As to be expected a certain learning process took place during the different interviews. The sample sizes for different questions are therefore not always equal to the total number of interviews conducted. The given percentages are adjusted accordingly.

3. Survey Results

3.1 Qualitative

One topic was mentioned frequently during the interviews:
The political situation seems to become more and more unfavorable for the TV stations. Especially in densely populated areas a growing awareness and concern of citizens and local governments leads to an increasing amount of complaints, restrictions and even lawsuits concerning the erection of new towers, antennas or modification thereof. Radiation hazard and unsightly appearance combined with negative influence on property values are the topics mentioned most frequently. Several states had introduced legislation restricting tower height and/or field strength. Tight local zoning laws result in lengthy and expensive 'convincing-processes' (up to several years) in addition to obtaining FAA and FCC clearances.
Since the political climate was not a direct part of the study the statistical validity of the above statements might not be given sufficiently. On the other hand there are strong indications that this 'political environment' is believed to become even more hostile over the next years (see also the growing discussion about harmful radiation from high-voltage power lines) and should be taken into account when developing the different transition scenarios.

There exist some major markets which are likely to experience severe difficulty when trying to obtain additional tower space. The majority of TV stations there share one or two towers in the midst of a heavily populated area and expansion choices are limited. Examples are: New York (World Trade Center and Empire State building), Chicago (Sears tower and Hancock building), San Francisco (Mount Sutro) and Minneapolis-St. Paul (3 tower cluster for all stations). Boston, MA, is worth to be mentioned as well because of its strict radiation limits.

3.2 Quantitative

The table 'TVSURVEY.XLS' in the appendix gives a detailed breakdown of the results. The answers to the most important question (accommodation of a second antenna on the existing tower) is broken down further and shown in the tables 'DET_ANT.XLS', out of which the graphical representations, which follow this table, were derived.

The major findings are:

- Tower ownership:
72.8 % of the stations own their tower, 25.7 % lease antenna space, 1.5% provided no answer or don't know. This compares to 87 % tower ownership according to the NAB survey.

- Tower loading:
Approximately 40% of all stations do not share the tower with either FM- or TV antenna(s). For the remaining 60% the answers range from 'no other antenna' to '60 2-way antennas' or '9 other TV stations on this tower'.

- Accommodation of a second TV antenna on the existing tower:
The question consisted of two parts:
a) Would your present tower support an additional full power TV antenna?
and
b) Would your present tower support an additional reduced power TV antenna (approx. 20 dB below NTSC)?

Since such a low-power TV antenna is not defined yet the percentage of 'don't knows' is much higher for b) than for a). The answer might furthermore be dependent on whether the station operates at VHF or a UHF. NTSC 'output power' has a different meaning in these cases.

Approximately 28% of all stations would be able to accommodate the second antenna on their existing tower with no or only minor modifications. 7% could upgrade their existing structure. The remaining 65 % could either erect an additional tower at the existing site (30%) or would have to develop a new tower site (35%).

The percentages for accomodation of a second low-power antenna are 50%, 5%, 19% and 26% respectively.

- Technical feasibility of erection a second tower on the existing site:
In case a negative response was received for accommodation of a second full power antenna inquiries were made about the tower site (210 usable responses).
Out of these 40% told that erection of a second tower would be technically possible, 48% gave a negative response, 5% did not know and 7% provided no answer.

- The accommodation of a second transmitter in the existing facility does not seem to be a major problem, 46.5 % of the respondents would have the space available, an additional 17.4 % would have to expand but indicated that such an expansion is possible. Under the assumption that for a new tower structure a new building will be erected the percentages calculate (for high-power ATV system) to 20% no or minor modification, 14.4% expansion, 65.6% new building. For a low-power system the figures are 35%, 19.7% and 45.3% respectively.

3.3 Statistical significance of the results

The statistical significance of the results is a function of sample and population size. A 90% confidence interval can be constructed with the formula (normal approximation)

