

NEIL ABERCROMBIE  
GOVERNOR

SHAN S. TSUTSUI  
LT. GOVERNOR

STATE OF HAWAII  
OFFICE OF THE DIRECTOR  
DEPARTMENT OF COMMERCE AND CONSUMER AFFAIRS  
335 MERCHANT STREET, ROOM 310  
P.O. Box 541  
HONOLULU, HAWAII 96809  
Phone Number: 586-2850  
Fax Number: 586-2856  
www.hawaii.gov/dcca

KEALI'I S. LOPEZ  
DIRECTOR

JO ANN M. UCHIDA TAKEUCHI  
DEPUTY DIRECTOR

VIA EMAIL & U.S. MAIL

August 1, 2014

Mr. Gregg Fujimoto  
President  
Oceanic Time Warner Cable LLC  
200 Akamainui Street  
Mililani, HI 96789-3999

Dear Mr. Fujimoto:

Re: Letter Order – Technical Quality of PEG Access Channels in Maui  
County and Lahaina Cable Franchises

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Pursuant to Decision and Order Nos. ("D&O") 174, 241, and 261 as amended, Oceanic Time Warner Cable LLC ("OTWC") designates and makes available to the Director ("Director") of the Department of Commerce and Consumer Affairs ("DCCA") or the Director's designee(s), Channels for Public, Educational, or Governmental ("PEG") access ("PEG Access Channels") in its Maui County (excluding Lahaina) and Lahaina cable franchise areas. By its contract with DCCA, Maui Community Television, Inc., aka Akaku: Maui Community Television ("Akaku") is the PEG Access organization responsible to manage and operate the PEG Access facilities and equipment and the Channels allocated for PEG Access by the D&Os in Maui County and Lahaina ("Maui PEG Access Channels").

I. Background

On or about March 21, 2013, Akaku notified OTWC of its concerns regarding the degradation of its program streams due to an "outdated" video transport system that OTWC was utilizing to move Akaku's program streams from its facility to OTWC's headend. At that time, Akaku stated that they were in the final phase of upgrading their facility to high definition ("HD"), and they were concerned with delivering "... the highest quality signals to the OTWC headend . . .", and were requesting to start a conversation with OTWC to discuss a number of issues related to this effort.

Because the situation had not been resolved, on or about January 14, 2014, Akaku advised DCCA about its concerns with the poor video quality of the Maui PEG Access Channels. DCCA requested that OTWC and Akaku work together to resolve the signal quality problems of the Maui PEG Access Channels. In an April 10, 2014 e-mail, Akaku informed DCCA of the continuing problems regarding the signal quality of the Maui PEG Access Channels to various areas of the County. DCCA again discussed the situation with OTWC which offered to update the transport equipment on its end prior to the completion of the Maui County and Lahaina franchise renewal process. DCCA also discussed the matter with Akaku and informed Akaku that it may also have to upgrade the equipment on its side.

On May 21, 2014 Akaku e-mailed the Director and again complained that the picture quality of the digital Maui PEG Access Channels was unacceptable and more degraded than the analog Channels due to OTWC's video compression and use of antiquated, out-of-date equipment. Akaku requested that the signal quality of all Maui PEG Access Channels be at the very least equivalent to that of the Oahu local broadcast channels. Akaku also requested that DCCA commission a full technical and engineering audit of OTWC's signals.

On June 25, 2014, OTWC's engineers, Messrs. Vernon Kato and Kit Kawamata, visited Akaku's main facility at 333 Dairy Road, Kahului, Maui, to conduct a technical assessment and review of Akaku's facilities, equipment, and the video transport system provided by OTWC. OTWC issued a report entitled the "June 25<sup>th</sup>, 2014 Technical Assessment, Observations, and Recommendations Regarding the Pending Discussion between Akaku Community Television & Oceanic Time Warner Cable" ("**OTWC Tech Report**"). The OTWC Tech Report is attached hereto as Exhibit "A".

In addition, on June 25, 2014, Mr. Donn Yabusaki, the former Cable Television Administrator for DCCA also conducted his own on-site observations and review of Akaku's workflow and the signal path in its master control facility, and obtained detailed information on the signal path at OTWC's facilities. Mr. Yabusaki prepared his own report entitled, "Oceanic's Maui PEG Video Transport Technical Review," ("**Yabusaki Report**") and offered several recommendations. The Yabusaki Report is attached hereto as Exhibit "B".

OTWC engineers observed the poor quality of the Maui PEG Access Channels and during their visit, observed Akaku's protocol regarding source content and base infrastructure, and performed numerous tests and measurements, the results of which are contained in the OTWC Tech Report. In particular, the OTWC engineers recommended that replacing OTWC's existing "transmission" equipment would assist in correcting the signal quality of the Maui PEG Access Channels.

In the Yabusaki Report, Mr. Yabusaki noted that the video signal originating from Akaku's master control facility was visibly degraded before it entered OTWC's video transport system. When viewing the Maui PEG Access Channels over OTWC's cable system, Mr. Yabusaki noted that the overall picture quality of the video programming on the digital Maui PEG Access Channels was degraded further with an overall loss of sharpness, ringing, and compression artifacts. He also observed that the quality of the analog Channels was noticeably better than the digital Channels, and appeared to be satisfactory, and that the analog video transport system was being utilized in a manner consistent with its design and was operating properly. A detailed summary of his observations, conclusions, and specific recommendations are contained in the Yabusaki Report.

## II. Discussion

As a holder of a cable franchise in the State of Hawai'i, OTWC is obligated to "provide safe, adequate, and reliable service in accordance with applicable laws, rules, franchise requirements, and its filed schedule of terms and conditions of service." See, Hawai'i Revised Statutes section 440G-8.1(a). OTWC is required to provide satisfactory signal quality to its Subscribers,<sup>1</sup> and also expected to keep pace with industry standards. In turn, as the PEG Access Organization in Maui County and Lahaina, Akaku is responsible for managing the PEG Access Channels, and to purchase and maintain PEG Access facilities and equipment.<sup>2</sup> Accordingly, ensuring that cable Subscribers are provided adequate service over the Maui PEG Access Channels is the shared responsibility of both OTWC and Akaku.

Both the OTWC Tech Report and the Yabusaki Report reflect that the viewing experience (i.e., picture quality) of the digital PEG Access Channels on Maui is less than desirable and needs to be remedied. OTWC has indicated its willingness to convert from analog to digital transport for the Maui PEG Access Channels.

