

Cmt #	Organization	Point of Contact	Comment	Section, Annex, etc and	Comment(Include rationale for comment)	Proposed change
		David Benini	T	4.4.5.1.	The draft currently requires adherence to the ANSI/INCITS Token Image Type standard yet requires a different resolution, which could be misinterpreted.	The Figure 4-4 image should be used to specify the size and resolution of the image, eye positions, and region of interest. The INCITS 385 Section 9 Token Image spec does not align with this specification, and should not be used for resolution specifications.
	Aware, Inc.	David Benini	T	4.4.5.1.	Compression guidelines are somewhat unclear.	Include a table with the following ROWS: 1) Permanent storage, 2) on-card minimum requirement, 3) on-card recommended. COLUMNS: 1) image dimensions, 2) eye-to-eye resolution, 3) eye locations, 4) uncompressed file size, 5) minimum compressed size, 6) maximum compression ratio, 7) ROI dimensions, 8) minimum PSNR.

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	Aware, Inc.	David Benini	T	4.4.5.5.	<p>Aware recommends that JPEG2000 compression be supported in addition to JPEG for the following reasons:</p> <ol style="list-style-type: none"> 1. JPEG2000 is an international ISO standard supported by ANSI/INCITS 385, ISO/IEC 19794-5 FCD, and ICAO LDS standards for compression of biometric face images. 2. JPEG2000 is available from multiple vendors, including Aware, Kakadu, Pegasus, and Luratech. There is a free open source version available called JasPer. 3. JPEG2000 achieves superior compression than JPEG for a given file size; JPEG2000 can compress an image to a file size that is 50-60% of what is required with JPEG for an image of equal quality (as calculated using PSNR). 4. JPEG2000 enables highly accurate compression targeting, achieving within 1% of a desired resulting image size or image quality. This is extremely valuable for the PIV application, given memory constraints. 5. JPEG2000 enables region-of-interest (ROI) encoding, which enables further compression of facial images. This basic functionality is specified in the JPEG2000 standard and is offered by several vendors. 6. There is ongoing litigation regarding JPEG intellectual 	<p>Replace "PIV images shall be compressed using the baseline JPEG compression algorithm using a 30:1 compression ratio." with "PIV images shall be compressed using the baseline JPEG compression algorithm or JPEG2000 using a 45:1 compression ratio. Region of Interest encoding using JPEG2000 is optional."</p>

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	Aware, Inc.	David Benini	T	4.4.5.5 Table 4.7	The guidance on file compression ratio is misleading. An uncompressed bitmap is most typically stored in RGB with no subsampling. 4:2:2 subsampling is, by definition, a lossy process and results in loss of half of the color data. It is incorrect to say that an "uncompressed" YUV422 image is 2/3 the size of an uncompressed RGB image because a YUV422 image is not truly original or uncompressed. Rather, a image compressed in the YUV color space and further subsampled at a 4:2:2 ratio is 2/3 the size of an image compressed in RGB.	The uncompressed size of a 480x640 image should be reported as 921,600 bytes. The equivalent output of 30:1 compression as required results in a file size of 20,480 bytes. Therefore, compression should be specified as 45:1. This is roughly consistent with guidance from ICAO to compress a 413x531 pixel (35x45mm @ 300ppi scanning) e-passport image (658 kbytes uncompressed) to 15 kbytes.
	Aware, Inc.	David Benini	T	4.4.5.5.	Aware recommends that maximum compression be guided or specified using a PSNR metric. PSNR is a simple, mathematical algorithm commonly used in imaging that provides a measurement of the pixel-to-pixel difference between two images. This technique is described in INCITS M1 Biometric Sample Quality Draft Revision 2, document M1/04-0608, Section 10. This number expresses the total distortion introduced by the compression process and provides a useful guideline independent of image content or size.	Add a minimum PSNR target along with compression ratio and compressed file image size guidance. Include reference to M1/04-0608: Biometric Sample Quality Standard Draft Revision 2. Requirement might read: "Image must either reflect less than 45:1 compression or PSNR of at least 36 dB."
	Aware, Inc.	David Benini	T	4.4.5.8.	If NIST will develop, standardize, and publish facial image quality scoring software, then these plans should be clarified and included in the standard. Companies should not be encouraged to develop products that will later be shut out from the standard.	Include statement that indicates if NIST will or will not develop, standardize, and publish facial image quality scoring software.

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