

| General | | |
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| L2-SPADES-1000 | The SPADES shall operate within a Red Hat Linux operating system environment. | Note: Verify that IDP also uses REL when possible. |
| L2-SPADES-1010 | The SPADES shall accommodate at least 10 (TBR) simultaneous users. | |
| L2-SPADES-1020 | The SPADES shall only permit access by a configurable list of authorized users. | <WFR - Per JR, clarified "authorized users"> |
| L2-SPADES-1030 | The SPADES system shall be fully functional at least 80% of the time during any 8x5 work week. | Limitations of 8x5 support structure. Rephrase for clarity later. {WFD - Change from "shall" to "should"} <WFR - I put this in as a "shall" because if it goes down for too long during PLT we'll have a lot of difficulty doing our jobs. We don't want it to be down for a week at a time during our 6 weeks of PLT. I'm not sure what "too long" is, but I think we really should have a firm requirement here.> <Per JM, clarify 1030, 1035, 1037. This requirement corresponds to the system being down for no more than 8 hours (1 day) of a 40 hour work week.> |
| L2-SPADES-1035 | The SPADES system shall be fully functional at least 99% of the time in any 1 year period when implemented in an 8x5 operational system. | Rephrase as necessary later. {WFD - Change from "shall" to "should"} <WFR - As stated in 1035, if this breaks on a weekly basis it could compromise our ability to do PLT. That's what I saw as the driver for having a "shall" in the prototype system.> <WFR - Per JM, clarify 1030, 1035, 1037. This requirement currently corresponds to ~90 hours of downtime per year.> |
| L2-SPADES-1037 | The SPADES system's L2+ processing path should be capable of being fully functional at least 99.9% of the time over the course of any year if implemented on a 24x7 operational system. | If used in the operational IDP system, their version of SPADES will need to be reliable. <WFR - Per JM, clarify 1030, 1035, 1037. This goal corresponds to designing a system that would experience no more than ~8 hours of downtime per year, if implemented in a 24x7 system> |
| L2-SPADES-1039 | The NGDC system shall detect any failure impacting SPADES which requires manual intervention. | {WFD - Certain key capabilities (GRB access / SPADES controller functions can be deferred until after GOES-R PLT) <WFR - GRB access is a "should" rather than a requirement. We need to establish whether any portions of the controller segment are actually needed right now, or if the requirement is to support the capability to add a controller segment with certain functionality in the future.> |
| L2-SPADES-1040 | | Assigned this to NGDC as a whole because a lot of the relevant monitoring may already be done by existing systems (NAGIOS). {WFD - We need to specify which functions need to be monitored. A system crash then yes but since part of the system is a sandbox then possibly some functions no. |
| L2-SPADES-1050 | The NGDC system shall notify SPADES Operations Staff of any failure impacting SPADES which requires manual intervention within 5 [TBR] minutes of the failure occurring. | <WFR - We can have configurable lists of people to be notified for various types of errors, e.g. for the Processing Segment we might notify Ops of hardware issues and STP if an algorithm stops running. They have done something like this with the CI Event Viewer.> |
| L2-SPADES-1060 | The SPADES system shall permit NGDC/STP personnel to edit all configurable SPADES parameters. | {WFD - We may want to segregate the ingest function (and possibly the data store) to operations staff} <WFR - 1060 statement only pertains to items that are defined as "configurable" in these requirements. I'll try to figure out a better way to delineate that from whatever ISD configures.> |
| L2-SPADES-1070 | The SPADES system may host multiple SPADES Segments on a single physical platform so long as all requirements are met. | |
| Ingest | | |
| L2-SPADES-2000 | The SPADES Ingest Segment shall acquire GOES-R series L1b and instrument calibration data via the GOES-R Access Subsystem/Product Distribution and Access (GAS/PDA), as specified in the PDA ICD [TBR]. | |
