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CONTRIBUTION

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FOR DIGITAL VIDEO TELECONFERENCING/VIDEO
TELEPHONY SERVICE

TITLE: APPLICATION CATEGORIES REPRESENTED BY
NTIA/ITS PROPOSED CODEC TEST SEQUENCES

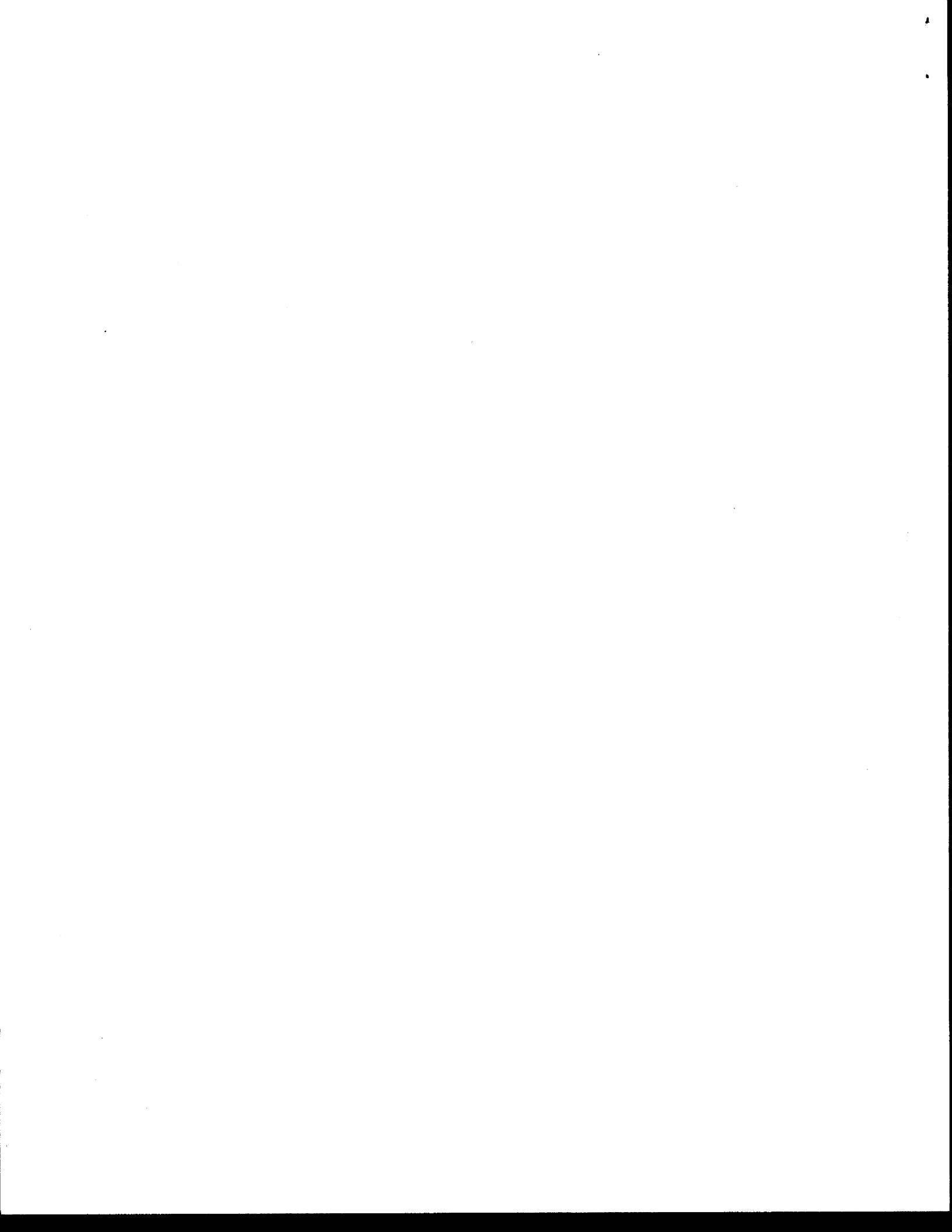
ISSUE ADDRESSED: SELECTION OF SUITABLE TEST SEQUENCES FOR
SUBJECTIVE TESTS

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APPLICATION CATEGORIES REPRESENTED BY
NTIA/ITS PROPOSED CODEC TEST SEQUENCES

This contribution forms part of a cooperative effort of NTIA/ITS and Delta Information Systems (DIS) to establish video sequences which can lead to realistic results when undergoing both subjective and objective tests. Both parties have previously submitted material to the T1A1.5 Subworking Group on Video Teleconferencing/Video Telephony which has made a preliminary selection of suitable sequences. This contribution contains a review of the NTIA proposed sequences by DIS and the identification of the practical application each of them represents.

Many potential application categories of video teleconferencing have been under discussion by T1Q1.5 and the concerned CCITT study groups for several years. Though no final consensus has been reached, a sample matrix of applications and their associated performance level requirements was included in the latest Draft National Standard for Digital Transport of Video Teleconferencing/Video Telephony Signals -- see Document T1A1.5/92-107, Para. 5.1.5, Table 1. At the last meeting, this table was slightly modified and, though no agreement has as yet been obtained, it stands to reason that the final form will be similar. These application categories are shown on Table 1, with a letter assigned to each category to facilitate identification.

