System testing

Legend:

CRITICAL ITEMS - WITHOUT THESE WE HAVE A HARD TIME TO FLY

Comment

Test types:

All test results except unit tests need to be checked by a person

Unit Test: Automatic software test

`type`	`operator`	`comment`	`explanation`
on-site	[human]	test/debugging	will require time with the system and a person
on-site	[automatic]	test/debugging	will require time with the system, but can be done without supervision.
remote-site	[human]	test/debugging	will require some remote access to some part of the system, e.g a readoutboard
off-site	[human]	test/debugging	no connection to any system required, but needs to be performed by a person
off-site	[unit]	test/debugging	done by software. Only failures reported.

`on-site` test might depend on flight network, switches hardware etc.)

`remote-site` can be done without the *exact* flight hardware, only the item subject to the test needs to be of flight status

`off-site` is typically a software test which can be done with simulated/emulated participants

System testing is defined as completly successful if:

- At least 24h run with cold tracker without failure

- Remote calibration procedure performed multiple times
- System passed critical scenario test (e.g. loss of connection, power outage, dead RB
- Run can be interupted/resumed from ground
- Monitoring data from all components received at ground

Data pipeline :

Flow direction downstream:

- MasterTrigger
- ReadoutBoard (TOF) - Sili Modules (Tracker)
- TofComputer - Tracker Daq
- Flight Computer
- Ground systems

Each system has to report readiness. Readiness is defined for each system as follows:

- MasterTrigger
- *IMPLEMENTATION OF TRIGGER ALGORITHM* -> remote site [human] development
- Connection test (UDP) to Tof Computer for 24 hours (arbitrary time) without losing/skipping any event. -> remote-site [automatic] test/debugging
- Connection test via dedicated wire to RB/Tracker DAQ *this is basically happening automatically when we do other test, so that is why it is "on-site"* -> on-site [human] test/debugging
- *CHANNELMASK/HITMASK MUST BE IMPLEMENTED/WORKING - this mask identifies the ReadoutBoards which have participated in the trigger*
- Absolute timing: GPS connection. *This seems less critical, for analysis related altitude measurement seems more important*
- ReadoutBoard
- Write/read registers reliably -> remote-site [human] test/debugging
- Deterministic/Fixed start up time -> remote-site [human] test/debugging
- Streaming of events in continuous (`StreamAnyEvent`) mode without skipping events -> remote-site [automatic] test/debugging
- Time between event request and served event in `RequestEvent` mode -> remotes-site [automatic] test/debugging
- Thread revivability -> remote-site/off-site [human] test/debugging

- Implementation of crucial commands on RB -> off-site [human] development
- Testing of crucial commands on RB -> remote-site [human] test/debugging
- Testing of crucial commands from ground -> on-site [human] test/debugging
- Implementation of auxiliary commands on RB -> off-site [human] development
- Testing of auxiliary commands on RB -> remote-site [human] test/debugging
- Testing of auxiliary commands from ground -> on-site [human] test/debugging
- Sending monitoring data -> remote-site [human] test/debugging
- Calibration -> off-site [human] development
- Automatic calibration -> off-site [human] development
- Reporting of calibration results -> off-site [human] development
- Software benchmarking, power/heat -> remote-site [human] test/debugging
- Rate test - max rate before breakdown -> on-site [human] test/debugging
- Sili Modules/Tracker DAQ
- Timing/Timestamps: compatible timestamps with tof -> on-site [human] test/debugging
- Eventid from master trigger,no missed event id -> on-site [human] test/debugging
- Channel mapping/geometry -> off-site [human] development
- Reasonable length of busy signal, optimization -> on-site [human] test/debugging
- No Christmas light event in 7 day run -> on-site [human/automatic] test/debugging
- **NO SHIFT OF EVENT ID BETWEEN TRACKER AND TOF EVER** -> on-site [human] analysis
- Tracker general
- Transfer functions for every module -> off/on-site [human] development
- Automated calibration procedure -> on-site [human] test/debugging
- Tof Computer
- Stable connection to all RBs -> on-site [human/automatic] test/debugging

- Software event caches at 20% after 24h run -> on-site [human/automatic] tset/debugging
- No memory leak/corruption EVER -> on-site [human] test/debugging
- No loss of RB in events -> on-site [human] analysis
- Gathering of significant sample of lucky events ("4 leaf clover") with exactly 4 hits in the tof on overlapping paddles -> on-site [human] operations *this basically defines the length of our minimum test run. Might be at least 24hours.* -> on-site [human] analysis
- Flight Computer
- Gathering monitoring data from flight subsystems -> off-site [human] development
- Event merging Tof/Tracker -> on-site [human] test/debugging
- Maximum rate when system fails -> on-site [human] test/debugging
- Number of missed packets from the tof computer -> on-site [human] test/debugging
- Interesting event search -> off-site [human] development
- Observing interesting events -> on-site [human] analysis
- Changing parameters trigger/interesting events -> on-site [human] test/development
- Receiving/Response to commands -> on-site [human] test/debugging
- Uploading of code/Update meechanism -> off/on-site [human] concept
- Revivability/Reviving other systems -> on-site [human] test/debugging
- Loss of connection to ground/reconnection -> on-site [human] test/debugging
- Distribution of GPS clock, subsystem clock sync -> on-site [humna] test/debugging
- Waveform request -> off/on/remote-site [human] development
- Ground computer
- Reasonable system interface, operational by non expoert -> off-site [human] development
- Necessary plots defined and available -> off-site [human] development
- Sending of commands, receiving acknowledgement -> off-site [human] development
- Archival of final data product -> off-site [human] development

- analysis of system test data -> off-site [human] development