited to one A4 page

1. Design Innovation Percentage: _____%. Briefly explain the innovative design concept.
2. Practical Functionality Percentage: _____%. Briefly explain the degree of industrial applicability.

【Finals】A presentation to explain the concept of antenna work, and then engage in a Q&A session with the jury panel.

Description	Weight
• Overall Performance (Antenna design innovation, functional integration with communication devices, commercialization potential, patentability analysis)	80%
• Presentation Ability	20%

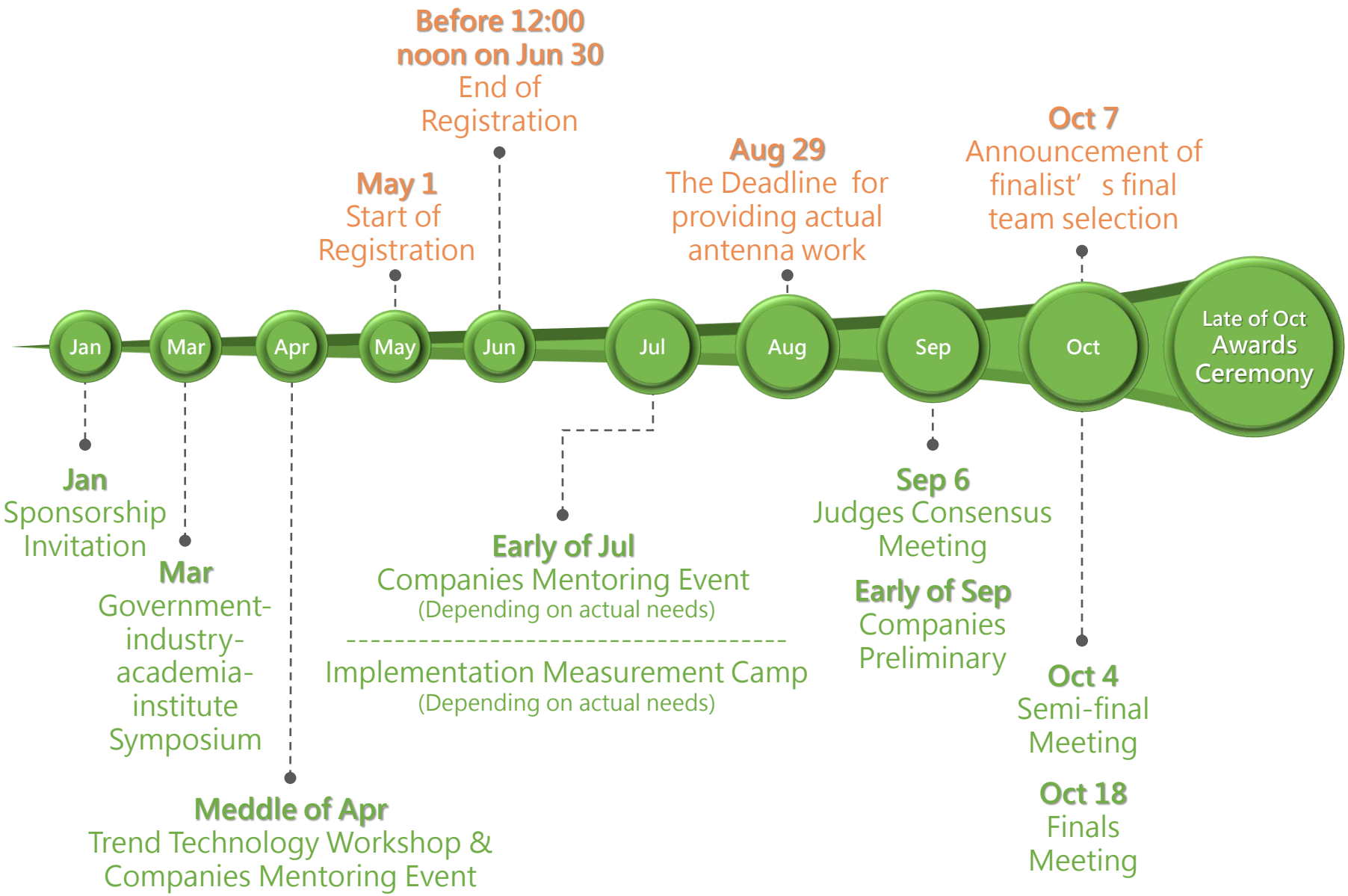
Contents

01 2025 Antenna Competition 3

02 5G-A Application Competition Description 25

03 5G Application Competition Description 32

5G Application Competition Schedule



※ The Organizers/ Implementer reserves the right of final decision of the competition.

