Requirement Number ***(Master source: CTF SRS)***	***Shall/Will Statement*** ***(Master source: CTF SRS)***	***Category / Design Element***	***Applicable Software Functions*** ***(Master source: CTF_RTM_STP:Reqts to Design)***
Functional and Performance Requirements			
CTF-01	**CTF shall support the following primitive data types:** • **int8 and uint8** • **int16 and uint16** • **int32 and uint32** • **int64 and uint64** • **float and double** • **character string** • **bit-field** *Rationale* *: Support cFS-supported primitive data types.*	Data types	CfsController.resolve_simple_type()
CTF-02	**CTF shall support the use of the following comparison operators on the CTF-supported primitive data types, except character string:** • **< and >** • **<= and >=** • **== and !=** *Rationale* *: Support comparisons between expected values and actual values as part of a verification success criteria.*	Comparison operations	CfsInterface.check_value()
CTF-03	**CTF shall support the use of the following comparison operators on the character string data types:** • **streq** • **strneq** • **regex** *Rationale* *: Support comparisons between character strings.*	Comparison operations	CfsInterface.check_value()
CTF-04	**CTF shall support configurable floating point tolerances.** *Rationale* *: Support user-defined floating point tolerances for comparisons*	Comparison operations	CfsInterface.check_tlm_packet()

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CTF-05	**CTF shall support comparisons of plus tolerance values.** *Rationale* : *Support comparisons of only plus tolerance*	Comparison operations	CfsInterface.check_tlm_packet()
CTF-06	**CTF shall support comparisons of minus tolerance values.** *Rationale* : *Support comparisons of only minus tolerance*	Comparison operations	CfsInterface.check_tlm_packet()
CTF-07	**CTF shall support comparison of both plus and minus tolerance values.** *Rationale* : *Support comparisons of both plus and minus tolerances*	Comparison operations	CfsInterface.check_tlm_packet()

CTF-08	**CTF shall support a CTF-initiated cFS sofware build.**
	Rationale : *Support automated verification testing*
		Automatic operations	CfsPlugin.build_cfs()
			LocalCfsInterface.build_cfs()
			RemoteCfsInterface.build_cfs()
			SP0CfsInterface.build_cfs()

CTF-09	**CTF shall support a CTF-initiated startup of a cFS instance.**
	Rationale : *Support automated verification testing*
		Automatic operations	CfsPlugin.start_cfs()
			LocalCfsInterface.start_cfs()
			RemoteCfsInterface.start_cfs()
			SP0CfsInterface.start_cfs()

CTF-10	**CTF shall support a CTF-initiated execution of cFS unit tests.** *Rationale* : *Support automated unit testing as part of verification testing*	Automatic operations	SshPlugin.run_command()
CTF-11	**CTF shall execute multiple test scripts.** *Rationale* : *Verifications can be done with multiple test scripts. Each test script is contained in a single file.*	Test composition	ScriptManager.run_all_scripts()
CTF-12	**CTF shall support test scripts with one or more test cases.** *Rationale* : *A test script can contain multiple test cases.*	Test composition	TestScript.run_script()

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CTF-13	**CTF shall support test cases with one or more test instructions.** *Rationale : A test case can contain multiple test instructions.*	Test composition	Test.run_commands()

CTF-14	**CTF shall capture pass/fail result of verifications along with actual and expected values.**
	Rationale : Support reporting of test results
		Test execution and verification	CfsPlugin.check_tlm_value()
			CfsInterface.check_tlm_value()

CTF-15	**CTF shall support the use of periodic telemetry in verification.** *Rationale : Telemetry sent by the target system can be periodic or non-periodic.*	Test execution and verification	CfsInterface.parse_telemetry_packet()
CTF-16	**CTF shall support the use of non-periodic telemetry in verification.** *Rationale : Telemetry sent by the target system can be periodic or non-periodic.*	Test execution and verification	CfsInterface.parse_telemetry_packet()

CTF-17	**CTF shall support continuous verification items.**
	Rationale : Support continuous verification, i.e., verification items must always be true during the scope of the test.
		Test execution and verification	CfsPlugin.check_tlm_continuous()
			CfsInterface.add_tlm_condition()

CTF-18	**CTF shall support non-continuous verification items.**
	Rationale : Support one-time verification, i.e., verification items must be true only when verification is conducted at some point in the test.
		Test execution and verification	CfsPlugin.check_tlm_value()
			CfsInterface.check_tlm_value()

