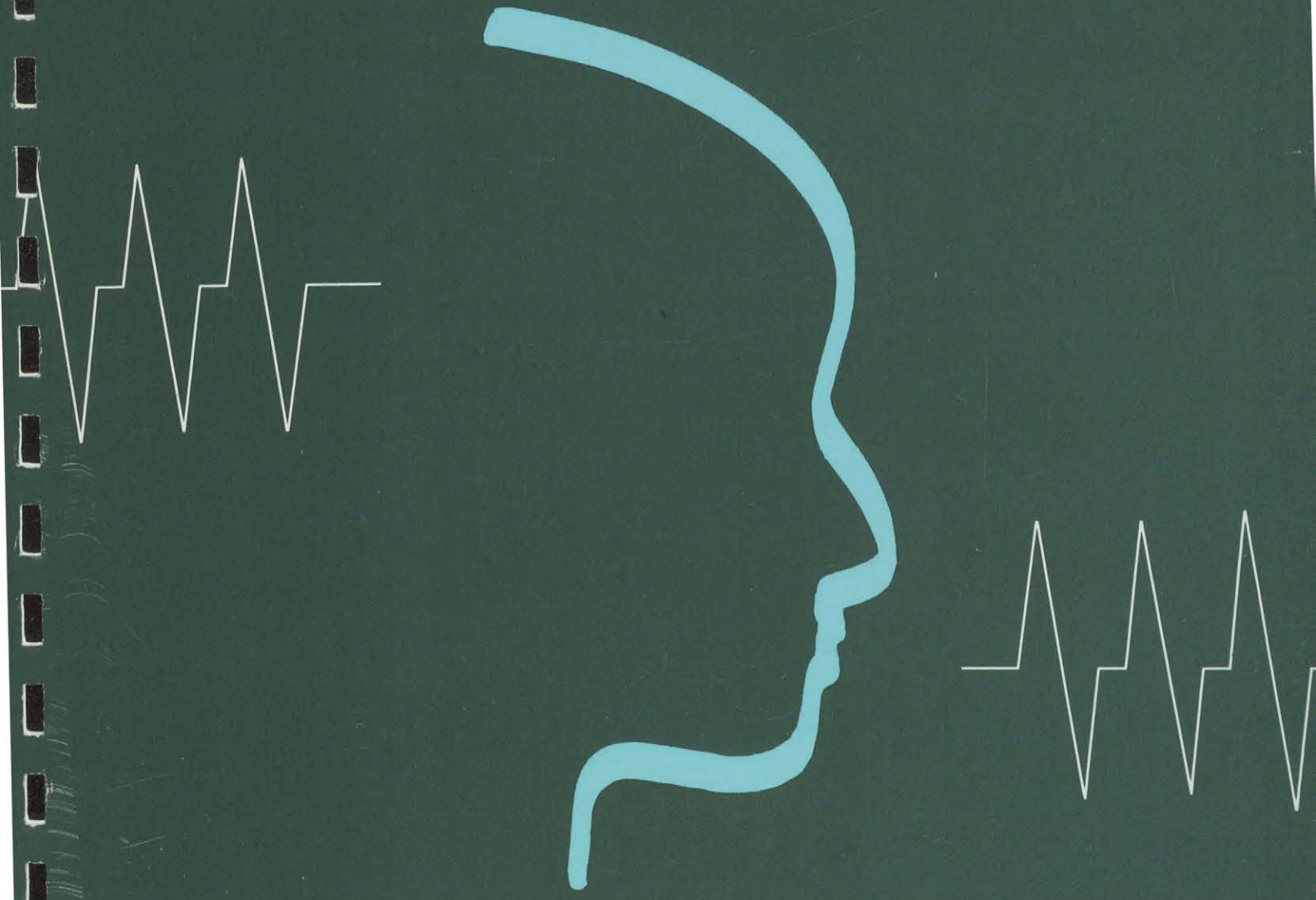
Communications Canada

TELEVISION

BROADCASTING IN TRANSITION



TECHNOLOGY, POLICY AND PLANNING BRANCH

TELEVISION

BROADCASTING IN TRANSITION

TECHNOLOGY POLICY AND PLANNING BRANCH
September, 1989

TABLE OF CONTENTS

CHAPTER I

THE ARRIVAL OF ADVANCED TELEVISION BROADCASTING

The arrival of advanced television broadcasting represents the greatest technical revolution in television in 35 years. More significant than the introduction of colour, the next generation in video will dramatically alter the face of television for both the broadcasting industry and the consumer.

Throughout the world, governments, program producers, broadcasters, manufacturers, and consumers are anxiously watching how advanced TV will be introduced. The decisions concerning the introduction of advanced TV are important, not only because of the opportunities that it presents for industry, but also because it will require major new investments by broadcasters and increased use of public radio spectrum.

Advanced TV Defined

Advanced television (ATV) broadcasting is a concept which looks to better match the television system to the human eye. This translates into a virtual doubling in the quality of both picture and sound. The result being a larger, wider, clearer TV picture that, like the movie theatres, covers a more natural field of view, and has a sound quality similar to compact disc.

Different approaches towards the trade-offs between cost, performance, and system efficiency have resulted in a wide variety of system designs for ATV.

While the objective of a high resolution, wide screen TV system (High Definition TV - HDTV) is common, there are two basic approaches towards achieving it: in a single step; or through an intermediate, medium resolution step to be followed later by the introduction of full HDTV. The intermediate solutions which would incrementally improve the resolution of existing TV with or without a widening of the picture are referred to as Extended Definition TV - EDTV.

International Initiatives

Regardless of the approach taken, the introduction of Advanced TV will likely require a major overhaul of today's broadcasting system in order to accommodate the dramatic increase in quality that ATV represents. Because upgrading to ATV represents both a tremendous economic gamble and opportunity for virtually all industries associated with broadcasting, around the world, government and industry are rapidly moving towards standards which will help develop the ATV marketplace and make ATV a reality.

Japan has been the driving force behind the development of ATV. Japan was the first to propose a new standard for domestic television service in 1970. Today, it is the leader and dominant supplier of HDTV technologies, and is poised to offer the first commercial HDTV service in the world. This summer, following three years of distribution trials, Japan's state-owned television company (NHK) started a daily "Hi-Vision" service on an experimental basis. At least ten Japanese manufacturers are also ready with a wide range of direct-view TV's, projection systems, and VCRs in support of the commercial "Hi-Vision" service which is scheduled to begin in 1990.