In the past, a similar issue arose in OTWC's Oahu system, and the Director looks to that prior situation as precedent for this matter. When OTWC's Oahu cable franchise was renewed in 2010 by D&O No. 346, OTWC agreed to a provision requiring it to maintain the technical quality of the PEG Access Channels on Oahu, to the extent within its control, to be at least equivalent to the technical and picture quality of the local broadcast television stations which are affiliates of major national broadcast networks. See, Section IV.G.1. of D&O No. 346.

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<sup>1</sup> If a Subscriber is unable to obtain satisfaction from the cable operator with respect to the quality of the cable signal, the Director may require the cable operator to send a technician to accompany a DCCA representative to test the Subscriber's equipment and measure the quality of the cable signal. See, Hawai'i Administrative Rules section 16-131-41.

<sup>2</sup> See, paragraphs B.1. and B.2. in DCCA's June 17, 1999 Agreement with Akaku: Maui Community Television.

Two years later, in an April 12, 2012 letter, `Ōlelo Community Media ("`Ōlelo"), the PEG Access Organization on Oahu, requested that its transport from its master control location to OTWC's Mililani headend be changed from analog to digital transport. On July 23, 2012, DCCA requested that OTWC provide the digital transport of Oahu's PEG Access Channels to OTWC's headend, and also requested that OTWC and `Ōlelo work together on the details of the transport. Pursuant to D&O No. 346, OTWC was solely responsible for all costs to provide and maintain each connection and for providing adequate equipment and software to ensure that there would be no ongoing reoccurring costs to `Ōlelo and DCCA. After an inquiry by OTWC and `Ōlelo regarding the cost of the equipment to implement the transport, DCCA determined in a September 17, 2012 letter that it was `Ōlelo's responsibility to purchase equipment to activate and utilize the connection provided by OTWC. Both `Ōlelo and OTWC worked together to coordinate their respective equipment needs and compatibility. On or about June 2013, `Ōlelo notified the public that the digital upgrade to the transport system for its signals was satisfactorily completed.

In order to ensure consistency with the PEG Access Channels in OTWC's cable franchises in the State, the Director adopts the standard in D&O No. 346 that OTWC is required to maintain the technical quality of the PEG Access Channels in Maui County and Lahaina, to the extent within its control, to be at least equivalent to the technical and picture quality of the local broadcast television stations that are affiliates of major national broadcast networks. OTWC shall be required to operate under the same technical process in Maui County and Lahaina that it does on Oahu, and shall maintain the Maui PEG Access Channels' video signal in the same manner as the local network affiliates in the Oahu franchise.

DCCA further recognizes that in order to preserve viewership of the Maui PEG Access Channels for analog cable television viewers, OTWC needs to maintain the current analog and digital standard definition cable Channels at this time. DCCA intends to re-evaluate the Channel configuration, including HD PEG Access Channels, when OTWC transitions to an all-digital format or upon OTWC's written request.

Both technical reports indicate that while Akaku's workflow and signal flow contribute to the signal quality problems of the digital Maui PEG Access Channels, the replacement of the current OTWC transport equipment would improve signal quality of the Maui PEG Access Channels. However, according to the Yabusaki Report, unless Akaku makes the changes recommended in the Report, any equipment upgrades by OTWC will only result in a marginal quality improvement of the Maui PEG Access Channels, and will not satisfactorily resolve the matter. By separate letter, the DCCA will advise Akaku of the corrective actions that are recommended in the Yabusaki Report to resolve the signal quality issues raised in Akaku's complaint.

III. Order

Based on the foregoing and pursuant to the authority in D&O No. 174, 241, and 261 as amended, the Director hereby orders the following:

1. The technical quality of the PEG Access Channels in OTWC's Maui County and Lahaina franchises, to the extent within OTWC's control, shall be at least equivalent to the technical and picture quality of the local broadcast television stations on Oahu that are affiliates of major national broadcast networks and satisfy the requirements contained in applicable provisions of the Hawai'i Administrative Rules.
2. Subject to Federal Communication Commission regulations, the Maui County and Lahaina cable systems shall be constructed and operated so that, to the extent within OTWC's control, there is no significant deterioration in the quality of the PEG Access Channel signals resulting from the transportation of the video signal, either upstream or downstream, as compared with any other Channel on the cable system. Deterioration refers to any signal problem, including but not limited to ghost images, other interference, distortions, and delays.
3. OTWC shall provide video transport of the Maui PEG Access Channels to OTWC's headend utilizing equipment that will provide the transport of each Maui PEG Access Channel in a manner technically equivalent to what is presently utilized to transport the content of the local broadcast television stations on Oahu that are affiliates of major national broadcast networks either upstream or downstream.
4. OTWC shall be solely responsible for the cost for this new video transport system and the required connection between its Maui headend to the Maui PEG Access Organization's main facility. As the PEG Access Organization on Maui, Akaku is responsible to purchase and maintain PEG Access facilities and equipment, including the fiber termination device and other hardware located within its main facility to activate and utilize the connection provided by OTWC.
5. OTWC and Akaku are expected to cooperate and work together directly on the details of the transport and compatibility of the new equipment and system processes. OTWC shall have the video transport system described herein of the Maui PEG Access Channels fully operational within one hundred twenty (120) days from the date of this Letter Order. In the event OTWC is not able to implement the transformation by the date described herein, it shall so inform DCCA in writing and specify the reasons for the delay. If any delay is attributed to either OTWC or Akaku, or both, the Director reserves all of her rights to address the delay.

Mr. Gregg Fujimoto  
August 1, 2014  
Page 6

If you have any questions on the above, please do not hesitate to contact me at (808) 586-2850. Thank you for your assistance and cooperation in this matter.

Sincerely,

A handwritten signature in black ink, appearing to be 'Keali'i S. Lopez', written over a horizontal line.

Keali'i S. Lopez  
Director  
Department of Commerce and  
Consumer Affairs

Attachments

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c: Jay April, Akaku  
Brian Kang, Esq.