5G Application Competition Register for Dummies

Step 1 Participating team register **before 12:00 noon on Jun 30**, and submit the following documents.			
Eligibility	Undergraduate students 1~2 members (thesis advisor is not included) 1~2 thesis advisor (thesis advisor can cross different teams, but contestant are not allowed)		
Register Website	https://www.stipc.org/tw/actregister/85 (The Registration is May 1 to 12:00 noon on Jun 30)		
Application documents	A. Written Report of Semi-finals (Write in English, Maximum 20 pages, PDF file)	• Abstract: Include an antenna structure diagram or system design schematic. • Design Motivation: Describe the motivation behind the design, target users, and the selection of operating frequency bands. • Industrial Applicability: Explain the industrial applications and commercial potential of your antenna. • Simulation and Measurement Data: Provide reports and discussions on simulations and measurements (including S-parameters, antenna efficiency, etc.).For the system testing (design/measurement projects) category, the overall system's cost, including supporting instruments, and the plan for off-site display must be explained separately. • Simulation Software: Specify the name of the simulation software used.	• Structure and Principles: Describe the design's antenna structure and underlying principles. • (Smart AI Collaborating) Explain how to use commercial software or self-developed software to achieve antenna design or performance optimization. • Innovation and Practicality: Highlight the innovation, progress, and practicality of your ANTENNA WORK. • Literature and Patent Review: Include a review of related research papers and patents. • Conclusion.
	B. Participation Agreement	Attach both sides of your ID card or passport, and Enrollment Letter.	
	C. Matching Resume	Provide a resume for talent matching opportunities with participating companies.	
	D. Antenna Photos	Provide antenna photos of actual antenna work or simulated.	

Note 1: The same antenna work has participated in our previous competitions, it must be pointed out the different items and technology in the written report of semi-finals.

Note 2: The register website couldn’ t upload any files, please email each application document to blacktea1996@g-mail.nsysu.edu.tw on time.

5G Application Competition Register for Dummies

Step 2 Participating team renews and submits the following documents before 12:00 noon on Aug 29.		
Application documents	A. Written Report of Semi-finals (Write in English, up to 20 pages, PDF file)	• This report can be updated before 12:00 noon on Aug 29.
	B. Send an actual antenna work (The postmark date will be regarded as the date of submission.)	• The actual antenna work must be able to be measured and verified, and it is recommended to use conventional connectors. • Judges of companies may send your actual antenna work to the testing laboratory for checking measurement data (including S-parameters, antenna efficiency, etc.) again if it is necessary. The measurement data results will be reviewed and discussed by all judges in the semi-final meeting. Note 1: If you choose the system testing (design/measurement projects) category, it is allowed to record a 5-minute video (mp4, under 100 MB) to demonstrate the system' s Operation and results. Note 2: If you chose the smart AI collaborating category, sending an actual antenna work is not necessary.

Note 1: The same antenna work has participated in our previous competitions, it must be pointed out the different items and technology in the written report of semi-finals.

Note 2: The register website couldn' t upload any files, please email each application document to blacktea1996@g-mail.nsysu.edu.tw on time.

5G Application Competition Register for Dummies

Step 3 The listed teams of finals must submit the following documents **before Oct 15**.		
Application documents	A. Finals Presentation	• **Abstract of Finals Presentation** A review of the key points from the finals presentation. • **Parametric Study and Optimization Process** Please explain how the relevant parameters of the work (such as antenna length and width) affect characteristics like resonance frequency, impedance matching, and bandwidth. Additionally, indicates how the optimal parameters for the antenna were determined during the design process. • **Process and Material Analysis Applicable to the Work Structure** Analyze the processes applicable for mass production of the work (e.g., FR4 printed circuit boards, ceramic materials, metal processing, etc.), and also propose solutions for potential issues (such as production yield and precision). • **Compatibility Explanation with Communication Devices** Explain the compatibility of the work with communication devices, including the casing and other components or circuits. • **Actual antenna work with Smart AI Collaboration** Clarify whether commercial software or self-developed software is used to achieve antenna design or performance optimization. • **Patentability Analysis (Novelty, Inventiveness, and Industrial Applicability)** Analyze the work and determine its patentability. Please attempt to outline the technical scope intended for protection when applying for a patent in the future. • **Relevant Literature and Patent Search Explanation** The team needs to confirm the references and technical sources cited, and specifically explain the advancements of the work compared to previous technologies. • **Conclusion**
	B. Reference Letter of Thesis advisor	• Within one page, explain the performance and division job of team members, as well as the recommended reasons for actual antenna work. • The organizing committee will provide a separate format. • The startup company and social people don’t submit the Reference Letter of Thesis advisor.

