

HANA BROADBAND COMMITTEE COMMENTS

REGARDING THE TRANSFER
OF
OCEANIC TIME WARNER CABLE LLC
CABLE TELEVISION FRANCHISE
TO
CHARTER COMMUNICATIONS, INC.

SEPTEMBER 16, 2015



HANA BROADBAND COMMITTEE

PO BOX 432
HANA, HI 96713

September 16, 2015

Testimony of the Hana Broadband Committee (HBC)
Subcommittee of the Hana Business Council,
on behalf of its members and others in the communities of East Maui
to the Hawai'i Department of Commerce and Consumer Affairs (DCCA)

Regarding: Franchise transfer from Oceanic Time Warner Cable (OTWC)
to Charter Communications Inc. (Charter)

The Hana Broadband Committee in principal opposes the transfer of OTWC's franchise to Charter on the grounds that competition is the cornerstone of free enterprise capitalism and combining two, of the top four cable-companies, is counter to that ideal. However we also recognize that OTWC currently has no cable-company competitors in Hawaii and therefore, regardless of the outcome, it is imperative that the DCCA insist that OTWC, a monopolist, be held to a strongly written agreement that protects the consumer and provides for better and equal service. To that end we submit the following.

GENERAL:

We understand that the management of OTWC/Charter seeks to create profit for their shareholders and that the Department of Commerce and Consumer Affairs (DCCA) is charged with regulating cable operators in order to best serve the public good, to protect consumers, and to ensure that local needs and interests are met. From this perspective, HBC wishes to support and inform the DCCA in their efforts to ensure that residents and businesses of East Maui are well served.

Hana is a remote community and as such, is arguably more dependent on quality high speed internet than other communities with resources more readily available. It is especially true for our school, emergency services (police, fire, medical), library, government offices, and businesses. According to the 2010 census, Hana had the second highest increase in population on Maui and with the increasing use of broadband and smart TV we don't believe that the current microwave transmission link will be able to address the future needs. Though Hana was recognized as needing high speed access in the last franchise period, we feel the community was left behind and ignored. We are concerned that the same will happen in the coming years if these issues are not addressed appropriately with the pending transfer of OTWC's franchise to Charter.

While OTWC has recently made improvements to its service, from past experience, we see this as a result of complaints raised by the community and for appeasement during negotiations. We believe that if this transfer takes place and the DCCA does not take full advantage, at this time of transfer, to require improved service for consumers, history has shown that OTWC/Charter, a monopolistic company, will continue to focus on profits at the expense of their customers.

HISTORY:

In 2001 a hybrid fiber-coaxial distribution plant was built delivering an upgraded 750 Mhz signal. The existing last mile coaxial cable was not replaced at that time, and many of those cables date back to the late 1970's. In 2002 internet became available using "Wave" internet service, which allowed for a dialup option. While this was an improvement over telephone dial-up, the system was not well maintained. The older cables were not being upgraded, and the microwave dish facility at the Hana Airport was beginning to suffer corrosion from exposure to the salt air. Relative to central Maui using "Roadrunner" (now "Time Warner Cable Internet"), "Wave" was a substandard service and Hana customers were being charged a higher rate, while receiving a slower and less reliable service.

Before our committee was formed, and during the last months of 2011, Hana's private and business consumers suffered through a series of TV and broadband outages that lasted for several days, caused much frustration and lost revenue to struggling businesses. The microwave dish facility at the Hana airport was by now in total disrepair (See Photo, Exhibit 1-A) and outages were becoming frequent and long in duration.

After much was written, and calls made, the Hana Business Council met on Dec. 2, 2011 with Rick Colletto and Matt Kleinsasser (Manager of technical operations) to discuss our complaints. We were told that rates were higher in Hana due to the high cost of service per customer. We were told that "they were doing the best they can, but current microwave dish technology did not allow for any improvement in service". Outages continued and the Hana Business Council had Rick Colletto back to speak to all of their members at their annual luncheon on June 29, 2012. He again stated that "it's as good as it can be". By this time the "Hana Youth Center" was dropped from OHA's on line Hawaiian culture educational program because they could not meet the connectivity requirements (See Exhibit II).

OTWC made efforts to find a solution and began to upgrade the system. While outages continued, new equipment and a larger broadband dish were installed at the airport (See Photo, Exhibit 1-B). In February 2013, the old Wave broadband was switched over to "Time Warner Cable Internet" and replacement modems were distributed. Again there were several outages until outside help was brought in to "fix" and "tune" the system. In early 2015 the distribution amplifiers at the 5 nodes in Hana were upgraded. Capacity and dependability eventually did improved but is still inadequate and inferior compared to the rest of the island.

The broadband needs of Hana School were not being met and in May of 2013 service was so deficient that the fiber INET link for the school and library was switched over to the University of Hawaii microwave dish (See Photo, Exhibit 1-B). Currently the Hana Medical Center (Hana Health) and the County Council office are using a DSL connection through the Hawaiian Telcom dish located at Hamoa. The Police Department, Fire Department and Maui Electric Company use the government dish also located at the airport (See Photos, Exhibit 1-C).

To discern the condition of broadband and television service in Hana we ran a survey and speed tests in March of 2014 and followed up again in October (See Exhibits III & IV). Also using Sam Knows and Atlas probes we have been doing ongoing technical testing of the system. For past and current results (See Exhibit V).

In Mid-May of 2014 "Hana Broadband Committee" members Sky Pierce, Bill Sides, Ward Mardfin and Dawn Lono met in Hana with Bob Barlow, Norm Santos, and Rick Colletto of "OTWC", Todd Ogasawara of the "DCCA" and Everett Kaneshige of "State of Hawaii" to get clarification of the existing system and what could be improved for the future. Chase Turner and

Sean McLaughlin (consultant) participated using Skype. At the time their plans included upgrading the airport dish facility as stated below.

Dish Upgrade:

- Build a complete new facility with an enclosure along with a generator to run the site. A new taller tower is to be located on the mauka side of the existing tower.
- Permits would have to be obtained for the entire project along with frequencies clearance and tower height restrictions and covenants would need to be approved. They will then install a new "high performance dish" and back-up generator.
- To maintain continuity of service, they would leave current tower functioning as is, while new one is constructed. Then would shift service.
- They are now finalizing the scope of work and will soon begin the process to layout the site at the airport.
- It is not likely that all of these improvements will happen this calendar year.
- In the interim they are working on some other aspects to improve the Hana bandwidth for HSD and also video improvements that will be completed this calendar year. These "minor" projects will provide significant improvements this year.

It was also noted that OTWC considered much of the service issues to be localized (the last leg). Currently there is a fiber optic connection from the airport dish to five nodes located in centralized service areas. The connection from these nodes to the home/business passes through copper cables which some can date back over thirty years. Poor connections within the establishments can also create problems.

Prior to our meeting, OTWC had been billing Hana customers for their "Standard Internet Plan". This plan was advertised at up to 15Mbps download, yet the company, by its own admission stated during the meeting, had capped the download speed at 10Mbps. The customers were never informed that they were being charged for a quality of service that wasn't being provided. The "National Broadband Map" listed Hana, as advertised by OTWC, at between 10-25 Mbps download and 768kbps-1.5Mbps upload. At the time the FCC would have concluded that Hana was being well served. This was false advertising which violated consumer protections for east Maui residents and for other communities relegated to second class service.

While not having specific information we believe that beginning in late December of 2014 upgrades were made to the dish transmitters and the amplifiers at the nodes significantly improving the broadband signal serving Hana.

CURRENT CONDITION:

Having studied the system over the last few years, the Hana Broadband Committee believes that there are generally two links that are the cause of poor connectivity. The first being the central microwave dish link between Hana Airport and Hosmer's Grove. The second being the "last mile" copper line connection from the nodes to the individual home/business. With upgrades having been made to the micro-wave connection and other more recent component upgrades the signal strength has now been brought within the advertised down-load and up-load speed. OTWC has recently confirmed that additional improvements to the micro-wave link will be completed by the end of the calendar year. There has been some improvement with the last-mile cable while poor connectivity still remains a problem at varying locations. Customer service is still limited to one day a week which is intolerable for both customers and businesses. There is continuing signal congestion in the

evening time which we believe will continue after the end of the year upgrade. While we appreciate the improvements, they are seen as a short term solution that will not address the growing broadband usage in Hana.

GENERAL:

Our country, once noted for its modern infrastructure, is now being left behind internationally. We are currently 10th behind Ireland and Latvia. High speed connectivity to the world is what will take our children into a promising future only if made equally available to all. While service to East Maui is not an appealing market, telecommunication companies should expect to serve all customers with equal quality and service at an equal price. This is a time for the DCCA to clarify the State of Hawaii's vision to bring high speed broadband to every resident and business in Hawaii and the role that OTWC/Charter will be expected to play in reaching that goal.

A telecommunication company is responsible to its share holders and the DCCA is responsible to its constituency. Verifying that the needs of the community aren't subservient to unreasonable shareholder profits should be considered as part of any agreement. Being that OTWC/Charter would continue as a monopolistic organization it is imperative that it operate with transparency and public oversight as a means of consumer protection. With these points in mind we submit the following abbreviated "recommended requirements for transfer".

RECOMMENDED REQUIREMENTS FOR TRANSFER:

With particular reference to the Hana District and broader East Maui, we make the following submission of requirements before the transfer of OTWC's cable franchise to Charter is accepted by the DCCA.