| L2-SPADES-2010 | The SPADES Ingest Segment shall deliver the data acquired via PDA to the SPADES Data-Store Segment within 30 seconds [TBR] of the data becoming available via PDA. | {WFD - I do not know the method of notification of a new file. Perhaps a wget with mirror functionality) <WFR - That'll be an implementation detail. They could use the type of messaging service that they use for other internal communications, I think they may prefer that to mirroring. I'd planned to let them propose something and then pick at it to make sure it meets our needs.> |
| L2-SPADES-2020 | The SPADES Ingest Segment shall acquire GOES-R series L0, housekeeping, and instrument calibration data via the Level Zero Storage Service (LZSS), as specified in the [TBD] ICD. | Do we want to ingest directly from LZSS (and possibly shunt it off to the Archive from the SPADES Ingest, which may leverage CI), or pull L0 from the archive? {WFD - Whenever possible I want to leverage CI functionality. We should let CI move the data directly to the archive but create a local version of the L0 data in the Data Store} <WFR - Added a "should" statement to explicitly point out that they should use the CI any time it can meet the other requirements.> |
| L2-SPADES-2025 | The SPADES Ingest Segment shall deliver data acquired via LZSS to the SPADES Data-Store Segment within 1 hour [TBR] of the data becoming available via LZSS. | {WFD - This can be a real loose requirement (~1 hour) until such time that we need to process L1b algorithms in NRT} <WFR - Specified "1 hour [TBR]" as a placeholder. I believe that we should require them to meet whatever our eventual need will be, rather than trying to get them to make major changes later.> |
| L2-SPADES-2030 | The SPADES Ingest Segment shall acquire GOES-R series L1b SWx products from the official archives, as specified in the CLASS ICD [TBR]. | Note that L0 is only going to be in CLASS if we put it there. Is it getting deposited to CLASS by a mechanism outside of SPADES? {WFD - L0 data will not be formally be going into CLASS. Better to refer to this as the official archives, as you have. And no, I am not aware of any such capability) <WFR - Should the SPADES Ingest be required to write L0 to the official archive as well as the Data Store Segment?> |

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| L2-SPADES-2035 | The SPADES Ingest Segment shall deliver data acquired via the official archives to the SPADES Data-Store Segment within 1 hour [TBR] of the data becoming available via the official archives. | {WFD - I'm not sure we have any control of this or if there are existing metrics for timely delivery} <WFR - This would be the additional time after the system could pull it from the archive until it appears in our Data Store. Put 1 hour as a placeholder, to match with 2020.> |
| L2-SPADES-2040 | The SPADES Ingest Segment shall verify that incoming data match the data sent by the provider, for all cases where the data provider supports such testing. | Some data providers may not provide a checksum or other information necessary to verify data integrity, but if they do, it should be exercised. |
| L2-SPADES-2050 | The SPADES Ingest Segment shall provide the necessary information for the SPADES Data-Store Segment to verify successful transmission of data. | Checksum/alternative. {WFD - Why provide this data to the data-store segment? Nevermind - this in an inter-segment verification} |
| L2-SPADES-2060 | The SPADES Ingest Segment should provide the capability to acquire GOES-R series L1b via the GOES-R series ReBroadcast (GRB) system, as specified in the GRB ICD [TBR]. | {WFD - At some point we may need to change this to a "shall". Is there a better way to describe the phased approach} <WFR - I will think about it. For now we could specify that the system will be able to have the connection added later. We'll need to have a new Sprint to actually add the functionality anyway, so we can update the requirement at that time. Any better ideas are welcome.> |
| L2-SPADES-2070 | The SPADES Ingest Segment should provide data acquired via GRB to the Data-Store Segment within 1 second of those data being made available from the GRB | |