$$CI = p \pm 1.67 * [(N-n)/(N-1) * p*(1-p)/n]^{1/2}$$

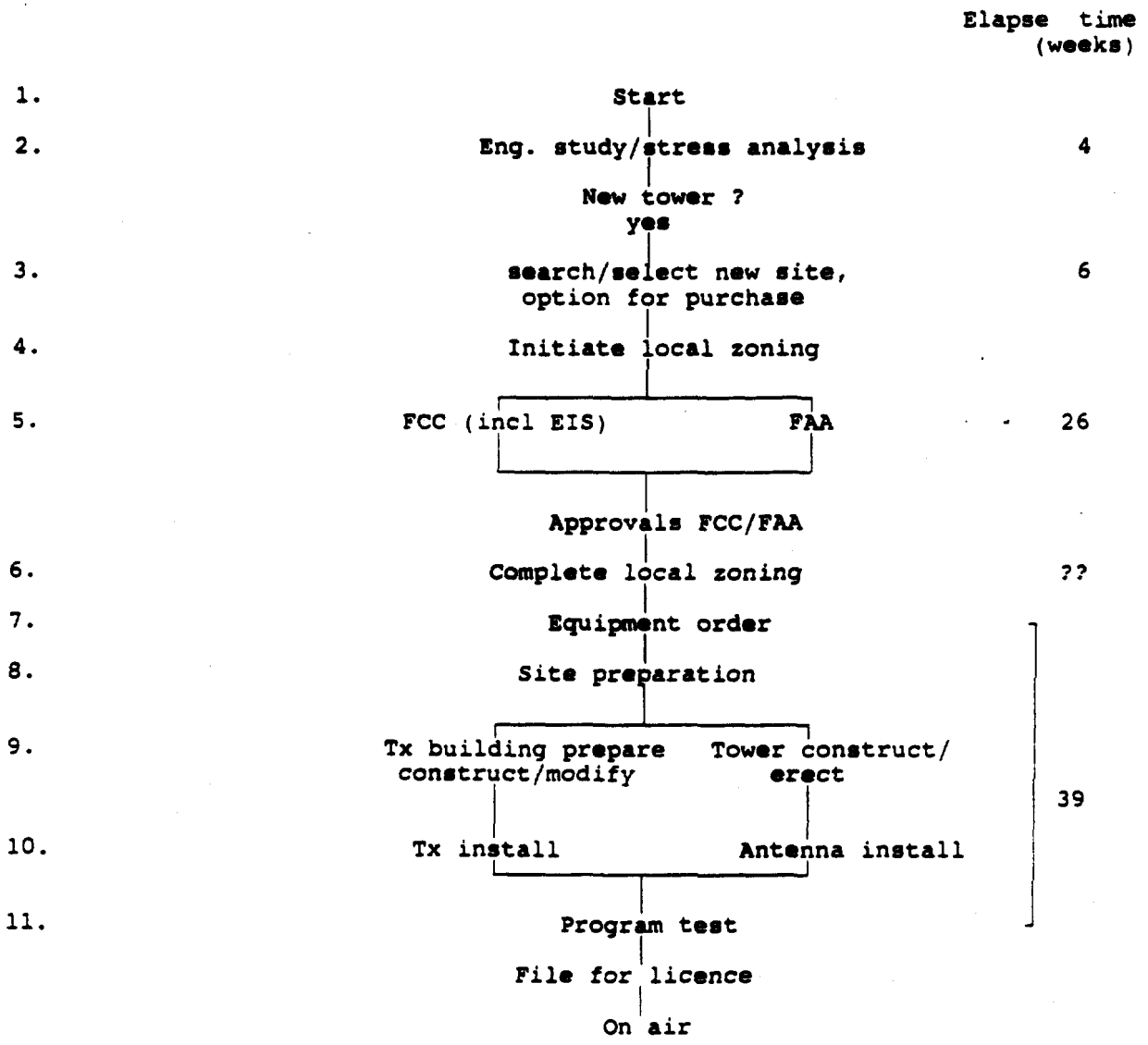
with

p := fraction (percentage) of sample having a certain attribute
n := sample size
N := size of population out of which sample is drawn.

For further details see Appendix B.

4. Expected duration of upgrade

The flow-chart below shows the different activities and the duration. Explanations to the diagram can be found on the next page.



Overall time required: Approx. 18 - 24 months

Comments to activities:

to 1. Engineering study/stress analysis:
Determines whether a new tower is needed or whether the existing one can be used either as is or with reinforcement.

to 3.: New site: Consulting firm advises on area where to locate the new tower (if existing site does not support it), station lists with real-estate agents. Normally a purchase option is obtained since FCC and FAA approval is not given yet.

to 4.: Initiate local zoning: very often local zoning is handled easier when FCC and FAA approvals are granted, but can (and sometimes should) be initiated at this stage.

to 5.: FCC approval: needs 3..6 month plus preparation (2..3 weeks). Environmental Impact Statement (EIS) is needed in certain cases (tower in wildlife refuge, preserve, etc).
FAA approval: if the new tower is located within an antenna farm: approx. 2..3 weeks, if new approval needed: 75 days if no serious objections from aviation in the area, up to 6 months otherwise.

to 6.: Complete local zoning:
This is the most uncertain part (time and money). In approx. 70% of all cases of application for a new tower objections are raised. Approximately 10% require court action (with potential delays of up to several years), the remaining 60% can be settled out of court. the legal
to 7, 8, 9, 10: Equipment order .. Tx/Antenna install
Stations are advised not to order equipment before all approvals are granted. With proper planning the lead time for the components can be sensibly utilized for e.g. site preparation (soil test, access road, Tx building modification, etc.). Time estimate for lead time is 6 months, actual construction will take another 3 months. A potential for delay exist in the northern part of the country where actual construction is limited to the summer months.

to 11.: When the station is satisfied with the technical status of the completed installation the 'program test' can start, which is regular program broadcasting. The station has to file for the FCC licence within 10 days. Grant of the licence may take several months, but has no delaying effect since the station is already on the air.

5. Potential additional study topics:

- Combine the survey results with the cost estimates developed by SS/WP3 to determine an overall figure for the transmitter/tower/antenna upgrade cost for the different systems. Compare results with outcome of NAB survey and reconcile any discrepancies.
- Determine the existence of tower cluster and antenna farms and the particular situation there.
- Separate analysis and potential follow-up on shared towers.

Appendix A: 'Lex Felkner Issues'

Implementation Subcommittee Issues

1. How should additional capacity be assigned if not all existing broadcasters could be assigned an optimum amount of additional spectrum capacity for HDTV? Options explored might include: a) some type of comparative process; b) lotteries; c) auctions; d) assigning capacity to all licensees uniformly and allow stations to acquire additional capacity needed from others.

2. Ashbaker issues. Does the Commission have authority to award ATV broadcast permission to existing licensees without accepting applications from potentially new broadcasters? How is the necessity for such a decision affected by the four predominant scenarios -- i.e. -- 6, 9, 12, & 12-simulcast? Is the definition of "simulcast" an issue? Are statutory changes needed?.

3. In the event that a complete transition to ATV takes many years (e.g., a decade or more), what options are available for making productive use of spectrum other than the present freeze? For example, are there uses of the spectrum compatible with television broadcasting that could be implemented during the uncertain interim transitional time period? Could the freeze be scaled back or eliminated with little or no adverse consequences? What are the advantages and disadvantages of the flexible use scheme suggested by the FCC in its FNOI?

4. If different systems appear to be preferable for cable, broadcast, satellite, and/or VCR, would fostering convergence be beneficial ? How could this be accomplished ? What statutes or regulations could be used, or would have to be amended ? Same questions, if different ATV systems prove to have different strengths and weaknesses; would convergence to obtain the best of the different systems be beneficial, and if so, how can the result be pursued?

5. Some broadcasters have complained that any ATV system which will require a new antenna site will be impractical. How pervasive is this problem?
What is the magnitude of the problem in dollars; number of stations potentially affected? Is this problem so severe as to rule out anything other than a six megahertz, compatible system?

Appendix B: Statistical significance and confidence intervals on the results:

When determining attributes (yes-no) of a finite population by random sample a hypergeometric distribution will result.

Let p' be an estimator for the true fraction p of the population possessing attribute A, $p' = x(A)/n$, n = sample size, x(A) = number of responses possessing attribute A.

The standard deviation s due to random sampling (instead of census) is then given by

$$s = [(N-n)/(N-1) * p*(1-p)/n]^{1/2}, \quad N = \text{size of population.}$$

Since p is not known, p' is a good enough estimator when calculating s.

To construct the 90% confidence interval (an interval around p' which contains the true value p with 90% certainty) the normal approximation is used and the confidence interval is given by

$$CI = p' \pm 1.67*s$$

with both s and CI being a function of p.