1. Open Books -

Broadband being a utility with a monopoly in Hawaii should, at the district level, be financially transparent with an open book policy such that the consumer would have confidence that they were being charged fairly for services rendered.

2. Audit -

The quality of the product being approved for transfer should be on record and public knowledge. An independent audit approved by the DCCA should be provided by OTWC/Charter before approval of the merger and every five years thereafter. This would verify the quality of the current product and improvements made over time.

3. Customer Service Requirements (FCC Customer Service Standards) -

Customer service is available only one day a week on Wednesday, and at times repairs are not completed and are passed to the following week. This is not acceptable, specifically for students doing research and the business community that relies heavily on their supplier and customer connections. Currently Terms & Conditions #241, Section 9.4, are not being met. Per "Decision & Order #241, Section IV", an exception was made for Molokai and Lanai. No such exception was made for Hana, therefore Hana should have the same service as Central Maui which is to comply with the "FCC Customer Service Standards". Both Maui Electric Company and Hawaiian Telcom have repair personnel that reside in Hana and are on call. OTWC has no technicians in Hana and OTWC currently offers quicker response time on Molokai and Lanai.

4. Service to all of East Maui-

As part of their merger, AT&T-DIRECTV will be required to expand its deployment of high-speed, fiber optic broadband Internet access service to 12.5 million customer locations as well as to E-rate eligible schools and libraries. Charter has committed that, within four (4) years of the merger it will invest at least \$2.5 billion in the build-out of networks into commercial areas beyond where it currently operates.

With the convergence of telecommunication technology and its reliance on a fiber-optic backbone it has become apparent that duplication of infrastructure is not a practical approach to bringing service to rural communities and adds cost to the consumer. The Hana Broadband Committee would like a commitment by OTWC/Charter to a cooperative effort to bring a commonly held fiber optic backbone cable to East Maui that would be open to all utilities and telecommunication providers.

5. Equal Service-

Because our private and business community is dependent on fast and reliable television and internet access, we feel the DCCA should require, as conditions of a merger, that Hana residents, businesses and community anchor institutions be provided with equivalent packages, quality, speed, functionality, and price of service for unrestricted (ie. open & unmetered) internet access as is available in the City of Honolulu.

6. Last Mile Link-

Hawaii and Hana in particular has an extremely corrosive environment compared to mainland communities. The mix of salt spray with VOG creates and acid rain that plays havoc with copper line connections and are conducive to many of the service problems experienced by the consumer. As part of their merger, AT&T-DIRECTV will be required to expand its deployment of high-speed, fiber optic broadband. As part of the agreement, the DCCA should see an obligation from OTWC/Charter to replace all copper last mile links in Hana with fiber-optic cable and use fiber-optic cable for all future build out in East Maui.

EXHIBITS:

1. Photos of old dish and current dish compared.
2. Youth Center
3. Survey
4. Speed Tests
5. Analysis (Chase)

EXHIBITS



EXHIBIT I



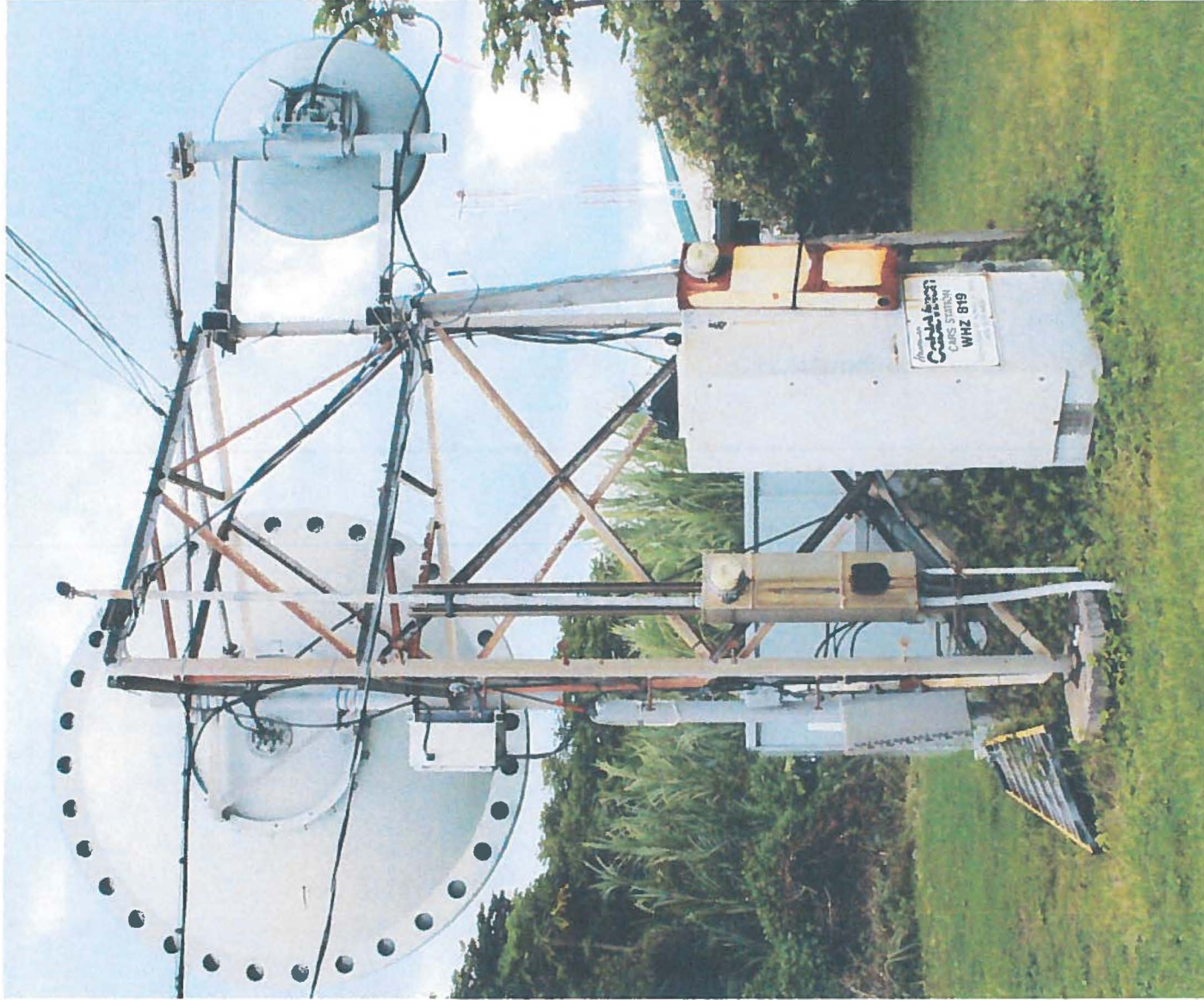
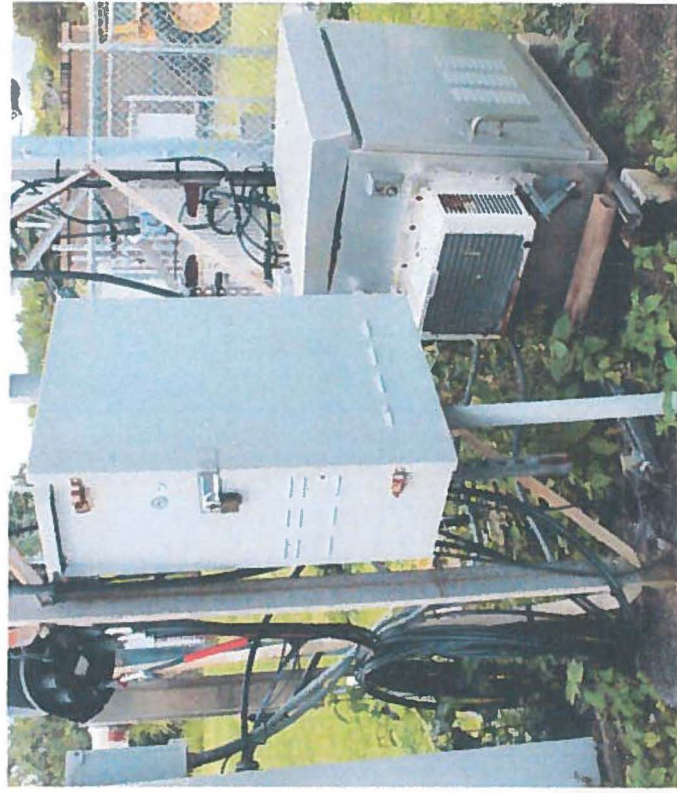