| L2-SPADES-2080 | The SPADES Ingest Segment shall not delete newly acquired data until the SPADES Data-Store Segment has confirmed that the data have been correctly stored. | Checksums are one possible method. |
| L2-SPADES-2090 | The SPADES Ingest Segment shall maintain a copy of all valid incoming data for at least 24 hours [TBR]. | No deletion of data until confirmation from data store AND 24 hours have passed. |
| L2-SPADES-2100 | The SPADES Ingest Segment shall provide all information requested by the SPADES Controller Segment. | {WFD - The Controller Segment is missing from your diagram} <WFR - It touches everything, I couldn't see a good way to fit it into the diagram. I'll add a text statement about it at the bottom of the page.> |
| L2-SPADES-2110 | The SPADES Ingest Segment should leverage existing capabilities where possible. | e.g. If the other requirements can be met by using the NGDC Common Ingest, then the Common Ingest should be used instead of creating a standalone Ingest specific to SPADES. |
| Data-Store | | |
| L2-SPADES-3000 | The SPADES Data-Store Segment shall be sized to accommodate all GOES-R series SWx (Space Weather) L0 and L1b, as well as supporting data, while maintaining a greater than or equal to 100% storage margin. | 100% storage margin {WFD - We need to consider how to handle SUVI's large data footprint} |
| L2-SPADES-3010 | The SPADES Data-Store Segment shall store 30 days [TBR] of GOES-R series L0, L1b, and supporting data for SUVI. | I think this should actually be configurable on a dataset-by-dataset basis, but that would make it difficult to ensure L2-SPADES-3000. {WFD - Again, perhaps consider SUVI separate and then everything else} <WFR - Your proposal had something like SUVI for 30 days, everything else for life, in the Relational Database. I can put that here for the moment, please let me know if you want it changed.> Please see SPADES-3015 |
| L2-SPADES-3015 | The SPADES Data-Store Segment shall store the full history [TBR] of GOES-R series L0, L1b, and supporting data for SEISS, EXIS, and the MAGnetometer. | |
| L2-SPADES-3020 | The SPADES Data-Store Segment shall retain GOES-R series SWx L0, L1b, and supporting data obtained via LZSS, PDA, or GRB in a separate directory for at least 7 | |
| L2-SPADES-3030 | The SPADES Data-Store Segment shall retain GOES-R series SWx L0, L1b, and supporting data obtained from CLASS in a separate directory for at least 24 hours | |
| L2-SPADES-3040 | The SPADES Data-Store Segment shall make all data in the Data-Store available to other systems within NGDC via a Rest API. | SPADES DSS only supports M2M requests by Processing and Display Segments. Discuss the best method. Currently listing as REST API to leverage NEXT efforts. |
| L2-SPADES-3070 | The SPADES Data-Store Segment shall make any data requested by the SPADES Processing Segment available within 10 seconds [TBR] of those data being received from the SPADES Ingest Segment. | Lower priority (e.g. not req'd by algorithms) files may take this long. {WFD: Again, think of the DSS as a spinning disk directory - which it might just be.} <WFR - Based on past discussions with John LaRocque, it should simplify discussions if we show what drivers necessitate spinning disk. On that note, should this be something like 1s?> |
| L2-SPADES-3080 | The SPADES Data-Store Segment should make GOES-R series L1b data available to the SPADES Processing Segment within 1 second [TBR] of those data being received from the SPADES Ingest Segment. | Core (L1b) data that the algorithms depend on should be available with low latency. {WFD - lbid} |
| L2-SPADES-3090 | The SPADES Data-Store Segment shall acquire data from the SPADES Ingest | |
| L2-SPADES-3095 | The SPADES Data-Store Segment shall verify integrity of data received from the | Likely a checksum. |
| L2-SPADES-3100 | The SPADES Data-Store Segment shall confirm receipt of data from the SPADES | Permits Ingest to delete any data that have already been safely stored. |
| L2-SPADES-3110 | The SPADES Data-Store Segment shall provide all information requested by the SPADES Controller Segment. | |