**2014**

**EXHIBIT A**

**Oceanic Time Warner Cable**

**Video Engineering and  
Operations**



**[AKAKU/OCEANIC TECHNICAL ASSESSMENT]**

June 25th, 2014 technical assessment, observations, and recommendations regarding the pending discussion between Akaku Community Television & Oceanic Time Warner Cable

**Akaku/Oceanic Technical Assessment**

2014 Video Engineering and Operations Report



**Purpose:** Technical assessment of Akaku broadcast facility in regards to pending discussion with Akaku Maui Community Television & Oceanic Time Warner Cable

**Date of Visit:** Wednesday, June 25, 2014

**Attendees:** Participants on the facility walk through are listed below:



Vernon Kato, Mgr. Video Engineering and Development  
Video Engineering and Operations Department  
808-479-3644 (cell)  
808-825-8417 (office)  
Vernon.Kato@twcable.com

Kit Kawamata, Communications Engineer II  
Video Engineering and Operations Department  
808-342-8310 (cell)  
Kit.Kawamata@twcable.com

Matthew Kleinsasser, Mgr. Technical Operations  
Maui County  
808-442-4832 (cell)  
Matthew.Kleinsasser@twcable.com



Donn Yabusaki, DCCA (Acting Neutral Observer and Technical Engineer)  
Department of Commerce and Consumer Affairs  
808-227-3244  
Donn.A.Yabusaki@DCCA.Hawaii.Gov



**AKAKU**  
Maui Community Television

Jay April, President and CEO  
Akaku: Maui Community Television  
808-871-5554 (office)

Shawn Michael, Programming Director  
Akaku: Maui Community Television  
808-871-5554 (office)

Lou DiLiberto, Director of Operations  
Akaku: Maui Community Television  
808-283-7303 (cell)  
808-871-5554 (office)  
Lou@akaku.org



## Executive Summary

Akaku Maui Community Television Inc. is representing a concern claiming that Oceanic Time Warner Cable is negligent in keeping its PEG access cablecasting equipment up to date and functional. A submitted testimony before CPC regarding HD1998 stated in part:

*"What happens to our signal after it reaches Oceanic is appalling; Oceanic uses antiquated, out of date equipment that degrades and deforms our signal both in video and audio and offers a substandard experience to the paying consumer. This cavalier treatment of our channels needs to be addressed immediately. One would be hard pressed to find another regulated utility that could get away with this kind of complete disregard for the consumer. Despite the fact that Oceanic Time Warner takes more than 68 million dollars in revenue from Maui County every year and that this upgrade will require a very modest investment of less than a \$10,000, Oceanic has informed us in writing that they will not upgrade this signal until after a franchise renewal is granted. This delay, which could take a year or more, puts all of our (and your) neighbor island programming at risk. This bill if it becomes law, will protect the consumer by providing our neighbor island communities with the opportunity to view local programming in the same manner and form as they do local full power broadcast stations. It will also send a message to federal policymakers and other Local Franchising Authorities across the nation that the State of Hawaii recognizes the necessity of requiring telecommunications monopolies and duopolies using our valued rights of way to stay current with the deployment of state of the art technology in our rapidly evolving digital environment."*

Furthermore, Akaku claims that its content producers are complaining about the degradation of their productions subsequently holding Oceanic Time Warner Cable as responsible for its picture quality, channel flickering, and outages.

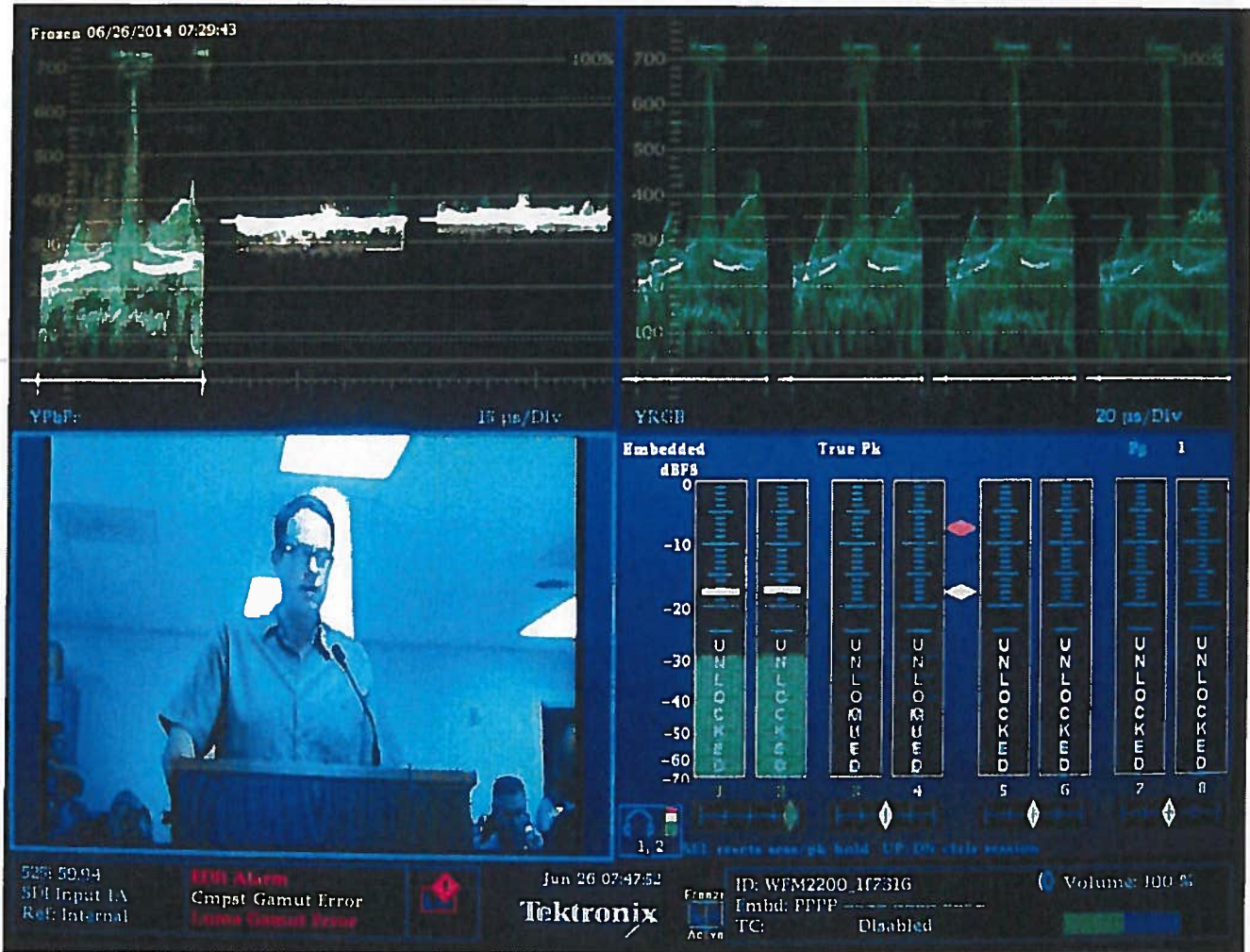
On Wednesday, June 25 a technical assessment of the signal path, equipment, and facility was conducted by Vernon Kato, Kit Kawamata, and Donn Yabusaki. This report will reflect the observations by Oceanic Time Warner Cable's Vernon Kato and Kit Kawamata. Donn Yabusaki representing as a neutral observer for the DCCA will be reporting to Director Kealii Lopez on his findings.