Table 1. Video Performance Requirements for Typical Applications

TEMPORAL PERFORMANCE	SPATIAL PERFORMANCE		
	LEVEL 1	LEVEL 2	LEVEL 3
LEVEL 1	----	B. Desktop Graphics	D. Enhanced Graphics
LEVEL 2	A. Head and Shoulders	C. People and Graphics	E. People and Enhanced Graphics

Many years of experience with subjective and objective testing of teleconferencing video codecs have shown that static resolution, motion performance and to a lesser extent, color fidelity, are vital parameters in both subjective and objective performance evaluation. The relative importance of these parameters depends largely on the application category depicted by the scene under evaluation. Two scenes with the same overall

numerical parameters may make completely different impressions on a subjective evaluator. Unless the content of the test scene has a relation to a real life application of the transmission service channel (TSC) under test, the received picture may show either presence or absence of irrelevant impairments which confuses the subjective evaluators. Only test scenes producing a range of challenge to the TSC which is realistic for the application category can produce valid results.

The test sequences suggested by NTIA encompass a scope much wider than applicable to teleconferencing and videophone, from still pictures in subtle pastel colors to scenes in vivid saturated colors with continuous fast motion. They produce such a wide range of impairments over a TSC suitable for teleconferencing use that subjective evaluators have difficulties classifying them according to the five grade impairment scale as specified in CCIR Rec. 500-3. It also is suggested in CCIR Rep. 1082 that a subjective evaluation experiment should be designed so that the grand mean score is close to 3. This is very difficult to accomplish when the picture impairments cover an unrealistically wide range.

The NTIA test sequences are obviously slanted towards transmission of entertainment quality pictures. Both still pictures in fine shades of pastel colors and beautiful landscapes containing very limited motion are mainly suited for evaluation of color fidelity which generally is a minor factor and easily satisfied in teleconferencing. Such test material will result in only minimal impairments in most cases. On the other hand, sequences featuring vivid colors and lively motion are excellent for testing broadcast quality digital TV systems requiring 25 to 100 times the transmission data rate available for teleconferencing. Such test material will always produce "very annoying" impairments so that differences in performance of various transmission systems will be completely "wiped out" by the severe degradations suffered in all tests. Thus many test results can be inherently biased by the test material in use.

Since the test tape submitted to DIS contained all test sequences considered by NTIA/ITS, they all were evaluated, including those already tentatively eliminated by T1A1.5. DIS fully agrees with all these eliminations. However, there are several other sequences which were apparently considered acceptable by the committee but are not recommended for use by DIS. Reasons for the recommendations are given in all cases.

Table 2 contains a listing of all NTIA/ITS sequences with their proposed categories and explanations for their assignments. A number and a title identical or similar to the one used by NTIA/ITS were given to each sequence to facilitate identification. Categories A to E are in accordance with Table 1. Category O means that the sequence was already tentatively eliminated by T1A1.5. Unless otherwise noted, the reason is that the content of the sequence is completely irrelevant for

teleconferencing. The same is true for the remainder of the sequences, assigned Category N, but since they were tentatively considered acceptable by the committee, a more detailed individual explanation for each rejection is given.

TABLE 2. CATEGORY ASSIGNMENTS FOR TEST SEQUENCES

SEQUENCE NO.	TITLE	CATEGORY	REMARKS
1	Color Bars	O	Not recommended in CCIR 500-3. Useful only for evaluation by experts. Color bars also useful for objective measurement of color fidelity.
2	Resolution Test Chart	O	
3	Girl at Map with Pointer	C	Typical T/C scene.
4	School of Athens	O	-----
5	Space Shuttle	O	-----
6	Calendar - 9 Days	O	Not challenging enough.
7	Calendar - 30 Days	B	Simple static resolution test.
8	People at Lake	O	-----
9	Boats in Harbor	O	-----
10	Washington, DC Map with Pencil	D	Typical T/C scene.
11	3 People in a Row	C	Typical T/C scene.
12	Lecture at Chalk Board	C	Technical presentation.
13	Equipment Demonstration	C	Technical or sales presentation.
14	Bike Shop	O	-----
15	Grand Prix Race	N	Only occasional motion.
16	Grand Prix Start	N	Mostly unidirectional motion.
17	Mountains & Lake	N	Nice color, but very limited motion.
18	Flowers	N	Nice color, but very limited motion. Slow fades good only for artistic effect.
19	Mountain Stream	O	-----
20	Two Ducks	N	Very limited motion.
21	Single Duck Closeup	N	Acceptable motion but including only limited detail.

22	Bubbling Waterfall	O	-----
23	Moon & Twigs	O	No useful picture content.
24	Lights in the Night	O	No useful picture content.
25	Icicle	N	Features strong highlight which generally is a picture defect. Essentially static.
26	Cheerleaders	N	Good color and motion for entertainment but beyond the scope of T/C.
27	Cherry Coke on Mountain	N	Commercial with very fast special effects typical for broadcast TV. Far beyond scope of equipment used in T/C environment.
28	Kiel Harbor	O	-----
29	Girl Newscaster	A	Usable but viewing angle too wide.
30	Crossword Puzzle	B	Not directly applicable but similar to typical T/C scenes.
31	TV Schedule	D	Good resolution test.
32	Ace of Hearts	O	No useful picture content.
33	5 People in Row	C	Typical T/C scene.
34	Closeups of above	C	Typical T/C scene.