| L2-SPADES-3TBD1 | The SPADES Data-Store Segment shall require authentication from processes attempting access. | May be unnecessary, given that the processes also reside on our servers. {WFD - Yes, this is all internal} |
| L2-SPADES-3TBD2 | The SPADES Data-Store Segment shall provide the necessary information for the SPADES-Processing Segment to verify successful receipt of data. | Also likely a checksum. {WFD - The DSS may be just a simple file store - I don't think a handshake to/from the Processing Segment is needed.} <WFR - I'll make it a TBD, pending discussion with Agile/ARC.> |
| Processing | | |
| L2-SPADES-4000 | The SPADES Processing Segment shall support the following software languages: Java, IDL, Fortran-95, C, C++, and Python. | {WFD - Add IDL. A license is one thing, the code is another} <WFR - Added IDL, Java per discussions at 04/02/14 STP Sat. MTG. Matlab under consideration to support MAG L1b, needs discussion with Rob and Paul.> |
| L2-SPADES-4010 | The SPADES Processing System shall have at least 4 active IDL licenses. | {WFD - I guess we could live with floating licenses for non-critical functions} <WFR - Up to you and the STP cal/val team.> <WFR - 4 licenses, per request by JR> |

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| L2-SPADES-4020 | The SPADES Processing System shall execute selected GOES-R series L1b and L2+ algorithms, as well as calibration tools, upon user command. | {WFD - At some point we could transition to processing pipeline to be a Controller Segment function - OK, I see - This is an "if" statement rather than a "if and only if" } |
| L2-SPADES-4030 | The SPADES Processing Segment shall provide continuous operations while in autonomous mode. | {WFD - You can see the point that autonomous and user command are at odds} <WFR - Yes, it has to be able to run the L2+ algs (And possibly some cal tools) while also running anything we call. Does L2-SPADES-4040 cover that sufficiently?> |
| L2-SPADES-4040 | The SPADES Processing Segment shall be capable of simultaneous autonomous operation and commanded execution. | |
| L2-SPADES-4050 | The SPADES Processing Segment shall maintain a greater than or equal to 200% resource margin while running all SWx L2+ algorithms and calibration tools simultaneously and meeting all algorithm latency requirements. | e.g. Memory, FLOPS, Storage. |
| L2-SPADES-4060 | The SPADES Processing Segment shall acquire Ancillary Data from non-GOES sources, as specified in [TBD documents]. | Ancillary data are defined as data from non-GOES sources that are required for generation of the L2+ products. |
| L2-SPADES-4070 | [TBD] The SPADES Processing Segment shall retain Ancillary Data for a time period that is independently configurable for each Ancillary Data set. [TBR] | Some algorithms may require only the most recent value of certain items, others may need to be maintained for a longer period. Future algorithms may require the interval to change. |
| L2-SPADES-4080 | The SPADES Processing Segment shall permit a configurable set of users within NGDC/STP to update and execute any software resident in the Processing Segment [TBR] | This is the "SPADES sandbox." We definitely need to be able to update the L2+ Science Code and Cal/Val tools. We should probably also be able to maintain/update versions of support software. Discussion during the 04/02/14 STP Sat. meeting included some concerns (especially from Paul Loto'aniu) about what the process would be. We need to decide how much freedom we need before bringing this to ARC/Agile. Note that this "Configurable set of users" could be a single user "Sys. Admin", or a fixed set. I'd assumed that we would set up an internal process decide what we (as a Division) want to have resident. ([JMD]: I suggest a change to something along the lines of "a process shall exist to update software upon user request and approval by the SPADES owner") <WFR - Again, we need to decide whether it's STP that makes updates, or ISD. Either way we have to be willing to suffer the consequences. The term "SPADES owner" could be interpreted differently by the two groups.> |
