

Space Security Challenge (SSC) 2020 Hack-A-Sat (HAS)



www.HackASat.com

Rules

4/9/2020



Air Force Research Laboratory
Information Directorate
525 Brooks Road
Rome, New York 13441

Document Change Summary

Section	Description	Date
	Initial Release V1	4/9/2020

Table of Contents

1	Introduction	4
2	Qualification Event.....	4
2.1.1	Qualification Event Scoring	5
2.1.2	Qualification Event Technical Paper.....	5
2.1.3	Advancement to the Final Event	5
3	Final Event.....	6
3.1	FlatSat CTF.....	6
3.2	On-Orbit Challenge.....	6
4	Prizes	7
4.1	Qualification Event Prizes.....	7
4.2	Final Event Prizes.....	7
4.3	Prize Payments	8
4.4	Technical Papers.....	8
5	Participation.....	9
5.1	Eligibility	9
5.2	Registration and Application Process.....	11
5.3	Disqualification.....	12
5.4	Publicity.....	13
6	Consent to Monitoring.....	14
7	Intellectual Property	14
8	Additional Information	15
8.1	Event Participation Agreement.....	15
8.2	Contest Subject to Applicable Law.....	15
8.3	Liability	16
8.4	VERIFICATION OF WINNERS.....	16
8.5	Resolution of Disputes	17
9	Important Dates:.....	17
10	Acronyms	17
11	Scope.....	18

1 Introduction

This document describes the rules of the Air Force's Space Security Challenge 2020, Hack-A-Sat Capture the Flag (CTF) contest. The contest consists of an online Qualification Event (Start: May 22, 2020 // Conclusion: May 24, 2020) and a Final Event (Start: August 7, 2020 // Conclusion: August 9, 2020) to be held in Las Vegas, NV at DEF CON 28 (or held online in the event that the on-location aspect of DEF CON 28 is postponed / cancelled). For further details of the contest including timeline please visit HackASat.com.

2 Qualification Event

The Qualification Event is an online contest that is open to the public via registration at HackASat.com. This Qualification Event will be a "Jeopardy" style CTF contest running over the course of 48 hours. Competitors are given a set of challenges in one of several categories on the Jeopardy board. At the start of the game one or more challenges will be unlocked and available for competitor teams to access. The first team to solve a challenge has the ability to unlock the next locked challenge in any given category. Teams can access and solve any unlocked challenge on the "Jeopardy" board at any time during the contest. Only challenges that have been unlocked can be solved by teams. Once a challenge is unlocked and a team accesses that challenge they will be presented with a problem that will require a solution. Successfully solving a challenge results in the competitor retrieving a "flag" as the solution. Redemption of this flag to the contest website results in points being awarded to that competitor and their team.

If a team is the first to solve a challenge and has the ability to unlock a new challenge but fails to unlock a new challenge on the board within 15 minutes the HAS organizers will choose for them the next challenge on the scoreboard to be unlocked. At any point during the Qualification Event the HAS organizers may administratively unlock challenges in the interest of progressing the flow of the contest.

At the conclusion of the Qualification Event, the scoreboard will be frozen and teams will no longer be able to redeem flags. The HAS organizers will evaluate the contest results and contact the top 10 ranked teams to request a technical paper and invite them to the Final Event at DEF CON 28.

2.1.1 Qualification Event Scoring

Competitor teams accumulate points by solving challenges on the challenge board and redeeming flags to the contest website.

Challenges in each category are arranged from easy to hard challenges, with easier challenges ordered first in a category and the hardest challenge being last. Teams can only solve each challenge once and a flag can only be redeemed a single time. Challenges will be scored based on the number of teams that have successfully solved that challenge. The more difficult challenges that have less total solves will be awarded a higher point value than easier challenges that have more total solves.

2.1.2 Qualification Event Technical Paper

To receive a formal invitation to the Final Event and receive a Qualification Event prize, a team must submit an acceptable technical paper to the HAS organizers describing their solutions to at least 5 of the challenges they solved during the Qualification Event. Qualification Event technical papers are due within 3 weeks of the conclusion of the Qualification Event.