Outside of Japan, ATV remained buried in various engineering and industry committees until May, 1986. At the Dubrovnik meetings of the International Radio Consultative Commission (CCIR), Japan, supported by the United States and Canada, proposed a single world-wide production standard based upon the Japanese HDTV system. European resistance however, postponed a decision on a single standard until the end of the next session in 1990, and it appears recent study into "common image format" and "common data rate" will likely delay decisions on a single world production standard until 1994, the end of the next CCIR study period.

TABLE 1.

INTERNATIONAL AGENDA - "ATV"

	Domestic Production Standard	Production Equipment Marketed	Domestic Emission Standard	Consumer Equipment Marketed	Consumer Service Trial	Commercial Service
Japan	'70s	'83	'84	'89	'89	'90
Europe	'87	? ('92)	'88	?	? ('92-MAC)	?
USA	? ('94)	?	? ('92)	?	? ('89 Faroudja)	?
Canada	? ('94)	?	? ('92)	?	?	?

Foreseeing a Japanese domination of global consumer electronic markets, in 1986 the Europeans started and have since been successful in developing an alternative HDTV system. However, considering the EECs 1986 commitment to a new satellite TV system based upon MAC technology it is up-in-the-air as to when they might introduce HDTV commercially.

The United States, while committed to ATV, is still searching for how ATV should be developed. Reacting to the concerns of the U.S. broadcasting industry, the Federal Communications Commission (FCC) created an Advisory Committee on Advanced

Television Service in November 1987. While the FCC made a tentative decision on spectrum policy in 1988, a ruling on U.S. over-the-air ATV standards will wait until November 1991, for the Advisory Committee recommendations.

Concerns have also been raised in the United States about the impact of ATV on America's electronics and computer industry. This has led to the National Telecommunications and Information Administration questioning the criteria for supporting the Japanese production standard; the Defense Advanced Research Project Agency issuing research contracts; and most recently a review by Congress of legislation covering industry consortia.

However, a strategic plan to establish an HDTV consortium amongst members of the American Electronics Association (AEA), which was submitted to Congress on May 9th, seems to have been met with opposition. On August 1st, the Congressional Budget Office claimed that the talk of HDTV saving the US semiconductor industry, or being likely to play an important part in American competitiveness, was much overstated.

Without a workable strategy from either the U.S. broadcasting industries, manufacturers, or government, it is still unclear as to who will drive the development on ATV in the United States.

Canada Needs a Strategy

Broadcasting in Canada, though an industry, has first and foremost been a public service - a means for cultural expression, education, and enlightenment. At the same time, TV, the most influential means of cultural expression in today's world, requires expensive technology. Thus the cost of upgrading to ATV, presents an enormous challenge both industrially and culturally. Canada must have a strategy towards ATV in order to ensure Canadian interests are protected.

To make policy development come together into a coherent strategy for ATV, the Department of Communications has already initiated public consultations through the Canada Gazette, and helped established a joint government/industry committee to assess the implications of the introduction of ATV. At the same time, the Department has initiated its own review of the subject.

The purpose of this report is to discuss the policy issues involved, by clarifying what is known in the various areas and by highlighting those questions where additional study will be required.

The report concludes by proposing some concrete steps to establish an Advanced TV strategy for Canada.

CHAPTER II

THE GAMBLE FOR CONSUMER ACCEPTANCE

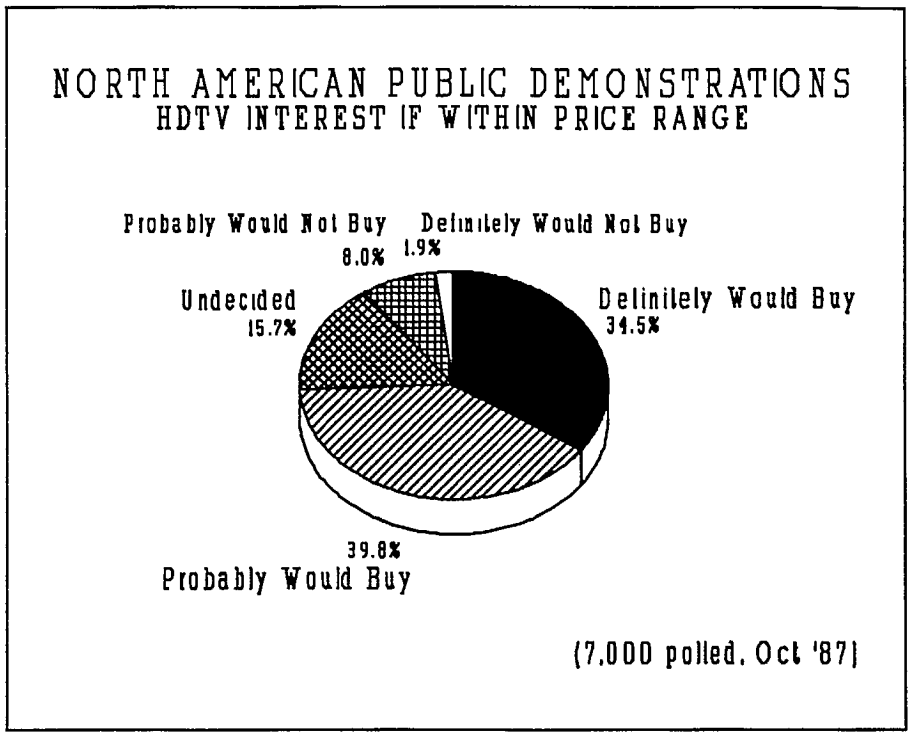
Never before has so much been invested with so little consumer testing.

While there has been extensive psycho-physical testing to design Advanced TV (ATV) systems, the lack of equipment availability has been a limiting factor in the consumer testing that might prove out an ATV system. Further research will be required to help clarify the important characteristics of an ATV system from a consumer viewpoint.

Consumer Surveys

Consumer research is an important tool for providing industry a "rough guide" as to how a particular market responds to different variables such as type of programming, screen characteristics, and price, at a particular point in time. However, as an ancient Chinese proverb posits: prediction is a most difficult art, especially as regards the future.