Note 1: The same antenna work has participated in our previous competitions, it must be pointed out the different items and technology in the written report of semi-finals.

Note 2: The register website couldn’t upload any files, please email each application document to blacktea1996@g-mail.nsysu.edu.tw on time.

5G Application Competition Judging Method

【Jury Panel】

Invite professionals from industry and academia to form the Jury Panel. They will first conduct a written report review based on the registration categories and the submitted Written Report of Semi-finals. Each judge will provide a list of recommended participating teams. Subsequently, during the Semi-finals Meeting, they will discuss the nominations together and select outstanding teams to advance to the finals.

【Written Report Review & Semi-finals】

Criteria	Description	Weight
Design Innovation	Antenna design effectiveness, system integration, and space utilization.	40%
Practical Functionality	Applicability in the industry or potential for commercialization	40%
Technical	Difficulty of the design and manufacturing process	20%

When registering, please conduct a self-assessment on design innovation and practical functionality, totaling 100%, limited to one A4 page

1. Design Innovation Percentage: _____%. Briefly explain the innovative design concept.
2. Practical Functionality Percentage: _____%. Briefly explain the degree of industrial applicability.

【Finals】A presentation to explain the concept of antenna work, and then engage in a Q&A session with the jury panel.

Description	Weight
• Overall Performance (Antenna design innovation, functional integration with communication devices, commercialization potential, patentability analysis)	80%
• Presentation Ability	20%

Detailed Rules

1. To ensure fair evaluation by the jury panel, **the summit info of the team's name, title of the antenna works, and other submitted materials, or any information that could identify the contestant's schools/departments must not include or imply**.
2. **The antenna works that have previously been submitted to other competitions or have won awards in other competitions may not be submitted to this Competition with identical or similar content.**
3. Antenna works **must disclose their intended future use or any prior submissions for purposes** such as graduation projects, journals, theses, or technical reports, and this must be indicated in the report.
4. Participating teams must submit simulation or measurement results. The jury panel may select key measurement data for verification by a measurement laboratory, comparing the original measurement data of the work with the laboratory' s data.
5. If the submitted work involves funding agencies or technical cooperation partners, detailed explanations of the assistance provided by these entities and their relevance to the submitted work must be provided.
6. Team works must be independently designed, conceptualized, and implemented, without infringing on the intellectual property rights of others, and must not be completed by others on behalf of the team.
7. If a winning work is found to infringe on intellectual property rights such as copyrights or patents, and there is concrete evidence, the organizer reserves the right to disqualify the team from participation or revoke their award. The team must return any awarded prize money, trophies, or prizes and bear all legal responsibilities.
8. Participating teams must properly safeguard any information they obtain or hold from relevant entities due to this Competition. Without written consent from the relevant stakeholders, such information must not be disclosed or transferred to any third party.
9. If a winning team' s work is commercialized, they must not use the fact that they won an award in the Antenna Competition as part of their promotion.
10. If participants intend to patent their work, they should first apply to the relevant authorities to protect the intellectual property rights of their work.
11. The intellectual property rights, such as patents and copyrights, generated from the submitted works do not belong to the Competition. The Competition may assist winning teams in participating in related promotional activities.
12. For outcomes generated through this Antenna Competition and collaboration with partner companies, licensing matters may be negotiated and agreed upon between the rights holder and the partner company based on mutual benefit principles and relevant legal regulations.
13. For Undergraduate Students in the event, the Competition will compile talent matching data to provide to sponsoring organizations. The sponsoring organizations will contact the participating teams to facilitate talent matching.
14. Teams that fail to submit materials on time in accordance with the registration rules may be disqualified from the event by the organizing committee.
15. In the event of natural disasters (e.g., typhoons, earthquakes, floods), whether the event proceeds as planned will follow announcements from the local county or city government regarding office closures. No separate notification will be provided, and the rescheduled date will be announced later.

Contact

National Sun Yat-sen University
Southern Taiwan Industry Promotion Center (STIPC)

Ifan Wu
07-9700910 ext.66
blacktea1996@g-mail.nsysu.edu.tw

Mills Chen
07-9700910 ext.34
mills.chen@g-mail.nsysu.edu.tw