

Issues with current NSGI Compression Architecture

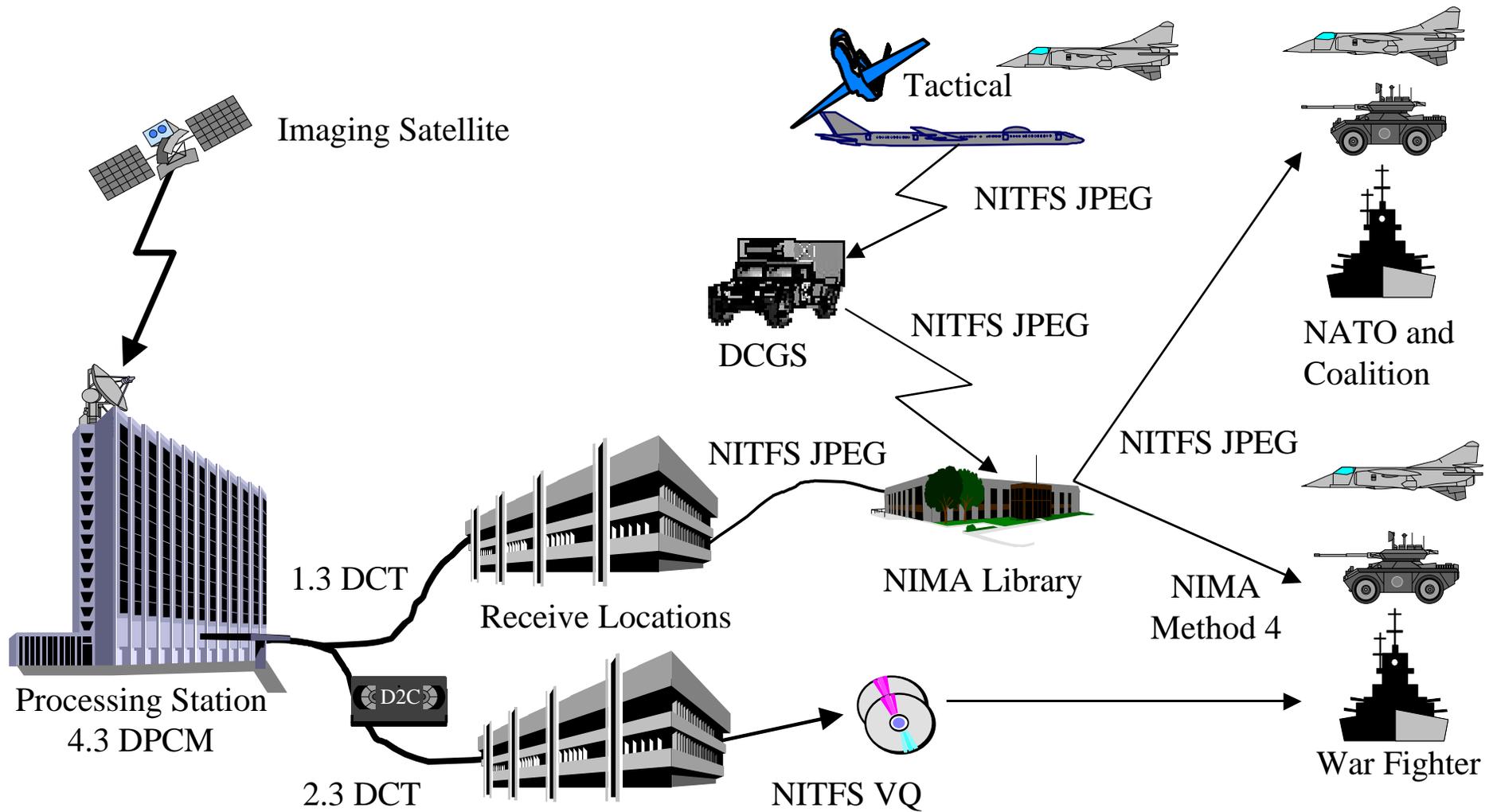
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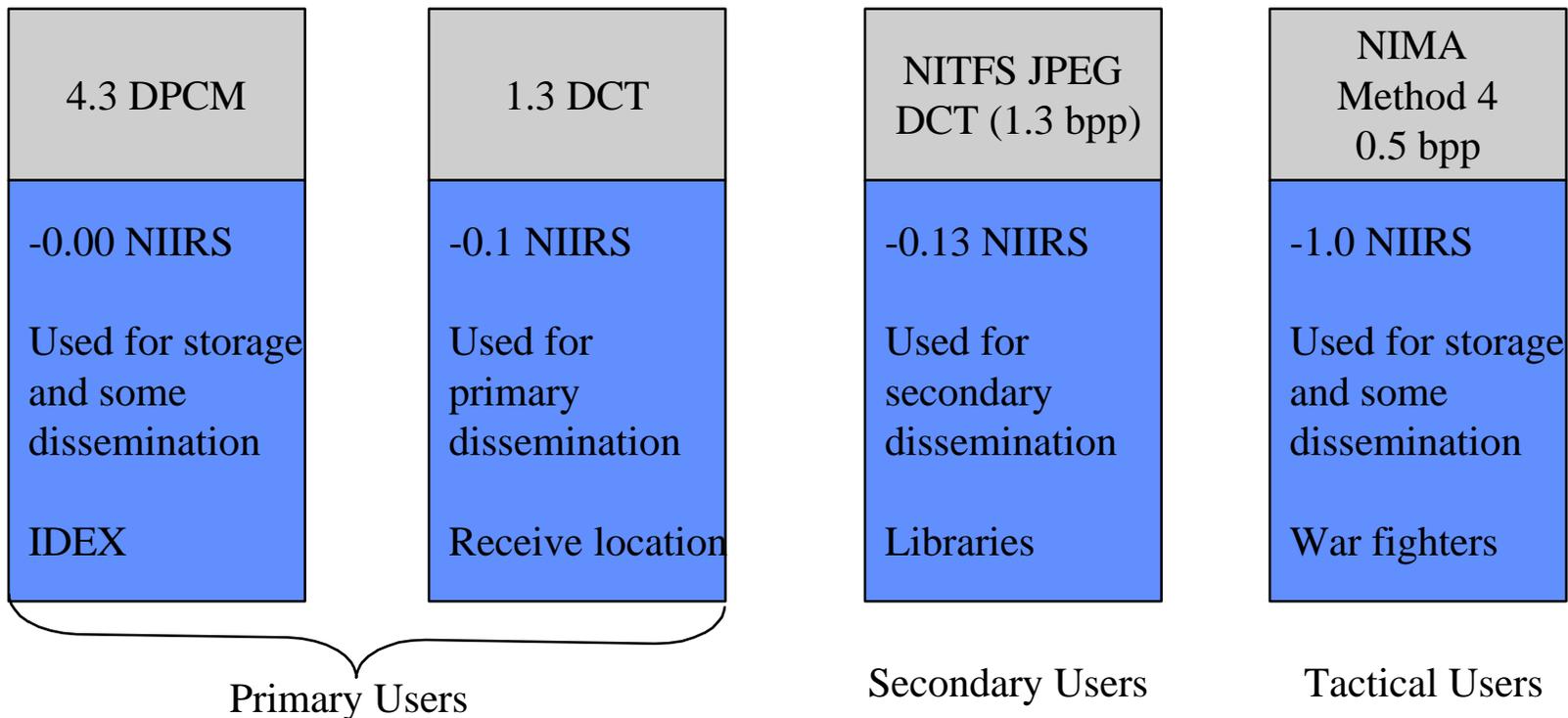
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National System for Geospatial Intelligence (NSGI)



