Important: All volunteers supporting events in the United States and Canada must be screened and assigned using the Volunteer Management System and are required to complete their certification test using the online volunteer certification system.

This test is provided publicly for team use and volunteer certification at events outside of the United States and Canada.

Revision History		
Revision	Date	Description
1.0	10/15/2024	Initial Release

Questions

Q1. When should the FTA, CSA, or WTA meet with the venue's IT staff and conduct a Wi-Fi environment survey?

A. The morning of the competition.
B. At least a week prior to the competition.
C. Never, a site survey is not needed because the ROBOT Control System uses Bluetooth for DRIVER STATION to ROBOT CONTROLLER communication.

Q2. May the FTA touch a ROBOT during an active MATCH period (AUTO or TELEOP) if the ROBOT is not working or is behaving in an unexpected manner?

A. No, ROBOTS cannot be touched by anyone once a MATCH starts unless there is a hazard such as a ROBOT on fire.
B. Yes, if no other ROBOTS are nearby.
C. Yes, if the ROBOT can be touched without entering the playing FIELD.
D. Yes, but only if the team gives their permission first.

Q3. A team is experiencing a problem with their ROBOT during the AUTO or TELEOP periods. What action(s) should the FTA perform?

A. None, it is a team problem.
B. Ask all teams to pause their ROBOTS (i.e., pause MATCH play), and investigate the problem.
C. Offer assistance to the team while the MATCH continues without interruption.
D. Recommend replaying the match to the Head Referee.

Q4. During a MATCH, a ROBOT behaves unexpectedly. Should the FTA try to determine the cause of the problem?
   A. No.
   B. Yes, so long as it can be done safely and without entering the playing FIELD.
   C. Yes, but only if instructed to do so by the Head REFEREE.
   D. ROBOTS never behave unexpectedly.

Q5. You notice during a MATCH that a team violates a game or ROBOT rule. What action(s) should the FTA take?
   A. Give the offending team a warning.
   B. Take no action.
   C. Alert a REFEREE to the problem.
   D. Ask the Game Announcer to comment on the problem over the PA system.

Q6. A student asks the FTA, "how many seconds may a ROBOT PIN an opposing ROBOT during the TELEOP period before a FOUL is assessed?" The FTA should reply:
   A. 5 seconds.
   B. 10 seconds.
   C. PINNING is not against the rules.
   D. Let me introduce you to a REFEREE, they are better suited to answer questions about the game.

Q7. The FTA should be an expert in which of the following game rules?
   A. G423 – A ROBOT may not PIN an opponent's ROBOT for more than five seconds.
   B. T301 - MATCH replays are only allowed in extreme circumstances due to an ARENA FAULT or for MATCHES which are stopped because FIELD STAFF anticipated FIELD damage or personal injury.
   C. G210 – Actions clearly aimed at forcing the opponent ALLIANCE to violate a rule are not in the spirit of FIRST Tech Challenge and not allowed.
   D. G428 – DRIVE TEAM members must remain in their designated ALLIANCE AREA.

Q8. Two or more ROBOTS stop functioning during a MATCH. The FTA should:
   A. Recommend replaying the MATCH to the Head REFEREE. There must be a problem with the Wi-Fi environment; it is unusual for more than one ROBOT to experience a problem during a MATCH.
   B. Take two aspirin; it is going to be a long day.
   C. Check out the malfunctioning ROBOTS while the MATCH continues as long as it can be done in a safe manner and doesn't affect gameplay. Report your observations to the teams and Head REFEREE.
   D. Focus on the ROBOTS that are functioning.

Q9. Wireless communication between the ROBOT CONTROLLER device and the DRIVER STATION device use which technology?
- A. Bluetooth.
- B. Wi-Fi
- C. IR Data Transmission.
- D. None of these options.

Q10. The "mode" button adjacent to the left joystick on the Logitech F310 gamepad serves the following function:
- A. The "mode" button toggles the ROBOT operational status between "enabled" and "disabled."
- B. An engaged "mode" button instructs the DRIVER STATION device to give the gamepad communication priority over the team's second gamepad.
- C. The "mode" button has no effect on the operation of the gamepad.
- D. An engaged "mode" button illuminates the green "mode" indicator light on the gamepad and the outputs of the left analog joystick and the D-pad buttons are swapped.