In October 1987, the Department of Communications, the CBC, the Canadian Cable Television Association, Telesat Canada, Rogers Cablesystems, and Scarborough Cable helped sponsor the largest survey to date on HDTV. The **North American Public Demonstrations** survey of some 7,000 consumers, covered cities throughout North America.



While the study identified that almost 75% of those polled would probably buy HDTV, it also pointed out three major factors that affect consumer demand: the cost of the TV equipment needed, the availability of programming, and the quality of reception. The results below show that, depending on the availability of programming, consumers are willing to pay for HDTV.

34% would probably pay $2,000 for HDTV equipment if there was unrestricted access to program material;

26% would probably pay $2,000 for HDTV equipment if material was restricted to only pay-TV and tape rental; and

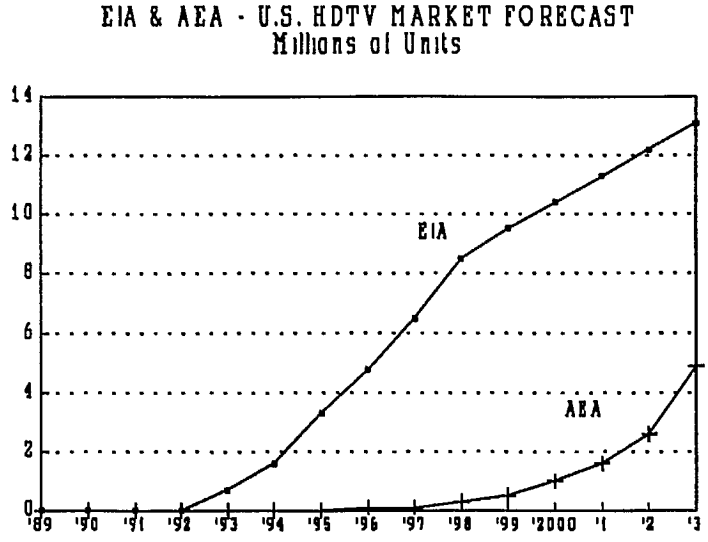
10% would probably buy a TV and VCR for $4,000 if material was restricted to only tape rentals.

The **Massachusetts Institute of Technology** conducted a far smaller and less conclusive study of HDTV in December 1987. Their interviews of 613 people compared HDTV to NTSC using pairs of 18" and 28" monitors. Overall there was a two to one preference for HDTV over NTSC; even with the use of smaller monitors, which admittedly do not show HDTV at its best. This was interpreted at MIT to mean that "HDTV is not the same kind of revolutionary shift in technology as experienced in the transition to colour in the 1950s and 1960s".

Market Forecasts

Market forecasts are another mechanism for predicting market behaviour, based upon correlations to historical behaviour. In the case of HDTV, industry forecasts are based upon a basic assumption that HDTV penetration will closely follow that of earlier television and VCRs.

Two recent studies have come out of the United States on the penetration of HDTV. The first was released by the American Electronics Association (AEA) in November 1988, and this was followed shortly thereafter by a report from the multi-national Electronics Industry Association (EIA).



The more recent EIA report, which has been praised by the AEA, predicts that HDTV penetration will grow faster than either colour TV or VCRs, reaching 25% of American homes by the end of the coming decade. The AEA prediction was almost 1/3 that of the EIA. When asked about the lower estimates of the AEA, the EIA Group Chairman said that TV manufacturers wouldn't start production in such small quantities.

The assumptions of the two studies are as follows:

EIA

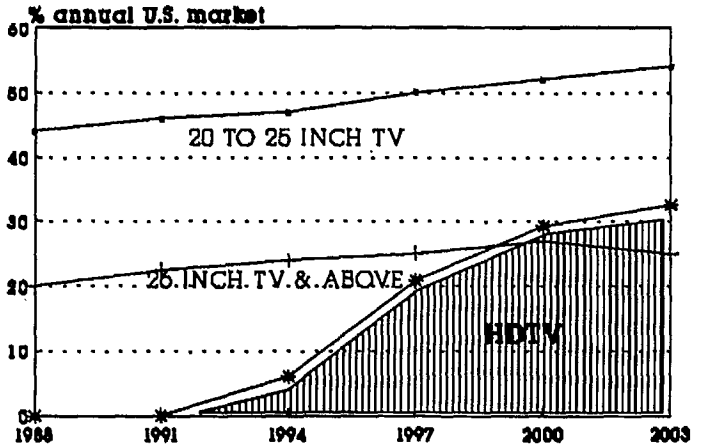
- FCC will approve a compatible system in 1991,
- two years later, HDTV sets will become available at $2,500, and decline at a rate faster than did colour sets.
- the long-term trend in per-capita television consumption continues to increase. (if, as the AEA predicts, this remains constant, HDTV sales in the year 2003 would be 65% of that forecast)

AEA

- The first HDTV sets will arrive in 1990 with an average price of $4,000, dropping to $2,500 by 1995, and $1,500 by the year 2000.
- EDTV broadcasts will start in 1993,
- HDTV broadcasts will start in 1996.
- comparatively small HDTV sales are assumed prior to locally transmitted HDTV broadcast services.

Initially the market for HDTV will be the 30" and larger sets, which are expected to be in ten percent of U.S. households within five years of introduction, and twenty-five percent by the end of the coming decade.

HDTV WILL PENETRATE THE BIG-SET MARKET
20 Inch and Larger



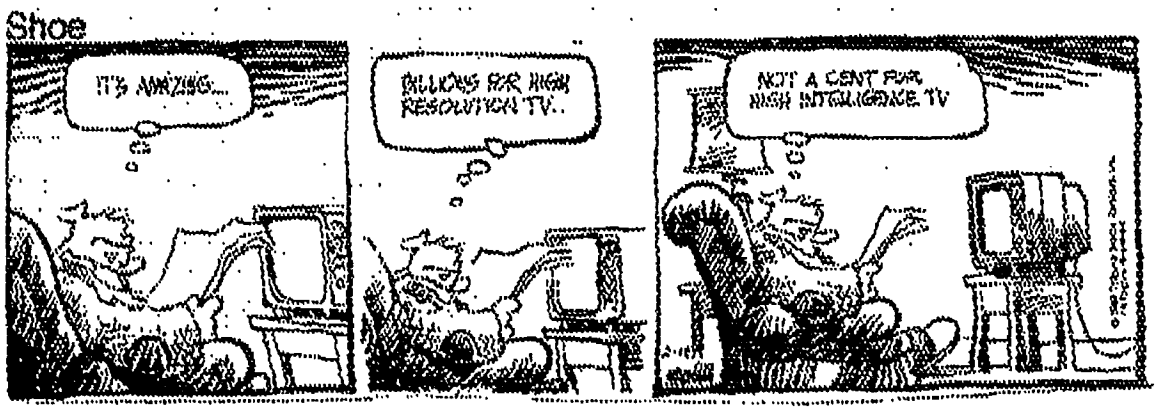
Source: EIA

Based upon the studies to date, **it is clear that the consumer would prefer the shape, size, sharpness, and colour quality of HDTV over today's NTSC. But what is unclear is how much they will be willing to pay, and whether they will accept a lower quality interim solution.**

The service trials planned for Japan and the United States will provide a better understanding of which system the consumer is willing to pay for. The type of services provided will be particularly interesting, since it is already clear that programming is what will sell HDTV not picture quality.