Example 1: 104 out of 200 responses could accommodate a second transmitter without any problems. Therefore

$$p' = 104/200 = 0.52$$
$$s = [(1183-200)/(1183-1) * 0.52*(1-0.52)/200]^{1/2} =$$
$$= 0.00104^{1/2} = 0.0322.$$
$$CI = 0.52 \pm 1.67*0.0322 = I[0.4662, 0.5738]$$

This means that, with 90 % certainty, the true value of p lies between 46.62% and 57.38%

Example 2: For 8 out of 200 respondents it will be difficult or impossible expand the existing structure to accommodate a second transmitter. Therefore

$$p' = 8/200 = 0.04$$
$$s = [(1183-200)/(1183-1) * 0.04*(1-0.04)/200]^{1/2} =$$
$$= 0.000159^{1/2} = 0.0126.$$
$$CI = 0.04 \pm 1.67*0.0126 = I[0.0189, 0.0611]$$

This means that, with 90% certainty, between 1.9% and 6.1% of all stations will have difficulty expanding their transmitter building, but at the same time I am <u>95%</u> certain that <u>no more</u> than 6.1% of all stations will face difficulties expanding their building.

n.b. To achieve a sample accuracy of ± 2(1)% at p'= 50% with 95% certainty a sample size of 803(1058) (out of a population of 1183) would have been required.

Tower Ownership/lease of antenna space

	Top 10		Top 11 - 212		Total	
	#	%	#	%	#	%
Owned	70	48.6%	174	87.0%	244	70.9%
Leased	70	48.6%	25	12.5%	95	27.6%
Don't know	1	0.7%	1	0.5%	2	0.6%
No answer	3	2.1%	0	0.0%	3	0.9%
	144	100%	200	100%	344	100%

Tower loading/sharing among sample

Answers:	Top 10		Top 11 - 212		Total	
	#	%	#	%	#	%
No answer	3	2.1%	4	2.0%	7	2.0%
No other antennas	10	6.9%	17	8.5%	27	7.8%
Small misc., but no TV or FM	28	19.4%	84	42.0%	112	32.6%
1 FM, excl or with small misc., no TV	25	17.4%	48	24.0%	73	21.2%
>1 FM, excl or with small misc., no TV	5	3.5%	13	6.5%	18	5.2%
1 TV, excl or with small misc., no FM	11	7.6%	18	9.0%	29	8.4%
2 TV, excl or with small misc., no FM	14	9.7%	6	3.0%	20	5.8%
> 2 TV, excl or with small misc., no FM	12	8.3%	3	1.5%	15	4.4%
1 TV, >= 1FM, excl. or with small misc.	6	4.2%	6	3.0%	12	3.5%
2 TV, >= 1FM, excl. or with small misc.	3	2.1%	1	0.5%	4	1.2%
>2 TV, >= 1FM, excl. or with small misc.	27	18.8%	0	0.0%	27	7.8%
total	144	100%	200	100%	344	100%

Responses to : Could you accomodate
a) a second full power TV antenna on your existing tower?
b) a second reduced power TV antenna (20 dB below NTSC) on your existing tower?

Answers on second antenna

Full power -	reduced power	Top 10		Top 11 - 212		Total	
		#	%	#	%	#	%
no answer	no answer	2	1.4%	0	0.0%	2	0.6%
don't know	don't know	1	0.7%	2	1.0%	3	0.9%
don't know	yes	0	0.0%	1	0.5%	1	0.3%
no	no answer	2	1.4%	0	0.0%	2	0.6%
no	don't know	26	18.1%	20	10.0%	46	13.4%
no	no	61	42.4%	73	36.5%	134	39.0%
no	yes	13	9.0%	42	21.0%	55	16.0%
yes	yes	39	27.1%	62	31.0%	101	29.4%
total		144	100%	200	100%	344	100%

n.b.: the combination "yes - yes" includes the answer: 2nd antenna ok with structural reinforcement (8 stations)

Summary of comments when 2nd full power antenna cannot be accomodated

Answers:

	Top 10		Top 11 - 212		Total	
	#	%	#	%	#	%
Tower is loaded to capacity	27	26.5%	70	51.9%	97	40.9%
Space problem on the tower	5	4.9%	4	3.0%	9	3.8%
Both space and load problem	13	12.7%	8	5.9%	21	8.9%
Can't tell without engineering study	5	4.9%	5	3.7%	10	4.2%
2nd Antenna ok with tower reinforcement	7	6.9%	7	5.2%	14	5.9%
special case, see separate notes	29	28.4%	5	3.7%	34	14.3%
No comment on full power antenna	9	8.8%	14	10.4%	23	9.7%
no further comment	1	1.0%	13	9.6%	14	5.9%
other comments	6	5.9%	9	6.7%	15	6.3%
total	102	100%	135	100%	237	100%

Summary of comments when 2nd full power antenna can be accomodated

Answers:	Top 10		Top 11 - 212		Total	
	#	%	#	%	#	%
No or only minor modifications	12	30.8%	13	21.0%	25	24.8%
Sidemount 2nd antenna only	2	5.1%	12	19.4%	14	13.9%
Changes underway, new situation	6	15.4%	2	3.2%	8	7.9%
Tower sharing: not ok for all stations	1	2.6%	5	8.1%	6	5.9%
Not 100% sure, but should be ok	4	10.3%	5	8.1%	9	8.9%
Other comments	2	5.1%	4	6.5%	6	5.9%
No further comments	9	23.1%	16	25.8%	25	24.8%
Only with structural reinforcement	3	7.7%	5	8.1%	8	7.9%
total	39	100%	62	100%	101	100%

Comments on accomodation of a 2nd reduced power antenna

Problem: This antenna is not defined, the answers received are very vague. In addition
The answer might depend on whether the station is VHF or UHF (significant different P(out))

Comments out of "don't know" (60 of 414):

depends on weight, load, windload, etc.	15
Engineering study is needed	17
No answer	2
No specific comment on low power antenna	14
Other comments	12

Comments out of "yes" (181 of 344):

No specific comment	79
Sidemount only	25
Tower shared, not ok for every station	15
Changes will come, new situation for answer	7
Only with reinforcement	9
No answer	46

Further split-up would not yield in statistically relevant data

Responses to :
Could You accomodate a second transmitter in the existing facility/Tx building?