EXHIBIT: 1-A

EXHIB: 1-B

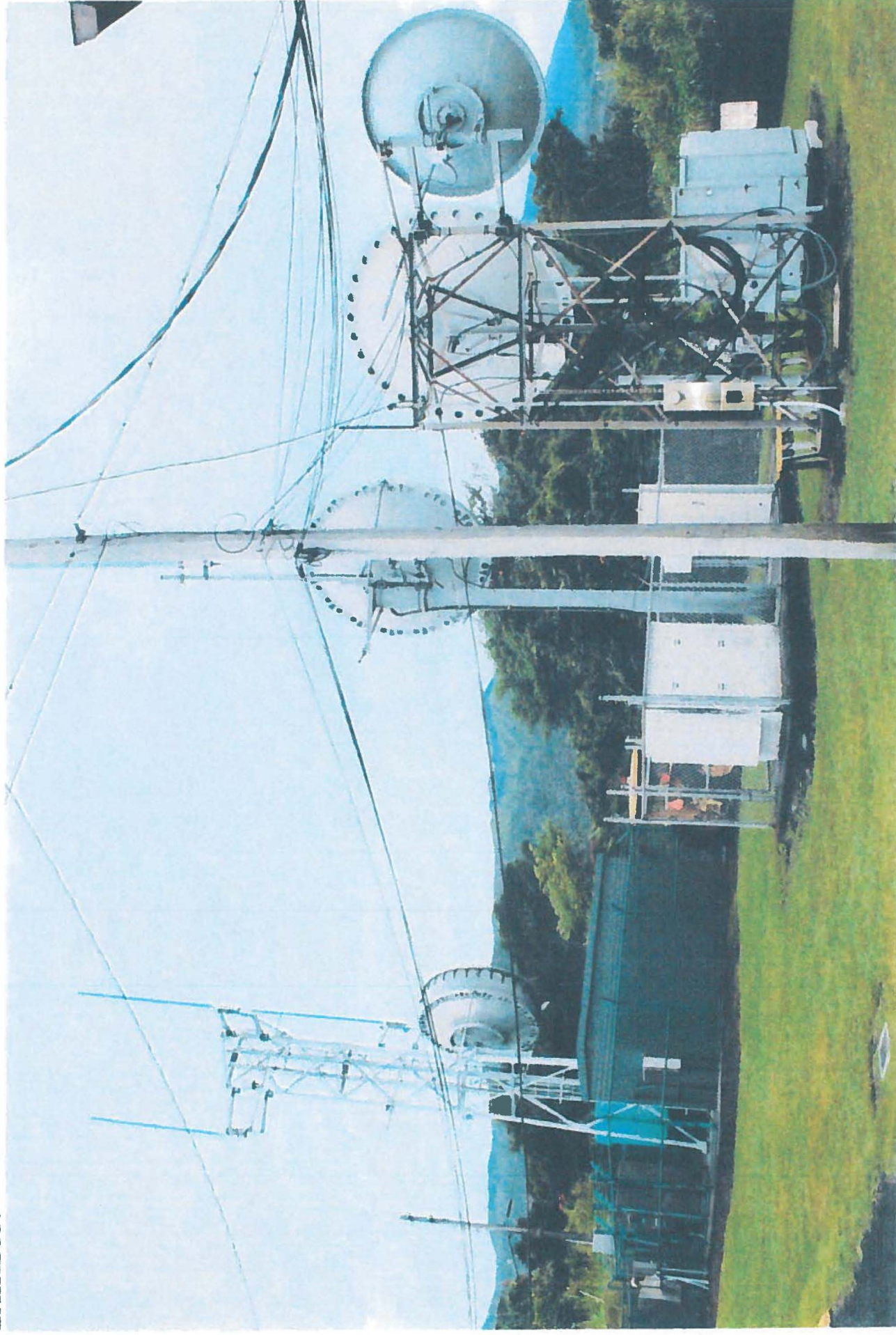


CURRENT OTWC - TV DISH (LEFT), BROADBAND (RIGHT)



UNIVERSITY OF HAWAII - BROADBAND DISH

EXHIBIT: 1-C



GOVERNMENT - DISH (LEFT SIDE) - UNIVERSITY OF HAWAII DISH (CENTER) - OTWC DISH (RIGHT SIDE)

EXHIBIT II



HĀNA YOUTH CENTER, INC.

E kipaipai i na 'opini i na hana ku i ka pono mai manawa a mau loa aku.
[Inspiring youth to make positive impressions that last a lifetime.]

5091 Uakea Road / P.O. Box 464
Hāna, HI 96713
Phone number: 808.248.8504
Fax number: 808.248.7336
Email: hanayouthcenter@netscape.net
Federal tax I.D. 99-0276738
Check us out on FaceBook

October 1, 2012

Ms. Edwina Minglana
Grants Specialist
Office of Hawaiian Affairs
711 Kapi'olani Blvd. #500
Honolulu, HI 96813-5249

Aloha Ms. Minglana,

Thank you for your letter dated September 25, 2012. Also thank you for having allowed Hana Youth Center to be a part of this OHA-DHHL Native Hawaiian Education and Employment Network.

Our records indicate that over the course of years, several attempts have been made along with PROSIS through communication over the telephone, email, via computer in addition to a couple site visits to get us up and running. All of these efforts have proved unsuccessful. I believe that our situation is that we suffer from not having adequate broadband width in our isolated community.

Our current cable provider is Oceanic Cable. Recently due to community outcry there was a meeting here in Hana where Mr. Rick Coletto, General Manager spoke. In a nutshell he said the our current community system, which is over 40 years old, utilizes outdated microwave technology, transmitting signal from the Big Island. He said that the idea of running fiber optic cable from Central Maui is costly. He mentioned that the idea of piggy backing on MECO cabling is not an option. He did not make any commitment as to when we can look forward to them considering this idea further. I figure that although what we have is inadequate, it is still better than nothing.

PROSIS had wanted to utilize Sandwich Isles Communication, which is the provider for Hawaiian Home Lands on Maui. However, being there are no current

developed Hawaiian Home Lands in Hana, it is not an option for us. I have no idea as to what is happening on that front.

Although being an after school program, Hana Youth Center avails itself during the day as an unofficial site for Hawaii Technology Academy which provides our Hana youth an alternative to attending Hana School. It is an online school utilizing the Internet. We currently have about 12 youth who on and off come to HYC, as they do not have Internet service at home. Originally, Oahu teachers needed confirmation that the problems experienced were actually happening due to the Internet and not of the child's accord.

We also partnered this summer with AKAKU, Maui's public television with something called Project Y-BEAM. This allowed our Hana youth to take classes here at the center and learn video journalism. Our ongoing challenge was it took considerable time to download the youth project clips to the AKAKU system.

Although we continue to experience challenges, we do try to make the best of it. Had we known better we would not have accepted to be part of your of the OHA project. I apologize for the inconvenience this has caused.

In your letter, you mentioned that OHA would designate the equipment we received to another non-profit in our area. Please know that we did what we could and I earnestly believe that the situation will remain unchanged as to any organization on East Maui you choose.

I humbly ask that you not consider having us ship the video conferencing equipment as this would prove impractical, burdensome and costly to our small organization.

I await your equipment decision.

Sincerely,



W. Keoki Kalani
Director

EXHIBIT III



Hana Broadband Survey Results

10 questions, 60 Respondents, collected 3/5/14-3/16/14

1. Indicate which services you currently subscribe to: (check all that apply)

Answer Choices	Responses
Time Warner Cable (Television)	56.67% 34
Time Warner Cable (Internet)	83.33% 50
Dish Network (Television)	3.33% 2
Starband Satellite Internet	5% 3
Excede Satellite Internet	5% 3
None of the above	6.67% 4

Total Respondents: 60

COMMENTS:

Hughes satellite internet
 I do not subscribe but use roommates Time Warnet Cable
 digital cellular att
 DIRECTV
 DTV Direct
 Directv (television)
 the Wave-through Oceanic
 DirecTV
 Verizon hot spot (internet)
 verizon

2. If you are now or previously were a Time Warner subscriber (Internet or Television), please use the check boxes below to tell us more about this.

	I am a subscriber	It's not available where I live	It's too expensive	I switched to another service within the last year	I switched to another service more than 1 year ago	I originally decided another company provided better service	I don't want home/business service
Television	68.63% 35	11.76% 6	9.80% 5	1.96% 1	3.92% 2	1.96% 1	5.88% 3
Internet	86.54% 45	9.62% 5	3.85% 2	1.92% 1	1.92% 1	3.85% 2	0% 0

COMMENTS:

I use roommate's internet and cable tv. I am not a subscriber but I was required to say so to give feedback. Bad survey. I use your products daily.

Internet service is terrible, and their maintenance/backup/repair has been poor as well

I also use Verizon internet

?

3. Indicate your overall satisfaction with the quality of TELEVISION service you currently receive.

Answer Choices—

Responses—

Extremely satisfied	11.67%	7
Somewhat satisfied	18.33%	11
neutral	11.67%	7
somewhat dissatisfied	18.33%	11
extremely dissatisfied	10%	6
I do not have any Television service	30%	18

COMMENTS

- WE WERE EXTREMELY DISSATISFIED FOR EVERY YEAR (16) WE HAVE HAD IT UNTIL THE LAST 6 MONTHS, WHEN IT HAS IMPROVED, THOUGH WE STILL HAVE VERY SLOW SERVICE, SOMETIMES NO BANDWIDTH, NIGHTTIME 6 P.M., TO 10 P.M., IS TERRIBLE, EVERYBODY STREAMING MOVIES? COCKROACHING NEIGHBORS?

- The service is extremely unreliable and most times very poor. Not happy at all!!! Have had over a dozen service calls in one year.

- This week in particular there were roving channel blackouts where you may have sound but no picture btw channels 17, 79, 71. An issue with the sevens it would seem. Very frustrating.

- FREQUENT lapses in service ESPECIALLY the digital stations

- DirecTV is reliable, price competitive, and technologically advanced. I used to be with Time Warner.

They refused to respond to my complaints. Their service was only intermittent, and their technology was inferior in every way to DirecTV, which I didn't discover until I quit Time Warner. After I quit, Time Warner started offering me all sorts of discounts (phone and direct mail) to come back. I refuse. They are awful. Wish DirecTV would start offering internet as well. (BTW, Time Warner told me that DirecTV would not work, would be unreliable. They were so wrong!!!)

