



**WIRELESS COMMUNICATION
COMPETITION
SPECIFICATION
2024**

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VERSIONS

Version	History	Explanation	Changes
1.0	18.12.2023	2024 First Version	-

1. PURPOSE OF THE COMPETITION

Increasing data density and cyber security concerns in 5G and beyond make the development and production of wireless communication technologies with national resources an important necessity for the future of countries. The Wireless Communication Competition is organized in order to produce solutions to the problems that may be encountered in the field of communication, to increase the knowledge and trained manpower. In this way, technological innovations in the field of communication will be encouraged, scientific and technological developments will be accelerated, experts in the sector and young engineers/engineer candidates will come together to increase information sharing and solutions to various problems will be found.

Since communication technologies are rapidly evolving field, it should be aimed to focus on the latest innovations in the sector and to find new solutions to meet future communication needs. Teams participating in the competition are expected to find/implement new communication protocols, faster data transfer methods, more secure communication systems and innovative solutions that will increase the efficiency of existing technologies.

2. COMPETITION APPLICATION

Competition; Applications must be made through the official website of the Aerospace and Technology Festival TEKNOFEST (www.teknofest.org) until **February 29, 2024**. Any applications submitted after the specified date will not be accepted. Competition teams should consist of a minimum of 2 and a maximum of 6 people, excluding the advisor faculty members.

3. CONDITIONS OF PARTICIPATION IN THE COMPETITION

- All high school (including Open Education) and university students (including Bachelor's, Associate, Master's, Doctorate and Open Education) studying in Turkiye and abroad can participate in the competition.
- Teams should consist of a minimum of 2 and a maximum of 6 people. One of these people should be appointed as the Communication Officer. Apart from this, teams can only take one person as a advisor.
- Teams can be formed from a single school or as a mixed team with more than one high school/university students coming together. The competition category in which the team can participate will be determined according to the highest level of education among the team members.
- Approved student documents must be submitted for students on a date determined by the TEKNOFEST Competitions Coordination Office, and approved documents showing that they are faculty members/assistants, research assistants or teachers for advisors.

- A member of a team cannot exist as a member of another team of the same competition.
- The same team members can apply to other competitions organized within the scope of TEKNOFEST with different projects.
- Only a single category or a single competition can be applied with the same project. Applications of teams or individuals who apply for the same project in a different category or different competition organized within the scope of TEKNOFEST will be deemed invalid.
- Teams at the high school level must hire a advisor. The document stating that the person who will serve as a consultant will fulfill his consultancy duties (Assignment Letter) must be uploaded to the system on a date determined by the TEKNOFEST Competitions Coordinator with a wet signature.
- Teams at the undergraduate and graduate students level may take a lecturer/member or research assistant as an advisor.
- Teams that will compete at the university and above level do not have to hire advisors. If there is a team advisor for applications at the university level and above, it is obligatory to send a consultancy document.
- The competitor cannot participate with the same and/or duplicate report as the project report he has participated in before. If the reports published on the www.teknofest.org address within the scope of the previous year's report are cited, the source should be specified. The citation format can be accessed from the general rules heading in the specification.
- All information to be made by the TEKNOFEST Competitions Coordinator during the competition process will be made to the person designated as the communication officer of the team. For this reason, each team should appoint a communicator.
- It is the duty of the communication officer to follow the processes (Application, Report Upload Deadline, Objection Process, Form to be Filled, etc.), and the TEKNOFEST Competitions Coordinatorship is not responsible for delays and/or disruptions caused by the communication officer.
- Between the application dates, the team captain/advisor registers through the system, registers the advisor and/or team captain/team members, if any, correctly and completely, and sends invitations to the e-mails of the advisor and members, if any. The member to whom the invitation is sent logs in to the application system and accepts the invitation from the "Team information" section and the registration is completed. Otherwise, the registration will not be completed.
- Competitors who have completed the team formation process must apply to the competition suitable for their project.

