

SACRAMENTO METROPOLITAN



Cable
CTC Television
 Commission

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ROBERT E. SMITH
 EXECUTIVE DIRECTOR

April 26, 1984

For Commission Meeting of:
May 3, 1984

To: Sacramento Metropolitan Cable Television Commission
 From: Bob Smith, Executive Director
 Subject: SYSTEM DESIGN & ENGINEERING

Summary.

On April 17, 1984, Cablevision submitted documentation to resolve all outstanding technical design issues necessary to complete the Final Design Approval, including a request to substitute three items of equipment originally listed in the Application. I am pleased to report that Hammett & Edison has recommended by the attached April 24, 1984 letter that with the three exceptions described below, the Final System Design and the equipment substitutions meet the criteria of the Resolution and are, therefore, ready for your approval.

In addition, as reported to you at the last meeting, Cablevision has agreed with the terms set forth by Hammett & Edison for an Alternative Test Plan for the Galt AM microwave and this is also recommended for your approval.

Final System Design.

Cablevision submitted an extensive microwave study which incorporated all missing aspects of the previous studies. This study uses the correct coordinates for the proposed hub sites, incorporates all necessary frequencies, and considers the Home Satellite Entertainment operation. Hammett and Edison has determined that the Final System Design as submitted by Cablevision can be recommended with three exceptions:

1. Fair Oaks Interconnect.

The System Design Approval does not include authority to construct a system interconnect to or from the Fair Oaks hub site pending submission of an Alternative System Design request relative to using supertrunk to link the Fair Oaks and Del Paso hubs.

This exception results from Cablevision's desire to minimize adverse esthetic impact to the Fair Oaks community by eliminating the need to construct a 125-150 foot tower. Avoiding construction of this tower will require Cablevision to submit an Alternative System Design request which satisfies our engineers and the Commission that the super trunk interconnect proposal is equivalent or better than the design in their Application. This change also serves to benefit Cablevision because the preliminary microwave tests

indicated potential interference on the Downtown to Fair Oaks link and thus may have required special signal processing equipment. While exact figures are not yet available, this change is likely to prove more costly to Cablevision than the originally proposed microwave interconnect.

2. Satellite Receive Antennas.

A second exception is due to computer studies which indicate very poor satellite signal receptions at both the Elk Grove and Downtown sites due to interference from other microwave sources. The initial data prepared by an independent consultant and submitted by Cablevision indicates the need for extensive shielding from other interfering microwave sources, to the point that relocating the satellite antennas away from the hub sites is likely. In that event, new data on the antenna interconnect to the hub sites would also be required and reviewed by our engineer before final approval can be granted.

This data must include specific field engineering tests, to verify the quality and feasibility of satellite TV reception at the Downtown and Elk Grove hub sites prior to construction and installation of the antennas.

3. Upgraded Microwave Antennas.

The microwave tests conducted by Cablevision's independent consultant and the ensuing recommendation for approval by our engineers are based on the use of high performance microwave antennas which are different than those specified originally in the Cablevision Application. Therefore, use of the original antennas is not approved and installation of upgraded antennas is required following submission and approval of an equipment substitution request for the higher performance antennas.

Equipment Substitution.

As required by the Resolution, Cablevision submitted to our engineers detailed technical specifications to substitute different equipment for the originally specified satellite receivers, amplifiers and stand-by power supplies. According to our engineers, this equipment provides overall equivalency or superiority to the equipment originally proposed.

Changes in Technical Specification.

The equipment substitution changes described above necessitate changes to several of the technical standards contained in the Franchise Resolution to reflect the new equipment's capabilities. Also, Resolution Section II-8b(2)(a) requires the Commission engineer to calculate certain amplifier cascade specifications within six months of the franchise award. These specifications are described in the attached Hammett & Edison letter. According to our engineers it is important to amend the Resolution to reflect the most recent calculations of the system specifications to ensure that our request to the FCC for a waiver of the FCC technical standards is supported by the most accurate and recent technical information.

Galt AM Microwave Test.

In February the Commission approved a requirement that Cablevision initiate the Galt AM microwave test by August 1st of this year unless an alternative plan could be agreed upon by our engineers. Such an alternative plan has been prepared and agreed to in writing by our engineers and by Cablevision as was reported to you at the last Commission meeting.