| L2-SPADES-4085 | The SPADES Processing Segment shall require authentication of users attempting access. | Standard Linux login may be sufficient. Simply being present in NGDC is not, as some of the data available may be ITAR/NDA restricted. Additionally, we don't really want someone else to command something that strains/breaks the system. |
| L2-SPADES-4087 | The SPADES Processing Segment shall permit a configurable set of personnel within NGDC/STP to administrate access privileges for users. | This must include adding new users or changing permissions for existing users. It may not include creating new admins. |
| L2-SPADES-4090 | The SPADES Processing Segment shall verify successful receipt of data where possible. | Some ancillary datasets may not provide checksum/other integrity checks. Evaluate whether it's worthwhile to validate data coming in from the Ingest Segment, per WFD. |
| L2-SPADES-4100 | The SPADES Processing Segment shall deliver L2+ products to the SPADES Distribution Segment within 1 second [TBR] of the products being generated. | I can not see any reason for it to take longer. Please point out any issues. |
| L2-SPADES-4110 | The SPADES Processing Segment shall provide the information necessary for the SPADES Distribution Segment to verify the integrity of L2+ products delivered to the | Distribution Segment acts as the L2+ Archive, therefore it must have a correct copy. |
| L2-SPADES-4120 | The SPADES Processing Segment shall not delete any L2+ product until receipt of the product has been confirmed by the SPADES Distribution Segment. | Paired with 4170 |
| L2-SPADES-4130 | The SPADES Processing Segment shall be architected such that additional hardware can easily be applied as needed to address performance issues. | May be poorly worded. Point is that some of the L2+ algorithms (or cal activities) can be moved to a new server if the current one gets overwhelmed. Additional storage can be used as needed. Etc... |
| L2-SPADES-4140 | The SPADES Processing Segment shall possess the capability to assign higher priority to operational algorithms if necessary. | Should this be automatic if the algorithms start to fall behind? Or just standard "nice" levels? |
| L2-SPADES-4150 | The SPADES Processing Segment shall acquire data from the SPADES Data-Store | |
| L2-SPADES-4160 | The SPADES Processing Segment shall deliver any data/results available from the Processing or Data Store segments to NGDC/STP users within 5 seconds (TBR) of the data being available to the Processing Segment. | Processing Segment data will have the latency of SPADES-4160. Data Store data will have the latency of SPADES-3070 + SPADES-4160. |
| L2-SPADES-4170 | The SPADES Processing Segment shall maintain a copy of each L2+ products generated for a configurable number of hours. | At NGDC this could be a short period (suggest a couple of hours). For operations it could be long enough to avoid a data gap until any problem is resolved. Is there any reason for this to be a different threshold for each product? |
| L2-SPADES-4180 | The SPADES Processing Segment shall provide all information requested by the SPADES Controller Segment. | |
| L2-SPADES-4TBD1 | The SPADES Processing Segment shall provide all capability necessary for the SPADES Controller Segment to run executable algorithms. | This may be future functionality, as mentioned before, since the option will not be used in the first release. |
| Controller | | |
| L2-SPADES-5000 | The SPADES Controller Segment shall monitor the performance of the overall SPADES system. | Specifically any elements not already monitored by other NGDC systems (e.g. NAGIOS). |
| L2-SPADES-5010 | The SPADES Controller Segment shall detect when the Data-Store Segment exceed a configurable threshold of storage utilization. | |

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| L2-SPADES-5015 | The SPADES Controller Segment shall notify selected personnel whenever the Data-Store Segment exceeds a configurable threshold of storage utilization. | |
| L2-SPADES-5020 | The SPADES Controller Segment shall detect whenever the Processing Segment exceeds a configurable threshold of its capacity. | Probably actually two thresholds, one to "log" for performance monitoring, one to immediately notify someone that they should take a look. |