Answers:	Top 10		Top 11 - 212		Total	
	#	%	#	%	#	%
Space is available, no problem	51	35.4%	104	52.0%	155	45.1%
Expansion needed, possible	17	11.8%	42	21.0%	59	17.2%
Expansion needed, difficult or impossible	14	9.7%	8	4.0%	22	6.4%
Expansion needed	5	3.5%	8	4.0%	13	3.8%
Depends on the size of the Tx	13	9.0%	2	1.0%	15	4.4%
Space will be a problem	6	4.2%	4	2.0%	10	2.9%
Don't know	8	5.6%	2	1.0%	10	2.9%
Other	2	1.4%	2	1.0%	4	1.2%
n.a.	28	19.4%	28	14.0%	56	16.3%
total	144	100%	200	100%	344	100%

Responses to :
Would the present tower site technically support the erection of a second tower?
(Question was asked if 'no' was the answer to accomodation of 2nd full power antenna and reinforcement was not mentioned as a possibility).

Answers:	Top 10		Top 11 - 212		Total	
	#	%	#	%	#	%
Yes	23	24.2%	64	50.0%	87	39.0%
No	58	61.1%	53	41.4%	111	49.8%
Don't know	7	7.4%	4	3.1%	11	4.9%
not asked, no answer	7	7.4%	7	5.5%	14	6.3%
total	95	100%	128	100%	223	100%

Accommodation of a second antenna
Detailed breakdown into TOP-10 and subgroups

Answers for high-power antenna

ADI Market	yes	reinforce	no	don't know	n.a.	sum
New York	1	1	15	1	0	18
Los Angeles	7	1	10	0	0	18
Chicago	3	0	12	0	0	15
Philadelphia	4	0	11	0	0	15
San Francisco	4	0	13	0	0	17
Boston	0	5	10	0	1	16
Detroit	2	0	6	0	0	8
Dallas	6	0	6	0	1	13
Washington	2	3	7	0	0	12
Houston	7	0	5	0	0	12
total	36	10	95	1	2	144

Subgroup	yes	reinforce	no	don't know	n.a.	sum
SG 1	7	1	12	0	0	20
SG 2	4	1	15	0	0	20
SG 3	7	1	12	0	0	20
SG 4	7	2	11	0	0	20
SG 5	10	0	10	0	0	20
SG 6	4	1	15	0	0	20
SG 7	5	1	13	1	0	20
SG 8	5	3	11	1	0	20
SG 9	3	2	14	1	0	20
SG 10	5	0	15	0	0	20
total	57	12	128	3	0	200