As stated in the Hammett & Edison letter of April 6, 1984 (attached) the Alternative Test Plan accommodates Cablevision by permitting tests in June, 1986, a time more appropriate to their overall construction schedule, but still provides sufficient lead time to implement any mitigating measures required from the test analysis. In fact, as specified by our engineer, this Alternative Test Plan provides for a more costly and reliable test because Cablevision will be testing with the 10 foot dishes on taller and sturdier towers. These towers must be capable of mounting seven antennas rather than the four contained in the Application. Further, Cablevision has agreed in advance to several mitigation measures including use of a diversity system (two antennas), low noise amplifiers or other measures if necessary to achieve the required minimum technical specifications.

The estimated additional costs of conducting the tests in this manner are \$10,000 and the costs of implementing the agreed upon mitigation measures could exceed \$100,000. However, with these additional stipulations, we are assured of the signal quality if the test results indicate that the Cablevision original design fails to meet the performance standards included in the Ordinance.

Your approval of the equipment substitution, Final System Design and Galt Microwave Tests, even with the Fair Oaks interconnect and satellite system exceptions, will allow Cablevision to proceed with plans for construction upon completion of the environmental process.

Resolution Amendment Process.

Changes in the technical specification and Galt microwave alternative testing plan require an amendment to the existing Resolution. However, neither the Ordinance nor the Resolution include provisions for amendment. Commission Counsel Dave McMurtry advises that the most efficient and expedient temporary solution to this problem is to follow the same Ordinance procedures as was used in adopting the initial Resolution. Therefore, it is necessary that each jurisdiction concur on the proposed amendment.

Therefore, it is recommended that you:

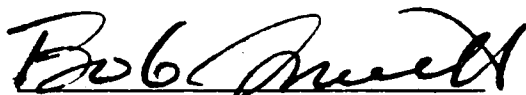
- (1) Approve, pursuant to Resolution Section II-15, the Final System Design as detailed in the April 24th Hammett & Edison letter including site locations, amplifiers cascades and technical specifications, except for: 1) the Fair Oaks interconnect; 2) the placement of the satellite antennas for downtown and Elk Grove; and, 3) use of non-upgraded microwave antennas.

Cable Television Commission

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- (2) Approve, pursuant to Resolution Section II-9, the equipment substitutions for amplifiers, satellite receivers and power supplies according to the April 24th Hammett & Edison letter.
- (3) Approve the revised technical specifications as recommended by Hammett and Edison.
- (4) Approve the Alternate Test Plan for the Galt AM microwave as outlined in the April 6, 1984 Hammett & Edison letter.
- (5) Upon receipt of a letter from Cablevision agreeing to all these conditions, direct Commission Counsel to prepare a Resolution Amendment incorporating these changes and recommend approval to the participating jurisdictions.



BOB SMITH, Executive Director
Sacramento Metropolitan Cable
Television Commission

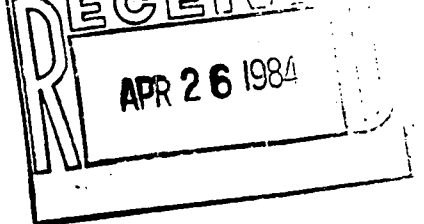
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Attachments:

1. Hammett & Edison letter dated April 24, 1984
2. Hammett & Edison letter dated April 6, 1984

84-019

HAMMETT & EDISON, INC.
CONSULTING ENGINEERS
RADIO AND TELEVISION



ROBERT L. HAMMETT, P. E.
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ROBERT P. SMITH
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April 24, 1984

FEDERAL EXPRESS

Mr. Robert E. Smith
Executive Director
Sacramento Metropolitan Cable Television
Commission
700 H Street, Suite 2500
Sacramento, California 95814

Dear Bob:

This letter will serve as a response to Cablevision's April 17 letter concerning final system design approval and equivalency requests for satellite receivers, standby power supplies, and trunk/bridger amplifiers. With two exceptions, we recommend that final system design approval be granted to Cablevision of Sacramento. The two exceptions are the Downtown/Fair Oaks interconnect (Item 3) and TVRO siting for Downtown and Elk Grove (Item 8).

I have carefully reviewed the attachments to the Cablevision letter of April 17. My comments and recommendations are as follows:

1. Microwave system. The April 16, 1984, revised Compucon microwave study includes the correct Home Satellite Entertainment Limited (HSE) transmitter coordinates, all 18 HSE frequencies, both Galt sites, and additional FM frequencies between downtown and Del Paso. Subject to the two conditions listed below, I can now recommend final system design approval for the microwave system.