In review of the technical systems at Akaku facilities we report that there is (1) attention needed to improve source content to meet broadcast specifications as programming is non-compliant with SMPTE analogue or digital CCIR/ITU standards as video luma and gamut levels exceed allowable thresholds, (2) critical infrastructure base requirements such as facility cooling, power, and grounding are inadequate as the ambient temperature at the rack facial exceeded 85 degrees (air conditioning was broken and room was that day being cooled by floor standing fan), hum and noise was present potentially from ground loops on power, signal leakage, or bad wiring, (3) video formatting of shows & transcoding process to MPEG-2 should be re-considered to using a better CODEC and playback solution, (4) there are issues to the inter-connectivity of equipment and the design for signal monitoring, (5) there is no technical reference or true signal measurement within the system, and (6) consideration needed toward replacing the Catel 4.5, Radiant video/audio multiplexer, and modulation solution in place.

Technically there is a popular reference in this industry with regardless to the correctness of logic; GIGO (garbage in, garbage out). In the TV broadcasting industry unless specification guidelines are followed you cannot assure any kind of quality. In this case because the source content produced by Akaku is already out of TV industry specifications any accusations toward Oceanic Time Warner Cable poor quality cannot be substantiated. Based on Oceanic progression for video backhaul it is recommended that Oceanic consider replacing the existing video/audio baseband transmission solution, however it will provide very little impact unless all other recommendations are met by Akaku. Majority of the quality issues are technically observed upstream from any Oceanic equipment. The following report pages detail such observations.

## Technical Assessment

Observation 1: Attention needed to improve source content to meet broadcast specifications as programming is non-compliant with SMPTE analogue or digital CCIR/ITU standards as video luma and gamut levels exceed allowable thresholds.



(Tektronix Test Measurement WFM2200)

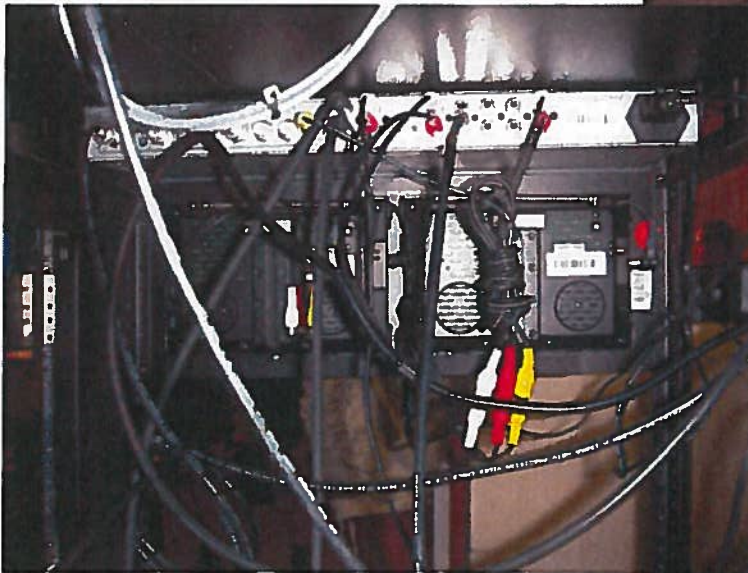
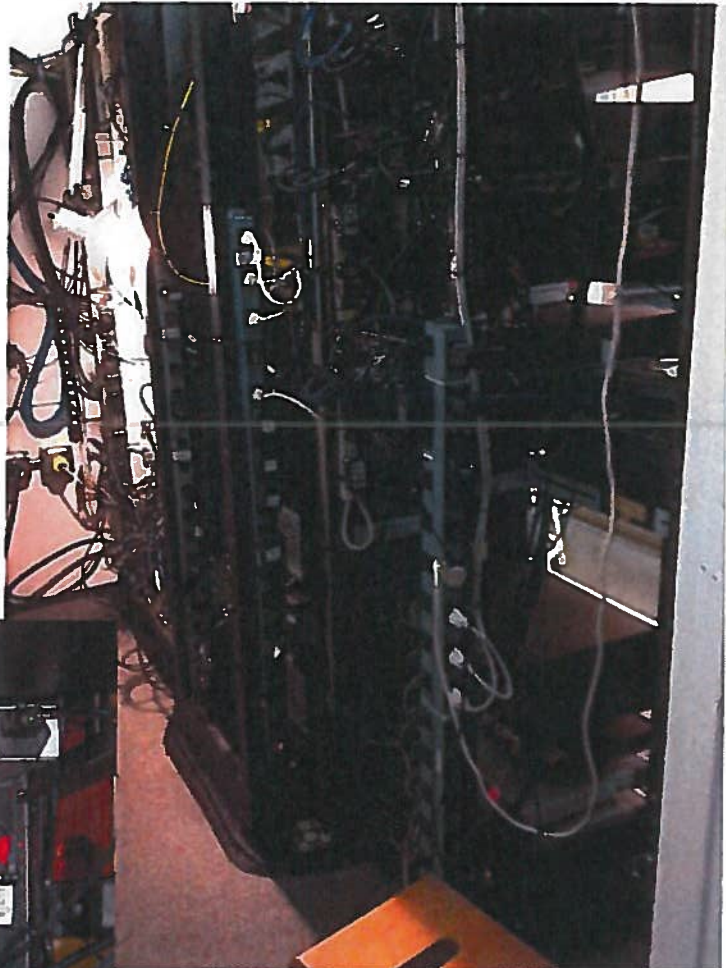
All Akaku channels (ch.53, ch.54, ch.55) at various times of measurement were indicating errors on Luma and Chroma far exceeding acceptable ranges for TV broadcast. As you can see indicated in the measurement above luma levels are clearly above and exceed 140IRE this is 40IRE above acceptable peak levels. These kinds of levels can cause video tearing, loss of sync, blooming of signal definition, video clipping, audio buzz, and frequency cross-talk for any equipment especially a consumer grade TV. Excessive gamut levels can also cause a loss of sync, and video bleeding causing loss of definition. Potentially this can cause transmission and modulation gear to lose sync and picture, something claimed earlier as a symptom to channel flickering and outages. Visible on the test monitors was video clipping, so bad upon view that it looked like a video termination issue which led Vernon Kato to ask about video distribution/amplification (DA) termination at the facility. Errors are so bad that EDH error alarms are indicating that the source cannot recover in error correction. Audio looks as expected with identical and highly correlated signals indicating monaural phase channeling.