CHAPTER III

PROGRAMMING HDTV



The Tool

Since 1983, Japanese HDTV equipment has been used as a production tool in special situations, in both the television and film industries. At the 1989 Cannes Film Festival, Rebo High Definition Studios won best short film with "Performance Pieces". The piece was produced on HDTV and transferred to film.

Presently, the benefits of using HDTV depend on the type of production involved. For those productions that look for film quality, and the production flexibility of video, HDTV can actually reduce the overall production costs. While HDTV has been used in the production of feature films and the CBC mini-series "Chasing Rainbows", its artistic benefits have been more readily accepted by the producers of TV commercials such as Rebo Productions, and 1125 Productions.

Music videos and TV commercials, because of their use of special effects, are two specialized production areas where HDTV has already been used. The first programming services to be provided in HDTV are expected to centre around feature films and sports. This will likely be followed by prime time network and syndicated drama programs, and

network news. It is expected that the last area to convert to HDTV production will be local programming.

While HDTV can reduce some of the operating costs associated with a production, the initial capital investment for HDTV production equipment could create a barrier for Canada's production industry.

A Costly Investment

With equipment for an HDTV station costing almost three times that of an NTSC station, for a broadcaster to convert to HDTV could be a costly venture.

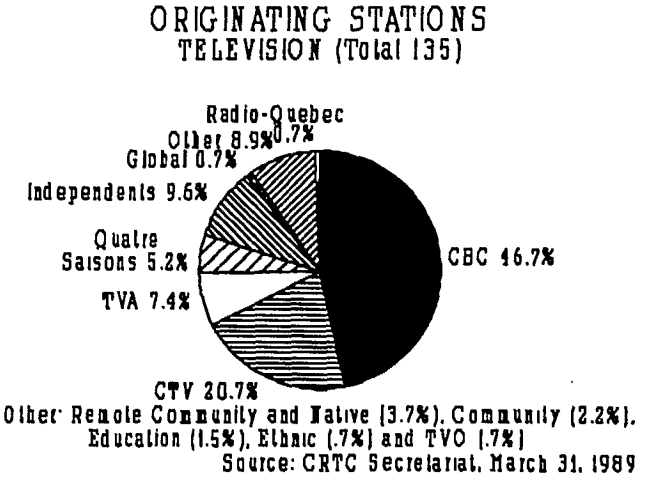
A significant portion of the conversion costs associated with HDTV would lie in program production, since the conversion is expected to require a total revamping of facilities as well as equipment. To accomodate HDTV, control rooms would need to be rebuilt, a new cabling system would be required between equipment, along with increased electrical capacity, and air conditioning. More expensive though would be the equipment costs.

If we were to apply the Gross National Product implicit price deflator to new products which were introduced twenty years ago we would find that, the price of that equipment today would be comparable to that of current HDTV equipment, yet the difference in performance is spectacular. However, HDTV equipment is not cheap, certain equipment can be as much as three times that of current NTSC equipment. A first pass at the cost of converting a broadcast facility to HDTV can be found in a paper presented by Robert J. Ross at the NAB '89. The estimates given were developed for use by the FCC Advisory Committee on Advanced Television systems. This paper estimated that a four camera studio operation for full local production would cost U.S.$14.8 million, a little over three times that of an NTSC operation. Field operation equipment at nearly four times that of NTSC would cost an additional U.S.$14.3 million. It should be noted however, that cost estimates can vary with the source of the data. An estimate by Ikegami, one of the manufacturers, places the cost of a fully equipped two camera HDTV studio at between $5.6 and $6.8 million.

Canada's Struggle with Programming

HDTV can be expected to increase the cost and thus the risk associated with producing programming for what has become a static TV viewing market.

In Canada, there are almost 1,600 licensed TV stations, however, the majority of these only rebroadcast network signals, less than 140 of these originate programs. As can be seen in the figure below, the cost of HDTV production equipment will hit public broadcasting the most, and the CBC in particular. Using the cost estimates above, if Canada's stations which originate programs were to convert to HDTV production today, the total cost would be nearly U.S.$4 billion.



Over the air broadcasters no longer have a monopoly on consumer viewing choices. The development of new distribution channels, such as cable TV, satellite and video tape rentals, has increased the competition for programming that will attract viewers. The resulting increase in programming costs is forcing producers to look for financing from foreign sales and production partners.

It remains to be seen whether the initially high cost of HDTV production equipment would accentuate current financing problems facing Canadian productions. Currently, thirty percent of the cost of producing reasonable-quality drama has to be financed from markets outside of Canada. According to the Association of Canadian Film and TV Producers, the growing necessity to seek foreign partners for a production only serves to weaken Canadian influence in a project - the introduction of HDTV could further decrease this influence. While the possibility of a single world-wide production standard would not significantly reduce the cost of producing programming for foreign markets, it would facilitate co-productions, and establish a level playing field in terms of technical quality.

Adding to the confusion of how to produce programs in HDTV is the issue of which standard to produce in.

Towards a World-wide Production Standard

The Japanese have been working on the development of HDTV since the early seventies. In 1986, they proposed a world-wide production standard based upon 1125 TV lines. While 1125 lines is the most compatible resolution for conversion between the world's various TV systems and is supported by various production unions, the Europeans blocked the proposal claiming the difference in frame rate (50/60Hz) as an insurmountable problem.

Since 1986 two other production standards have been under development. During the past year the Europeans demonstrated high resolution production equipment with 1250 lines (two times their existing 625 line system). Similarly in the United States, NBC has proposed a production standard based upon 1050 lines (two times the existing 525 line system).