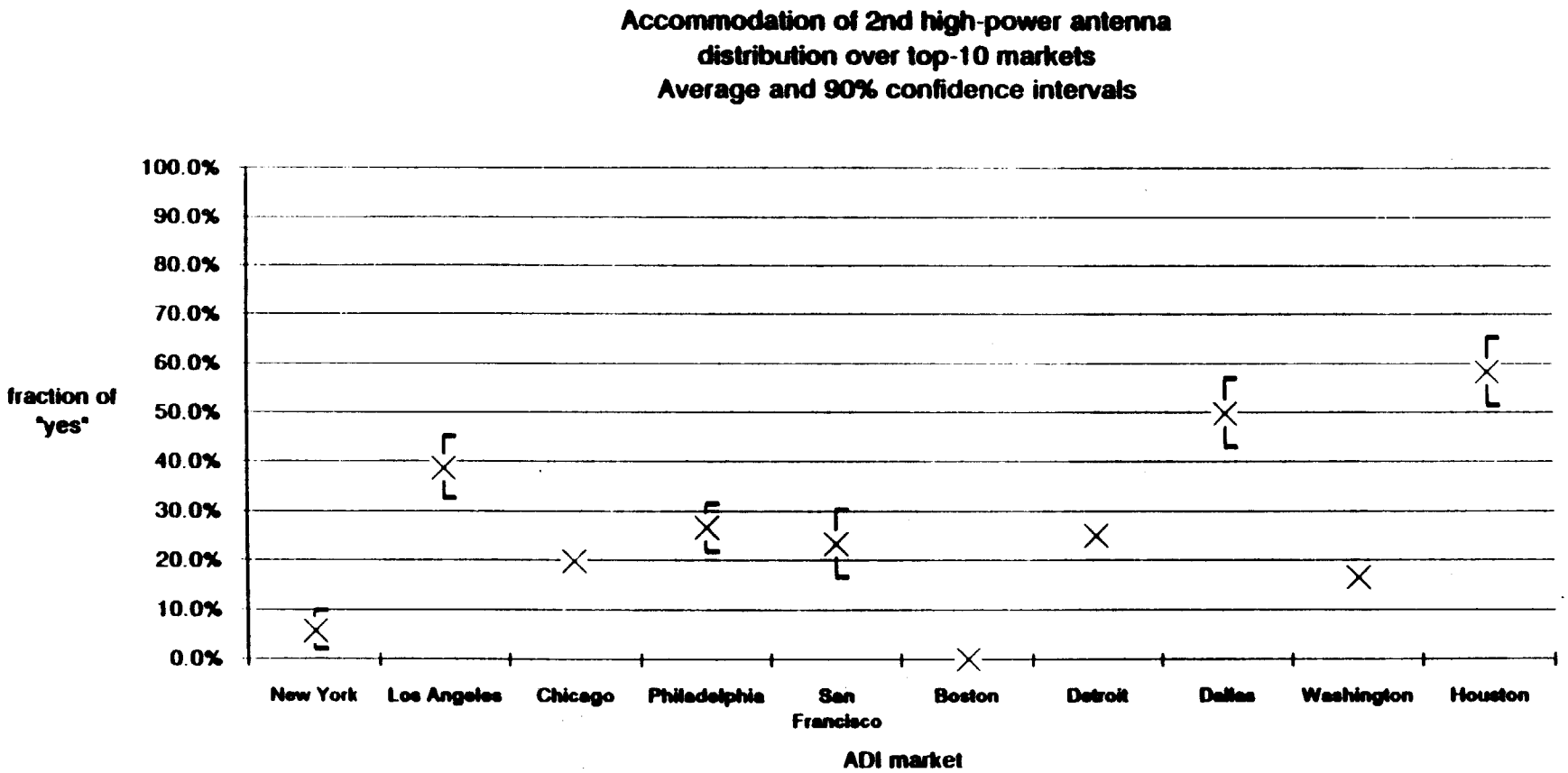
Answers for low-power antenna

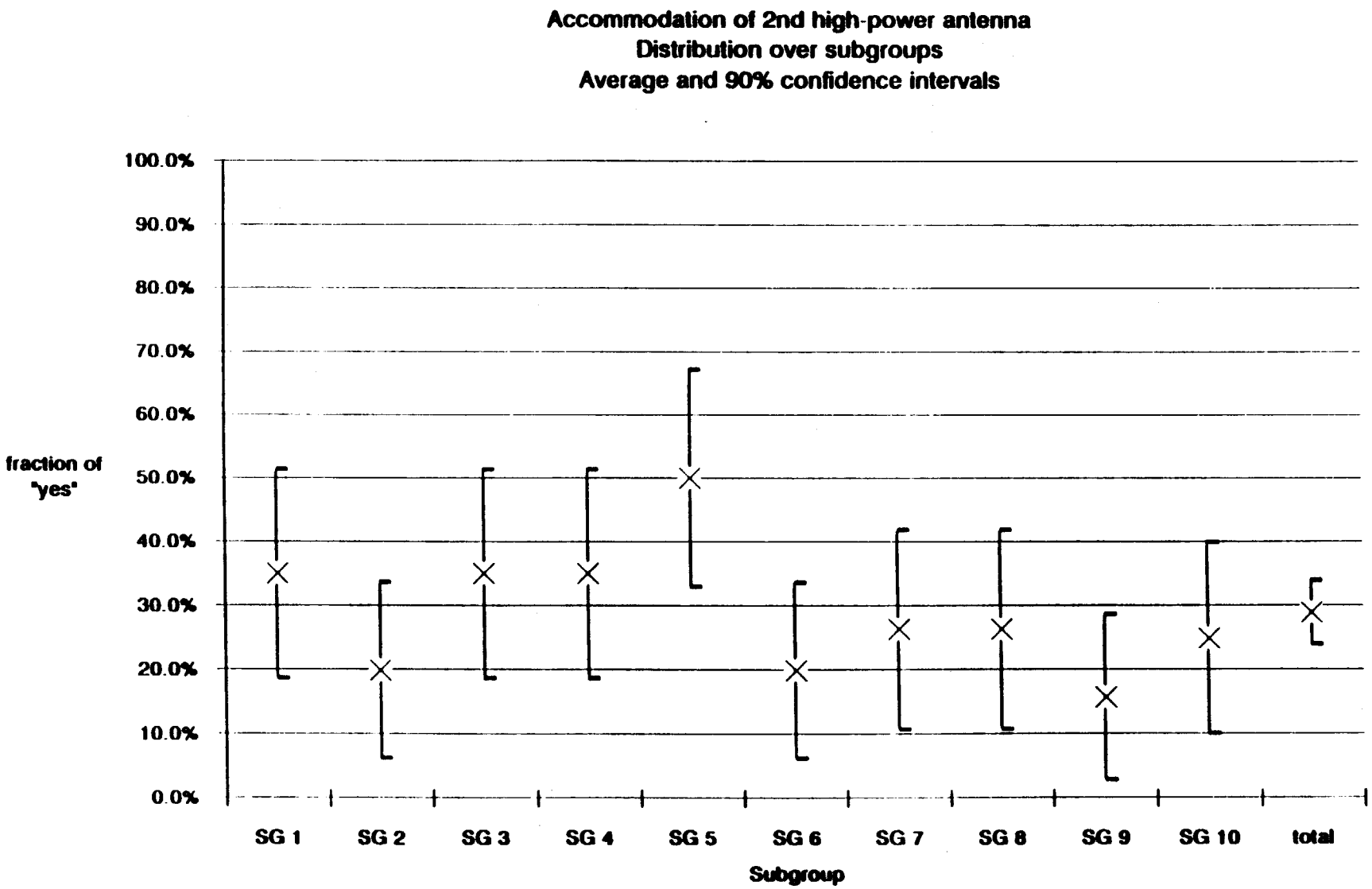
ADI market	yes	reinforce	no	don't know	n.a.	sum
New York	2	1	10	3	2	18
Los Angeles	10	0	6	2	0	18
Chicago	3	0	12	0	0	15
Philadelphia	5	0	3	7	0	15
San Francisco	10	0	4	3	0	17
Boston	0	3	7	5	1	16
Detroit	2	0	5	1	0	8
Dallas	6	0	6	0	1	13
Washington	2	0	5	5	0	12
Houston	9	0	2	1	0	12
total	49	4	60	27	4	144

Subgroup	yes	reinforce	no	don't know	n.a.	sum
SG 1	12	1	6	1	0	20
SG 2	10	1	9	0	0	20
SG 3	12	0	6	2	0	20
SG 4	10	1	8	1	0	20
SG 5	13	0	7	0	0	20
SG 6	6	1	8	5	0	20
SG 7	8	0	8	4	0	20
SG 8	8	2	6	4	0	20
SG 9	11	1	6	2	0	20
SG 10	10	1	6	3	0	20
total	100	8	70	22	0	200

