doucet & associates
consulting ltd.

1200 McGill College Avenue
Capitol Centre, suite 1520
Montreal, Quebec H3B 4G7
(514) 866-5836
Twx: 610-421-3390

RURAL COMMUNICATIONS IMPROVEMENT PROGRAM: CABLE TELEVISION SYSTEMS IN NEWFOUNDLAND: TECHNICAL AND ECONOMIC STUDY

EXECUTIVE SUMMARY

D. Belanger, Eng.

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TABLE OF CONTENTS

LIST OF TABLES

CONTRACTUAL IDENTIFICATION

The following document is a summary of the final report submitted to the Department of Supply and Services Canada under:

Contract no.: 175ST.36001-8-4630

Title: "Cable Television Systems in Newfoundland/ Technical and Economic Study".

It is submitted to Mr. Fernand Leger of the Department of Communications, Ottawa, for approval since he is designated as the Scientific Advisor for the project.

The work was undertaken by Doucet and Associates Consulting Limited, Montreal, in collaboration with an external advisor.

PROJECT TEAM AND RESPONSIBILITIES

The team consisted of the following key persons:

M. Primiani	-	Project manager for the first part of the project
D. Belanger	-	Engineering and project manager for the final phase of the project
Y. Lambert	-	Engineering and Field surveys
D. Finch	-	Data gathering in Newfoundland

EXTERNAL ADVISOR

G. LeBlanc	-	Economic Analysis

ABSTRACT

The growing need for providing unserved urban and rural communities with cable television service is an important social issue.

Lack of cable television service to these areas is due to the relatively high investment cost required to establish the local distribution system and to the cost of bringing to these distribution systems a suitable range of television signals.

Hopefully this study will stimulate the cable industry to invest in the potential communities defined in this report and for Government to formulate policies conducive to the extension of cable television to the unserved population.

1.0 INTRODUCTION

Since cable television service was introduced some 25 years ago, the number of cable systems has increased rapidly. Today more than 50% of the households in Canada, mostly concentrated in urban areas are served by cable television.

While most of the large cities and communities in urban areas are already cabled, unfortunately the situation is quite different in rural areas of Canada with very few rural communities provided with cable television service. Therefore, endeavours to extend cable television to rural areas of Canada should be given serious consideration.

Feasibility studies have been carried out in the past for different provinces of Canada but never for Newfoundland and Labrador. Although this study is primarily concerned with cable television service in Newfoundland and in Labrador, the fact that it explored satellite technology to bring remote television signals to communities, permits some of the conclusions to be applied to other regions of Canada.

This study deals with the fundamental question of the technical feasibility and commercial viability based on cost and revenue, for establishing small CATV systems in communities having a population of 500 or more and 25 households or more per road mile for the province of Newfoundland and Labrador.

The study considers 114 communities of Newfoundland and Labrador which represent more than 45 500 households or 199 000 people. This is equivalent to approximately 50% of the population which does not receive cable television services in Newfoundland and Labrador. In Newfoundland alone more than 39 000 households, or 170 000 people have been considered. This represents 107 distinct communities, with some 895 miles of roads.

The findings of the study are presented in the main report made out of sixteen sections. The first half of the report deals with the technical feasibility of bringing cable television services to various communities, including associated capital and operating costs. The second half deals with the commercial analysis of the various options of bringing cable television to identified communities and it includes conclusions and recommendations.

LEVEL OF EFFORT

The study represents approximately 1 800 man-hours.

2.0 TERMS OF REFERENCE

As a result of an "Unsolicited Proposal" (Reference no. UP-D-128), Doucet & Associates was awarded this contract on January 11, 1979.

The mandate for this study was in accordance with the scope of work outlined in the original unsolicited proposal dated September 29, 1978 with amendments as per letter from Doucet & Associates of November 27, 1978. Its terms of reference can be summarized as follows:

. That the study, will deal with the technical and economical feasibility of extending cable television service to communities having a population of 500 or more and a household density of 25 or more per road mile for the province of Newfoundland and Labrador.