CTF-19	**CTF shall support run-time updates of continuous verification items.** *Rationale : Support updates of verification items used in continuous verifications.*	Test execution and verification	CfsPlugin.remove_check_tlm_continuous()

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CTF-20	**CTF shall support run-time updates of non-continuous verification items.**
	 <u>Rationale</u> : *Support updates of verification items used in non-continuous verifications.*
		Test execution and verification	CfsInterface.clear_received_msgs_before_verification_start()
			 CfsInterface.check_tlm_value()

CTF-21	**CTF shall support ending the test run upon execution failure of a test instruction.** <u>Rationale</u> : *Test run exit can be configured via user configuration in the .ini file or in a plug-in configuration..*	Test execution and verification	PluginManager.run_commands()
CTF-22	**CTF shall support the use of the "wait" attribute to allow a wait time prior to the execution of a test instruction.** <u>Rationale</u> : *Allow a wait time before a test instruction is executed.*	Test execution and verification	PluginManager.run_commands()
CTF-23	**CTF shall support the use of the "disable" attribute to exclude the execution of a test instruction.** <u>Rationale</u> : *Allow exclusion of a test instruciton from being executed instead of having to delete then re-add that test instruction from the test script when debugging a test issue*	Test execution and verification	PluginManager.run_commands()
CTF-24	**CTF shall support the use of the "timeout" attribute to override the global verification timeout.** <u>Rationale</u> : *Allow the verification test instructions to override the verification timeout at the test instruction level.*	Test execution and verification	Test.run_commands()
CTF-25	**CTF shall allow user-input to decide whether to continue or stop the execution of a test case.** <u>Rationale</u> : *Allow a pause in the execution of a test case for user input to determine whether to continue or stop the execution.*	Test execution and verification	UserIOPlugin.waituserinput_command()

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CTF-26	**CTF shall support execution of conditional looping test cases.**
	Rationale : *Provide the ability to execute steps in a conditional loop.*
		Test execution and verification	ControlFlowPlugin.begin_loop()
			ControlFlowPlugin.end_loop()

CTF-27	**CTF shall support execution of conditional branching test cases.** *Rationale* : *Provide the ability to execute a different set of test instructions based on the defined conditions.*	Test execution and verification	ControlFlowPlugin. if_condition() ControlFlowPlugin. else_condition() ControlFlowPlugin. end_condition()

CTF-28	**CTF shall support the use of user-defined variables in expressions.**
	Rationale : *Provide the ability to use user-defined variables in conditions or telemetry verifications*
		Test execution and verification	VariablePlugin.set_user_defined_variable()
			VariablePlugin.set_user_variable_from_tlm()

CTF-29	**CTF shall keep a test result summary in a readable-formatted file.**
	Rationale : *Provide test execution results in readable format: JSON and text*
		Logging and reporting	ScriptManager.prep_logging()
			ScriptManager.write_summary_line()
			ScriptManager.run_all_scripts()

CTF-30	**CTF shall capture test execution data to a log file.**
	Rationale : *Provide test execution data in readable format*
		Logging and reporting	LocalCfsInterface.start_cfs(CFS output)
			ScriptManager.run_all_scripts(CTF output)

CTF-31	**CTF shall log all telemetry received during a test execution.**
	Rationale : *Provide detailed test execution data in readable format*
		Logging and reporting	CfsInterface.write_tlm_log()
			CfsInterface.write_evs_log()

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Software Internal Interface Requirements			
CTF-32	**CTF shall support the integration of custom plug-ins as extensions of CTF functionalities.** *<u>Rationale</u> : Support extending CTF functionalities to meet project-specific needs.*	User extension	ctf.main()
Software External Interface Requirements			

CTF-33	**CTF shall support raw CCSDS message format.**
	<u>Rationale</u> : Support of the use raw data packet.
		Message formats	CcsdsPacketInterface()
			CcsdsPrimaryHeaderBase()

CTF-34	**CTF shall support CCSDS message payload in little-endian byte order.**
	<u>Rationale</u> : The CCSDS message payload could be either little-endian or big-endian byte order. Note that the CCSDS message header is always in big-endian or network byte order.
		Message formats	CommandInterface()
			CcsdsV2ExtendedHeader.set_endian()