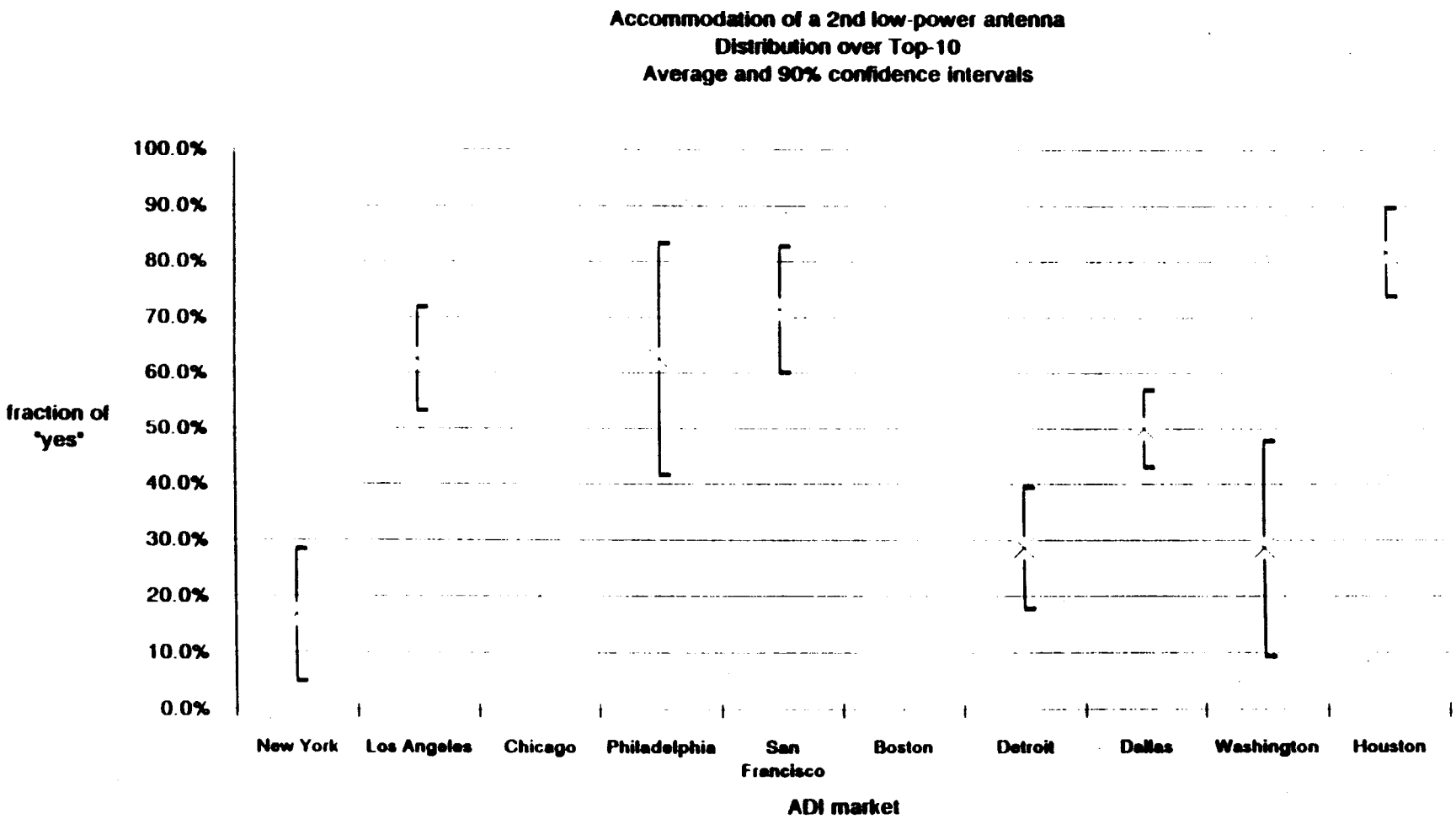
Table DET_ANT.XLS

AVE_HP1.XLC

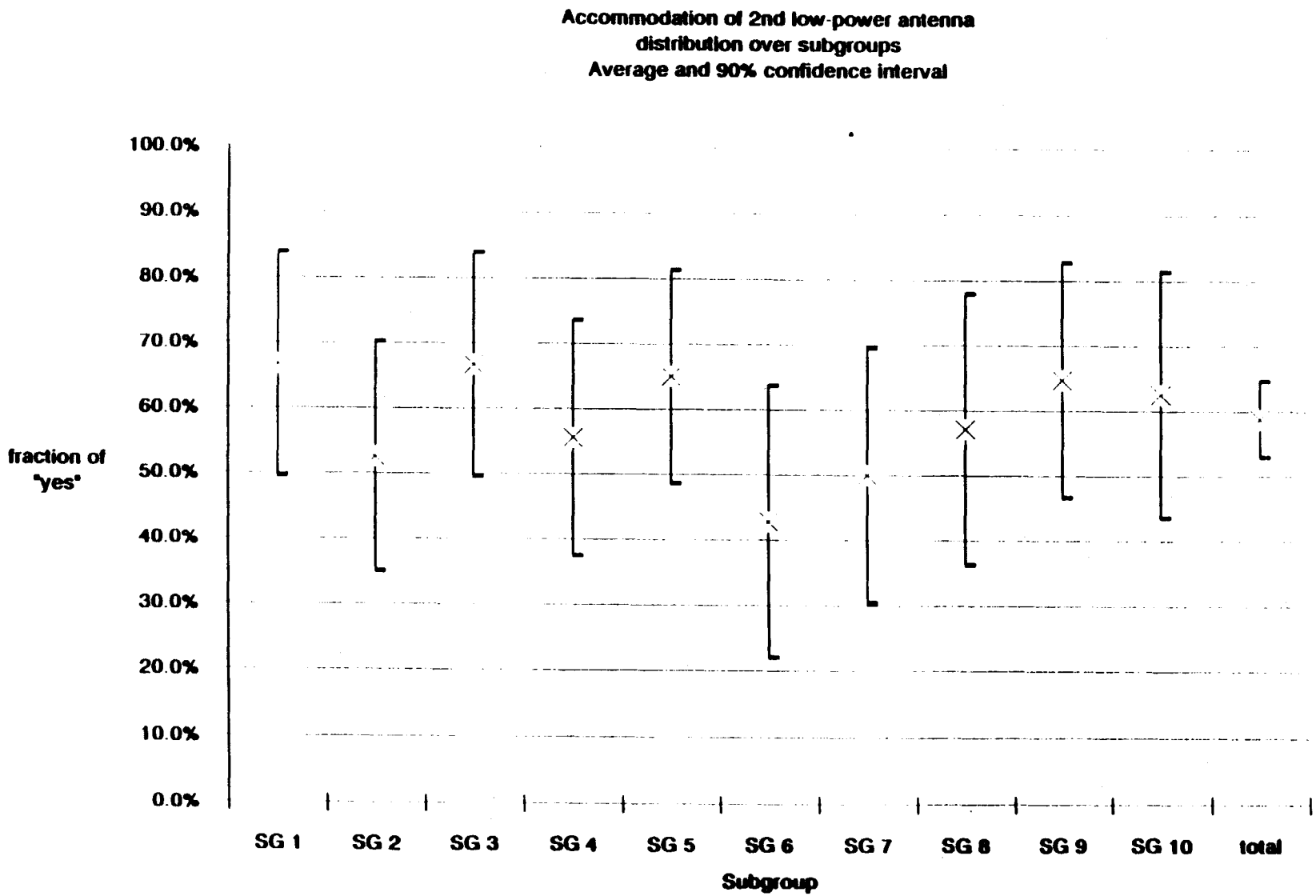

Accommodation of 2nd high-power antenna
distribution over top-10 markets
Average and 90% confidence intervals
fraction of "yes"
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
New York
Los Angeles
Chicago
Philadelphia
San Francisco
Boston
Detroit
Dallas
Washington
Houston
ADI market


Accommodation of 2nd high-power antenna
Distribution over subgroups
Average and 90% confidence intervals
fraction of "yes"
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
SG 1
SG 2
SG 3
SG 4
SG 5
SG 6
SG 7
SG 8
SG 9
SG 10
total
Subgroup