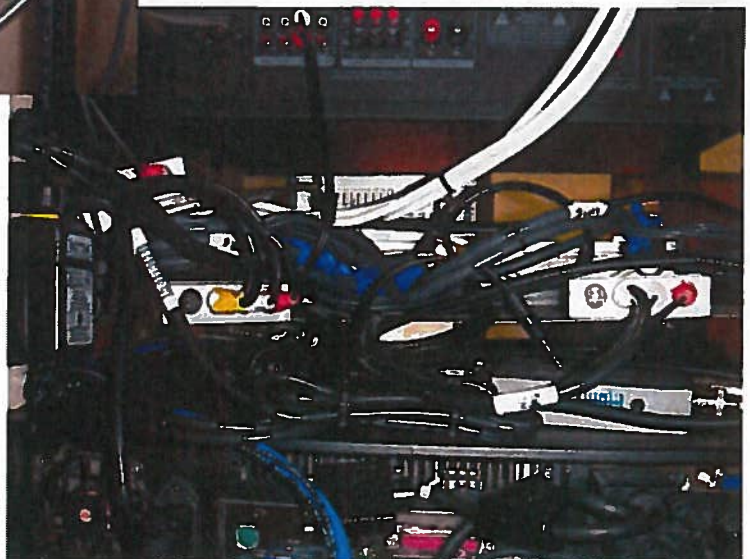
Observation 2: Critical infrastructure base requirements such as facility cooling, power, and grounding are inadequate as the ambient temperature at the rack facial exceeded 85 degrees (air conditioning was broken and room was that day being cooled by floor standing fan), hum and noise was present potentially from ground loops on power, signal leakage, or bad wiring.

The air conditioning was broken on the day of visit, so it is difficult to determine what Akaku technical facility cooling is like, however a racked equipment environment can generate a lot of heat that can not only damage equipment, but impact functionality and performance. At the time of measurement the rack facial was around 85 degrees which meant that the exhaust blowing to the rear of the racks were at a much higher temperature.

Without further investigation it's difficult to tell if the hum/noise was coming from power grounding issues, or a particular piece of equipment within the facility. Noise was present upon test measurement as well as visually on the Akaku monitors.

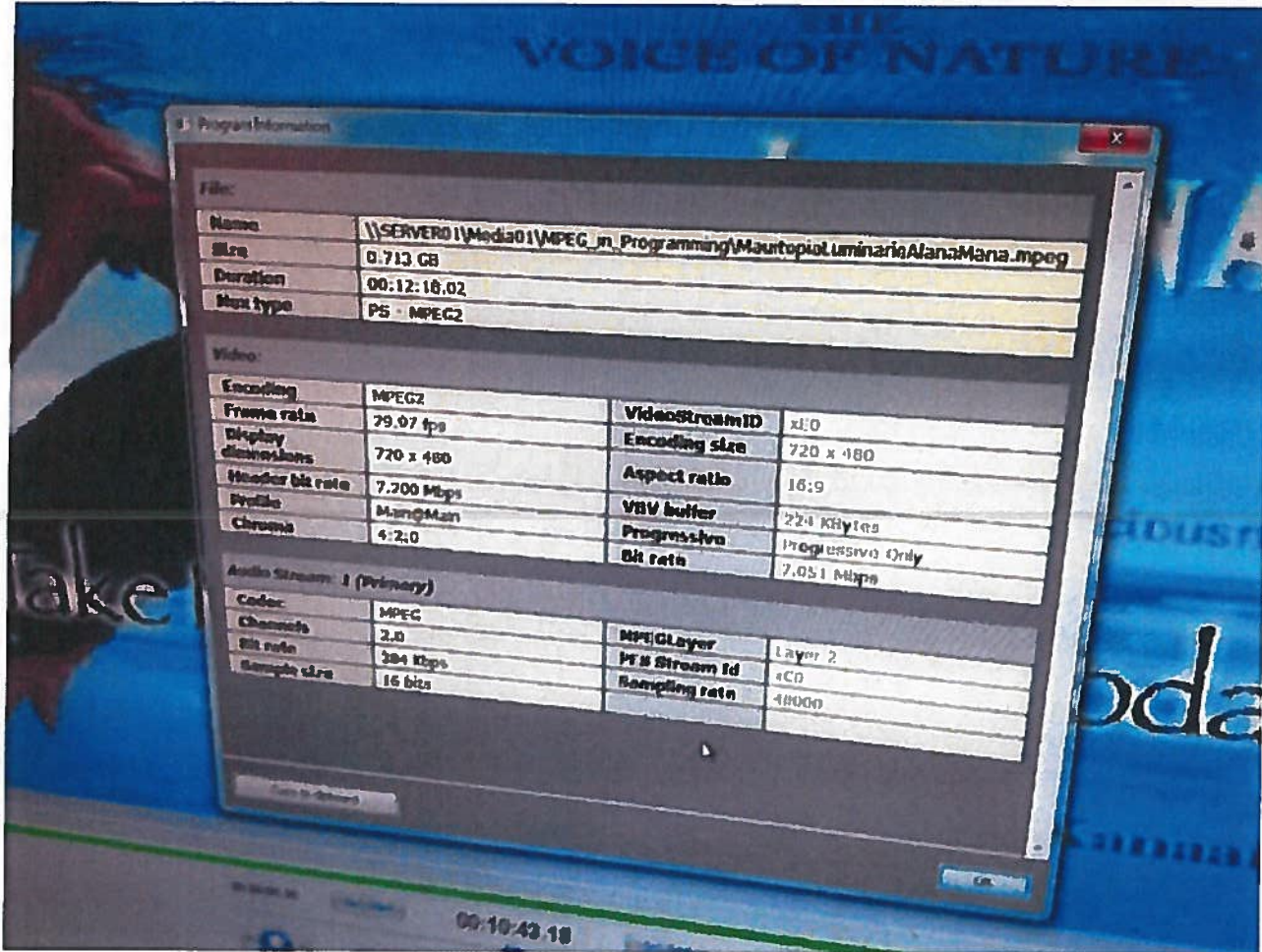


The use of consumer grade signal wires, adapters, and unnecessary wire coupling and splitting are also contributing to adding noise into the system. Any unterminated cables should be removed to avoid unwanted interference or noise introduced into the system.