- a. The HSE Sunrise Village path was studied by Compucon with the wrong transmit polarity. The path was studied as horizontally polarized whereas the HSE application specified vertical polarization. However, in response to my April 19 telephone call to Barbara Haby at Compucon, she explained that although not stated in the report, the HSE paths had been studied for both polarizations and had been found to clear each case. Therefore, the Compucon study remains valid even with the polarization error.

- b. The Compucon study concludes that the Cablevision microwave proposal will clear existing and proposed systems only if Cablevision employs upgraded microwave antennas. Therefore, final design approval should be conditioned on Cablevision's agreement to use the upgraded microwave transmit and receive antennas specified in the Compucon study. Additionally, it is understood that 10-foot ultrahigh performance dishes as proposed by Cablevision will be used in the Elk Grove/Galt microwave interconnect, even though Compucon found the system would clear using 8-foot ultrahigh performance dishes. The larger dish sizes are needed to maintain a satisfactory signal level for the Elk Grove/Galt microwave interconnect.

2. Galt site designations. We will adopt the designation "Galt 1" for the Galt transmit and receive site (North Latitude 38° 16' 00", West Longitude 121° 17' 30"), and the designation "Galt 2" for the Galt receive-only site (North Latitude 38° 15' 08", West Longitude 121° 18' 22").

3. Downtown/Fair Oaks interconnect. We understand that Cablevision will submit an alternative system design request for the Downtown/Fair Oaks interconnect. Accordingly, our recommendation for Final System Design approval does not include the Downtown/Fair Oaks interconnect.

4. Satellite receiver substitution. Based upon Cablevision's stipulation that 90° K LNC's will be utilized, we recommend approval of the Equivalency request to substitute Avantek Model AR1000 satellite receivers for M/A-COM Model 4003 satellite receivers.

5. Location of system hubs. The calculations provided for the Fair Oaks and Elk Grove hubs, which assume use of the Jerrold X series amplifiers, satisfy us that improved noise and distortion performance will result even with the revised hub locations and resulting increased trunk length. Therefore, we recommend final design approval for the locations of the Fair Oaks, Del Paso, Downtown, Elk Grove, and Galt hubs.

6. Distribution system amplifier substitution. We recommend approval of the Equivalency request to substitute the Jerrold X series amplifiers for the Jerrold JN450 series amplifiers. Although the X series amplifiers have a slightly relaxed flatness specification compared to the JN series amplifiers, the X series amplifiers have significantly better distortion specifications. A net improvement in signal quality will result.

7. Standby power supply substitution. We recommend approval of the Equivalency request to substitute Lectro Products, Inc. Sentry II standby power supplies for Control Technology PAX Citation power supplies. We have compared power supply specifications and agree with the Cablevision certification that the Sentry II is superior to the PAX Citation.

8. Satellite receiver sites. The Compucon March 20, 1984, TVRO frequency coordination studies for the downtown and Elk Grove sites indicate that no combination of shielding or filtering is likely to eliminate interference to reception of satellite signals at those sites. Compucon recommends that an alternative site be chosen for the downtown TVRO. Accordingly, our recommendation for grant of final system design approval does not include TVRO siting for the Downtown and Elk Grove hubs. A field survey should be conducted; if it confirms the magnitude of the interference, Cablevision should submit an alternative system design request for different TVRO sites, and indicate how those sites will be interconnected to the downtown and Elk Grove hubs.

9. FAA filing. Cablevision did not accept or reject our May 15 filing deadline proposal. We continue to recommend that the FAA notices be filed by May 15, 1984. Because we consider it likely that FAA approval will ultimately be granted for the moderate antenna structures required, we are still recommending final system design approval of the hub locations.

10. Resolution modifications. Several modifications are needed to the technical standards now in the Resolution Offering the Cable Television Franchise. The suggested changes are given in Attachment A. These modifications are needed for the following reasons:

- a. Items 1 and 8: Resolution Section ILB.8.b.1.a.C requires establishing an amplifier equivalency number for the microwave interconnect by May 22, 1984.
- b. Items 1, 2, 5, and 8: The amplifier frequency response and non-adjacent channel visual carrier level specifications require adjustment in light of information obtained from manufacturers of equipment now proposed.
- c. Items 3, 6, and 7: These correct typographical errors or make editorial changes.
- d. Item 4: This modification would provide flexibility in system design, with no compromise in system performance, by deleting the redundant reference to maximum amplifier cascade. This change is required for the system configuration now proposed. We feel that as long as Cablevision meets the other standards specified in the Resolution, the amplifier cascade which Cablevision chooses to employ should not be restricted.