Q11. The "Input Mode Switch" on the underneath/bottom surface of the Logitech F310 gamepad should be in which position (FTC SDK version 9.0 and greater)?
- A. Direct Input (D).
- B. X Input (X).
- C. Direct Input (D) and X input (X) are both acceptable positions.
- D. The Logitech F310 gamepad doesn't have an Input Mode Switch.

Q12. The *FIRST* Technical Advisor is responsible for the following (select all that apply).
- A. Overseeing the CSA and WTA, or performing their tasks if volunteers have not been assigned to these roles.
- B. The go-to person for all things technical at the event.
- C. Assisting teams at the playing field with troubleshooting and triage.
- D. Assisting the Head Referee with identifying gameplay penalties.

Q13. FTA training "homework" includes reading the following (select all that apply).
- A. FTA, CSA, and WTA Manuals.
- B. Field Supervisor Manual.
- C. Control System Troubleshooting Guide.
- D. Scorekeeper Guide.
- E. Wi-Fi Event Guide and Wi-Fi Event Checklist.
- F. Referee Manual.

Q14. The FTA or a volunteer reporting to the FTA (i.e., CSA or WTA) is responsible for checking and monitoring the Wi-Fi environment during the event.
   A. True
   B. False

Q15. What is the recommended minimum 2.4GHz Wi-Fi channel spacing when using multiple channels to run a competition?
   A. 1 (Channels 1, 2, 3, 4, etc.)
   B. 3 (Channels 1, 4, 7, 10)
   C. 5 (Channels 1, 6, 11)

Q16. The Wi-Fi pairing between the ROBOT CONTROLLER and DRIVER STATION smartphone devices should typically be performed with the:
   A. ROBOT CONTROLLER activity that is available from the Settings menu of the DRIVER STATION app.
   B. Red button on top of the Samantha Wi-Fi module.
   C. Android Wi-Fi menu on the ROBOT CONTROLLER.
   D. Wi-Fi pairing is not needed at *FIRST* Tech Challenge competitions.

Q17. Prior to the start of the MATCH, several teams are not able to establish and/or keep a Wi-Fi connection between their DRIVER STATION and the ROBOT CONTROLLER. Select all of the correct possible causes (select all that apply):
   A. A high concentration of Android devices are attempting to establish a Wi-Fi connection on the same channel.
   B. Malicious Activity (i.e., active attempts by someone to disrupt the Wi-Fi environment).
   C. The venue's wireless network may have a Wi-Fi blocker/jammer.
   D. Teams are holding their Android devices upside down.

Q18. Which of the following steps is critical when daisy-chaining two REV Expansion Hubs together?
   A. The user checks the serial address of each Expansion Hub, and if necessary, changes the address of one of the Hubs to avoid an address conflict.
   B. The user reviews the ROBOT CONTROLLER log files before connecting the two Hubs together.
   C. The user connects a Logic Level Converter to one of the two Expansion Hubs.
   D. The user sets the physical master/slave switch on the Expansion Hubs to the appropriate position.

Q19. An indication of Wi-Fi connection quality is the measured ping time between the DRIVER STATION and ROBOT CONTROLLER Android devices as shown on the DRIVER STATION app. Ping times associated with poor wireless connection quality are typically:

A. 25 msec or more.
B. 100 msec or more.
C. less than 250 msec.
D. 250 msec or more.

Q20. Potential sources of Wi-Fi interference are (select all that apply).

A. Wireless access points that belong to the venue.
B. Unauthorized team or spectator access points.
C. Mobile hotspots.
D. Wi-Fi enabled cameras or other devices such as Gameboys or R/C toys.
E. A tinfoil helmet

Q21. Potential sources of non-Wi-Fi interference are (select all that apply).

A. Bluetooth devices.
B. Wireless audio/visual systems.
C. Remote control cars, quadcopters, etc.
D. Microwave ovens.

Q22. Assigning teams to two or more Wi-Fi channels is recommended for competitions with:

A. Two or more Competition playing fields.
B. More than 40 robots.
C. More than 50% rookie teams.
D. Competition playing fields that are adjacent to the pit area.

Q23. Which of the following may cause lag or other communication problems between the DRIVER STATION and the ROBOT CONTROLLER (select all that apply).