Common NSGI Compression of Imagery

- The primary system's compression algorithms were developed for high quality for primary dissemination and exploitation of data.
- The secondary system's compression algorithm was adopted from commercial sources because of flexibility and COTS availability.
- The tactical BWC was derived from JPEG to be backwards compatible and meet the tactical dissemination requirements.



Issues with Current Compression in NSGI

- No current compression standard meets the requirements for all systems
 - This is why there are 8 different compression standards within NSGI
- National BWC algorithms not suitable for tactical dissemination
 - National BWC algorithms are not flexible enough to meet the low bit rate and variable condition of the tactical arena
 - National BWC algorithms are not based on COTS
- Tactical BWC algorithms not suitable for national dissemination
 - Tactical BWC does not meet the quality/compression requirements of National
 - JPEG DCT is not as good as the 1.3 DCT or 2.3 DCT

Issues with Current Compression in NSGI

- Current components meet the segment requirements
 - These segments requirement were defined before the NSGI was defined
 - May not meet the requirements for NIMA to achieve the desired end-to-end throughput
- No efficient capability to handle MSI and HSI
 - The compression and dissemination paths were not built for MSI and HSI type data
- Today most procedures (chipping, rotation, changing resolution, changing quality or compression ratio) are performed in pixel (image) space
 - This often requires that the first procedure to be decompression
 - It also often requires that the last procedure is the recompression of the image
 - Most systems will do decompression and recompression even if they do not change the pixel values (the recompression does though)
- Precision of imagery
 - Current compression algorithms are limited to specific bit precisions
 - For example, JPEG is either 8 or 12 bit
 - It is expected that future collection systems will not be limited to current limitations

Issues with Current Compression in NSGI

- Eight compression algorithms are used within the NSGI architecture
 - Costly for systems to implement all 8 compression algorithms
 - Not all systems support all 8 compression algorithms so there must be conversion from one compression to another
- To achieve dissemination it is common to convert from one compression algorithm to another
 - This causes concatenation of compression related image quality loss and compression artifacts
 - This imposes extensive processing requirements for libraries and other converters of the data
- In order to support user requirements of different compression ratios, the compressed data must be decompressed and recompressed at the new desired compression ratio
 - Again, concatenation affects and processing time and image quality

Issues with Current Compression in NSGI

- Poor choice image quality impacts
 - Concatenation affects are drastically increased with poor choice of image processing
 - Sharpening between compression
 - Off block boundary chipping
- NITFS JPEG DCT image quality issues
 - Selection of the proper quantization tables is important to image quality
 - Some implementations do not recognize the optimized compression tables available
 - JPEG does not support tiling
 - JPEG only allows 8- and 12-bit data
 - Does not support color (it is color blind)
- Only one resolution for all compression algorithms
 - Need to decompress, generate RRDS, and recompress all RRDS

NSGI Concatenation Image Quality Hits