- OFTEN MANY OF THE CABLE CHANNELS ARE BROKEN UP OR SIMPLY NOT COMING THROUGH AT ALL. WHY NO HD WHEN I'M PAYING FOR THE SERVICE

- I cannot receive clear HD signals at night, I think that there is not enough bandwidth to handle both television and internet under the current system.

- most of the time it works and they are pretty good about troubleshooting problems

- .Weather interferes with reception

- We experience many power outages in our area throughout the year which directly affect our television and internet services.

- Reception inconsistent, some channels not coming correctly.

- as a disabled veteran, i enjoy watching the Military channels. However, the picture freezes, pixilates, audio chatters and goes to black screen making it impossible to watch and enjoy... i recently just went back to basic cable....sigh

- Service is unreliable.

- Certain channels on my TV does not work and yet I pay for those channels and have called to report

and nothing fixed. Pay per view service is not good sometimes you pay for a movie and then it is disrupted service...

- Slow, down a lot, in bad or fowl weather we lose channels.
- I have dish because Oceanic wanted too much \$\$ to bring service to my location. Years later they brought the internet but we haven't switched to Oceanic TV because we hear a lot of complaints and service goes down often. Dish is very reliable.
- High Band channels are not reliable.
- Every and anytime I have an issue, which is not often, they are extremely helpful and always rectify the problem.

4. Indicate your overall satisfaction with the quality of INTERNET service you currently receive

Answer Choices

Responses

extremely satisfied	8.33%	5
somewhat satisfied	31.67%	19
neutral	11.67%	7
somewhat unsatisfied	26.67%	16
extremely unsatisfied	20%	12
I do not have any Internet service	1.67%	1

COMMENTS:

-SEE ABOVE FOR BOTH TV AND INTERNET

-slow unreliable internet service, pathetic customer service

-However, it is often pretty slow

-When it is available, too much down time this past year.

-At times, too slow.

-not fast enough, doesn't work throughout the house, wifi very inadequate, service poor and only occasional, really horrible, really!

-It is totally unreliable, goes in and out all day, service calls are pointless. Time Warner has told me that the reason is that there are so many people subscribing—they suggest that I only use internet at times when people are not home using it—however, they continue to charge me 24/7!

-Network perforistent. And TWC fmance is inconsront-line technical support is confusing, often times unaware of the situation even though TWC can tell there is a network problem.

MORE DEPENDABLE SERVICE AND SLIGHTLY FASTER SPEEDS SINCE INSTALLATION OF NEW EQUIPMENT BUT STILL NOT UP TO STANDARD -OF SERVICE ELSEWHERE

-Better than it used to be!

-it's better that it use to be but still sometimes slower then we would like especially downloading media stuff. The service is less frequently down, but still down more that it is in other parts of the country.

-it sometimes freezes and I have to turn it off and on.

-Internet services beats dial up, and for that alone I am grateful. When the weather is bad our services get affected and that's a bomber, but overall I have had no other problems.

-I need internet for my work, and it drops out regularly, is slow, and often kicks me off. Getting service is difficult, and streaming for movies often is interrupted.

-altho very very slow in the past, it seems as tho the internet speed is getting better and better.

-Service cuts out. Very slow for what we are paying. Still, would pay even more for faster speed! It's 2014, many small countries have 10X the internet speed we do out here!

- Speed is very slow and service is overall intermittent.
- It goes off line too often and streaming is always slow.
- Internet goes down at times off and on but no changes on bill going down! Can't get netflix without disruptions in service...
- Extremely slow service, at rates that would not be acceptable on the mainland and shouldn't be here. There are times when dial-up is faster.
- Too many slow downs and complete outages for the fees charged.
- Slow, slow. slow..
- much better speeds over the past months since the service has been upgraded. Still occasional outage or times when it is running slow.
- I like my service. I was not on Oceanic TW Cable when it went down for a few weeks a few years ago. I only clicked somewhat satisfied because I understand that in other countries, other places on Maui, and elsewhere, the connection is faster.
- Most of the time it's pretty fast and reliable, but it does have times when it either goes out for a period or bogs down significantly.
- Present Verizon service is slow and on occasion is unavailable. Previous Time Warner Cable only worked once in a while. Repeated replacement of modems did nothing to improve service. Finally, we gave up on them
- Speed of download completely unreliable and slow; frequently just lose connection, usually just briefly but very disruptive. Rarely able to sustain streaming content.

5. Please tell us more about your satisfaction with the specific aspects of Television service listed below

	extremely satisfied	somewhat satisfied	neutral	somewhat unsatisfied	extremely unsatisfied	I do not have Television service	Total Respondents
Picture quality	11.86% 7	30.51% 18	3.39% 2	11.86% 7	10.17% 6	32.20% 19	55
reliability	7.14% 4	21.43% 12	5.36% 3	17.86% 10	17.86% 10	30.36% 17	56
stations available	12.73% 7	18.18% 10	14.55% 8	20% 11	3.64% 2	30.91% 17	55
price	5.45% 3	12.73% 7	16.36% 9	20% 11	14.55% 8	30.91% 17	55
customer service	10.71% 6	19.64% 11	12.50% 7	19.64% 11	7.14% 4	30.36% 17	56

COMMENTS:

- Very expensive and usually unreliable
- WHEN OCEANIC FOLKS FINALLY COME THEY ARE GREAT. COMING ONLY ON WEDNESDAYS UNLESS THERE IS A REAL EMERGENCY IS NOT ACCEPTABLE. THE WHOLE WORLD OPERATES ON THE WEB NOW, WE CANNOT LOSE SERVICE WEDNESDAY NIGHT AND OUT UNTIL THE FOLLOWING WEDNESDAY MORNING. RIDICULOUS.
- When service goes out, which is frequently, and we call to report it, we get a lot of rigamarole. Examples: "No one else has reported a problem, (they probably had the sense to give up) or, "Our repair crew will be on Wed." (and we're calling on Sat.). Grr....
- DirecTV is totally responsive. Their equipment is constantly being upgraded—amazing technology!
- AGAIN WEAK SIGNAL, LACK OF HD AND MISSING STATIONS BIG PROBLEM
- Again, if the weather is fine then the television service is great. I pay \$146.00 per month for TV and internet services, I feel that is a lot compared to telephone services.
- Price....altho you charge full price for you service you provide less than "full" quality service to the Hana area
- The field technicians are good, but the customer service elsewhere in Time Warner is poor.
- While the technicians on the ground are very helpful and sympathetic, the company does not seem interested in providing the level of service

the advertise - and charge for. The technicians know what the problems are but the company seems unwilling to fix them correctly.
 -Weather plays a factor...

6. Please tell us more about your satisfaction with the specific aspects of Internet service listed below

	extremely satisfied	somewhat satisfied	neutral	somewhat unsatisfied	extremely unsatisfied	I do not have Internet service	Total
Speed	10.17% 6	27.12% 16	10.17% 6	23.73% 14	27.12% 16	1.69% 1	59
Reliability	8.62% 5	29.31% 17	3.45% 2	24.14% 14	32.76% 19	1.72% 1	58
price	5.17% 3	18.97% 11	22.41% 13	27.59% 16	24.14% 14	1.72% 1	58
customer service	8.77% 5	21.05% 12	24.56% 14	17.54% 10	26.32% 15	1.75% 1	57

COMMENTS:

-We pay \$90/month for <15 hours of normal streaming a month.

OCEANIC PEOPLE WHO COME TO THE HOUSE ARE WONDERFUL AND PROFESSIONAL AND DO THEIR BEST. WITH THE EXCEPT OF THE WONDERFUL DONNY PINERO IN ENGINEERING AND LIZ IN THE OFFICE, PERSONEL IS NOT SATISFACTORY

-\$\$\$\$ monopoly

-It's a monopoly, so I have to subscribe. Internet service is critical to all that I do, but it's the poorest service and quality that I have found anywhere in the world.

-Don't get me started . . .

-Current pricing should deliver consistent 24x7 20MBps down and 10MBps up

-Internet services is great as long as the weather is great.

-OTW has a very good phone payment system using voice commands that makes it super easy to pay my bill each month in less than a minute. But I also have had bad experiences with customer service not understanding or responding to my issues well.

-At least Verizon service is usually dependable.

-As above, while the technicians on the ground are very helpful and sympathetic, the company does not seem interested in providing the level of service the advertise - and charge for. The technicians know what the problems are but the company seems unwilling to fix them correctly.

