Summary of recent trouble with FTS file transfers from BNL to NERSC involving BeStMan-Full mode

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Recent FTS file transfers from BNL to NERSC involving BeStMan-Full mode for US ATLAS had troubles. This document summarizes what caused the trouble and how it was supported.

NERSC as US ATLAS T3 wanted to deploy BeStMan-Full mode to support both STAR and ATLAS with easier site maintenance. BeStMan-Full mode did not support the pre-configured static tokens, unlike BeStMan-Gateway mode, which is required for ATLAS data transfers.

1. BNL requested to support the pre-configured static space tokens in BeStMan-Full mode, and LBNL decided BeStMan-Full mode to support the requested feature. The turn-around support time at LBNL (from the support request to feature completion) was about a day. This is an added new feature in BeStMan-Full mode.
2. FTS noticed that the non-existing target directory was not created by FTS during the file transfers. The srmLs return status code was not the one that FTS prefers to handle, although the status code itself was appropriate from the specification. Knowing FTS code support to support this status code matter taking few weeks to months, LBNL decided to support this status code in BeStMan-Full mode. The return status of srmLs for non-existing target directory got modified at the file level in BeStMan-Full mode, so that FTS can handle its preferred status code to create non-existing target directories upon the return status codes. The turn-around support time was about two hours including the time that the new server at NERSC was started. This is an update in favor of the clients in BeStMan-Full mode.
3. FTS noticed that srmLs from BeStMan-Full mode did not return file locality information for the files with ATLAS tokens. BeStMan-Full mode did not return file locality information for the files in non-bestman managed spaces, which include the spaces with pre-configured static space tokens. LBNL decided to support this feature in BeStMan-Full mode. The turn-around support time was about an hour including the time that the new server at NERSC was started. This is an added new feature in BeStMan-Full mode.
4. FTS noticed that the checksum configuration was not properly set at NERSC. NERSC site manager updated the BeStMan-Full mode configuration. The turn-around support time was less than an hour. This is a configuration issue.
5. FTS noticed that the checksum values are not matching to cause file transfers failed. BeStMan-Full mode did not properly retrieve the file sizes in 64 bit from the external call. The turn-around support time was less than an hour including the time that the new server at NERSC was started. This is a bug-fix in BeStMan-Full mode.
6. FTS file transfers from BNL to NERSC were so slow causing TURLs timed-out and file transfers failed. NERSC site manager updated the configuration timeout value to 900 seconds, and later updated again to 3600 seconds. The turn-around support time was less than an hour, although FTS testing time took more than an hour because of the slow transfers. This is a configuration issue.
7. FTS file transfers from BNL to NERSC were all successful, and BeStMan 2.2.1.3.13 was released.

Notes:

1. FTS does not call external srm clients.
2. Srmcp does not create the non-existing target directories.
3. FTS behavior cannot be duplicated without FTS.
4. The above added features (not the behaviors) can be verified with multiple srm client calls.
5. These issues have nothing to do with other OSG deployments of BeStMan-Gateway mode including BeStMan+Xrootd, as all the other T2/T3 sites deply BeStMan-Gateway mode. NERSC is the only site in OSG running BeStMan-Full mode as far as we know. (If there are other sites running BeStMan-Full mode, we'd like to know.)

Administrative remarks:

1. https://atlaswww.hep.anl.gov/twiki/bin/view/UsAtlasTier3/GridServices page was used to configure the NERSC service in replacing the BeStMan-Gateway mode by the BeStMan-Full mode. The token definition has (usedBytesCommand: /usr/bin/du -s -b) in-lined. du should not be used based on the osg-int mailing list , because it's slow and inefficient. NERSC site manager replaced it with a statement that worked from the command line, but not in-lined in the bestman configuration entry.
2. The manual testing for ATLAS space tokens with srm clients (FNAL SRM clients)
   srm-get-space-metadata -webservice_path=srm/v2/server
   -space_tokens=ATLASLOCALGROPUDISK
   srm://pdsfdtn1.nersc.gov:62443/srm/v2/server
   has a typo in the space token, as seen above. It is hard to notice GROPU vs GROUP, and it took more than a day to spot the typo in manual testing. Automated server testing for the site admins and managers would be highly desirable. Additional delays were added by asking BNL all the time to test again with FTS, even though BNL was very cooperating.
3. https://atlaswww.hep.anl.gov/twiki/bin/view/UsAtlasTier3/TestingTheSE describes test procedures, and NERSC SRM server passed. However, it is important for this page to be updated with all the tests that are required for the server validation.
4. There was confusion with srmcp that non-existing target directories were supposed to be created by srmcp. The confusion added delays in support to confirm and testing to verify that the issue was not with srmcp, but with srmLs and the non-handled return status code for files.
5. The validation steps could be improved, and there should be better ATLAS examples for the usedBytesCommand and sample test commands.