Europe's concerns about a single production standard may not be just industrial in nature. Earlier this year cultural concerns moved the European Community closer to a common policy to limit programs from the United States.

According to Sony's Larry Thorpe the issues surrounding standards today are engineered to delay things, or to define a standard which is not already available. While the International Radio Consultative Commission (CCIR) was meant to resolve the HDTV production standard issue by 1990, recent study into "common image format" and "common data rate" will likely delay decisions on a single world standard until 1994, the end of the next CCIR study period.

The setting of production standards seems to be taking a long time, which is creating frustration amongst producers. Presently, the Japanese 1125 line system is the defacto standard since it is the only system under consideration which has equipment commercially available (both Japanese and United States manufacturers). However, the lack of agreement on a single production standard and Europe's commitment to commercialize their line of production equipment, leaves producers questioning when and in which format to produce ATV programming.

CHAPTER IV

DELIVERING HDTV

Considering that any HDTV programming that is produced is intended for delivery to a market, the distribution chain used becomes just as important as program production, since indirectly distribution finances program production.

While there are a multitude of distribution media, ranging from off-air, to cable, and satellite, to VCRs and videodiscs, not all media have the capacity to deliver the same quality signal. The Japanese and Europeans have selected direct-to-home satellite transmission as the primary means to deliver domestic HDTV services. However, to restrict HDTV to direct broadcast satellites may not be viable for North America.

North America's broadcasting system presently distributes the vast majority of its programming via over-the-air distribution. Therefore, the United States and Canada will have to develop strategies that will allow our current broadcasting system to migrate to a new Advanced TV system.

The issues surrounding an over-the-air delivery strategy are not so much technical as business based. An Interim Report the U.S. Advisory Committee concluded that to remain competitive, broadcasters must have the opportunity to deliver HDTV-quality signals to their audiences. There are a number of technical options available, the question is, from a business point of view, which would be most appropriate as a standard.

The Options

Different approaches towards the trade-offs between cost, performance, and system efficiency have resulted in a wide variety of system designs for ATV. To evaluate these approaches the Federal Communications Commission (FCC), which is responsible for setting over-the-air distribution standards in the United States, created an Advisory Committee on Advanced Television Service. Similarly, in Canada a joint industry/government group called the Canadian Advanced Broadcast Systems Committee has been established.

In reviewing the various options available, a number of issues need to be considered including economic factors, system designs, and the trade-offs between

systems. A key element in the decision making process will be the collaboration between Canada and the United States on the objective and subjective testing of the different systems.

While last November there were seventeen different proponent systems at the table, now that it has come to delivering equipment for testing only eight manufacturers have committed to delivering equipment for testing starting in April 1990. The combined objective and subjective test program is expected to run for approximately two years, which would coincide with the U.S. Advisory Committee's timetable to provide recommendations to the FCC.

Of the ATV systems that will be tested, the approaches that the system proponents have taken in order to accommodate the increased picture quality of ATV basically fall into four categories: single channel NTSC compatible; one and a half channel NTSC compatible; two channel NTSC compatible; and a second channel simulcast (non-compatible).

TABLE II

ATV SYSTEMS TO BE TESTED

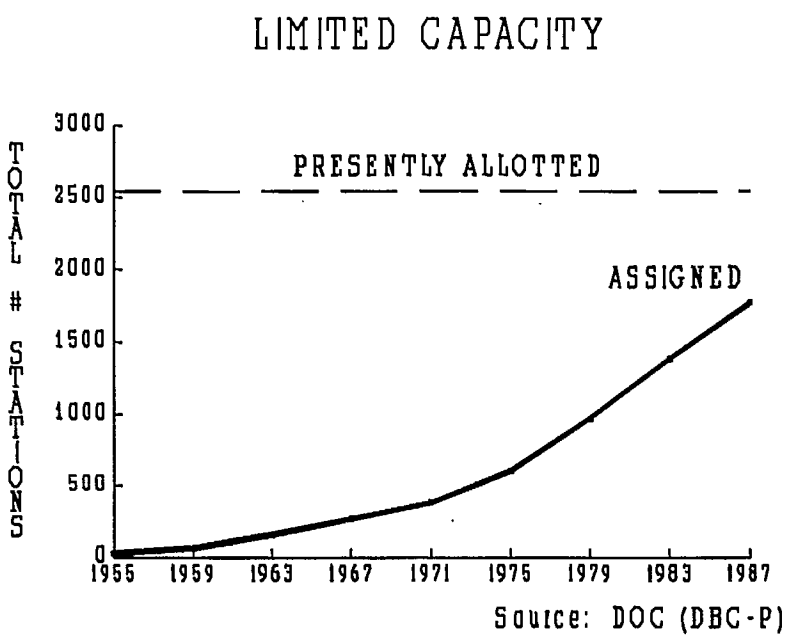
OFF-AIR PROPONENTS	CAMERA [can accept]	RECEIVER	STAGE OF DEVELOPMENT
1 Channel (NTSC compatible)			
MIT	current 525 line	NTSC+	eqp't in Aug '90
Faroudja (SuperNTSC)	525 *progr.scan [1050 lines]	NTSC+	trialed: off-air, May '89 cable, fall '89
Sarnoff (ACTV I)	525 *progr.scan [1050 lines]	NTSC+ [EDTV]	trialed: off-air, Mar '89 satellite May '89 cable Jun '89
NHK (MUSE-6)	1125 lines	EDTV	demo'd: May '89
Production Services Inc.	1125 lines	HDTV	eqp't in Aug '90
1½ Channel (NTSC compatible)			
Philips (HDS-NA)	525 *progr.scan [1050 lines]	HDTV	simulation Apr '88 equipment Jun '90
2 Channel (NTSC compatible)			
Sarnoff (ACTV II)	1050 lines	HDTV	eqp't in Dec '90
2nd Channel (non-compatible)			
Zenith (SC-HDTV)	787.5 lines	HDTV	simulation May '89 eqp't in Dec '90
NHK (Narrow MUSE)	1125 lines	HDTV	demo'd: May '89

Constraints

The constraints around which system designers have had to work include three important factors: spectrum limitations, demand for quality, and cost.