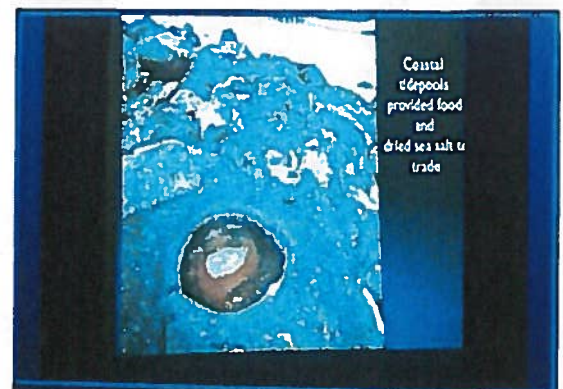
Observation 3: Video formatting of shows & transcoding process to MPEG-2 should be re-considered to using a better CODEC and playback solution.



Akaku is currently transcoding most of its file-based content to MPEG2 program stream 720x480, 16x9 standard definition at a bit rate of 7Mbps. The automation playback system is by Synergy Broadcast Systems which is capable of SD/HD SDI output. It was mentioned by Akaku that 90% of the Akaku content is acquired in standard definition. During the assessment at the facility we were witness to aspect ratio re-formatting issues with squashed/stretched video and disproportionate ratios.

This could account for reports made by viewers as to the one presented by Jay April on May 21, 2014: *"The subject matter involved a basketball game where the numbers on players's jerseys and the scoreboard were rendered virtually unreadable. The problem is that this degradation of signal quality is endemic to all Akaku channels and programs which adversely affect all graphics, lower thirds, channel bugs as well as overall picture quality."*

Transcoding video formats from one to another can also contribute to picture degradation. Some transcoding solutions are better than others in quality retention, and re-encoding/transcoding improperly from one aspect ratio to another can impact the picture resolution. Akaku should re-evaluate its encoding and transcoding solutions to better retain resolution quality and playback.



Observation 4 & 5: There are issues to the inter-connectivity of equipment and the design for signal monitoring, and no technical reference or true signal measurement within the system.

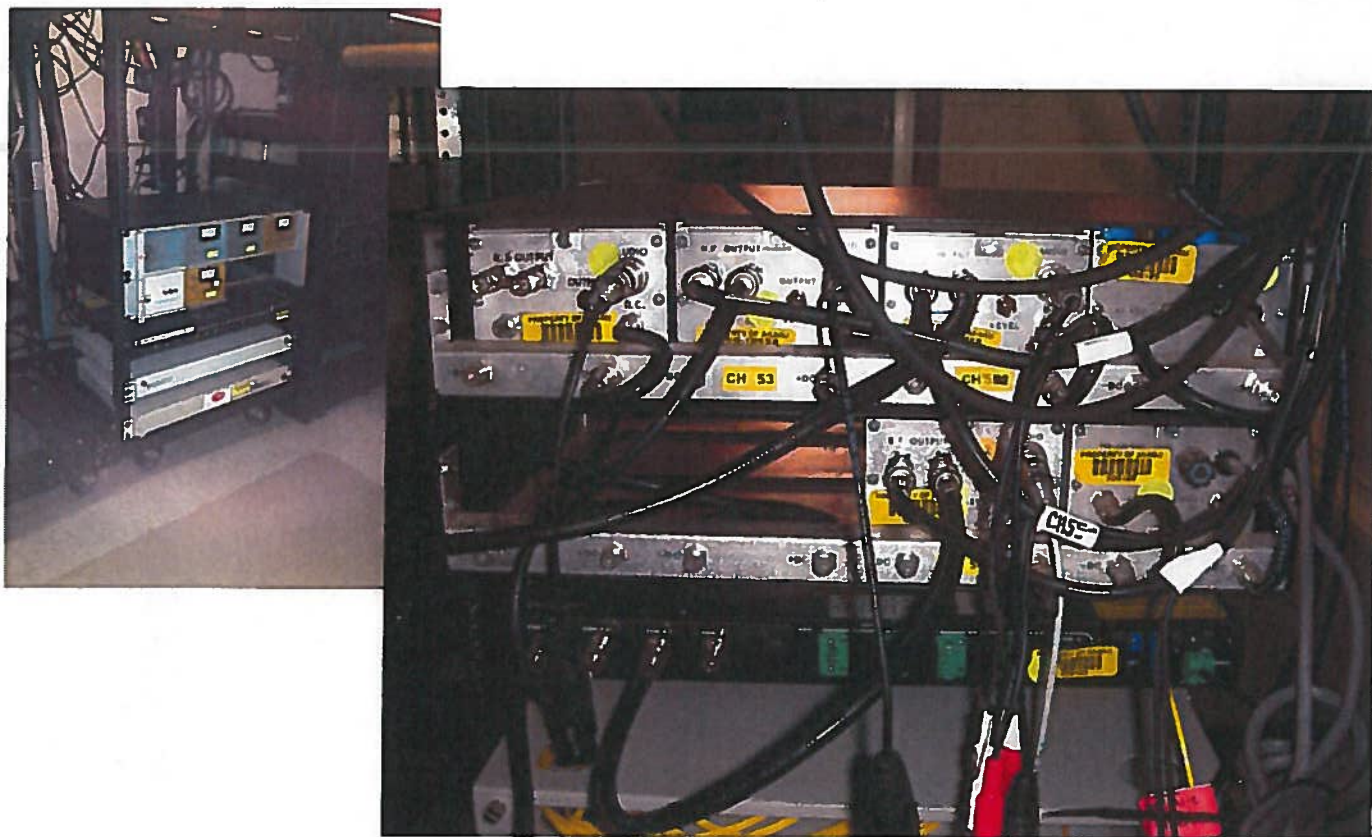


In any system build there needs to be method to test and measurement. Test/evaluation tools and/or signal generation units can serve as a baseline for evaluating the input and output signals within a system. Without a baseline there can be no means of determining quality or performance of a system. For example an analog/digital signal generator could be used to properly align reference monitors, DA's, etc. and evaluate video and audio signals for broadcast. While a waveform/vectorscope was racked in the room it seems personnel are not using these tools to correct the signal for broadcast. Since this facility has migrated to a digital environment they should also have the technical ability to validate the signal, identify the errors, and maintaining broadcast specifications within the signal and workflow. Otherwise there can be no continuity for quality, reliability, or standards that broadcasting demands.



Observation 6: Consideration needed toward replacing the Catel 4.5, Radiant video/audio multiplexer, and modulation solution in place.