Qualification Event technical papers will be reviewed and accepted according to their accuracy and must include a background description of the challenge and a description of the techniques used to solve the challenge. Write-ups should follow the format of typical CTF write-ups. For an example of an acceptable write-up format please see (<https://github.com/ctfs/write-ups-2015/tree/master/defcon-qualifier-ctf-2015/babys-first/babyecho>). Associated source code, dependencies and instructions for deploying the code to solve the challenge should also be provided. The HAS organizers will review write-ups and communicate acceptance to each team entrant official within 1 weeks of receipt of the technical papers.

2.1.3 Advancement to the Final Event

The top 10 teams ranked on total points scored in the Qualification Event will be formally invited to the Final Event. In order to accept their invitation to the Final Event, teams must complete and submit the Extended Application along with an acceptable technical paper. If a top 10 ranked team does not accept their invitation, by completing these requirements, the next ranked team will be invited. Only the 8 top ranked teams will participate in the Final Event and the remaining 2 teams will be on standby as alternate teams should one of the 8 finalist teams fail to attend or become disqualified from the Final Event.

3 Final Event

The Final Event will consist of a FlatSat CTF, followed by an On-orbit Challenge. Teams will be ranked by their combined score balance from the FlatSat CTF and On-orbit Challenge. The Final Event contest is anticipated to be held at DEF CON, finalist teams must have at least one person present in the contest area to be eligible to receive prizes. If the event is moved to an online format, additional requirements for prize eligibility will be determined at a later date and updated in this document.

3.1 FlatSat CTF

The FlatSat CTF Event occurs with FlatSat hardware and a virtual/simulated space environment.

3.1.1 FlatSat CTF Scoring

Each challenge in the FlatSat CTF event will be assigned a number of points based on difficulty. Teams will win a fraction of the total points available based on accuracy, efficiency, and timeliness of results. Specific scoring algorithms will be made available at the start of each challenge during the FlatSat CTF Event.

3.2 On-Orbit Challenge

Once a team successfully solves all the FlatSat CTF challenges, they are eligible for the final On-Orbit Challenge.

3.2.1 On-Orbit Scoring

This is a time-based, completion-scored challenge. Scoring will be based on submitting a correct solution to the HAS organizers ahead of the other competitors. Only two solution submissions per team will be permitted. The specific scoring algorithm will be made available at the start of the On-Orbit challenge event.

3.2.2 The Final Event Technical Paper

To receive a Final Event prize, a team must submit an acceptable technical paper to the HAS organizers describing their solutions to at least 5 of the challenges they solved during the Final Event.

An informal, initial summary of 3-7 sentences will be sufficient to declare HAS prize winners if the summary aligns with observations by the HAS organizers. Teams are encouraged to write their summaries after they solve each challenge.

Formal technical write-ups must be submitted within 3 weeks after the conclusion of the Final Event, and must include enough detail to permit accurate stepwise solving of the CTF challenge described. Write-ups should follow the format of typical CTF write-ups. As an example of acceptable write-up format please see (<https://github.com/ctfs/write-ups-2015/tree/master/defcon-qualifier-ctf-2015/babys-first/babyecho>). The write-ups should include a background description of the challenge and a description of the techniques used to solve the challenge. Associated source code, dependencies and instructions for deploying the code to solve the challenge shall also be provided. The HAS organizers will review write-ups and communicate acceptance to each entrant official.

4 Prizes

4.1 Qualification Event Prizes

The Qualification Event anticipates awarding 10 prize packages which include \$15,000 (USD) and a functioning FlatSat trophy to each team ranked in the top ten who submit an acceptable technical paper within 3 weeks of the conclusion of the Qualification Event. Only the Top 8 ranked teams will receive a formal invitation to participate in the Final Event. If a top 8 ranked team does not accept their invitation, by completing the requirements outlined above, the next place alternate team will receive a formal invitation.

4.2 Final Event Prizes

The Final Event will award prizes to the top 3 placed teams as follows: \$50,000 first place, \$30,000 second place, \$20,000 third place. Teams must submit an acceptable technical paper to claim their prize within 3 weeks of the conclusion of the Final Event.