7. Regarding Internet Usage, how often do you use the internet for the following activities...

	Constantly	frequently	sometimes	occasionally	hardly ever	never	I do not have Internet service	Total
General Web Browsing/Email	38.33% 23	56.67% 34	3.33% 2	0% 0	0% 0	0% 0	1.67% 1	60
e-commerce/Business usage	20.69% 12	46.55% 27	13.79% 8	3.45% 2	6.90% 4	6.90% 4	1.72% 1	58
Streaming movies/shows (Netflix, Hulu, iTunes, etc.)	6.78% 4	33.90% 20	18.64% 11	11.86% 7	15.25% 9	11.86% 7	1.69% 1	59
Online gaming	1.85% 1	3.70% 2	9.26% 5	3.70% 2	9.26% 5	70.37% 38	1.85% 1	54
Video Communications (Skype, iChat, etc.)	8.93% 5	12.50% 7	17.86% 10	26.79% 15	19.64% 11	12.50% 7	1.79% 1	56
Voice Communications (VoIP service, skype voice, etc.)	5.56% 3	7.41% 4	16.67% 9	20.37% 11	18.52% 10	27.78% 15	3.70% 2	54

8. How often do you notice any sort of interruption in the quality or speed of your Television or Internet service?

	not applicable	Very frequently	Often	Sometimes	Occasionally	Hardly ever	Total
Time Warner Television Service	25% 12	27.08% 13	14.58% 7	20.83% 10	8.33% 4	4.17% 2	48
Time Warner Internet Service	7.14% 4	30.36% 17	33.93% 19	17.86% 10	7.14% 4	3.57% 2	56
Other Television Service	62.50% 15	8.33% 2	4.17% 1	4.17% 1	0% 0	20.83% 5	24
Other Internet Service	52% 13	12% 3	12% 3	4% 1	12% 3	8% 2	25

COMMENTS:

-TIME WARNER TV SERVICE IS REALLY BAD... REALLY REALLY BAD... PIXILATING CONSTANTLY, UPPER TIER NEVER AVAILABLE CONTINUE TO PAY FOR IT... AWFUL AWFUL AWFUL... NO RESPONSE FROM REPAIR... THEY JUST SHRUG THEIR SHOULDERS AN "THERE IS NOTHING WE CAN DO ABOUT THIS" AND THEY HAVE BEEN SAYING THAT FOR YEARS!!! RICK COLLETO, MANAGER, S/ NOTHING TO BE DONE.

-If the electricity is out by Hana airport, which is not on the emergency generator, the cable and internet are out.

-Time Warner service was interrupted constantly, so I finally gave up after 9 months of complaining. DirecTV has never had an outage!

-TWC current Internet provisioning feels as though it is specifically designed to prevent competitive services (Netflix.com, Hulu.com, Vimeo.com, youtube.com, etc) as an alliterative to TWC CableTV

-We experience interruptions only during bad weather, trees fall on cable lines, etc. Otherwise, we are very happy and content with the Oceanic services.

-RE: internet usage #7. I would use some features more if the service was fast and reliable enough.

9. If given the choice, would you choose to pay for a faster level of Internet service from Time Warner like subscribers in other parts of the state can do?

Answer Choices--	Responses--	
Yes	55.00%	33
No	18.33%	11
Not sure	26.67%	16
Total	60	

COMMENTS:

-Price is already more than the quality provided

-WHY SHOULD WE HAVE TO PAY EXTRA FOR GOOD SERVICE????? WE PAY A WHOLE LOT OF MONEY FOR REALLY BAD SERVICE HOW FAST IS "FASTER"?? WOULD THAT BE THE "NORMAL" ELSEWHERE ? I JUST WANT REGULAR, UNINTERRUPTED INTERNET TV SERVICE. THIS SEEMS REASONABLE FOR ALL THE MONEY WE PAY AT THIS TIME. AND T-W NEEDS TO BE HELD ACCOUNTABLE AND NEEDS TO RESPOND TO THE NEEDS OF ITS CUSTOMERS. THAT IS NOT NOW THE CASE BECAUSE THEY HOLD PRACTICAL MONOPOLY ON INTERNET AND CABLE TV SERVICE, AND NOW WITH THE PURCHASE UNDERWAY, I PREDICT IT WILL ONLY GET WORSE AND WORSE. OUR PUBLIC OFFICIALS DO NOT, REPEAT NOT, RESPOND TO THIS. OUR ELECTED OFFICIALS DEPEND ON CAMPAIGN FUNDS TO GET RE-ELECTED AND ARE NOT ABOUT TO STICK THEIR NECKS OUT FOR CONSUMERS (I.E., THE PUBLIC, VOTERS)... THAT IS REALLY SAD, DISAPPOINTING, AND DISILLUSIONING. ALL OF WHICH WE NEED TO REGISTER AT THE BALLOT IN THE NEXT ELECTION.!

-I'm not interested in trusting Time Warner with more \$\$

-You can't maintain what you have, why pay more for unreliable service.

-if reasonable

-I'd prefer another provider!! Done with Time Warner!

-SUBJECT TO A MINIMUM SLA (Service Level Agreement) that ensures less than 0.5% packet loss at all times!

-Not a choice.

-i reliable....

-please, please, please!

-Depends on price and service.

-Seems like for the rates charged the provider should provide a reliable highspeed so that additional fees for increased speed would not be necessary.

-depends on price

-But not if it means the movement to undo net neutrality. see www.freepress.net

-speed has not been an issue.

10. Please use this space to share any thoughts or concerns regarding television or internet service in the Hana district.

When we first received new modems in summer 2013, service was great. Since this past fall, the speed and reliability have seem to have gotten worse.

3/16/2014 1:49 PM

Hana residents are getting ripped off by the high cost and low quality of internet service. Why should we pay more for less? If you can't solve the problems that continue to occur, then don't charge us so much for such poor service. I'd rather you fix it. Btw, when I did have cable internet at another residence in Hana, the guys who came to provide service were great!

3/14/2014 8:42 PM

we should have a reduction in price due to inconsistent and bad reception...without having to constantly phone and have repairmen come out

3/14/2014 9:40 AM

Need TV/Internet service in Upper Nihiku

3/13/2014 9:04 PM

WE HAVE BEEN FIGHTING THIS FIGHT FOR YEARS AND YEARS WITH OCEANIC,

3/13/2014 6:04 PM

The absolute worst service I've ever experienced. All calls go straight to Honolulu and they have no clue where Hana is and seems to be just as clueless on the continued problems here. It's a joke!! And, when I've asked to have someone from Maui call me back, I've never had a returned call from anyone on this island in a year. I have wondered several times if I should contact the better business bureau as I feel that Oceanic Time Warner has been ripping off the people of Hawaii for years. I even had poor service issues in Honolulu.

3/13/2014 2:07 PM

Reliability is a big issue.

3/13/2014 1:12 PM

We need fiber optic cable connection over the entire route from "the other side"

3/10/2014 10:32 AM

How about servicing outer Hana, Nahiku area for example.

3/9/2014 3:16 PM

Is it true we are the only area in Hawaii where we can't get internet via phone company? I think I heard this somewhere.

3/8/2014 7:48 PM

We need great service and quality of internet. How can we get it? Cause we certainly aren't getting either right now.

3/8/2014 2:15 PM

Hana Coast needs competitive internet service—I hope DirecTV will come in and provide internet.

3/7/2014 5:38 PM

If it isn't the case that TWC is purposefully making the internet unreliable or useful to competitive alternatives, then it must be the case TWC lacks sufficient technical skills to deliver reliable service – either directly or through their subcontractors.

3/7/2014 9:50 AM

WE HAVE BEEN A STEP CHILD TOO LONG. PLEASE DO WHAT NEEDS TO BE DONE TO PROVIDE THE QUALITY OF SERVICE THAT ARE PAYING FOR.

3/7/2014 9:10 AM

How important is it to put in microwave to pollute our clean environment?? This is not why folks live in & visit Hana, slow town doesn't need fast business. Keep Hana CLEAN & Keep microwave OUT !!!

3/7/2014 8:54 AM

Use the power company's easement to service Hana with fiber-optic cable. This will speed up service and reliability of that service.

3/7/2014 6:08 AM

Because Time Warner only sends their customer service reps to Hana once a week, getting service can often mean a three week wait which seems far too long.

3/6/2014 8:57 PM

Internet is down about 1/3 of the time, and I depend on it for my business.

3/6/2014 8:34 PM

We need fiber optic cable from anyone who will provide it. Current service is horrible!!!!

3/6/2014 3:06 PM

I am off the grid so I have to have satellite service.

3/6/2014 1:50 PM

I would not mind if time Warner upgrade the services to a faster level for Hana as long as the cost does not go up. I feel I am paying too much already!!!!

3/6/2014 11:36 AM

We have had Oceanic owned internet of the "Wave" originally. Now is just part of Oceanic Time Warner. It works well sometimes, but you never know.

3/6/2014 10:56 AM

I would be extremely excited & grateful for the availability of OTWC television & high speed internet service (equal to that of other parts of Maui) for my Hana residence as well as business. Mahalo!

3/6/2014 10:55 AM

you charge full price for less than full service....

3/6/2014 10:54 AM

please extend wired internet service further west of Hana!!

3/6/2014 10:42 AM

This is a very underserved area that is predominantly Hawaiian. The deficit level of service in this area is discriminatory.

3/6/2014 10:18 AM

It's better than it used to be but not as good as other areas of Maui for the same price.

3/6/2014 10:15 AM

Living in an isolated area makes connectivity even more important to all of us in Hana. The inferior speeds and reliability of the Time Warner service in Hana should not be accepted. Service provided to other areas of Hawaii is far superior and that should be the standard set for Hana as well. The fees paid in Hana are the same as paid everywhere else, including the mainland, but in those areas they expect and get much higher speeds and reliability. Why should we accept less for the same fees? If Time Warner wants to offer a faster service for a higher price, why should we be expected to pay more for what is considered "normal" elsewhere? An area that also needs improvement is customer service and their awareness of the Hana customers and situation. Experience has shown that any call only leads to frustration because the customer service rep tells each caller that he is the only one having trouble when we have already talked to friends having the same trouble and who have called and gotten that same reply. There is apparently very poor communication within Time Warner customer service and placing a call usually guarantees frustration and poor results.