Off-air spectrum constraints have placed a fundamental restriction on the design and evaluation of ATV systems. Because off-air spectrum is a basic public resource which is allocated by government to serve many social needs and because increased use of spectrum will likely be required by broadcasters in order to deliver full HDTV, in September 1988 the FCC announced a tentative decision to limit ATV spectrum to within the existing VHF and UHF TV bands.

Broadcast spectrum studies in Canada have shown that we are rapidly approaching full capacity, allocated VHF channels are all but exhausted and UHF channels are almost exhausted in larger urban areas.



Preliminary studies, based upon assumed criteria, indicate that those ATV system designs that require one and a half NTSC channels could be accommodated in the UHF band. Such an implementation however, leads to areas of concern over the impact of cancelling existing "unprotected" low power TV (eg:Maritimes) and the limitations on future service growth in urban areas (practically zero). When it comes to those services that would require a second channel, only the "spectrum compatible" Zenith system shows promise of being accommodated.

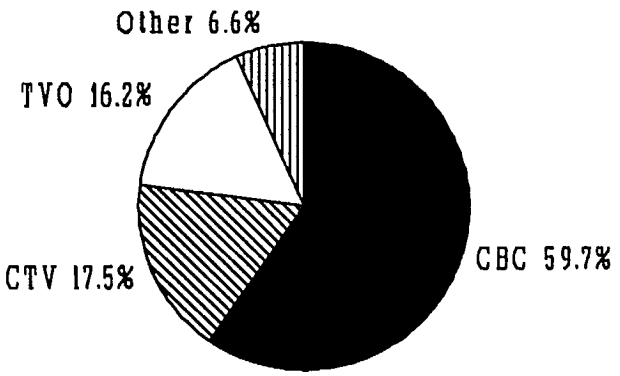
The trade-off in going to a system that uses less spectrum or is compatible with NTSC is poorer picture quality. While making a system NTSC compatible could result in a smoother transition to ATV its quality would be constrained by the limitations of existing NTSC, and would not compete with the quality available through other distribution media which do not have the same spectrum limitations. The value of this

trade off can only be determined through consumer testing as to which level of quality the consumer is willing to pay for. There is no insight into this as yet. The only consumer testing to date has been of the Japanese HDTV system.

Similar concerns about cost versus quality apply to ATV delivery. The cost to deliver ATV over-the-air can be thought of as proportional to the quality delivered. ATV delivery costs will depend heavily on whether existing transmitter plant can be modified or whether a complete second transmitter system would be required. Today's worst case estimate of the U.S. Advisory Committee, is that to merely retransmit (pass) an ATV network signal would be U.S.$9.4 million (1.6 times that of NTSC). The Canadian Association of Broadcasters estimates that ATV delivery costs in Canada would be somewhat less since we would not be paying first buyer prices.

Given the estimates we have today, considering the number of rebroadcasting stations we have, the cost of extending "over-the-air" ATV service to rural Canada could be almost four times the cost of converting program production to HDTV. As reflected in the figure below public broadcasting and the tax payer would bear the majority of the burden of over-the-air delivery of ATV.

REBROADCASTING STATIONS
(TOTAL 1297)



Other: Independents (2.4%), TVA (1.5%), Radio-Quebec (1.5%), Global (0.6%), Quatre Saisons (0.5%), Educational (0.1%)

Source: CRTC Secretariat, March 31, 1989

Bypassing the Constraints

Considering that over 93% of Canadian households lie within the service area of a cable TV systems, if broadcasters were to provide ATV service to cable systems directly, rather than over-the-air, they would eliminate a lot of the constraints on their ATV service.

ATV delivery over cable would save broadcasters the delivery portion of converting to ATV without significantly reducing their audience. Thus allowing them to devote more resources to their basic business of making their programming more attractive.

The spectrum limitations on the quality of a broadcaster's ATV picture could also be removed if ATV programming was provided directly to cable systems rather than going over-the-air. While Canadian cable systems could probably readily accomodate an ATV system that required an additional half channel, unlike over-the-air broadcasting, they can also build additional capacity into the system.

Notwithstanding the introduction of ATV, there is a major rebuilding of cable systems underway, in order to increase the quality of their signals and accomodate the changes in service tiering. In March 1989, Rogers Communications announced it was planning to spend $525 million, to upgrade the backbones of his cable systems to fibre. This would provide a capability to offer up to 150 cable channels by 1998. Overall, the CCTA has forecast that Canada's net fixed assets in cable facilities are expected to reach $1.2 billion by 1990, and rise to $2.1 billion by 1994.

A need for increased capacity may not be the only factor that could force the rebuilding of cable systems. Because of the higher quality ATV signal, systems may have to be rebuilt to meet more stringent constraints on system distortion. The majority of cable systems have been designed for a minimum carrier-to-noise of 40dB, however, preliminary studies indicate that to deliver HDTV this level may have to be increased to 49dB. With less noise in the HDTV picture other distortion parameters such as phase delay will likely become more noticeable and require further attention.

An assessment of these issues is ongoing by the Communications Research Centre, the CCTA, and the Cable Labs in the United States. However, since a number of the HDTV proponent systems are not yet available for testing, it is difficult to say which of the system proponents would be robust enough to travel through the cable system without distortion or impairment.

Cable's basic coaxial technology is clearly approaching maturity. In many cases service upgrading would require new amplifiers and possibly new spacing between amplifiers, making it probably better to rewire using fibre optics.

"Going The Last Mile" with Fibre Optics

Fibre optics can offer a much improved signal quality. It is already being introduced into trunking systems both within the telephone network and cable industry, however it is not being installed by either in the "last mile" to the residential customer.

Many North American telephone companies are estimating that the cross-over-point in copper vs. fibre costs for plain-old-telephone-service are expected to be reached in the early 1990's. Thereby setting the scene for a massive investment of telephone fibre in the residential environment, just prior to the anticipated introduction of HDTV services. Telephone fibre penetration to homes could reach more than 60% by the year 2005 through growth or replacement of existing copper plant. The international development of standards for future broadband (high capacity) Integrated Services Digital Network

(ISDN) will accelerate the convergence of narrowband and broadband technology and service carriage. The first series of broadband ISDN standards is expected in 1990.

A combination of these technological forces and economic forces are eroding the existing barriers which previously prevented the cable television and common carrier industries from offering each other's services.

The prospect of a local duopoly offering a range of common services, led the Department of Communications to announce a major policy review of Canada's cable television and common carrier industries on September 2, 1989.