4.3 Prize Payments

Prizes awarded under HAS will be paid in United States Dollars by electronic funds transfer to the bank account specified by the winning teams' entrant official (referred to as participant in this section). If the winning team has multiple members, it is the responsibility of the participant (entrant official), not the Air Force, to determine the subsequent division of any prize money.

All prizes awarded to participants by the Air Force are subject to tax liabilities, and no withholding will be assessed by the Air Force on behalf of the participants claiming a prize. The Air Force will comply with the Internal Revenue Service withholding and reporting requirements, where applicable. Winning team entrant official must provide the Air Force with an appropriate U.S. taxpayer identification number (TIN) (e.g., social security number, employer identification number, etc.) within 72 hours of the announcement of the prizes. Information on how to obtain a TIN is available on the U.S. Internal Revenue Service website at www.irs.gov. Winning teams should consult a tax advisor to ensure that the prizes are handled properly and reported accurately for tax purposes.

4.4 Technical Papers

All prize winners must submit Technical Papers to the HAS organizers describing their solutions to at least 5 of the challenges they solved during each of the events, in order to claim their prize. The technical papers will be evaluated and approved according to the guidelines specified in this document. The HAS organizers will review each technical paper and communicate acceptance of papers to each team. HAS Technical Papers are due within 3 weeks of the conclusion of each event.

By making a submission to this prize contest, all participants (all members of the team) agree that no part of its submission includes any Trade Secret information, ideas or products. All submissions to this prize contest are deemed non-proprietary. Since the Air Force does not wish to receive or hold any submitted materials "in confidence" it is agreed that, with respect to the participant's submission, no confidential or fiduciary relationship or obligation of secrecy is established between the U.S. Government, HAS organizers, and the participant, the participant's team, or the company or institution the participant represents when submitting, or any other person or entity associated with any part of the participant's submission.

5 Participation

A full list of dates and deadlines pertaining to participation in the HAS can be found on the HAS website (www.HackASat.com).

5.1 Eligibility

The Space Security Challenge's 2020 Hack-A-Sat (HAS) Capture the Flag event is open to all individuals, nationalities, ages, academic institutions, and business entities, subject to the caveats below:

- An entrant may be an individual competing alone or a team representing an academic institution, business, or group of individuals. Each entrant must include at least one U.S. citizen or permanent resident. Entrants may enter under an official affiliation (e.g., a university or corporation). Entrants may also have an official set of sponsors. Affiliations and sponsors must be disclosed on the Extended Application.
- Only one application per team shall be submitted.
- Each team must identify one Entrant Official and one Team Leader. The Entrant Official and the Team Leader may be the same individual. The Entrant Official must be a U.S. citizen, must speak English and will serve as the official administrative point of contact for communications with the HAS organizers. The Team Leader must be a U.S. citizen, must speak English and will serve as the official technical point of contact for communications with the HAS organizers.
- Individual teams are to be wholly separate entities that do not share members/affiliations or sponsorship (financial interests) with other teams. Individuals cannot be members of multiple teams. Teams may have one or more sponsors. Teams may not collaborate or share their technical approaches and solutions with other teams. Teams who do not comply with these guidelines will be subject to disqualification.
- Teams consisting of players who were/are members of the same organization prior to Hack-A-Sat may be permitted to compete as long as the teams do not collaborate and do not share organizational sponsorship. Organizations which form to compete in Hack-A-Sat may only field one team.
- An entrant shall not be deemed ineligible because the entrant used Federal facilities or consulted with Federal employees during the contest if the facilities and employees are made available to all individuals and entities participating in the contest on an equitable basis.
- All participants (any individual who enters the contest) under 18 years of age require the authorization by a parent or guardian.