3/6/2014 10:07 AM

Increase bandwidth for better and faster quality

3/6/2014 9:40 AM

Oceanic must continue to explore methods to upgrade the infrastructure in order to provide comparable service to the Hana area as is provided to the rest of the State.

3/6/2014 9:35 AM

Amazing it exists. We ARE remote. Thanks for your efforts.

3/6/2014 9:03 AM

Previously with Time Warner internet it was so unsatisfactory that I had to use the public library for access. With Verizon my service is slow, occasionally undependable, but I am able to carry out my correspondence and affairs with patience.

3/6/2014 7:08 AM

TWC does not seem interested in providing service to Hana anywhere near comparable to that offered elsewhere in Hawaii, yet we are "trapped" by TWC as there is no realistic alternative. Their franchise is sanctioned by the state and should require a guaranteed standard of service across their ENTIRE system - not just high density more urban areas. I would argue that a higher level of service should be required BECAUSE we are remote.

3/6/2014 5:22 AM

The digital and hd cable is a rip off. you shouldn't even offer it, if you can't ensure a high quality picture and reliable service.

3/6/2014 12:32 AM

The internet service I have (near Hana airport) is comparable to the high speed I paid double for on mainland. I have past experience with business use on high speed internet and am very satisfied with Time Warner.

3/5/2014 10:18 PM

reliability is my primary issue

3/5/2014 9:34 PM

it is more about the frequent interruptions in service and we still have to pay a full bill every month. it goes off ALOT!

3/5/2014 8:54 PM



FOLLOW-UP SURVEY

10/29 - 12/7, 2014

Indicate which service you currently subscribe to:

• **Answered: 30 Skipped: 0**

Answer Choices –	Responses –
Oceanic Time Warner Cable television.	6.67% 2
Oceanic Time Warner Cable internet.	40.00% 12
Oceanic Time Warner Cable television & internet.	56.67% 17
I am not an Oceanic Time Warner Cable customer.	6.67% 2

Total Respondents: 30

**Indicate your overall satisfaction with the quality of
TELEVISION service you currently receive.**

• **Answered: 28 Skipped: 2**

Answer Choices –	Responses –
Extremely Satisfied	3.57% 1
Somewhat Satisfied	17.86% 5
Neutral	3.57% 1
Somewhat Dissatisfied	35.71% 10
Extremely Dissatisfied	7.14% 2
Don't Have Cable Television	32.14% 9
Total	28

Indicate your overall satisfaction with the quality of INTERNET service you currently receive.

• Answered: 30 Skipped: 0

Answer Choices	Responses –	
Extremely Satisfied	0.00%	0
Somewhat Satisfied	13.33%	4
Neutral	6.67%	2
Somewhat Dissatisfied	40.00%	12
Extremely Dissatisfied	33.33%	10
I Don't Have Cable Internet	6.67%	2
Total		30

Please indicate your level of satisfaction with the specific aspects of your Time Warner TELEVISION service listed below.

• Answered: 26 Skipped: 4

	Extremely Satisfied	Somewhat Satisfied	Neutral	Somewhat Unsatisfied	Extremely Unsatisfied–	I Don't Have Television Service	Total
Picture	7.69%	23.08%	15.38%	23.08%	0.00%	30.77%	
	2	6	4	6	0	8	26
Reliability	3.85%	7.69%	15.38%	19.23%	23.08%	30.77%	
	1	2	4	5	6	8	26
Price	0.00%	11.54%	15.38%	23.08%	19.23%	30.77%	
	0	3	4	6	5	8	26
Service	0.00%	7.69%	26.92%	15.38%	19.23%	30.77%	
	0	2	7	4	5	8	26

Please tell us about your satisfaction with the specific aspects of your Time Warner INTERNET service listed below

• Answered: 30 Skipped: 0

	Extremely Satisfied	Somewhat Satisfied	Neutral	Somewhat Unsatisfied	Extremely Unsatisfied	I Don't Have Internet Service	Total
Speed	0.00% 0	13.33% 4	10.00% 3	26.67% 8	43.33% 13	6.67% 2	30
Reliability	0.00% 0	6.67% 2	16.67% 5	20.00% 6	50.00% 15	6.67% 2	30
Price	0.00% 0	6.67% 2	26.67% 8	40.00% 12	20.00% 6	6.67% 2	30
Service	0.00% 0	3.33% 1	16.67% 5	23.33% 7	50.00% 15	6.67% 2	30

Regarding Internet Usage, how often do you use the internet for the following activities...

• Answered: 29 Skipped: 1

	Constantly	Frequently	Sometimes	Occasionally	Hardly Ever	Never	I Don't Have Internet	Total
Web Browsing/Email	55.17% 16	41.38% 12	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3.45% 1	29
E-Commerce /Business Usage.	13.79% 4	65.52% 19	13.79% 4	0.00% 0	3.45% 1	0.00% 0	3.45% 1	29
Streaming Videos /Movies	3.45% 1	31.03% 9	34.48% 10	10.34% 3	13.79% 4	3.45% 1	3.45% 1	29
Online Gaming	3.57% 1	3.57% 1	0.00% 0	3.57% 1	21.43% 6	64.29% 18	3.57% 1	28
Video Calls (Skype, Ichat, Etc.)	3.45% 1	27.59% 8	10.34% 3	13.79% 4	24.14% 7	17.24% 5	3.45% 1	29
Voice Calls (Skype, Volp Etc.)	3.45% 1	20.69% 6	6.90% 2	6.90% 2	34.48% 10	24.14% 7	3.45% 1	29

Indicate any improvement to your TELEVISION service in the last 6 months

• Answered: 26 Skipped: 4

	Greatly Improved	Somewhat Better	The Same	Somewhat Worse	Much Worse	No Television Service	Total
Picture Quality	0.00% 0	0.00% 0	69.23% 18	0.00% 0	0.00% 0	30.77% 8	26
Reliability	0.00% 0	8.00% 2	56.00% 14	4.00% 1	0.00% 0	32.00% 8	25
Service	0.00% 0	4.00% 1	60.00% 15	4.00% 1	0.00% 0	32.00% 8	25

Indicate any improvement to your INTERNET service in the last 6 months

• Answered: 29 Skipped: 1

	Greatly Improved	Somewhat Better	The Same	Somewhat Worse	Much Worse	No Internet Service	Total
Speed	0.00% 0	27.59% 8	48.28% 14	10.34% 3	10.34% 3	3.45% 1	29
Reliability	0.00% 0	14.29% 4	64.29% 18	7.14% 2	10.71% 3	3.57% 1	28
Service	0.00% 0	11.11% 3	66.67% 18	7.41% 2	11.11% 3	3.70% 1	27

Please add your comments regarding your current television or internet service and if you have observed any improvement to your service in the last 6 months.

Answered: 18 Skipped: 12

I have gone through 3 new cable boxes in the last 2 months, still experienceing "black outs" when changing channels, or complete lack of signal so that i have to turn off the box 1,2, or 3 times to get the picture back. OTWC tells me that there are too many people on the same channel at the same time, so it causes us not to be able to connect to that channel right away. Sorry otwc not buying that excuse. It seems when i call otwc and let them know, get to tech, ck. speed, all of a sudden it's all good. A number of channels also have digital audio glitches, so it makes it very uncomfortable to listen too, so there are a few channels i won't watch because of this. Our local channels, 2,4 8 and 9 always have some sort of visible static, 2 is impossible to watch and 4 is almost as bad, if not worse.. channels 8 and 9 are not as bad. Frankly, i could go on and on about the lack of quality service in our area of Hana Maui, HI. i will say we do have fewer internet outages that in the past, so i'm glad for that. i have been a otwc customer on maui since the late 80's, service is always better on the other side of our island, from kahului to napili, to kihei. sincerely D. smith hana maui hi.

12/7/2014 11:00 AM

Thank goodness I switched to DirecTV . . . the difference in service, reliability, and technology is incredible. Wish they also provided internet. I am weary with being told by OTW that I should just use the internet at times when others are not home using it--they charge me 24-7, I should have internet service that is reliable and fast 24-7!!

12/4/2014 9:23 AM

DL = 16.1 MBS UL = 1 MBS

12/3/2014 2:26 PM

Would like to have it

12/3/2014 8:11 AM

When service guys come to Hana on Wednesdays, the feeling in town is that they make up excuses to not do their job as they're driving here. Too often several trucks are parked at the bay FOR HOURS AT A TIME

12/3/2014 7:15 AM

Did not observed any improvement. :-(

12/2/2014 9:52 PM

TWC will not install cable. They say it's too far from the road. HOW does TWC ever expect to have enough customers to support cost of better infrastructure/improved service if they refuse to install service? Not everyone lives in the subdivision. C. Diliberto

12/2/2014 8:51 PM

I don't notice slow downs or buffering as often - though prime time it still happens with some regularity. Customer service is still agonizing.

12/2/2014 6:53 PM

SPEED TEST SHOWS FASTER BUT USAGE SEEMS WORSE.

11/11/2014 8:08 PM

Many cable stations still break up if they appear at all

11/2/2014 4:35 PM

Would like to see more reliable service and faster internet speeds via a fibre-optic link to central Maui...