A. The ROBOT CONTROLLER is connected to a wireless Android Debug Bridge (ADB) network.
B. More than 40 ROBOTS are operating on the same Wi-Fi channel.
C. Adjacent Wi-Fi channels have a lot of Wi-Fi activity.
D. Radio signals between the DRIVER STATION and ROBOT CONTROLLER are blocked or screened by large sheets or pieces of metal.

Q24. A team is having trouble connecting their DRIVER STATION to the ROBOT CONTROLLER. Which of the following are good first steps for the FTA to perform (select all that apply).

A. Verify that the ROBOT CONTROLLER Android device is turned on.
B. Verify that the ROBOT CONTROLLER Android smartphone (if used) is running the ROBOT CONTROLLER app.
C. Verify that the ROBOT CONTROLLER app on an Android smartphone (if used) is in the foreground and not minimized.
D. Verify that the ROBOT CONTROLLER Android device is in Airplane mode (Android smartphones only) and Wi-Fi is enabled.
E. Verify that the DRIVER STATION and ROBOT CONTROLLER apps have the same version number.

Q25. The REV Robotics Control and Expansion Hubs operate using what digital logic level?

A. 12V
B. 3.3V
C. 5V
D. 1.65V

Q26. Is the ROBOT CONTROLLER Android device capable of connecting to more than one Wi-Fi device at the same time? For example, connect to a DRIVER STATION Android Device and a computer to the ROBOT CONTROLLER network at the same time.

A. Yes
B. No.

Q27. Unexpected ROBOT motion could be caused by (select all that apply):

A. Software programming issues such as uninterruptable loops or threads, or a missing “waitForStart()” statement.
B. Gamepad joysticks that were not in a neutral position when they were connected to the DRIVER STATION.
C. A breach in the ROBOT’S waterproof electronics compartment.

Q28. The ROBOT CONTROLLER Log File (select all that apply):

A. Is a very useful debugging tool for the FTA.
B. Contains error messages displayed in red.
C. Is easily viewed from within the REV Hardware Client.
D. Can be viewed from the ROBOT CONTROLLER app on a Smartphone (if used).

Q29. The recommended minimum power cycle time for the REV Robotics Expansion Hub or Control Hub is:
- A. 1 second
- B. 5 seconds
- C. 30 seconds
- D. 60 seconds

Q30. A DRIVER STATION can lose wireless connectivity to its ROBOT CONTROLLER due to the following reasons (select all that apply).
- A. Low battery on the ROBOT CONTROLLER or DRIVER STATION Android device.
- B. Improperly configured ROBOT CONTROLLER or DRIVER STATION Android device (for example, the ROBOT CONTROLLER is also connected to another device and/or network during the MATCH).
- C. Disruption due to an electrostatic discharge (ESD) event.
- D. The team forgot to pay their monthly AT&T, Verizon, T-Mobile, etc. invoice.
- E. High current draw from motors or servos causes a power brownout.
- F. Loose or disconnected wire supplying power to the REV Control Hub.
- G. Wire with damaged insulation contacts the ROBOT structure.

Q31. Electrostatic discharge (ESD) events are more likely to occur if the relative humidity inside the venue (at comfortable room temperatures) is 30% and lower.
- A. True.
- B. False.

Q32. The RGB LED located on the REV Expansion Hub provides user feedback regarding its status. Select all of the correct LED codes for firmware version 1.07.0 or higher (select all that apply).
- A. Blinking Orange – Battery voltage is lower than 7V. Either the 12V battery needs to be charged, or the Expansion Hub is running on USB power from the ROBOT CONTROLLER smartphone device only.
- B. Red illumination pattern of 3 short, 3 long, and 3 short blinks – The Expansion Hub is in distress.
- C. Solid Green with one or more blue blinks every five seconds – Expansion Hub has power and active communication with the ROBOT CONTROLLER.
- D. Solid Blue – Hub has power greater than 7V and it is waiting for communication with the ROBOT CONTROLLER.

Q33. Pre-MATCH execution of OpMode initialization code (any OpMode) is required by G304.
- A. True
- B. False

Q34. *FIRST* has observed an increase in the number of venues that use Wi-Fi Blockers/Jammers. Select all of the true/correct statements below (select all that apply).