- To be eligible for a cash prize refer to section 4.3
- Entrants will be cross checked with the U.S. Treasury Office of Foreign Assets Control - Sanctions Programs <https://www.treasury.gov/resource-center/sanctions/SDN-List/Pages/consolidated.aspx>

The following individuals and organizations are not eligible to participate in HAS events:

- Individuals, organizations or sponsors that are named in the Specially Designated Nationals list of the U.S. Department of Treasury.
- Official Government entities (from the U.S. or any other country) are not eligible to participate as entrants, sponsors or official affiliates. Government employees (from the U.S. or any other country) acting within the scope of their employment are not eligible to participate as entrants, entrant officials, team leaders or team members.
- Government Military members or Civilian employees may be eligible to participate if done so in their **personal** capacity and if the work performed for the contest is **NOT** related to their official government duties. Government members or employees should first consult their supervisors and designated agency ethics officials before participating in the contest.
- U.S. DoD service members and civilian employees may participate in their personal capacity, on authorized leave, and are eligible for rewards and prizes given to competitors in contests or events, including random drawings, open to the public unless the employee's entry into the contest or event is required as part of the employee's official duties. See 5 C.F.R. 2635.203(b)(5).
- Applicants should follow their parent organization's rules and regulations regarding outside activities.
- Persons or entities that received funds for supporting or advising the HAS organizers are not eligible to participate.

5.2 Registration and Application Process

5.2.1 Qualification Event Registration

Participants (individual players) must register for the Qualification Event on the HAS website. Once registered, participants may create a new team or join an existing team. Individual participants will receive a confirmation number upon successful registration. Participants must save this confirmation number and only use it for communication with the HAS organizers. This number will be used for identity verification should a team qualify for the Final Event.

Participants must be registered and/or become a member of a team prior to the conclusion of the Qualification Event on May 24, 2020 to be eligible.

5.2.2 Final Event Application

Each top 10 team (entrant) from the Qualifying Event must complete all parts of the Extended Application and submit it via email to Shout@HackASat.com, no later than 8:00pm (EDT), June 4, 2020 to be eligible to participate in the Final Event.

The HAS organizers will acknowledge receipt of complete applications via email. Upon receipt of each team's Hack-A-Sat registration, the HAS organizers will assign a team reference number which must be included on all team correspondence with the HAS organizers.

Once all of the Extended Applications have been received from the Top Ten teams, the HAS organizers will identify any potential conflicts and notify the Entrant Officials. Entrants will then have the opportunity to address any perceived conflicts to ensure they are not disqualified.

Incomplete registrations and applications received after the deadline will not be accepted. The Air Force may disqualify any team which does not meet the eligibility requirements specified herein.

Applications may be withdrawn at any time via email to shout@HackASat.com. All questions regarding eligibility and participation must be directed to the HAS mailbox, shout@HackASat.com.

Registration information collected by the Air Force will be used solely for the purpose of administering the event. Registration information will not be distributed to any parties outside of the Department of Defense nor released for any other purpose except as noted in this document.

5.3 Disqualification

This is a game and the contest is expected to be challenging, competitive and fun. In order to maintain the integrity and fairness of the contest and to ensure the game remains competitive, the following rules must be followed:

- Utilizing or engaging in Denial of service against other competitors is strictly forbidden
- All patches to open-source software must be made available according to open source license guidelines
- Any vulnerabilities discovered in open-source software must be made available to the public via a public disclosure process
- No physical coercion or intimidation is allowed
- Any acts of sabotage, tampering, misuse, attacks, or use without consent of the contest organizers property, contest infrastructure, equipment, software, or items that pertain to the contest that are outside of the contest environment are expressly forbidden

Any violations related to the above may result in immediate disqualification. Due to the nature of the contest infrastructure, exceptions will be examined on a case-by-case basis at the discretion of the HAS organizers. The HAS organizers reserve the right at any time to update these rules before and during the contest to maintain the integrity and fairness of the contest.

The HAS organizers reserves the right to disqualify a participant whose actions are deemed to violate the spirit of the contest for any reason, including, but not limited to, the violation of relevant laws or regulations in the course of participation in the contest.

5.4 Publicity

All teams that participate in the HAS contest may be listed on the HAS website to enable the event to be tracked by interested members of the public. Public information may include performance results from HAS events and general information updates. The names and photographs of the finalist teams may be posted on the HAS website, featured on the Air Force's website, newsletters, social media, other outreach materials, and released to the media.