AVE_LP1.XLC


Accommodation of a 2nd low-power antenna
Distribution over Top-10
Average and 90% confidence intervals
fraction of "yes"
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
New York
Los Angeles
Chicago
Philadelphia
San Francisco
Boston
Detroit
Dallas
Washington
Houston
ADI market

AVE_LP2.XLC


Accommodation of 2nd low-power antenna
distribution over subgroups
Average and 90% confidence interval
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
fraction of "yes"
SG 1
SG 2
SG 3
SG 4
SG 5
SG 6
SG 7
SG 8
SG 9
SG 10
total
Subgroup

Attachment 3: DRAFT
November 3, 1989

IS/WP1 REPORT ON ATV TRANSMISSION STANDARDS

I. Introduction and Summary

Working Party 1 of the Implementation Subcommittee investigated the legal and policy basis for the establishment by the Federal Communications Commission of a transmission standard for a new terrestrial broadcast advanced television (ATV) system. Specifically, the Working Party sought to determine (1) whether the Commission has legal authority to mandate a transmission standard, (2) if so, whether it would be beneficial for the Commission to establish a transmission standard, and (3) the process by which a particular transmission standard should be adopted.

The Working Party has determined that the FCC has the legal authority to choose a single ATV transmission standard for terrestrial broadcasting, provided that the Commission observes lawful procedures and that its choice has a rational basis. The Working Party believes that the choice of a single ATV transmission standard for terrestrial broadcasting would serve the public interest, and that the choice should be based on comprehensive testing and consensus among ATV participants. The Working Party further concludes that, in order to promote competition among system developers and to facilitate the process of developing a broadly based consensus, the FCC should, at the earliest opportunity,

announce its intention to adopt, at the appropriate time, a single broadcast ATV transmission standard.

The basis for these conclusions is discussed in detail in the following report.

II. Legal Authority

Of necessity, the Communications Act provides the Commission with sweeping grants of authority.[1/] These provisions clearly encompass the area of broadcast transmissions.[2/] Moreover, an agency is generally accorded

---

1/ FCC v. WNCN Listeners Guild, 450 U.S. 582 (1981); NBC v. U.S., 319 U.S. 190 (19__); FCC v. Pottsville Broadcasting Co., 309 U.S. 134, 138 (1940). See also 47 U.S.C. 154(i) (1988).

2/ See e.g., Section 303:

> Except as otherwise provided in this Act, the Commission shall from time to time, as public convenience, interest or necessity requires shall
>
> . . .
>
> (c) Assign bands of frequencies to the various classes of stations and assign frequencies for each individual station and determine the power which each station shall use and the time during which it may operate;
>
> . . .
>
> (e) Regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein;
>
> (f) Make such regulations not inconsistent with law as it may deem

(footnote cont'd)

broad discretion in implementing its controlling statute, particularly when the matter involves the scientific and technical expertise of the agency, such as is the case with ATV.[3/] The Commission is required only to act reasonably and in accordance with established procedures. The Commission would appear to have the authority to promulgate broadcast transmission standards for ATV by choosing a standard from among several technologically feasible possibilities.

Thus, in 1951, the FCC's choice of a standard for color TV transmission was upheld by the Supreme Court in Radio Corp. of America v. United States.[4/] It was regarded as beyond dispute that the Commission had authority under Sections 303(c), (e), (f), and (g) of the Communications Act,

---

(footnote cont'd)

> necessary to prevent interference between stations and to carry out the provisions of this Act: Provided, however, that changes in the frequencies, authorized power, or in the times of operation of any station, shall not be made without the consent of the station licensee unless, after a public hearing, the Commission shall determine that such changes will promote public convenience or interest or will serve public necessity, or the provisions of this Act will be more fully complied with;
>
> (g) Study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest.

3/ See FPC v. Florida Power & Light, 404 U.S. 453, 463 (1972).

4/ 341 U.S. 412 (1951).

to adopt such standards on the basis of substantial evidence. 341 U.S. at 416. The only issue was whether the Court should review the wisdom of the Commission's choice.

The Commission had held extensive hearings on the various transmission methods, including demonstrations, and ultimately concluded that the CBS system would best serve the public interest by producing immediate benefits. In the process it rejected two other color systems, one of which, the RCA system, was compatible with existing technology. The Supreme Court reviewed the contention that the FCC was arbitrary and capricious in rejecting RCA's system. The Court found substantial evidence to support the FCC's findings, relying on the Commission's "special familiarity" with these matters.[5/] The Court emphasized that "courts should not overrule an administrative decision merely because they disagree with its wisdom."[6/]

In only one instance has the Commission's authority to set technical standards been successfully challenged.[7/] In EIA v. FCC, the Court held that since the standard for UHF noise reduction chosen by the Commission was not then technologically feasible (a critical fact not disputed by the Commission), the Commission exceeded its authority under the

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5/ Id.

6/ Id. at 420.

7/ Electronic Industries Ass'n v. FCC, 636 F.2d 689 (D.C. Cir. 1980).

All Channel Receiver Act.[8/] The Court found that the legislative history of Section 303(s) limited the FCC's standards-setting power in this specific respect to "the normal state of receiver development at the time."[9/] Thus, the holding of the Court that the FCC had exceeded its authority was premised on a specific Congressional rejection of broad regulatory power in the area, unique to the UHF all-channel situation.

In the ATV context, there are no such regulatory constraints. The Commission's authority flows not from any specific provision like Section 303(s) but from the more general and broad authority of Sections 303(e), (f), (g), and (r).

The Commission thus clearly has the authority to adopt a single standard for ATV transmission by television broadcast licensees. In doing so, the Commission must follow prescribed procedures of the Administrative Procedure Act for informal rule making[10/] and it must act reasonably. Whether an FCC order on ATV will be affirmed depends on the particular facts of the ruling -- namely, did the Commission act in accordance with proper procedure, and have substantial evidence to support its conclusion?

8/ 47 U.S.C. § 303(s) (1988).

9/ EIA v. FCC, 636 F.2d at 694.

10/ See 5 U.S.C. § 553 (requiring notice and opportunity to comment).

That the decision may be difficult to make militates for, not against, judicial affirmance. The courts are not expert, and do not substitute their judgment for that of the expert agency on difficult, complex technical issues committed by Congress to the agency's judgment.