- All necessary processes within the scope of the competition (Application, Report Receipt, Report Results, Member adding/removing procedures, etc.) It is done through the CMS system. Teams are required to follow their processes through the CMS system.
- Adding/removing members is done until a date determined by the TEKNOFEST Competitions Coordinator during the competition process. No changes can be made within teams after the deadline.
- During the competition process, the application process, the uploading of reports, the appeals process, and the completion of forms via the CMS are the responsibility of the team captain and/or advisor, and the competition process is managed by these individuals.
- The consultant is required to upload the document stating that the consultant is a teacher/trainer/academic from the relevant institutions with which the consultant is working into the system with the Preliminary Design Report. There must be a team captain in the team.
- The consultant should not be added as a team member. Each team can have a maximum of one advisor. Applications of teams with more than one consultant will be considered invalid.
- The role of the counsellor is to help the students to plan their own education, to guide them in academic, social and cultural matters, to create a suitable environment for the development of the student's personality as a whole, with its mental, social and emotional aspects, etc. The role of the counsellor in the team is to provide the academic support needed for the project and to help the team members to find solutions to their problems. The role of the counsellor in the team is to provide the academic support needed in the project and to guide the team members in finding solutions to their problems.
- Transport and accommodation support for finalist teams is limited. The number of people to be supported is a maximum of 3 people per team (including consultants) and TEKNOFEST has the right to make changes.
- The advisor undertakes to support the team until the final stage and to be with the team during the final stage. In the projects that make it to the final stage, it is obligatory for the teams to be in the field with their advisors at the high school level.
- Competitors at university level and above do not have to come to the final stage with an advisor.
- During the competition process, the level of education in the application period will be taken into account.
- TEKNOFEST has the authority to limit the number of members to be in the festival area. In case of limitation, information will be provided by the coordination office.

- The competitor will be able to participate in the competition by reading and approving all explanations about the competition and the conditions of participation before applying.
- Applicants to the competition are deemed to have accepted all of the conditions in the specification.
- After the application, a pre-selection process will be carried out with the pre-evaluation reports sent by the teams. During this pre-selection process, the reports they have sent will be examined in terms of report layout and project subject, and a decision will be made to evaluate the pre-evaluation report, and invalid or incorrect applications will be eliminated. In this context, the project to be eliminated does not have the right to object.

4. COMPETITION DETAILS

The aim of this competition is to realise wireless communication between 2 points. The aim is to transmit the fastest and most accurate data between 2 points at a given carrier frequency, with a given type of antenna and at a given bandwidth (to achieve the highest data rate per unit time). Competitors are expected to design, build and test both the receiver and the transmitter. The distance between the two points is determined as 15 meters. Competitors are not restricted to any protocol for data transmission. They are free to choose the communication technique, modulation and waveform. It is expected that the use of modulation and waveforms used in 5G technologies will be preferred.

Provided the same type of antenna is used, competitors may choose to use MIMO for data transmission. (Preferably limited to a maximum of 2 communication layers (2T2R). A maximum of 2 layers may be appropriate in order to keep the process for communication above 2 layers simple and the transceiver system economical). The transmitter output power should also be fixed and preferably chosen so that it does not exceed a maximum of 250 mW.

Carrier frequency range: Unlicensed Wi-Fi band

Working frequency band: The competitor can choose the team himself. However, high bandwidth is preferred.

Antenna Type: Linear

Final Rating:

In the final evaluation, all competitors will be evaluated in the same environment and under the same conditions. By using the receiver/transmitter unit, codes and antennas prepared by the competitors, the stages of transferring the same 1-10GB of data for all competitors from 15 meters in the fastest way will be evaluated. During these tests, the distance between the 2 points to be communicated can be changed or obstacles can be added to the environment.