The issue is, how to assure the rapid and efficient introduction of new services, while at the same time fostering the development of an efficient state-of-the art local distribution infrastructure to serve Canadians. One of the important questions yet to be answered is whether local duopolies for providing competitive service would result in economic hardship for the service providers or service users.

The Possibilities of DBS

Another option in assuring the earliest and widest possible access to HDTV, especially in Canada's rural and remote areas, is the use of Direct Broadcast Satellites (DBS).

High powered direct broadcast satellite services are already in various stages of development in countries such as France, Germany, the United Kingdom, the United States, and Japan, and several techniques already exist for the broadcasting of HDTV via satellite. The advantages of using techniques such as MUSE-E and HDS-NA is that, because of relatively few spectrum constraints, they can provide one of the highest quality HDTV services possible today. For the future, the CCIR is even considering allocating a new frequency band for near studio quality, HDTV broadcast services on a world-wide basis.

There are however two problems facing high-powered DBS in Canada. With over 90% of Canadian households wired for cable television service, only a small number of Canadians have an incentive to buy dishes that could receive satellite programming. Current estimates in Canada place the number of satellite receiving households at between 250 and 270 thousand. Another equally important issue would be the initially high start up costs associated with introducing high-powered DBS to Canada.

While it would be possible in the interim to use existing lower-powered satellites to provide direct-to-home service for Canada, such a service would be up against the DBS services planned for the United States. As the United States moves towards DBS service in 1992, it will be important to keep in mind two critical issues. First, a shift towards higher-powered DBS service would allow consumers to buy smaller, cheaper, receiving dishes which would not be able to receive existing Canadian satellite signals. Secondly, it is also possible that U.S. DBS services will become advertising supported, thus providing tremendous competition to Canadian satellite and cable TV services.

It is obvious that there are a number of issues associated with each of the ATV delivery options which require further consideration, as Canada plans for the introduction

of advanced TV. However, of immediate concern during the development of the various delivery options, is the need for a hierarchical set of transmission and emission formats. A set of formats that can take best advantage of the different characteristics of each medium, while at the same time allowing conversion between formats with minimal degradation and at reasonable cost. Easy convertibility would also be an important issue in reducing the cost and complexity of home receivers. Such a hierarchical concept is now under consideration at the International Radio Consultative Committee (CCIR).

CHAPTER V

INDUSTRIAL DEVELOPMENT AND NON-BROADCAST SERVICES

Even though Canada does not manufacture television sets per se, a number of plants assemble TVs for the North American market.

One important difference in HDTV receivers is their greater need for semiconductor components. A Canadian semiconductor venture, has already become involved in HDTV semiconductor development. Mosaide Inc. signed an agreement with Sanyo in April, 1989 to design a 4-Mb dynamic random access memory chip that will be used for HDTV and other applications. Sanyo will develop the technology for mass production in Japan this fall.

The other manufacturing in Canada which is related to television, is basically a group of some 12 companies who produce TV studio equipment. In 1984, these companies, which employed some 700 employees, had sales of roughly $50 million, 70% of which came form exports. In March 1986, a Broadcast Equipment Development Board, representing Canadian manufacturers, requested government funding in order to undertake major R&D programs to remain internationally competitive. The Department of Communications was unable to support the R&D initiative at that time, and instead contracted Nordicity Group to develop a strategic plan that would take the industry from their present analogue systems to digital and High Definition TV. Based upon this strategic plan, Ontario, which is home for the majority of the manufacturers, has agreed under the Ontario Technology Fund to fund development of a number of projects:

ADCOM Electronics -will receive $1.9 million to develop an integrated post production management system for film and TV productions.

Digital Video Systems -will receive $2 million for a line of high quality TV image conversion products to go between analogue and digital formats.

Leitch Video -will receive $4.6 million for three interrelated projects: a digital component encoder/decoder subsystem; a digital routing switcher; and a digital RGB picture monitor.

McCurdy Radio Indust. -will receive $2.8 million for a digital audio console to be used in TV and radio production studios.

Ross Video -will receive $1.3 million to develop a digital production switcher product line.

With the delays in standards setting, a number of people feel that, because they are less dependent on standards, business applications will be the first market for HDTV in North America. In October, 1989, Telesat Canada will start a two-year trial of such services as: closed-circuit transmission of cultural and sports events, and the telecasting of conferences, meetings, and special events. Other possible applications which have also been talked about include: teleconferencing and product promotion; high quality image storage and retrieval for publishing and medical imaging; computer graphics for tactical displays and simulation and training. It may be that HDTV can provide a number of niche market opportunities for Canada.

CHAPTER VI

TOWARDS AN "ADVANCED TV STRATEGY" FOR CANADA

Broadcasting in Canada, though an industry, has first and foremost been a public service - a means for cultural expression, education, and enlightenment. However, TV, the most influential means of cultural expression in today's world, requires expensive technology. Thus the cost of converting to Advanced TV (ATV) equipment, equipment that could be almost three times that of NTSC equipment, presents an enormous challenge for Canada both industrially and culturally.

It is obvious that, considering the international initiatives that are already underway, Advanced TV is coming. From the market research to-date, it would seem that ATV sales will account for some 30% of the market within 10 years. The question as to which ATV systems will be used to produce and distribute these new programming services will depend heavily on testing which will be conducted during the next 2 years.

Canada must therefore develop a strategy for the introduction of ATV in order to ensure Canadian interests are protected.

A number of steps have already been taken towards such a strategy:

Canadian Advanced Broadcast Systems Committee (CABSC)

The debate about the introduction of Advanced TV in Canada was launched by the Department of Communications in June 1987, when it helped to establish the Canadian Advanced Broadcast Systems Committee. With representation from Canada's TV broadcasters, cable TV operators, satellite services, and equipment manufacturers, this committee has provided a joint industry/government forum for examining key issues associated with the implementation of Advanced TV in Canada. With the support of the Communications Research Centre, the CABSC has established a high credibility in the United States.

At the May 17, 1989 General Meeting of the CABSC, it was recommended that a program of work be undertaken over the next five years to conduct: "industry liaison studies"; subjective testing of candidate systems; to complete the work on cable channel characterization; and to conduct studies into digital audio. The Department of Communications has already committed $1.8 million towards the subjective testing of

candidate systems and the CABSC has recently asked Canadian industry to match these funds.