. That it will develop a data base on typical cable television designs and costs applicable to rural communities.

3.0 METHODOLOGY

Procedures and Methodology followed in carrying out this study are outlined below:

3.1 Data gathering

The main input to our study has been a previous report entitled "Demographic Study of the Extention of Cable Television to Rural Areas of Newfoundland and Labrador". It was prepared by the Department of Transportation and Communications, Government of Newfoundland and Labrador, in December 1978.

The demographic report identifies all the unserved communities in Newfoundland and Labrador having 500 people or having more than 25 households per road mile. The number of households and of road miles for each community have been summarized.

For the purpose of our study, field surveys were carried out in six communities. These surveys were made to gather representative date to facilitate the preparation of mathematical models which were applied to the development of cable distribution capital costs for various types of communities.

3.2 Design Options Considered

Network designs were developed, taking into consideration different types of communities and different trunking systems. These design options were:

a) communities were studied, using stand alone or common head-end for a cluster of communities;
b) to accommodate (a), we used two large trunking alternatives for bringing a minimum of two U.S. television signals. These alternatives were:
   i) extension of existing microwave system already carrying the two U.S. television signals;
   ii) application of satellite earth stations operating via ANIK A and assuming availability of the signals.

Optimum network configuration for each of the above trunking alternatives and head-end options were chosen.

3.3 Capital and Operating Costs

The capital costs for the cable distribution systems were established for each community using the mathematical models.

The capital costs for head-ends, microwave trunking (including AML Hubbing) and satellite earth stations (TVRO's) were established as well as costs associated with land, building, towers, etc ...

Leasing cost for part of the microwave trunking facilities were developed in consultation with the existing common carriers.

Operating costs associated with various types of capital outlays were determined.

3.4 Tariffs and Commercial Viability

A series of monthly tariffs per household and community or group of communities were derived for the various design options using:

a) various rates of return on capital investment;
b) various market penetration;
c) projected operating inflation rate.

4.0 RESULTS AND OBSERVATIONS

4.1 Tariffs

The results and observations are taken from tables 1 and 2, which summarize the various options studied. These tables illustrate, for each technical alternative, the number and percentage of households and communities falling within certain monthly tariff categories. For discussion purposes, in this report, we have categorized the tariffs as follows:

Tariff	Category
Tariff of less than $10/month	Excellent
Tariff between $10 and $15/month	Acceptable
Tariff between $15 and $20/month	Marginal
Tariff of more than $20/month	Not viable

Also for discussion purpose, we have based our observations on a 17% rate of return on investment with 0% inflation rate since inflation would be taken care by rate increases. This could be considered the minimum level of return on investment sought by the cable industry. A 60% market penetration was used as a criteria.

4.2 Design making extensive use of AML Microwave in Newfoundland

4.2.1 Capital Investment

Microwave facilities making extensive use of AML systems were throughly studied in Newfoundland in order to accommodate groupings of communities under a common head-end.

Some 114 communities in Newfoundland alone were clustered under 19 head-ends and fed by conventional microwave network, already carrying the two U.S. television signals. The capital cost of the overall project was estimated at $18.1 millions. A significant cost reduction was achieved by eliminating seven communities from the project for a revised estimated overall project cost of $15.7 millions.

The study revealed that all except two community groupings have a prorated capital investment of more than $300 per household which compares badly with the national average for small systems which is below $200.

Operating costs per household in the communities under this design alternative are very high as compared with the Canadian average of $49/household.

Compared to other existing CATV systems, the high investment per household is attributed to a large extent to the heavy investment of trunking the U.S. television signals to each community.

4.2.2 Rates

As shown in the first row of tables 1 and 2 of the nineteen (19) groupings of communities analyzed in Newfoundland, only two (2) groupings fall within the "acceptable" tariff category with the balance either "marginal" or "not-viable".