During the Final Event equipment will be used to photograph, record video and sound, and film footage in connection with the production of documentary content by third-party producer(s). In addition to this notice, conspicuous notice of photography, video recording, and filming will be provided at the event. Your presence at the event is an acknowledgment that you have been informed that you may be photographed, video recorded, and filmed; and, that you grant permission for your likeness and voice to be used without compensation, credit, or other consideration in any media now known or hereafter devised, in perpetuity and throughout the universe, to include the advertising and publicity thereof. If you do not wish to be subject to the foregoing, please do not attend the event.

6 Consent to Monitoring

The HackASat.com public website and the Hack-A-Sat CTF network are property of the U.S. Government. Participants (teams and individuals of those teams) acknowledge they are accessing a U.S. Government (USG) Information System (IS) that is provided for USG-authorized use only.

By using this IS (which includes any device attached to this IS), you consent to the following conditions:

The USG routinely intercepts and monitors communications on this IS for purposes including, but not limited to, penetration testing, COMSEC monitoring, network operations and defense, personnel misconduct (PM), law enforcement (LE), and counterintelligence (CI) investigations.

At any time, the USG may inspect and seize data stored on this IS.

Communications using, or data stored on, this IS are not private, are subject to routine monitoring, interception, and search, and may be disclosed or used for any USG authorized purpose.

This IS includes security measures (e.g., authentication and access controls) to protect USG interests - not for your personal benefit or privacy.

Notwithstanding the above, using this IS does not constitute consent to PM, LE or CI investigative searching or monitoring of the content of privileged communications, or work product, related to personal representation or services by attorneys, psychotherapists, or clergy, and their assistants. Such communications and work product are private and confidential.

7 Intellectual Property

All technical papers and provided supporting materials as outlined above will be delivered to the Air Force with Government Purpose Rights as defined in 48 CFR § 252.227-7013 – Rights in technical data – Noncommercial items. The Air Force will only use the materials submitted by teams for official government purposes.

The Air Force does not authorize or consent to participants infringing on any U.S. patent or copyright while participating in the HAS.

8 Additional Information

Nothing in these rules, including information on the HAS website and communications by the Air Force officials and HAS organizers, may be interpreted as authorizing the incurrence of any costs or modifying the statement of work or authorizing work outside the terms and conditions of any existing agreements or contracts with the Air Force.

8.1 Event Participation Agreement

Participation in the Final Event will be governed by the Event Participation Agreement. These Agreements will define the boundaries of collaborative contest within each event as well as assign IP rights to data transmitted during each event to the Air Force. Acceptance of the Event Participation Agreements is mandatory for participation in the Final Event.

Each individual (whether participating singly or in a group) and entity participating in this contest must comply with all terms and conditions of these rules, and participation in this contest constitutes each participant's full and unconditional agreement to abide by these rules. Winning is contingent upon fulfilling all requirements herein.

8.2 Contest Subject to Applicable Law

This prize contest is authorized under 10 U.S.C. § 2374a, which authorizes the Secretary of Defense to award prizes in recognition of outstanding achievements in basic, advanced, and applied research, technology development, and prototype development that have the potential for application to the performance of military missions of the Department of Defense.

All contests are subject to all applicable federal laws and regulations. Participation constitutes each Participant's full and unconditional agreement to these official rules and administrative decisions, which are final and binding in all matters related to the contest. Eligibility for a prize award is contingent upon fulfilling all requirements set forth herein. This notice is not an obligation of funds; the final award of prizes is contingent upon the availability of appropriations.

Participation is subject to all U.S. federal, state, and local laws and regulations. Participants are responsible for checking applicable laws and regulations in their jurisdiction(s) before participating in the prize contest to ensure that their participation is legal. The Air Force, shall not, by virtue of conducting this prize contest, be responsible for compliance by Participants in the prize contest with Federal Law including licensing, export control, and nonproliferation laws, and related regulations. Individuals entering on behalf of or representing a company, institution, or other legal entity are responsible for confirming that their entry does not violate any policies of that company, institution, or legal entity.