On June 27, 1989, the CABSC issued a press release on an interim report of their Strategy Sub-Committee. The press release highlighted their current assessment that: "To remain competitive, all television broadcasters and cable operators must be able to offer some form of improved picture and sound quality in the future", and that "If the widest possible audiences are to be captured, it is important that licensees transmitting ATV services continue to reach viewers with older receivers".

Canada Gazette Notice

Broader public consultations have also been conducted through a July 1987 Canada Gazette Notice on "Implementation Strategies for Advanced TV Services". A paraphrasing of some of the responses provides a broader perspective on the issues facing Canada.

Apart from the stressing that all growth in ATV will depend on the availability of program material, a primary concern in Canada seems to be "whether spectrum will be available in the future". It was pointed out that spectrum efficiency should continue to be a major area of study, since there were concerns that "the introduction of advanced TV may further deteriorate the inefficient use of the broadcast spectrum". If advanced TV were to require greater spectrum, it was stressed that the established needs of other services must also be considered.

While the submissions also suggested that all transmission systems should be allowed to develop the capability to deliver ATV services, this was tempered by comments about the feasibility of such an approach. A common distribution standard may be desirable, but not possible. As we are seeing with the ability of TV receivers to accept multiple input formats and the continuing improvements in VCR picture quality, it is no longer possible to restrict the quality that different distribution media can provide. However, considering that the majority of Canadians receive their programming from cable TV systems, it was felt that as a minimum, any distribution formats adopted should be compatible with coaxial cable delivery.

A key question was raised, as to which program providers will be able to economically support another format. There was a general feeling that over-the-air broadcasters will likely have major difficulties with spectrum considerations and the enormous capital outlays required. While an evolutionary approach towards the introduction of ATV would be the least disruptive, some were concerned that consumers will not perceive enough difference in signal quality. Thus for technical, economic and good spectrum management considerations, many thought that "the primary initial transmission medium in Canada may be the cable television industry, and that delivery of these services through satellite-to-cable will open up a small direct to home market for uncabled areas. Over-the-air broadcasters will not be a major player in the initial stages of implementation".

Other Activities in Support of a Strategy

Canada's first experience in HDTV production came with the CBC's Chasing Rainbows. The quality of the HDTV picture is so good that the CBC used it in lieu of 35-mm film. The good part is that producing in HDTV can give television a cinematic level of brightness and picture quality, at an estimated savings of 15 per cent over film, with no loss in quality. The 14-hour mini-series, was converted to NTSC for distribution. It was first aired in March 1988 getting some of the most positive audience response ever for a CBC production, and has since been re-released in June of 1989.

In terms of service trials, on April 28, 1989 Telesat Canada announced its plans for an application trial to explore the use of high definition television in a satellite environment. Starting in October, Telesat's two-year Advanced Television Applications Trial will provide closed-circuit transmission of cultural and sports events, and the telecasting of conferences, meetings, and special events. During the trial, organizations will be able to lease any or all components of the network to conduct test productions, technical trials, market research, demonstrations, and applications trials.

To provide Canadian industry and policy makers access to the influential players throughout the world, the CBC, DOC, National Film Board, and Telesat Canada will jointly sponsor what will be Canada's fourth International Colloquium on Advanced TV, June 25-29, 1990, in Ottawa. This follow-up to earlier colloquia which were held in 1982, 1985, and 1987 will provide a focal point for reviewing the current stage of development of Advanced TV around the world.

All of these initiatives are contributing towards the overall objective, the development of an HDTV implementation strategy for Canada. A strategy that would serve the public interest by providing Canadians an increased choice and availability of quality Canadian programming, using the most efficient and effective technologies possible.

An Advisory Committee

While there has been much debate about the introduction of ATV, it has yet to come to focus on the important issues for Canada. For this reason, Marcel Masse, the Minister of Communications has decided to establish an advisory committee on the "Introduction of Advanced TV in Canada".

Similar to the recent Advisory Committee on Integrated Services Digital Networks (ISDN), this committee will consist of representatives from various interest groups, and be headed by an independent chairperson, soon to be announced by Mr. Masse.

The basic mandate of the advisory committee will be to study and report back on the issues and options relating to the introduction of Advanced TV in Canada, and to recommend future courses of action by March 31, 1990.

PRIVATE SECTOR ADVISORY COMMITTEE ON ADVANCED TV

TERMS OF REFERENCE
OUTLINE

Committee Composition:

Chairman, to be appointed by the Minister, will direct the deliberations and, after consulting the committee, will be responsible for making a report to the Minister identifying the issues and recommending courses of action, no later than March 31, 1990.

Committee members, to be named by the Minister after consultation with the Chairman and various interest groups, will include representatives from various interest groups, such as: manufacturers, service users, and service providers.

Mandate:

to examine all aspects of ATV implementation and service provisioning that affect the public interest; and

to identify the issues and options.

Committee will take into Consideration:

NEW SERVICES - that may become available

THE DEFINING CHARACTERISTICS OF ATV - as they relate to the new services envisioned

IMPLEMENTATION OPTIONS FOR CANADA -

THE EFFECT OF EACH OPTION ON: - existing services, service subscribers, and on the industry in general

THE EXTENT TO WHICH EACH OPTION WOULD ENABLE CANADA'S BROADCASTING SYSTEM TO EVOLVE TOWARD THE BLUEPRINT OUTLINED IN THE GOVERNMENTS POLICY AND LEGISLATION.

- the overall guiding principles of the Broadcast Policy for Canada as announced by the Minister of Communications on June 23, '88 are:

INCREASING THE CHOICE AND AVAILABILITY OF CANADIAN PROGRAMMING:

improve the quality and quantity of television production through increased spending

provide efficient delivery of programming at affordable rates, using the most effective technologies
(specifically, CBC programming should be made available throughout Canada by the most appropriate and efficient means)

allow broadcasters to choose the best and most competitive technology available.

improve access to broadcasting services by Canadians in remote and smaller communities

WHICH PRINCIPLES AND OPTIONS RELATED TO INTERNATIONAL RECOMMENDATIONS BEST MEET CANADIAN NEEDS.

and any others aspects considered appropriate.

By:

considering written submissions; and

holding public meetings as it sees fit, in order to solicit comments from interested parties

Technology, Policy and Planning
Branch
300 Slater Street
Ottawa, Ontario
K1A 0C8

Canada