The revised standards still reflect excellent performance and exceed FCC standards. No reduction in the critical specifications for carrier-to-noise, composite triple beat, and cross-modulation is proposed.

Final Review Recommendations

With the single exception of the Downtown/Fair Oaks interconnect, Cablevision's April 17, 1984, letter provides the remaining information needed to complete

April 24, 1984

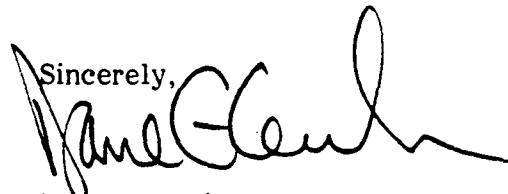
the review of system design required by Resolution Section ILB.15. We recommend approval of the microwave system, hub locations, and earth station facilities at Fair Oaks and Del Paso. However, we recommend disapproval of the earth station facilities at Downtown and Elk Grove. Cablevision may correct the deficiencies in the Downtown and Elk Grove TVRO sites, and secure design approval, by pursuing the steps described in Item 8 above.

We further recommend design approval for the amplifier cascades originated from each hub and acceptance of the carrier-to-noise, cross-modulation, and composite triple beat figures given in the attachments to Cablevision's letter of April 17. These figures meet or exceed the Resolution requirements.

Upon adoption of the proposed revisions to the Resolution and in light of the tests which Cablevision has agreed to conduct on the microwave systems and off-air television signals, we are now satisfied that the proposed cable television system will provide service which will meet or exceed the Minimum Operating Standards.

I am pleased that we are close to a milestone in bringing cable television service to Sacramento. Should you have questions in regard to this letter, please call.

Sincerely,



Dane E. Ericksen

ac

Attachment

cc: Mr. David W. McMurtry (w/attach.) - Federal Express

ATTACHMENT A

PROPOSED RESOLUTION MODIFICATIONS

We recommend modifying the Resolution Offering Franchise for Cable Television System to Cablevision of Sacramento, as follows:

1. Section ILB.8.b.1.a.B. Forward trunk frequency response.

Substitute $\frac{N}{10} + 1$ for $\frac{N}{10}$

2. Section ILB.8.b.1.a.C. Forward trunk and distribution frequency response.

Substitute $(\frac{N}{10} + 2.5)$ for $(\frac{N}{10} + 1)$.

Delete the sentence beginning "Within 6 months. . ." Substitute the sentence "For purposes of this specification, the microwave link serving Galt shall be considered as equivalent to 30 trunk amplifiers.

3. Section ILB.8.b.1.m. Crosstalk between cables.

Substitute the word "impedance" for "impendance".

4. Section ILB.8.b.1.n. Maximum trunk amplifier cascade.

Delete this specification.

5. Section ILB.8.b.1.p.B. Non-adjacent channels visual carrier levels.

Substitute 6 dB for 4 dB.

6. Section ILB.8.b.1.r . Converter standards.

Delete the sentence beginning "For any converter. . ."

7. Section ILB.8.b.1.u. FM signal levels.

Substitute 180 microvolts for n/a microvolts.
Substitute -15 dBmV for -15 dB.

8. Section ILB.8.b.2.a.ii. Reverse system frequency response.

Substitute $\left(\frac{N}{10} + 1\right)$ for $\left(\frac{N}{10}\right)$.

Substitute $\left(\frac{N}{10} + 2.5\right)$ for $\left(\frac{N}{10} + 1\right)$.

Delete the sentence beginning "Within 6 months. . ." Substitute the sentence "For purposes of this specification, the microwave link serving Galt shall be considered as equivalent to 30 trunk amplifiers."

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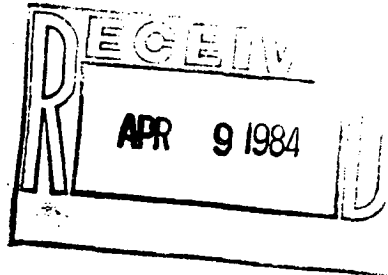
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April 6, 1984

FEDERAL EXPRESS

Mr. Paul Mills
Corporate Engineer
Cablevision
1 Media Crossways
Woodbury, New York 11797

Dear Paul:

This is to confirm our understanding of the alternative plan for the Galt microwave tests. The tests described in this letter will be in lieu of the microwave tests now scheduled to begin by August 1, 1984. This alternative plan does not reduce the Commission's authority to insure a satisfactory technical design for the microwave interconnect, but does address Cablevision's concerns that the Elk Grove-Galt microwave interconnect be built in the correct construction sequence with the overall build so as not to incur additional and unnecessary costs.