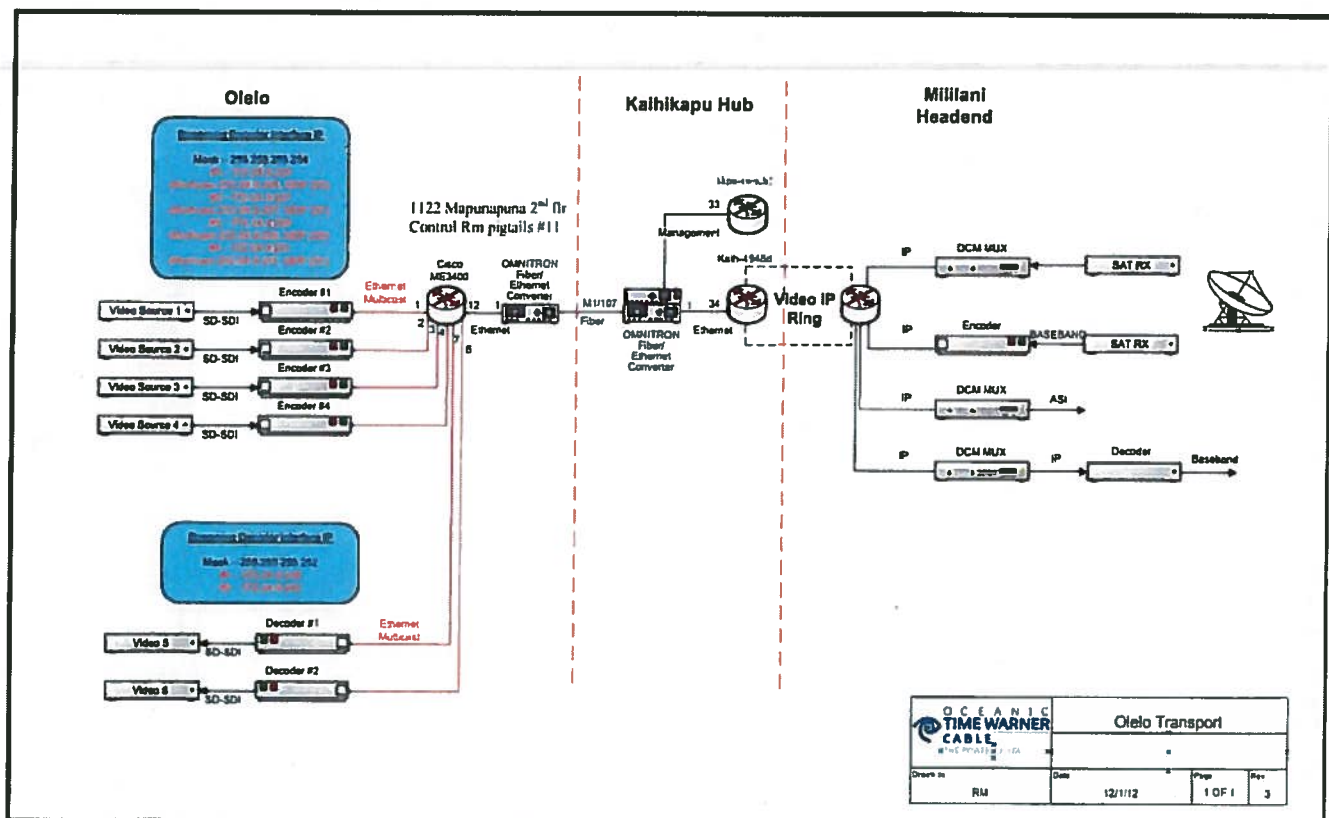
Based on discussion over the signal flow (June 25<sup>th</sup>, 2014), the SDI program signal to air is converted from SDI to analog using a Blackmagic mini-converter. The Blackmagic mini-converter connects to an Ocean Matrix OMX-7001 video/audio distribution amplifier which distributes the video/audio baseband signals to multiple devices such as 2-gang monitors, Catel AM-2000, and Radiant VBX 700 equipment. The Ocean Matrix audio DA feeds the designated audio input of the Catel 4.5 modulator. Likewise the video DA feeds the designated video input of the Catel 4.5 modulator. The combined modulated video with 4.5 audio is multiplexed at the Radiant VBX700S which outputs WDM at 1310nm to the Kahului hub (62) carrying all 3 Akaku channels (ch.53, ch.54, ch.55)



The optical signals are combined at Kahului hub 62 with other optical ITU channels coming from the MCC feeds (ch.354~EduTV, ch.365~Teach), and optically transmitted to the Kihei hub/headend (57). In Kihei the optical signal is converted back to baseband using a Radiant VABX65-R-2A3. Each baseband video and audio feeds a Scientific Atlanta 9280 modulator. Three SA modulators for each channel (Akaku ch.53, ch.54, ch.55) outputs RF that is combined/inserted onto the Synchronous supertrunk, the same SA modulators also outputs a demodulated feed to an ATX DigiVu digital encoder that encodes and multiplexes the 3 digital channels onto a single QAM channel that is inserted onto the Synchronous supertrunk. The Akaku channels are distributed in both analog and digital form to Oceanic Time Warner Cable subscribers.

To remedy any question to degradation occurring within the transmission path, and consideration to Oceanic's progression of digital video backhaul technology; it is recommended that Oceanic Time Warner Cable consider replacing the video/audio optical baseband equipment with an alternative broadcasting technology. A proposed Cisco DCM solution could encode the 3 digital SDI channels from the Akaku facility onto an IP network. The multicast streams could be sent to a D-to-A (ATX Networks/RGB Networks) solution for the analog channel delivery or remain in digital form sent to a QAM for distribution. This solution would comply with a similar deployment provided for Olelo Community Media on Oahu, and potentially align with a video IP initiative already underway with our residential and commercial systems.

For some insight to the design, the following is a logical for the Olelo deployed solution on Oahu. This solution uses a combination of video encoders for each channel delivering an IP stream to the Mililani Headend for distribution. The design was developed in 2012 and implemented early 2013. Since this time other solutions have emerged, and should be considered if an IP design is required.



A Cisco DCM solution could prove to be a smaller form factor alternative with lower capital cost. Exact cost on design can be determined based on desired model. Please contact your Video Engineering and Operations Department for more information.

**Oceanic's Maui PEG Video Transport  
On-Site Technical Review  
Conducted on 06/25/2014**

By Donn Yabusaki, Manager  
Information Systems & Communications Office  
Department of Commerce & Consumer Affairs  
State of Hawaii  
July 10, 2014

**EXHIBIT** B

**Introduction:**

The purpose of the technical review was to look into the complaints from Akaku regarding the poor video quality of the Maui PEG Access cable channels. Akaku, in various emails to Oceanic Time Warner Cable (Oceanic) and DCCA, indicated that it felt that the loss of quality to the PEG Access Channels was primarily due to the analog video transport system provided by Oceanic, and excessive compression utilized by Oceanic's digital distribution system. Akaku has also stated that Oceanic is "down converting" its High Definition signal to an analog signal, which further degrades the quality of its signal. As a benchmark for the quality issue, Akaku has stated that its expectation was to have the same on air quality as the Oahu local broadcast channels.