In addition, to confirm that the competitors are communicating on the unlicensed WiFi frequency and at the bandwidth they have specified, the frequency band to which each competitor refers will be monitored by the competition jury. In the area where the contest will be judged, the designated band will be continuously monitored with spectrum analysers to confirm that the band is clean for all contestants and to ensure that there are no transmissions other than those of the contestant. As one of the most important criteria of the contest is the fastest data transfer, the transceivers of the competitors are also expected to synchronise quickly. Synchronisation management, i.e. how quickly the two points see each other and synchronise, and maintaining this synchronisation, sensitivity, etc., are also evaluation criteria.

One of the evaluation criteria of the competition is to determine the accuracy of the data proportionally. As a feature of the evaluation platform, it should ensure that the accuracy rate of the transmitted data is compared with the original data and determined. It is expected that the BER value obtained during transmission will be provided by the competitors.

The data rate, bit error rate and system cost at the specified distance will be used in the final evaluation.

Equipment to be used within the scope of the category:

All competitors must demonstrate a transceiver system designed by their own team. Preferably with 2T2R support

- Cost-effective solutions will be given advantageous scoring.
- Supporting carrier bands lower than 6 GHz
- It will be able to send and receive at bandwidths of 20 MHz or less.

5. SCORING

Scoring Type	Scoring Percentage
System Requirement Definition Document	%10
Preliminary Design Report	%10
Project Detail Report	%10
Presentation and Q&A	%20
Mission Success	%50

Table 1: Score Distributions

6. COMPETITION CALENDAR, SCORING AND EVALUATION

History	Explanation
29.02.2024	Competition Application Deadline
12.03.2024 – 22:00	System Requirement Definition Document Deadline
22.03.2024	According to the System Requirement Definition Document Announcement of the First Pre-Qualified Teams
18.04.2024 - 17:00	Preliminary Design Report Submission Deadline
06.05.2024	According to the Preliminary Design Report Results Announcement of the Second Pre-Qualified Teams
01-18.05.2024	Q&A Meeting with Teams
03.06.2024 – 17:00	Project Detail Report Submission Deadline
01.07.2024	According to the results of the Project Detail Report Announcement of the Third Pre-Qualified Teams
July - September 2024	Competition Finals
August - September 2024	TEKNOFEST

Table 2: Competition Schedule

6.1. Application

Competition applications will be made on the official website (www.teknofest.org) of the TEKNOFEST Aviation, Space and Technology Festival until February 29, 2024, and applications will be accepted in the form of teams. Competition teams will be a minimum of 2 and a maximum of 6 people, excluding the advisor faculty members.

6.2. System Requirement Definition Document and Evaluation

Teams should send the document defining the requirements of the system they intend to develop and the necessary breakdowns to the Competition Commission by the specified date, in accordance with the required format. The documents submitted will be examined by the Competition Commission and the teams entitled to continue in the competition will be announced. Teams that do not submit the System Requirement Definition document or whose submitted document is eliminated by the Commission will not be able to continue in the competition.

Report submission must be uploaded via the CMS system within the day and time specified in the calendar. The TEKNOFEST competition committee will inform the teams about the appeals procedure by e-mail after the results have been announced. The TEKNOFEST Competition Committee has the right to change the calendar and times.

The system requirements definition document will be evaluated and the results of the first pre-selection will be announced. Teams who pass this stage may proceed to the other stages of the competition.

6.3. Preliminary Design Report and Evaluation

Teams should send the Preliminary Design Report, which includes the system and software they intend to develop, to the Competition Commission by the specified date, in accordance with the report format. These reports will be reviewed by the Competition Commission and the teams entitled to continue in the competition will be announced. Teams that do not submit a Preliminary Design Report or whose submitted report is eliminated by the Commission will not be able to participate in the competition.

Report submission must be uploaded via the CMS system within the day and time specified in the calendar. The TEKNOFEST competition committee will inform the teams about the appeals procedure via e-mail after the results have been announced. The TEKNOFEST competition committee has the right to change the calendar and times.

The preliminary design reports will be evaluated and the results of the second preliminary round will be announced. Teams who pass the preliminary design stage may proceed to the other stages of the competition.