Based upon your letter of March 30 and our meeting of April 3, we agreed that the alternative test plan provides that the tests be made with 10 foot diameter antennas, will begin on or before June 1, 1986, and will provide data for a period of 90 days. The tests will be conducted with a one second sampling rate over successive five-day periods. The data will be analyzed by Cablevision and the results provided to Hammett & Edison within two weeks following each test period. The analysis will include, as a minimum, a tabulation of the seconds per day that the noise contribution of the AML microwave degrades to each of the following levels:

- a. 45.2 dB C/N
- b. 44.3 dB C/N
- c. 40.1 dB C/N
- d. 36.0 dB C/N

The data must be provided to us in such a form as to permit us to evaluate the approximate times of day in which significant fades occur.

Cablevision agrees to take whatever mitigation measures are necessary to remedy any technical deficiencies reflected by the test data. Mitigation measures include, but are not limited to, the following:

- A. Diversity reception. Antenna structures at Galt and Elk Grove will be initially designed and constructed so as to be able to accommodate height-diversity receiving antennas. For the CARS frequency band, a vertical separation of at least 50 feet would be needed between receiving antennas. Should test data indicate the efficacy for diversity reception, Cablevision agrees to install such a system.
- B. Low-noise amplifiers. Cablevision agrees to install low-noise amplifiers for the microwave receivers, should the test data indicate the need for such devices.
- C. Other measures. Cablevision agrees to take other mitigation measures as deemed necessary by the Commission engineers if Items A and B fail to sufficiently improve the microwave interconnect quality.

We understand that if, in our judgment, the initial test data shows that diversity reception techniques, low-noise amplifiers, or other mitigation measures are necessary, Cablevision will take such steps prior to the expiration of the initial 90-day test period. The tests shall then be continued, with the improved facilities, to determine whether acceptable performance has been obtained.

In regard to the recording technique to be used to monitor the microwave receive signal level, we understand that by April 20 you will duplicate onto a standard one-half inch VHS format video cassette, a sample time-lapse tape made in the one second video sampling rate ("120H mode") for review by Hammett & Edison. If our review of the sample tape satisfies us that use of a video time-lapse recorder will allow accurate acquisition and interpretation of the received signal level, that method may be used as the means of recording data for the microwave path tests; otherwise, a standard strip chart recorder will be used to monitor the received signal level.

We are satisfied that the above conditions will allow verification of the reliability and quality of the Galt microwave interconnect sufficiently in advance of the scheduled service to Galt so that any problems can be detected and corrected without ultimately delaying service. Please confirm in writing whether this letter accurately summarizes Cablevision's understanding of the conditions for the revised Galt microwave tests.

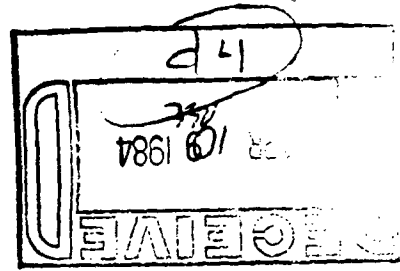
Sincerely,



Dane E. Ericksen

ac

cc: Mr. Robert E. Smith ✓
Mr. David W. McMurtry
Mr. Wilt Hilderbrand
Mr. Byron D. Jarvis
Mr. William J. Quinn



April 9, 1984

FEDERAL EXPRESS

Mr. Dane E. Ericksen
Hammett and Edison, Inc.
1400 Rollins Road
Burlingame, CA 94010

Dear Dane:

I am in receipt of your letter of April 6, 1984 which restates the alternative plan for the Galt microwave tests.

Cablevision is in agreement with the terms set forth in your letter and will begin these tests on or before June 1, 1986.

I will be sending you a sample time lapse tape within the next few days as promised. Thanks again for resolving this issue in a way which satisfies both Cablevision and the Commission's respective concerns.

With kind regards,

Paul Mills
Corporate Engineer

cc: Bob Smith, Sacramento Metropolitan Cable Commission

PM/rc