8.3 Liability

By submitting its application and acceptance to the HAS contest, all Teams and Participants AGREE TO ASSUME ANY AND ALL RISKS AND WAIVE CLAIMS AGAINST THE Federal Government and its related entities, except in the case of willful misconduct, for any injury, death, damage, or loss of property, revenue, or profits, whether direct, indirect or consequential, arising from participation in this prize contest, whether the injury, death, damage or loss arises through negligence or otherwise.

Insurance: Participants are **not** required to obtain liability insurance for this contest.

Indemnification: Participants agree to indemnify the Federal Government against third party claims for damages arising from or related to contest activities.

By registering and/or participating in the HAS, each individual (whether competing singly or in a group) or entity agrees to indemnify the U.S. Government from any and all liability and costs arising from or related to the participant's participation in the contest.

8.4 Verification of Winners

All contest winners will be subject to verification of identity, qualifications, and role in the creation of the submission by the contest organizers and the Air Force.

Participants must comply with all terms and conditions of the Hack-A-Sat rules. Winning a prize is contingent upon fulfilling all requirements contained herein. Winners from the Qualification and Final Events will be notified by email, telephone, or mail after the conclusion of each event. Each Winner of monetary or non-monetary award will be required to sign and return to the Air Force, within ten (10) days of the date the notice is sent, an ACH Vendor/Miscellaneous Enrollment Form (OMB NO. 1510-0056) and a Participant Eligibility Verification form in order to claim the prize.

In the sole discretion of the Air Force, a potential winner will be deemed ineligible to win if: (i) the entrant cannot be contacted; (ii) the entrant fails to sign and return an ACH Vendor/Miscellaneous Enrollment Form (OMB NO. 1510-0056) and a Participant Eligibility Verification form within the required time period; (iii) the prize or prize notification is returned as undeliverable; or (iv) the submission or entrant is disqualified for any other reason. In the event of a disqualification of a winner, the Air Force in their sole discretion may award the applicable prize to an alternate winner, when applicable.

8.5 Resolution of Disputes

The Air Force is the final decision authority for all matters concerning HAS. The Air Force reserves the right, in its sole discretion, to (a) cancel, suspend, or modify the contest without notice, and/or (b) not award any prizes if no entries are deemed worthy. Decisions by the Air Force are final and binding in all matters related to the contest.

9 Important Dates

- Registration Opens: April 22, 2020
- Registration Closes: May 24, 2020, 8:00pm (EDT)
- Qualification Event Start: May 22, 2020, 8:00pm (EDT)
- Qualification Event Conclusion: May 24, 2020, 8:00pm (EDT)
- Top Ten Extended Applications Due: June 4, 2020, 8:00pm (EDT)
- Qualification Event Top Ten Technical Papers Due: June 14, 2020, 8:00pm (EDT)
- Top Ten Final Event Invitations sent: June 24, 2020
- Final Event Start: August 7, 2020, 10:00am (EDT)
- Final Event Conclusion: August 9, 2020, 12:00pm (EDT)
- Final Event Top Ten Technical Papers Due: August 30, 2020, 8:00pm (EDT)

10 Acronyms

ACH	Automated Clearing House
CTF	Capture the Flag
DoD	Department of Defense
HAS	Hack-A-Sat
OMB	Office of Management and Budget
SSC	Space Security Challenge
TIN	Taxpayer Identification Number
U.S.	United States

11 Scope

All documents including this rules document will be posted and updated on the HAS website, www.HackASat.com. All HAS documents including these rules shall be considered living documents, subject to update and clarification throughout the HAS contest.

Requests for rules clarifications, questions about proprietary or sensitive matters, and questions about logistics of the event must be sent to shout@HackASat.com. The Air Force will post responses on the HAS website (www.HackASat.com). The Air Force will ensure that answers do not give any team an unfair advantage. Teams should expect that their questions and the Air Force's responses will be made available to all participating teams.

This version of the rules is subject to change and may be superseded by later versions. The Air Force has the authority to modify and interpret the rules at any time.