6.4. Q&A Meeting with Teams

Question and answer sessions will be held to answer questions on the technical details of the competition with competitors whose system requirement definition documents have been accepted and who have passed the preliminary design stage. Competitors will be informed of the meeting environment and of any change in the meeting date.

6.5. Project Detail Report and Evaluation

Teams should submit the detailed design report, which includes the system and software they intend to develop, to the Competition Commission by the specified date, in accordance with the report format. The project detail reports will be evaluated and the results of the 3rd preselection will be announced. Teams who pass the Project Detail Report stage will be eligible to proceed to the final stage.

According to the results of the Project Detail Report, the successful teams will be entitled to receive financial support, if they have applied for financial support, at this stage it is necessary to fill in the Financial Support Form to be sent through the CMS system, the date for the Financial Support Form will be determined by the TEKNOFEST Competitions Committee and the information will be made available to the Communication Officer. It is not compulsory to apply for financial support.

The results of the Project Detail Report will be evaluated and the results of the 3rd Preliminary Selection will be announced. Teams who pass the Project Detail Report stage will be eligible to participate in the competition.

6.6. Competition

On the day of the competition, the competitors will set up their systems in the competition area before the start of the competition and will conduct tests with the competition technical team to see if the system is working. Competitors who run their systems will be able to participate in competition tests. If teams are unable to participate in one of the tests for any reason or cannot get their systems up and running on time, they can participate in other sessions when their systems are ready, but they cannot receive points from the sessions they cannot attend. The exact dates of the competition sessions will be announced to the teams.

During the competition sessions, the communication officer of each team will present the system they have developed to the competition referee committee in the order to be announced in advance. During the presentation, the team communication officer will be asked questions by the judging committee. Each team is expected to make a 5-minute presentation. A sample presentation template for the teams' presentations will be sent to the finalist teams.

6.7. TEKNOFEST

After the competitions are completed, the teams that meet the success criteria to be determined by the Competition Commission will be invited to the event as competitors. Event; Competition results and various trainings will take place.

7. AWARDS

The prizes shown in the table below represent the total amount that will be awarded to eligible teams, no individual prizes will be awarded.

The first, second and third prizes will be divided equally according to the total number of team members (excluding the Consultant) and paid into the bank account specified by each person. Team Consultants who are eligible to receive a prize will not be eligible for the first, second and third prize amounts below, and the prizes to be awarded to the consultants are also shown in the table below.

If the consultant does not come to the competition area, the consultant award will not be given. In addition, one of the finalist teams will be given the "Best Team Spirit Award".

Degree	Award Amount	Consultant
First Prize	120,000 ₺	6,000 ₺
Second Prize	100,000 ₺	6,000 ₺
Third Prize	90,000 ₺	6,000 ₺

Table 3: Award Amounts

In addition to the cash prizes, the "Best Team Spirit Award" will be given to the teams in line with the conditions described below.

Best Team Spirit Award: It is the award given to the teams that best strive to complete their tasks and business plans in the field, and to the teams that best reflect their energy in the field, whether or not they are successful in doing so. The evaluation will be based on the team's work in the field, the effort shown in the field, the skills, the communication within the team and between the teams, etc. The success of the presentations to be made in the field will also be used as a criterion for awarding this prize. The award is for prestige purposes and has no financial reward.

8. GENERAL RULES

[Click here to access the General Rules](#) booklet valid within the scope of the competition.

9. CODE OF ETHICS

[Click here to access the Code of Ethics](#) booklet valid within the scope of the competition.

Statement of Responsibility

T3 Foundation and TEKNOFEST are not responsible in any way for any product delivered by the competitors or for any injury or damage caused by the competitor. T3 Foundation and organization officials are not responsible for the damages caused by the competitors to 3rd parties. T3 Foundation and TEKNOFEST are not responsible for ensuring that the teams prepare and implement their own systems within the framework of the laws of the Republic of Turkiye.

Turkish Technology Team Foundation reserves the right to make any changes to this specification.

