COMMITTEE T1
CONTRIBUTION

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STANDARDS PROJECT: ANALOG INTERFACE PERFORMANCE SPECIFICATIONS FOR DIGITAL VIDEO TELECONFERENCING/VIDEO TELEPHONY SERVICE

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TITLE: SELECTION OF REFERENCE CIRCUITS FOR USE IN SUBJECTIVE CODEC TESTS

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ISSUE ADDRESSED: PRELIMINARY LIST OF OUT-OF-SERVICE TESTS FOR VTC/VT QUALITY MEASURES

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SELECTION OF REFERENCE CIRCUITS FOR USE IN SUBJECTIVE CODEC TESTS

An audioconference of the Ad Hoc Group of the VTC/VT Subworking Group was held on August 27, 1992. One of the objectives of this conference was the selection of reference circuits for use in subjective tests. Although considerable progress was made, the final selection was not finalized. The following table is a proposed list of reference circuits.

No.	Circuit or Codec	Algorithm	Resolution	Total Bit Rate	BER
1	null	N/A	N/A	N/A	0
2	VHS	N/A	N/A	N/A	0
3	A	H.261	QCIF	64K	0
4	A	H.261	QCIF	128K	0
5	A	H.261	CIF	128K	0
6	A	H.261	CIF	384K	0
7	A	H.261	CIF	1536K	0
8	B	H.261	QCIF	64K	0
9	B	H.261	QCIF	128K	0
10	B	H.261	CIF	128K	0
11	B	H.261	CIF	384K	0
12	B	H.261	CIF	768K	0
13	B	H.261	CIF	1536K	0
14	C	Proprietary	low	64K	0
15	C	Proprietary	low	128K	0
16	C	Proprietary	low	384K	0
17	D	Proprietary	medium	128K	0

18	D	Proprietary	medium	384K	0
19	D	Proprietary	medium	1536K	0
20	E	Proprietary	high	384K	0
21	E	Proprietary	high	768K	0
22	E	Proprietary	high	1536K	0
23	F	Proprietary	very high	45M	0
24	A	H.261	CIF	384K	10^{-5}
25	A	H.261	CIF	384K	10^{-4}

Circuits No. 1 and 2 are included for check purposes. No. 1 obviously produces no impairment while No. 2 provides a baseline of quality with which most viewers are familiar. Any erratic results in the assessment of these circuits are reason for close examination and probably disqualifying the specific viewer. Circuits No. 3 to 13 are using two different H.261 codecs at various data rates and both operating modes. QCIF with its inherently low resolution is practical only at the two lowest data rates. Testing both QCIF and CIF at 128 Kbps allows a direct comparison of both modes. The most frequent use of CIF is expected to be at 384 Kbps. High performance requirements can be satisfied at 1536 Kbps. 768 Kbps has been shown to be only slightly inferior, so only one reference circuit has been included at this rate.

Circuits No. 14 to 22 are implemented with three codecs using different proprietary algorithms, probably from three US manufacturers. Since these algorithms do not necessarily cover the full range of bit rates, it has been assumed that codec C handles low rates up to 384 Kbps, codec D can operate over most of the range while codec E is a high quality unit for 384 Kbps and above. Equipment availability may dictate a modification of these assumptions. Circuit No. 23 serves as a comparison reference to show the capability of digital video but for a special occasion, a DS-3 circuit may be available for a teleconference.

Finally, Circuits No. 24 and 25 provide a sampling of performance testing in the presence of transmission errors. Error susceptibility is an important factor in the assessment of transmission quality but is dependent on so many variables, such

as algorithm, effectiveness of forward error control, bit rate, error rate, picture content, that the number of required reference circuits for complete coverage would exceed all reasonable limits. Therefore, tests are being proposed only on one codec at a typical average operating condition at two error rates which are likely to have a significant effect on picture quality. Previous experience has shown that an error rate of 10^{-6} generally has no visible effect while 10^{-3} results in complete system failure. Should this limited testing prove to be insufficient, a special very limited selection of test scenes (2-4) would have to be made and subjected to a sufficient number of combinations of reference circuit parameters and error rates to produce significant results. This would require an added series of tests which however could probably be implemented within a reasonable time period.

It is assumed that with H.261 codecs all optional or adjustable features are operating to give the best possible performance. That means inter-frame coding with motion compensation, forward error control, and a maximum frame rate of 30 to take full advantage of the adaptive frame rate feature. The same is true for proprietary codecs to the extent such features are available. Except for H.261 codecs at QCIF, at least three bit rates are tested on each codec. This has been found to be important because the effect of bit rate on codec performance can change drastically between models. Since the basic H.261 algorithm is specified, the possible differences between codecs are minimized and limiting the tests to two H.261 codecs appears reasonable. Otherwise, trade-offs between numbers of codecs and bit rates tested would have to be made to keep the number of reference circuits at 25.