> . . . Although it was declared in National Broadcasting Co. v. United States, supra, that the goal of the Act is 'to secure the maximum benefits of radio to all people of the United States,' 319 U.S., at 217, it was also emphasized that Congress had granted the Commission broad discretion in determining how that goal could best be achieved. The Court accordingly declined to substitute its own views on the best method of encouraging effective use of the radio for the views of the Commission. 319 U.S., at 218 . . . 11/

Indeed, in light of Congressional interest in ATV (shown by the numerous oversight hearings), courts may be especially reluctant to enter this legislative thicket. Thus, as long as there is "carefully articulated expert opinion,"12/ the Commission's findings as to the desirability and necessity of a standard will be upheld.

Finally, there is the issue raised in the AM Stereo decision that if the Commission selects a single standard, the losers will appeal and obtain a stay, thus leaving the area in a judicial "freeze" for years of litigation. We think this is a mistaken notion of judicial process. Stays can be obtained

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11/ FCC v. WNCN Listeners Guild, supra, 450 U.S. at 593-946. See also id. at 596.

12/ FPC v. Florida Power Light, supra, 404 U.S. at 463.

only upon a showing of irreparable injury (i) not just to the petitioners but (ii) also to the public and (iii) must have a substantial likelihood of prevailing upon the merits.[13/]

If the Commission does its job properly as indicated above, it should be most difficult for a petitioner to make the showings as to factors (ii) and (iii). On the contrary, the Commission should be able to argue persuasively that the public interest will be hurt by delay, and that the merits lie with the agency. Again it should be a powerful factor that Congress, with its strong oversight, is allowing the Commission to proceed (if Congress is urging delay, that is a different matter, because as experience has shown (e.g., subscriber line charges; price caps), a favorable political climate is a vital aspect of successful agency action on a matter like this).

In sum, the Commission has the necessary legal authority to adopt a single ATV standard, and if it acts reasonably and appropriately as to procedure and substance, it should have clear sailing.

13/ Washington Metropolitan Area Transit Commission v. Holiday Tours, Inc., 559 F.2d 841 (D.C. Cir. 1977); Virginia Petroleum Jobbers Association v. FPC, 259 F.2d 921 (D.C. Cir. 1958).

III. Policy Analysis

A. Background

There is an extensive academic literature on the subject of standard setting. This literature is summarized in the report of Working Party 5 of the Planning Subcommittee.[14/] Rather than repeat that discussion at length, this report will build on the foundation of PS/WP5.

In general, the studies have found that the principal advantages of standardization include economies of scale leading to lower prices, increased incentive to invest because of lower risk, the ability of users to share, connect or interchange hardware and software, and protection against the imposition of a sub-optimal de facto standard by individual market participants. The general disadvantages include the possibility of choosing a sub-optimal standard, precluding further technological innovation, and discouraging alternate solutions for users with divergent preferences.

The relative importance of these advantages and disadvantages vary with the particular circumstances. Standards are especially important where parts of a system must be compatible, requiring a high degree of coordination among market participants. The higher the cost of converting a product or service from one standard to another at the

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14/ "Economic Factors and Market Penetration" (May 9, 1988) at pages 90-99. The PS/WP5 report also contains an extensive bibliography of this literature.

interface, the more important it is that they be initially produced according to the same standard.[15/]

De facto standards are more likely to emerge where control of an industry is concentrated and the action of relatively few firms will be decisive. For example, IBM effectively set the de facto standard for the personal computer industry. Other firms designed software, peripherals and clones to be compatible with IBM. Standards also may emerge without government intervention if one design is perceived as clearly superior to others, especially if consumer demand is high.

However, consensus may be slow to develop where firms are uncertain about the preferences of other participants in the market. This can occur where the differences between contending standards are small or difficult to evaluate, or where different groups of consumers have varying uses for a product. In addition, when one or more firms have a proprietary interest in a particular standard they may try to prevent the industry from coalescing around any other standard.[16/] Consensus also may be delayed

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15/ Conversely, where compatibility among standards can be achieved at relatively low cost, or where standards differ in their ability to serve the particular needs of diverse user groups, it may be desirable to maintain multiple standards.

16/ The Working Party does not mean to imply that it is any way inappropriate for system proponents to have proprietary interests in their systems. To the contrary, such interests and the prospect of substantial return on investment are

(footnote cont'd)

if technology is developing rapidly and some participants choose to wait for the situation to stabilize in order to avoid the risk of being stranded with an unsuccessful technology. More participants are likely to adopt such a "wait-and-see" attitude when a serviceable substitute technology is already in place, or when the cost of adopting a new technology is high, especially if the sunk costs associated with a new technology cannot be recovered.

Previous attempts to introduce major improvements into mass media standards have demonstrated the value of standard setting.[17/] Such innovations as TV stereo, FM stereo and color TV were successfully introduced through the use of mandated or "protected" standards. Similarly, entirely new services such as television, FM radio and cellular telephone that employed a single standard achieved more rapid and efficient acceptance in the marketplace than AM stereo, teletext, or direct broadcast satellites, where no consensus standard emerged. Government intervention can act as a catalyst to facilitate the sharing of information and the

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important stimulants for research and development. Nor does the Working Party take any position in this paper as to what, if any, consideration the Commission should give to the presence and nature of proprietary interests in selecting a transmission standard. The point here is simply that the existence of such proprietary interests may impede the development of a consensus.

17/ See S.M. Besen & L.L. Johnson, Compatibility Standards, Competition, and Innovation in the Broadcasting Industry, (Rand, November 1986) (collecting case studies).

emergence of a consensus in situations where most participants desire standardization, but transaction costs, antitrust barriers or strategic behavior may prevent a marketplace agreement.

The cautionary tale of AM stereo is perhaps the most prominent example of the importance of standardization and the useful role that government can play in the process.[18/] Although the introduction of stereo would benefit both broadcasters and listeners, in the absence of an agreement on standards adoption of the new technology has been extremely slow.[19/] All segments of the industry are reluctant to risk committing themselves to a standard that may not gain wide acceptance. The result is stalemate.

AM stereo is very similar to ATV in many significant respects. Broadcasters, consumers and equipment manufacturers all must coordinate their actions for the service to achieve the wide acceptance that is necessary for the success of the service. Several incompatible standards are contending for acceptance, and no single firm has the market power to establish a de facto standard. The potential for the necessary coordination is complicated by the fact that in both

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18/ See Report and Order in Docket No. 21313, 47 Fed. Reg. 13152 (1982). The Commission continues to believe its approach was appropriate and that the market is converging on a single AM stereo standard, see AM Stereophonic Broadcasting, 3 FCC Rcd. 403 (1988).

19/ Seven years after Commission action, only about 10 percent of all AM stations broadcast in stereo. Id.