CTF-35	**CTF shall support CCSDS message payload in big-endian byte order.**
	<u>Rationale</u> : The CCSDS message payload could be either little-endian or big-endian byte order. Note that the CCSDS message header is always in big-endian or network byte order.
		Message formats	CommandInterface()
			CcsdsV2ExtendedHeader.set_endian()

CTF-36	**CTF shall support CCSDS message definitions in JSON format.** *<u>Rationale</u> : The CCSDS message definitions will be defined in JSON syntax. This is by CTF design.*	Message formats	CCDDExportReader.get_ccsds_messages_from_dir()

CTF-37	**CTF shall support sending a CCSDS message to one or more CTF-supported external interfaces.**
	<u>Rationale</u> : A CTF test scenarios can involve sending a message to multiple external receivers.
		Message sending and receiving	CfsPlugin.send_cfs_command()
			CfsController.send_cfs_command()
			CommandInterface.send_command()

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CTF-38	**CTF shall support receiving a CCSDS message from one or more CTF-supported external interfaces.** *Rationale : A CTF test scenarios can involve receiving a message from multiple external senders.*	Message sending and receiving	CfsInterface.read_sb_packets()

CTF-39	**CTF shall support sending an intended invalid CCSDS message to one or more CTF-supported external interfaces.**
	Rationale : Support fault injection of an invalid message to verify the handling of an invalid message.
		Message sending and receiving	CfsPlugin.send_cfs_command()
			CfsController.send_cfs_command()

CTF-40	**CTF shall time-tag telemetry received from one or more CTF-supported external interfaces.** *Rationale : To avoid verification against stale telemetry*	Message sending and receiving	CfsInterface.on_packet_received()

CTF-41	**CTF shall interface with one or more cFS systems running on the same computer.**
	Rationale : A target system could consist of multiple cFS instances, e.g., a primary and a backup cFS instance.
		Interface types	CfsPlugin.register_cfs()
			LocalCfsInterface.start_cfs()

CTF-42	**CTF shall interface with one or more cFS systems running on remote computers.**
	Rationale : A target system could be running remotely instead of locally from CTF.
		Interface types	CfsPlugin.register_cfs()
			RemoteCfsInterface.start_cfs()
			SP0CfsInterface.start_cfs()

CTF-43	**CTF shall support user configuration of CTF core configuration items.** *Rationale : Support user setup of CTF core configuration items in the .ini file to work with their project workspace.*	Configurations	ctf.main, Global.load_config() PluginManager.reload_plugins()
CTF-44	**CTF shall support additional project-specific configuration items.** *Rationale : Support user setup of CTF core configuration items in the .ini file to work with their project workspace.*	Configurations	Global.load_config()

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CTF-45	**CTF shall support test scripts in JSON format.** *Rationale : This is by CTF design.*	Test format	JSONScriptReader

CTF-46	**CTF shall support test script creation, modification and configuration via its graphical editor.**
	Rationale : Provide a front-end editor to create and update test scripts without working directly in JSON format. Editor will generate the necessary JSON files.
		Graphical editor	HomePresenter.didClickNew()
			HomePresenter.didClickSave()
			CtfFileEditor.onNewTestClicked()

CTF-47	**CTF shall support auto-suggestion of message data via its graphical editor.**
	Rationale : Provide a user-friendly interface for developing and running test scripts.
		Graphical editor	BuildEmptyFunctionCall.build()
			MakeEmptyArgument.make()
			BuildEmptyCommand.build()

CTF-48	**CTF shall support the loading of configuration for the graphical editor.**
	Rationale : Provide a user-friendly interface for developing and running test. This pertains to the editor configuraitons for workspace path and other display settings.
		Graphical editor	HomePresenter.didClickOpenWorkspace()
			Home.promptForCustomConfig()

CTF-49	**CTF shall support the startup of test execution via its graphical editor.**
	Rationale : Provide a user-friendly interface for controlling test script executions.
		Graphical editor	HomePresenter.didClickRunFiles()
			Home.promptForCustomConfig()

CTF-50	**CTF shall support the stopping of test execution via its graphical editor.** *Rationale : Provide a user-friendly interface for controlling test script executions.*	Graphical editor	Home.showRunStatusModal.onCancel()
CTF-51	**CTF shall display test status of each test case immediately after its execution.** *Rationale : Provide real-time status that include test number, requirements being verified, current test case being executed, test case status, execution time, test run, passed/failed results, CTF errors, etc.*	Graphical editor	RunStatusView.render()