On Wednesday, 6/25/2014, I visited Akaku's facility along with Kit Kawamata and Vernon Kato from Oceanic's Engineering Department on Oahu. After being given a tour of Akaku's facility, Akaku's staff took me through Akaku's entire process, showing me how program material is received, processed, loaded on its servers, and played on the PEG Access cable channels. At my request, Akaku's technical staff showed me the Master Control area, described the signal path through the equipment, and allowed me to examine the wiring in the Master Control facility. In addition to this, I met with Oceanic's Maui engineering staff and obtained detailed information on the signal path outside of Akaku's facility.

**Observations:**

Akaku receives content on various digital file formats on media that ranges from jump drives to USB hard drives. These files are manually reviewed and transcoded to an MPEG2 file format utilizing a software codec running on an Apple computer. During this process, there appears to be no check for proper levels or other types of compliance checks other than resolution (720x480), bitrate (8mbps), and GOP settings. Video quality at this point is "eyeballed" using the image on the computer monitor and there do not appear to be provisions for checking video, audio, and color gamut values. After the transcode to an MPEG2 file, the file is loaded onto a Synergy Broadcast Systems server network.

The Synergy Broadcast Systems server network utilizes MPEG2 decoders that output a Serial Digital Interface (SDI), Standard Definition (SD) video signal with the audio embedded into the video stream. This digital signal is then fed into a Black Magic converter which outputs baseband analog audio and video. The analog video signal is then fed into an Ocean Matrix OMX-7001 analog distribution amplifier. One output of this distribution amplifier is then fed into Oceanic's equipment. Video monitoring equipment is fed by the remaining outputs.



The first piece of Oceanic equipment that the analog audio and video feeds into is a CATEL analog modulator. From there the modulated signal goes into a Radiant Communications Corporation optical transport system that multiplexes the modulated feeds (one feed for each of the PEG Access channels) and transports them to Oceanic's node via fiber optic cable. Note that the system being used (Radiant VBX700S) was designed to transport analog modulated signals for use in an analog cable distribution system. At Oceanic's node, the optical signal is converted back to the individual modulated feeds and enters Oceanic's analog channel distribution system.

However, for Oceanic's digital cable channels, Akaku's modulated analog streams need to undergo several conversions before being fed into Oceanic's digital cable distribution system.

Akaku's Master Control has the capability to monitor Oceanic's analog cable channels as well as their digital cable channels. While in Akaku's Master Control Facility, I could also see and evaluate Akaku's video before it feeds into Oceanic's analog video transport system.

When viewing Akaku's video signal prior to entering Oceanic's analog video transport system, I observed that the signal coming out of the analog video distribution amplifier had video levels that looked excessively high and could see compression artifacts and ringing in the video. When viewing Akaku's analog channels, the analog video transport system appeared to be functioning normally as it was accurately passing the signal that was being fed to it. While the image was not pristine, it was acceptable in that only a trained eye would notice the flaws in the image.

However, when we viewed Akaku's digital channel, the overall picture quality, when compared to the analog channel's picture quality, was noticeably degraded with an overall loss of sharpness, and the ringing, and compression artifacts were very visible. This led me to notice that other than a single waveform monitor, there appeared to be a lack of adequate monitoring, test, and measurement equipment in Akaku's Master Control facility.

#### **Conclusions:**

There are several factors contributing to the observed quality issues of the Maui PEG cable channels.

First, care must be taken to preserve the quality of the video image throughout the workflow. A digital system, while inherently cleaner than an analog system, still requires attention throughout the workflow and signal path. Akaku's current workflow does not include quality checks for proper levels or the tools to detect and take corrective action. This situation is compounded by the fact that Akaku's Master Control facility has not been calibrated properly, and is adversely affecting the quality of the video signal that is passing through it.

Secondly, the utilization of MPEG2 by Akaku is degrading the video. The software MPEG2 encoders being used at Akaku are not the best as evidenced by the visible artifacts. There are much better performing codecs available that are also more efficient in terms of the storage required. Compounding this situation is the degradation that is taking place in converting a digital video signal to an analog video signal to match the analog video transport system.

With regard to Oceanic's video transport system, because Oceanic is still operating analog channels on its cable system, this analog video transport system is being utilized in a manner that is consistent with what it was designed for, and appeared to be operating properly. The video quality that was observed on the analog channels provided confirmation of this.

However, I observed that the quality of Akaku's digital channels was visibly degraded when compared to the analog channels. The reason for this starts with the degraded analog signal that Akaku is providing, which then needs to go through additional processing (demodulation, analog to digital conversion, etc.) before it can be fed into Oceanic's digital channel distribution system. Note that because each of these additional processes degrades the quality of the analog signal further, the result is that the video quality on the digital channel is noticeably worse when compared to the analog channel.

Based on these observations, the cause of the poor video quality that Akaku has concerns about, is due to a combination of factors. While Oceanic's analog video transport system is a contributing factor, it is just one of a number of factors that are adversely affecting the signal quality of the Maui PEG Channels. However, excessive compression by Oceanic is not observed to be a contributing factor.

Because there are several factors contributing to this problem, addressing only one or two of them will result in only a marginal improvement of the PEG Channels video quality. In order to solve this issue, all of these factors must be addressed.

**Recommendations:**

- 1) Akaku needs to implement a quality control process that will enable it to check for proper video and audio levels, and other measurements, and make adjustments as needed. This is even more critical because the digital realm is not as forgiving as the analog realm. Improper levels and values could create a signal that is undefined in the digital realm leading to unpredictable equipment behavior.
- 2) Akaku needs to calibrate its Master Control facility, install test and monitoring equipment, and perform regular checks and maintenance of the facility. This might require the replacement or upgrade of some equipment and staff training.
- 3) Akaku should consider utilizing MPEG4 or any other advanced codec for encoding and playback. This would increase the quality of the encoding while cutting down on the disk storage required for the compressed files. In addition to this, MPEG4 or any other advanced encoding would eliminate a lot of the compression artifacts and improve the overall picture quality seen on both the analog and digital channels.
- 4) Oceanic should handle Akaku's video transport in the same manner as the local network affiliates on Oahu, which is to utilize digital video transport. Since Akaku is able to provide an SDI signal, this would increase the quality of both the analog and digital channels on the Maui cable distribution system. Note that this is consistent with what was provided on Oahu under the current Cable Franchise agreement.