These tables also indicate that individual communities comprising 9 205 households are in the "acceptable" tariff category with the balance of the communities falling in either the "marginal" or "non-viable" categories.

4.3 Design making use of microwave relay system in Labrador

Results for the analysis carried out in Labrador are calculated in table 1 and 2, second row. These results indicate that all communities in Labrador except for Labrador City fall in the "non-viable" tariff category.

4.4 Potential Communities studied on a Stand alone Basis using Microwave Trunking

This option considers 22 000 households with 32 communities. Although the design was considered primarily for communities on a stand alone basis,

in order to realize economies of scale in some cases communities in close proximity to one another were grouped under one head-end. For example this is the case of Lewisporte which is first analyzed with Embree and Little Burnt Bay and then on a stand alone basis. These communities are identified in table no. 3.

All the results of the economic analysis have been summarized on table 1 and 2 (fourth row) in terms of households and communities per tariff category. As can be seen from these tables, none of these communities falls in the "excellent" tariff category, but ten (10) communities are in the "acceptable" range. These ten communities represent 31.2% of the 32 communities studied.

4.5 Communities to be fed individually using Satellite Earth Station (TVRO)

This alternative is based on the assumption that two suitable foreign networks would be made available on Anik A type of satellite, at a very low cost per subscriber.

Also, each community is assumed to have its own two channel earth station.

Within the 114 communities analyzed, twelve (12) fall within the "excellent" category and they are listed as follows:

Lewisporte	$7.61/month
Springdale	8.72/month
Baie Verte	9.83/month
St. Anthony	9.90/month
Marystown	7.29/month
Fortune	9.86/month
Grand Bank	8.07/month
Placentia	8.80/month
Clarenville	9.43/month
Bonavista	8.98/month
Happy Valley	5.26/month
Labrador City	4.46/month

As shown in table 1 an 2, fifth row, these communities represent more than 33% of the households studied in Newfoundland and Labrador.

It is to be noticed that a significant improvement of the commercial viability of cable services is achieved with satellite technology, especially in the "non-viable" tariff category.

4.6 Grouping of Communites to be fed using Satellite Earth Station (TVRO)

Further optimization of the economics of providing cable services via satellite can be achieved through the grouping of communities under a single TVRO. In our study we have considered 37 communities, which are listed in table 4.

As shown in table 1 and 2, sixth row, further economies of scale are achieved using a common TVRO for selected groupings. As indicated, 71.9% of the households now fall in the "excellent" and "acceptable" tariff categories. This represents improvement of 8% from the individual TVRO design.

5.0 CONCLUSIONS

From the results obtained, we derived important conclusions concerning the commercial viability of extending cable television service in Newfoundland and Labrador. However, it is to be noted that a higher rate of penetration and/or lower rate of return on investment for the community studied would provide better results.

5.1 Conclusion no. 1

The various designs studied using terrestrial microwave design facilities to deliver the two U.S. television signals and to achieve grouping of communities under a common head-end proves to be too costly for the majority of the communities studied in Newfoundland. For most of the communities, a monthly tariff exceeding $15/customer is required.

As discussed in section 4.2.1 of this executive summary the reason for the non-commercial viability of providing cable services to most of the communities studied is due to the high capital investment required.

5.2 Conclusion no. 2

The use of a satellite earth station for each community to deliver the two U.S. television signals shows a significant improvement in the commercial viability of extending cable television services to the communities studied in Newfoundland and Labrador. In terms of households, more than 33% fall in the "excellent" tariff category or less than $10/month/customer.

Moreover, another 30.9% of the total households studied fall within the "acceptable" tariff category or between $10 and $15/month/customer.

It is assumed that the two U.S. television signals are available on the Anik A satellite at a minimal cost per subscriber.