| L2-SPADES-5030 | The SPADES Controller Segment shall log any periods when the Processing Segment exceeds a configurable threshold of its capacity. | Monitor memory, flops, and storage? |
| L2-SPADES-5035 | The SPADES Controller Segment shall notify selected personnel whenever the Processing Segment exceeds a configurable threshold of its capacity. | |
| L2-SPADES-5040 | The SPADES Controller Segment shall operate autonomously. | |
| L2-SPADES-5050 | The SPADES Controller Segment shall monitor the status of all algorithms operating autonomously within the SPADES Processing Segment. | |
| L2-SPADES-5060 | The SPADES Controller Segment shall detect that an algorithm that is operating autonomously within the SPADES Processing Segment has entered a non-nominal state within 5 minutes of the algorithm entering a non-nominal state. | |
| L2-SPADES-5065 | The SPADES Controller Segment shall notify selected NGDC personnel when an algorithm operating autonomously in the SPADES Processing Segment is detected in a non-nominal state. | Ops personnel might want to be notified if it's a sign of a hardware issue. STP personnel that are impacted will likely want to know irregardless. |
| L2-SPADES-5070 | The SPADES Controller Segment shall detect that any dataset expected by the SPADES Ingest Segment has not been updated for longer than a configurable | e.g. GRB-EXIS could be as short as 20 or 30 seconds, but CLASS could be multiple hours. |
| L2-SPADES-5075 | The SPADES Controller Segment shall notify selected NGDC personnel when a dataset expected by the SPADES Ingest Segment has not been updated for longer | |
| L2-SPADES-5080 | The SPADES Controller Segment shall detect any communications failure between | Ping/heartbeat? |
| L2-SPADES-5085 | The SPADES Controller Segment shall notify selected NGDC personnel of any communications failure between SPADES segments. | |
| Display | | |
| L2-SPADES-6000 | The SPADES Display Segment shall display any data available in the Processing Segment or Distribution Segment. | |
| L2-SPADES-6010 | The SPADES Display Segment shall authenticate any users requesting display of restricted data. | Restricted data may be available. Authenticate only for certain datasets, or for all usage? |
| L2-SPADES-6020 | The SPADES Display Segment shall maintain a configurable list of authentication | NGDC/STP has the option to update all configurable parameters. |
| L2-SPADES-6030 | The SPADES Display Segment shall provide user-configurable display capabilities. | a la ART |
| L2-SPADES-6040 | The SPADES Display Segment shall provide all information requested by the | |
| Distribution | | |
| L2-SPADES-7000 | The SPADES Distribution Segment shall support SFTP push capability for real-time delivery of L2+ products. [TBR] | |
| L2-SPADES-7010 | The SPADES Distribution Segment shall initiate pushing to L2+ product subscribers within 1 second [TBR] of receiving the product. | |
| L2-SPADES-7020 | The SPADES Distribution Segment shall support SFTP pull capability for real-time delivery of L2+ products. [TBR] | Do we need to authenticate these users? Do we need any other access mechanisms? |
| L2-SPADES-7030 | The SPADES Distribution Segment shall make all L2+ products it receives available via pull within 1 second [TBR] of receiving the product. | |
| L2-SPADES-7040 | The SPADES Distribution Segment shall verify the integrity of all data received by the SPADES Processing Segment. | |
| L2-SPADES-7050 | The SPADES Distribution Segment shall maintain a rotating archive of all L2+ products generated over the last 30 days [TBR]. | |
| L2-SPADES-7060 | The SPADES Distribution Segment should possess the capability to notify the official archive that any L2+ products is available within 30 seconds [TBR] of that product | |
| L2-SPADES-7070 | The SPADES Distribution Segment shall provide all information necessary for the official archive or users to verify the integrity L2+ products delivered by the SPADES | |
| L2-SPADES-7080 | The SPADES Distribution Segment shall provide all information requested by the SPADES Controller Segment. | |
| L2-SPADES-7090 | The SPADES Distribution Segment shall maintain a configurable list of users permitted to access the SPADES Distribution Segment. | |