A. *FIRST* Tech Challenge ROBOT communications are not affected by Wi-Fi Blockers/Jammers.
B. It is critical that a pre-event Wi-Fi survey include asking the venue's IT staff about the existence of Wi-Fi Blockers/Jammers. If possible, perform an onsite pre-event DRIVER STATION/ROBOT CONTROLLER Wi-Fi connection test before tournament setup day. If needed, ask the venue to turn off their Wi-Fi Blockers/Jammers during event setup and on competition days.
C. The event director and/or FTA should have a 24-hour contact telephone number for the venue's IT staff.
D. It isn't necessary to conduct a Wi-Fi survey or check with the venue's IT staff if the venue hosted *FIRST* Tech Challenge tournaments in previous seasons.
E. Wi-Fi Blockers/Jammers can prevent Wi-Fi connections between the DRIVER STATION and ROBOT CONTROLLER Android devices.
F. Teams who use REV Control Hubs with a REV Driver Hub are generally immune from Wi-Fi Blockers/Jammers.

Q35. Select the correct maximum electrical current capabilities for the REV Control Hub ports (select all that apply).

A. A servo port pair (e.g., ports 0 and 1) share a 2A maximum output.
B. All six servo ports combined share a dedicated 5A maximum output.
C. The two 5V auxiliary power ports share a dedicated 5A maximum output.
D. The six servo ports plus the two 5V auxiliary power ports all combined share a 5A maximum output.

Answer Key

Q1. B – This should be done as soon as possible.
Q2. A – per G101 for teams, but same goes for FIELD STAFF.
Q3. C – assistance in helping the struggling team stay calm is very important.
Q4. B
Q5. B – An FTA is not a REFEREE.
Q6. D – If a free REFEREE is not easy to find, there's always the question box.
Q7. B – In Technical matters, the FTA is a member of the FIELD STAFF who may assist in advising the head REFEREE in case there are systemic issues that might cause concern for the event.
Q8. C – It's not uncommon for more than one ROBOT to have issues at the same time, but keep an eye out for patterns.
Q9. B
Q10. D – this is only on the Logitech F310 gamepad and is a common source of new team frustration.
Q11. C – FTC SDK 9.0 (2023) and newer have drivers that work in both X and D mode.
Q12. A, B, C
Q13. A, B, C, D, E – the FTA wears a lot of hats, though most FTAs hope they don't need them.
Q14. A – Most events don't monitor Wi-Fi unless there is an issue, it's always best to ensure you've performed a venue Wi-Fi evaluation before the competition.
Q15. C – Wi-Fi channels 1, 6, and 11 are known as "non-overlapping channels" for 2.4GHz
Q16. A – When pairing two Android Smartphones, do not use the built-in Android pairing methods but instead use the Wi-Fi settings from within the DRIVER STATION app.
Q17. A, B, C – Try not to blame malicious activity unless you've exhausted every other possibility.
Q18. A – This can be changed using the ROBOT CONTROLLER app's "Advanced Settings".
Q19. D – 250ms or more can signal issues, but the high ping doesn't necessarily mean that the ROBOT will definitely have problems. Check the signal strength and link speed too.
Q20. A, B, C, D, E – There is usually no single interference source, but interference sources stacked together can cause big problems. Tackle them one at a time.
Q21. A, B, C, D – all of the above.
Q22. B – This recommendation is for 5GHz, there should be no more than 20 ROBOTS on 2.4GHz.
Q23. A, B, C, D – all of the above. ROBOT CONTROLLER devices buried inside metal is the most common cause, check signal strength and link speed.
Q24. A, B, C, D, E – all of the above. Apps do not require having the same version number, but is a good rule of thumb to ensure compatibility.
Q25. B
Q26. A – Any number of devices can connect to the Control Hub network.
Q27. A, B – Generally only Logitech F310 gamepads have issues with neutral position configurations, though other controllers can have issues with analog stick drift.
Q28. A, B, C, D – all of the above.
Q29. B – It's always recommended to power down all electronics for at least 5 seconds to allow capacitors to fully discharge before re-energizing.
Q30. All but D.
Q31. A – ESD is a real problem in dry areas.
Q32. A, C, D – Consult the REV Control Hub and REV Expansion Hub documentation for more details.
Q33. A – all teams MUST select an OpMode AND Init the OpMode Pre-MATCH per G304.

Q34. B, C, E, F
Q35. A, D – B and C could be correct if the word “dedicated” wasn’t in the statements.