5.3 Conclusion no. 3

Further improvement can be achieved by grouping several communities under a common satellite earth station and head-end and by using trunk cable to link these communities. This grouping of communities ensures that an additional 8% of the studied households will be added to the tariff categories and to the results defined in conclusion no. 2.

6.0 RECOMMENDATIONS

In view of the general nature and scope of the study - considered were 114 communities under various technical options- we believe that there is scope for more in-depth studies of the technical means and commercial viability included in providing rural communities in Canada with multi-channel television service.

In this section, Doucet & Associates wish to present their recommendations with regards to a framework for further studies aimed at the development of methods to achieve extension of multi-channel cable television service to communities across Canada who at present lack this service due to the high capital and operating costs involved in providing such service.

6.1 Recommendation no. 1

We believe that studies previously carried out in Nova Scotia, New Brunswick and Prince-Edward Island with regards to extension of cable television service to rural communities should be updated through application of the methematical model and of the economic approach developed in our study. Also applied to the revision of the studies for the above referenced provinces would be the network designs using Satellite Earth Stations (TVRO).

We believe that the methodology we used in our study plus application of satellite technology may indicate a high degree of commercial viability for communities which may otherwise not be considered for cable television distribution systems.

6.2 Recommendation no. 2

In our study we have identified in Newfoundland a number of communities which are in the "non-viable" tariff category. We believe that further studies should be aimed at these communities in order to develop network designs which would incorporate the latest in technology in order to transfer these communities from "not-viable" to a "marginal" or better tariff category.

6.3 Recommendation no. 3

Our study has been based on the use of cable television systems as a basis for providing extra television service to rural communities. There is however a study being prepared for the Department of Communications which is carried out by D.G.B. Consultants Inc. of Montreal and which is entitled "Multi-channel Rebroadcast Stations for use in Rural Areas in Canada".

We believe that a comparative analysis of the two studies should be undertaken with the aim of determining which of the two approaches, cable systems or rebroadcasts, should be recommended for rural communities across Canada. Such a study may develop a master plan for all rural communities across Canada.

	TOTAL HOUSEHOLDS CONCERNED	TOTAL COMMUNITIES CONCERNED	TARIFF EXCELLENT T < $10		TARIFF ACCEPTABLE $10 < T < $15		TARIFF MARGINAL $15 < T < $20		TARIFF NOT VIABLE T > $20	
			NO. OF HOUSEHOLDS	NO. OF COMMUNITIES	NO. OF HOUSEHOLDS	NO. OF COMMUNITIES	NO. OF HOUSEHOLDS	NO. OF COMMUNITIES	NO. OF HOUSEHOLDS	NO. OF COMMUNITIES
Design Using AML (excluding Labrador)	37 729	100	—	—	9 205	14	6 279	15	22 245	71
Labrador Only (with microwave feeds)	6 332	7	—	—	3 830	1	—	—	2 502	6
TOTAL	44 161	107	—	—	13 035	15	6 279	15	24 747	77
Communities Studied on a stand alone, with microwave feeds	22 005	32	—	—	7 172	10	4 490	6	10 343	16
Individual TVRO per community	45 716	114	15 100	12	14 127	23	6 846	21	9 643	58
Grouping of communities with TVRO	19 044	37	3 523	4	12 802	21	1 886	7	833	5
TVRO Individuals plus groupings	45 716	114	13 683	11	19 204	36	3 904	13	8 925	54