11/1/2014 9:43 AM

Oceanic Time-Warner internet service has never connected satisfactorily at our home, 134 Waikoloa Road in Hana town. After repeated efforts to solve the problem through Oceanic and other assistance we had to shift to a Verizon hot-spot that is minimally satisfactory. Poor internet access makes it extremely difficult for us to conduct our normal affairs. Twenty years ago this would not have been a serious problem but today it is a real impediment to life in Hana.

10/30/2014 3:17 AM

Service HAS improved but still way short of acceptable

10/29/2014 3:47 PM

The internet got much much better for several months, but over the past couple of months has been splotchy and slower, popping on and off frequently, making business activities very difficult at times. We appreciate the effort Oceanic has made to improve our service and hope they can resolve the current issues soon.

10/29/2014 2:21 PM

Internet just as fast as it was following the recent "upgrade" which is slower than it should be. Reliability is still poor - it goes out frequently. Even though it usually comes back on, or is fixed with a modem reset, it takes time (especially to call support) and is frustrating. Peak hours are the worst. They need to figure out a solution to handle the traffic during peak hours. I hate to think of what it will be like in another year when sites require increased speed to function properly, and even more people are online.

10/29/2014 12:42 PM

moderately improved digital -- MSNBC (and a few other channels over 100) still kicks out frequently but maybe a little less frequently than before.

10/29/2014 11:42 AM

We need better internet connection

10/29/2014 11:13 AM

My Internet has been running so slow and goes on and off most days for no apparent reason. I waited on hold for 45 minutes one day when I was reporting a problem and they said that they would look into the issue.

10/29/2014 9:56 AM

EXHIBIT IV





The map displays the town of Hana, Hawaii, with its coastal layout and inland roads. Major roads shown include Highway 360 running north-south and Highway 31 running east-west. Several streams are labeled, including 'Stream' and 'Hana Stream'. Red dots indicate specific speed test locations, with red lines connecting them to the legend. The locations are distributed across the town, from the northern part near Highway 360 to the southern part near the coast.

LEGEND

Andrew Rayner - 130 Kalo Rd.
(24.94.69.188)
Judy Kinser - 95 Kalo Rd.
Gaylord Stadshaug - 290 Kalo Rd.
(24.94.68.158) (Atlas Probe)
Rebecca Buckley - Alalele Pl.
Ward Mardfin - 4196 Hana Hwy.
(24.94.69.115)
John Romaine - 4869 Uakea Rd.
Neil Hasegawa - Haneo'o Rd.
(24.94.68.213)
Richard Paul - 4777 Hana Hwy.
(29.94.69.0)
Sky Pierce - 6810 Hana Hwy.
(66.27.209.27)
Kiran Sansone - 47750 Hana Hwy.
(24.94.69.247)
Chase Turner - 47550 Hana Hwy.
(24.94.68.214)
(Atlas & SamKnows Probes)

HANA SPEED TEST MAP

SPEED TEST DATA

NAME: Judy Kinser

ADDRESS: 95 Kalo Rd., Hana, HI 96713

DCCA SITE - <http://www.hibroadbandmap.org/speed-test/>

OCEANIC SITE - <http://speedtest.oceanic.com/>

		MBPS - DOWNLOAD			MBPS - UPLOAD					MBPS - DOWNLOAD			MBPS - UPLOAD		
DATE	TIME	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3			TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
3/13	7:34PM	1.48			1.05					10.24			1.06		
	7:38PM	1.19			1.04					10.68			1.07		
	7:41PM	1.11			1.05					8.92			1.05		

Signal Stats (Codewords)	Bonding Channel Value		
Channel ID	2	3	4
Total Unerrored Codewords	23358210567	23242011702	23241977960
Total Correctable Codewords	5958	10018	7089
Total Uncorrectable Codewords	12816	13863	13838
Unerrored/Uncorrectable	1822581.973	1676549.932	1679576.381

SPEED TEST DATA

NAME: Gaylord & Robin IP 24.94.68.158

ADDRESS: 290 Kalo Rd. Hana

DCCA SITE - <http://www.hibroadbandmap.org/speed-test/>

OCEANIC SITE - <http://speedtest.oceanic.com/>

		MBPS - DOWNLOAD			MBPS - UPLOAD			MBPS - DOWNLOAD			MBPS - UPLOAD		
DATE	TIME	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
3/11	8:05P	.56	.51		1.05	.96		6.2	1.6		1.06	1.05	
3/11	8:10P	.44			.94			3.63			.66		
3/11	8:15P	.51	.85		1.08	1.05		5.17	3.85		1.05	1.08	
3/11	8:20P	.62	.89		1.08	1.06		3.89			.78		
3/11	8:25P	.61			1.08			2.09			1.06		
3/11	8:30P	.65			1.05			3.91			1.07		

Signal Stats (Codewords)	Bonding Channel Value		
Channel ID	2	3	4
Total Unerrored Codewords	6061073238	6061056454	6061064662
Total Correctable Codewords	259	334	224
Total Uncorrectable Codewords	687	547	533
Unerrored/Uncorrectable	8822522.908	11080541.96	11371603.49

SPEED TEST DATA

NAME: Rebecca Buckley

ADDRESS: Alalele Pl., Hana, HI

DCCA SITE - <http://www.hibroadbandmap.org/speed-test/>

MBPS - DOWNLOAD

MBPS - UPLOAD

DATE	TIME	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
1/21/14	10:35 am	3.26			1.04		
	3:00 pm	2.18			1.05		
	9:30 pm	1.16			1.05		
1/22/14	7:40 am	4.49			1.05		
	2:35 pm	2.38			1.05		
	9:15 pm	1.16			1.05		
1/23/14	7:00 am	6.22			984 kb		
	2:05 pm	1.78			1.04		
1/24/14	6:30 am	7.54			1.05		
1/25/14	6:50 am	4.01			1.04		
	4:10 pm	2.36			1.05		
	10:15 pm	2.30			1.05		
1/26/14	12:45 pm	3.71			927 kb		
	9:50 am	1.72			1.05		
1/27/14	7:30 am	6.25			1.05		
	7:55 pm	242 kb			866 kb		
1/28/14	8:50 am	1.58			1.03		
	5:20 pm	327 kb			1.05		
	9:35 pm	811 kb			1.00		
1/29/14	6:55 am	6.68			1.05		
	11:30 am	5.24			1.04		
	7:55 pm	915 kb			1.06		
1/30/14	7:12 am	6.15			1.05		
	10:30 pm	1.83			1.06		

OCEANIC SITE - <http://speedtest.oceanic.com/>

MBPS - DOWNLOAD

MBPS - UPLOAD

TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
1071			1.06		
10.83			1.09		
9.93			1.09		
11.00			1.10		
NOT AVAILABLE			NOT AVAILABLE		
10.70			1.08		
10.93			1.07		
10.88			1.09		
7.21			1.09		
N/A			N/A		
8.20			1.09		
10.89			1.09		
N/A			N/A		
10.92			1.08		
2.52			1.10		
8.99			1.09		
10.76			1.10		
10.64			1.10		
9.85			1.09		
9.87			1.08		
10.92			1.10		

SPEED TEST DATA

No particular disruptions

NAME: Ward Mardfin IP: 24.94.69.115 (all three)

W Desktop 3/11 Youtube: Dishonorable Disclosures

ADDRESS: 4196 Hana Highway (Wakiu area), Hana, HI, 96713

W Laptop 3/11 Youtube: McLaughlin 7/26/2013

J Desktop 3/11 Youtube : Over Hawaii

DCCA SITE - <http://www.hibroadbandmap.org/speed-test/>

MBPS - DOWNLOAD

MBPS - UPLOAD

OCEANIC SITE - <http://speedtest.oceanic.com/>

MBPS - DOWNLOAD

MBPS - UPLOAD

DATE	TIME	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
		Ward	Desktop				
3/11	8:05	0.221			0.881		
3/11	8:10	0.440			1.03		
		Ward	Laptop				
3/11	8:05	0.386			1.03		
3/11	8:10	0.525			0.437		
		Jean	Desktop				
3/11	8:05	0.345			1.03		
3/11	8:10	0.227			1.03		
		Ward	Desktop				
3/12	8:05	.395	.597	.426	1.04	.952	1.04
3/12	8:08	.775	.686	.818	1.05	1.05	1.05
3/12	8:08	.329	.519	.735	1.01	.951	1.03
3/12	8:28	.813	.810	.797	1.05	1.05	1.05
		Ward	Laptop				
3/12	8:05	1.08	.605	.527	1.04	1.04	1.02
3/12	8:08	.834	.390	.597	1.03	.940	.936
3/12	8:11	.744	.856		1.03	1.02	
		Jean	Desktop				
3/12	8:05	.264	.808	.851	1.02	.906	1.03
3/12	8:10	.718	1.07	.332	1.04	1.04	.888

[illegible]

Signal Stats (Codewords)	Bonding Channel Value		
Channel ID	2	3	4
Total Unerrored Codewords	70989177937	70209229650	70060416041
Total Correctable Codewords	10889905	4326659	5964796
Total Uncorrectable Codewords	4774031	1448147	1695000
Unerrored/Uncorrectable	14869.86112	48482.11518	41333.57879