TABLE

NUMBER OF HOUSEHOLDS AND COMMUNITIES PER TARIFF CATEGORY, FOR EACH OPTION STUDIED

	TOTAL HOUSEHOLDS CONCERNED	TOTAL COMMUNITIES CONCERNED	TARIFF EXCELLENT T < $10		TARIFF ACCEPTABLE $10 < T < $15		TARIFF MARGINAL $15 < T < $20		TARIFF NOT VIABLE T > $20	
			% OF HOUSEHOLDS	% OF COMMUNITIES	% OF HOUSEHOLDS	% OF COMMUNITIES	% OF HOUSEHOLDS	% OF COMMUNITIES	% OF HOUSEHOLDS	% OF COMMUNITIES
Design Using AML (excluding Labrador)	37 729	100	—	—	24.4	14.0	16.6	15.0	59.0	71.0
Labrador Only (with microwave feeds)	6 332	7	—	—	60.5	14.3	—	—	39.5	85.7
TOTAL	44 161	107	—	—	29.5	14.0	14.2	14.0	56.3	72.0
Communities Studied on a stand alone, with microwave feeds	22 005	32	—	—	32.6	31.2	20.4	18.8	47.0	50.0
Individual TVRO per community	45 716	114	33.0	10.5	30.9	20.2	15.0	18.4	21.1	50.9
Grouping of communities with TVRO	19 044	37	18.5	10.8	67.2	56.8	9.9	18.9	4.4	13.5
TVRO Individuals plus groupings	45 716	114	29.9	9.6	42.0	31.6	8.6	11.4	19.5	47.4

TABLE I

PERCENTAGE OF HOUSEHOLDS AND COMMUNITIES PER TARIFF CATEGORY, FOR EACH OPTION STUDIED

1) Lewisporte (a) (including Embree and Little Burnt Bay)

2) Lewisporte (b) alone

3) Springdale

4) Baie Verte

5) St-Anthony

6) Pasadena

7) Meadows (including Irishtown and Summerside)

8) Halfway Point

9) Burgeo

10) Burin

11) Marystown (b) (including Burin)

12) Marystown (b) (including Burin)

13) Fortune

14) Grand Bank (a) (alone)

15) Grand Bank (b) (including Fortune

16) Placentia

TABLE 3

LIST OF COMMUNITIES STUDIED ON A STAND ALONE BASIS.

17) Harbour Main, Brigus, Bay Roberts, Spaniard's Bay and Upper Island Cove

18) Brigus, Bay Roberts, Spaniard's Bay and Upper Island Cove

19) Clarenville

20) Bonavista

21) Glovertown

22) Gambo

23) L'Anse au Loup

24) Port Hope Simpson

25) Cartwright

26) Happy Valley

27) L'Anse au Loup, Port Hope Simpson, Cartwright and Happy Valley

28) Botwood

TABLE 3 (continued)

LIST OF COMMUNITIES STUDIED ON A STAND ALONE BASIS .

COMMUNITY WHERE THE REGIONAL TVRO IS INSTALLED	COMMUNITIES LINKED BY CABLE	ROAD MILES TO MASTER OR PRECEEDING COMMUNITY
EMBREE	Lewisporte	2.4
	Little Burnt Bay	3.5
PORT SAUNDER	Port aux Choix	4.7
MEADOWS	Summerside	1.2
BURNT ISLAND	Isle aux Morts	6.3
FORTUNE	Grand Bank	2.4
BURIN	Marystown	3.2
PLACENTIA	Fox Harbour	5.9
CHAPEL ARM	Norman's Cove	0.4
DILDO	Blaketown	4.3
	Wittbourne	4.0
FERMEUSE	Ferryland	7.1
	Cape Broyle	4.7
HARBOUR GRACE	Upper Island Cove	4.3
	Spaniard's Bay	2.4
	Bay Roberts	0.8
	Brigus	0.8
	Harbour Main	4.3
WESLEYVILLE	Badger's Bay	1.0
MUSGRAVETOWN	Buyan's Cove	4.7
ELLISTON	Bonavista	3.2
	Little Catalina	7.9
	Port Union	1.2

TABLE 4

LIST OF COMMUNITY GROUPINGS UNDER A SINGLE TVRO

RURAL COMMUNICATIONS IMPROVEMENT PROGRAM : CABLE TELEVISION SYSTEMS IN NEWFOUNDLAND : TECHNICAL AND ECONOMIC STUDY : EXECUTIVE SUMMARY