SPEED TEST DATA

NAME: John Romaine

ADDRESS: 4869 Uakea Rd., Hana, HI 96713

DCCA SITE - <http://www.hibroadbandmap.org/speed-test/>

OCEANIC SITE - <http://speedtest.oceanic.com/>

		MBPS - DOWNLOAD			MBPS - UPLOAD			MBPS - DOWNLOAD			MBPS - UPLOAD		
DATE	TIME	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
1/20	4:20 pm	4.58			1.05			10.84			1.09		
1/21	10:00 am	2.43			1.04			10.81			1.09		
1/22	9:30 am	3.10			1.04			10.63			1.08		
	2:00 pm	7.24			1.04			10.82			1.09		
1/23	6:10 pm	3.23			1.01			10.77			1.09		
1/24	4:30 pm	1.65			1.04			10.70			*		
1/25	8:00 am	6.03			1.05			10.82			1.09		
	2:05 pm	7.65			1.05			10.55			1.05		
1/26	10:25 am	4.64			1.05			10.80			1.09		
1/27	9:00am	5.26			1.02			10.80			.99		
1/28	9:15 am	3.46			1.04			10.82			1.09		
1/29	5:00 pm	1.25			1021 kb			10.78			1.07		
1/30	7:00 pm	6.43			1.05			10.73			1.09		
2/1	9:45 am	4.88			1.05			10.78			1.08		

* Cable connection went down - no test

Signal Stats (Codewords)	Bonding Channel Value		
Channel ID	2	3	4
Total Unerrored Codewords	4749078223	4749086035	4749096208
Total Correctable Codewords	7702	9767	8104
Total Uncorrectable Codewords	4224	2924	3051
Unerrored/Uncorrectable	1124308.291	1624174.431	1556570.373

SPEED TEST DATA

NAME: Neil Hasegawa

ADDRESS: Haneo'o Rd., Hamoa, Hana HI 96713

IP ADDRESS: 24.94.68.213

DCCA SITE - <http://www.hibroadbandmap.org/speed-test/>

MBPS - DOWNLOAD

MBPS - UPLOAD

DATE	TIME	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
3/11	8:05 pm	463 Kb			890 Kb		
	8:10 pm	397 Kb			961 Kb		
	8:15 pm	623 Kb			978 Kb		
	8:20 pm	919 Kb			971 Kb		
	8:26 pm	512 Kb			953 Kb		
	8:30 pm	700 Kb			858 Kb		
3/12	8:01 pm	692 kb	959 kb	1.11	720 kb	1.01	966 kb
	8:06 pm	660 kb	514 kb	369 kb	413 kb	1.00	1.04
	8:11 pm	662 kb	686 kb	639 kb	367 kb	365 kb	935 kb

OCEANIC SITE - <http://speedtest.oceanic.com/>

MBPS - DOWNLOAD

MBPS - UPLOAD

TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
4.88			0.87		
1.39			0.62		
4.65			0.98		
2.63			1.00		
4.78			1.02		
4.67			0.97		
8.89	7.2		1.04	0.99	
8.27	7.72	7.89	10.4	1.02	0.9
7.8	6.86	8.98	1.05	1.04	1.05

SPEED TEST DATA

NAME: Richard W. Paul

ADDRESS: 4777 Hana Hwy. Hana, HI

IP ADDRESS: 29.94.69.0

DCCA SITE - <http://www.hibroadbandmap.org/speed-test/>

MBPS - DOWNLOAD

MBPS - UPLOAD

DATE	TIME	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
3/11/14	8:05 pm	558 kb			1.05		
	8:10 pm	235 kb			934 kb		
3/12/14	8:05 pm	784 kb			1.05		
	8:10 pm	784 kb			1.05		
3/13/14	8:08 pm	775 kb			1.05		

OCEANIC SITE - <http://speedtest.oceanic.com/>

MBPS - DOWNLOAD

MBPS - UPLOAD

TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3

SPEED TEST DATA

NAME: Sky Pierce IP: 66.27.209.27

ADDRESS: 6810 Hāna Hwy. Hana, HI 96713

DCCA SITE - <http://www.hibroadbandmap.org/speed-test/>

OCEANIC SITE - <http://speedtest.oceanic.com/>

DATE	TIME	MBPS - DOWNLOAD			MBPS - UPLOAD				MBPS - DOWNLOAD			MBPS - UPLOAD		
		TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3		TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
1/16	6:30pm	905k	2.28		622k	1.04			8.71	10.65		1.09	1.09	
1/24	9:25pm	175k	744k	1.00	1.04	816k	691		1.87	.21	3.44	.39	.35	.75
1/28	8:10pm	391k	315k	1.04	1.03	1.04	1.05		3.83	3.36	2.87	.65	.90	.91
1/29	12:30pm	340k	5.99	4.09	690k	1.05	1.04		10.63	10.29	10.45	1.03	1.08	1.05
1/31	10:25am	453k	275k	511k	375k	178k	197k		.79	1.26	.51	.22	.18	.15
2/27	10:15am	2.9	1.97	2.54	1.04	1.05	1.01		5.84	9.63	10.77	1.09	Error	1.07
2/27	8:48pm	329k	882k	378k	132k	1.04	1.04		4.9	4.41	3.51	1.03	1.08	1.09
3/11	8:05pm	495k	745k	663k	906k	728k	1.01		4.54	1.44	.89	1.01	.72	.31
3/11	8:10pm	195k	215k	541k	436k	862k	430k		4.3	6.48	4.88	1.08	1.07	.89

Signal Stats (Codewords)	Bonding Channel Value		
Channel ID	2	3	4
Total Unerrored Codewords	4328045401	4306133569	4306131509
Total Correctable Codewords	5414	5532	5024
Total Uncorrectable Codewords	11942	10840	11475
Unerrored/Uncorrectable	362422.2572	397244.7942	375262.0051

SPEED TEST DATA

NAME: Kiran Sansone IP: 24 94 69 247

ADDRESS: 47750 Hāna Hwy., Hana, HI 96713

DCCA SITE - <http://www.hibroadbandmap.org/speed-test/>

OCEANIC SITE - <http://speedtest.oceanic.com/>

DATE	TIME	MBPS - DOWNLOAD			MBPS - UPLOAD				MBPS - DOWNLOAD			MBPS - UPLOAD		
		TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3		TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
3/12	8:00PM	744 kb		1.04										
	8:05PM	674 kb		962 kb					6.62			1.05		
	8:10PM	1.09		1.04					5.87			1.02		
	8:15PM				Upload Test Error				4,58			1.04		

Signal Stats (Codewords)	Bonding Channel Value		
Channel ID	2	3	4
Total Unerrored Codewords	19555539391	19439206874	19439186483
Total Correctable Codewords	3573	5430	4168
Total Uncorrectable Codewords	14397	15773	16576
Unerrored/Uncorrectable	1358306.549	1232435.61	1172730.845

SPEED TEST DATA

NAME: Chase Turner

ADDRESS: 47550 Hana Hwy. 7G, Hana, HI 96713

IP ADDRESS: 24.94.68.214

DCCA SITE - <http://www.hibroadbandmap.org/speed-test/>

MBPS - DOWNLOAD

MBPS - UPLOAD

DATE	TIME	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
Mar. 12	8:05	0.67	0.75	0.72	0.20	0.55	0.55
	8:15	0.72	0.85	0.43	0.55	0.35	0.53
	8:21	0.70	0.49	0.58	0.32	0.51	0.35
	8:33	0.29	0.47	0.36	0.80	0.91	0.75

OCEANIC SITE - <http://speedtest.oceanic.com/>

MBPS - DOWNLOAD

MBPS - UPLOAD

TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
0.95			0.37		
1.89			0.23		
0.24	0.58	0.62	Error	Er or	E or
1.5	0.58	0.24	E ror	0.59	Er or

SPEED TEST DATA

NAME: Andrew Rayner

ADDRESS: 130 Kalo Rd., Hana, HI 96713

IP ADDRESS: 24.94.69.188

DCCA SITE - <http://www.hibroadbandmap.org/speed-test/>

MBPS - DOWNLOAD

MBPS - UPLOAD

DATE	TIME	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
10/20	12:00 pm	4.40	3.80	0.15	1.08	1.08	1.03
		0.90	4.90	5.10	1.30	1.20	0.90
	1:30 pm	2.90	3.50	1.60	1.00	1.00	1.00
		4.50	4.20	4.50	1.20	1.20	1.10
10/27	8:20 pm	3.10	5.20	5.50	1.00	1.10	1.00
		6.20	3.30	6.00	1.10	1.10	1.10
10/28	10:00 pm	5.10	5.10	4.60	1.00	1.10	1.10
		6.00	6.20	6.20	1.20	1.20	1.20
	7:30 pm	4.20	5.60	3.70	1.00	1.00	0.90
		4.40	4.00	4.30	1.10	1.10	1.20
	9:30 pm	3.20	4.00	4.20	1.00	1.00	1.00
		5.00	4.80	5.00	1.20	1.20	1.20
10/30	2:30 pm	SITE NOT WORKING					
		2.90	2.90	3.00	1.20	1.20	1.20
10/31	6:45 am	SITE NOT WORKING					
		2.00	2.40	2.30	1.20	1.20	1.30

OCEANIC SITE - <http://speedtest.oceanic.com/>

MBPS - DOWNLOAD

MBPS - UPLOAD

TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
8.16	7.85	8.16	1.36	1.36	0.99
6.72	5.64	5.60	1.30	0.30	1.40
6.00	5.90	6.10	1.20	1.10	1.20
5.80	5.80	5.70	1.30	1.30	1.40
4.50	4.90	4.60	1.30	1.10	1.30
4.30	3.50	3.60	1.20	1.20	1.30
3.10	3.10	3.10	1.20	1.30	1.20
2.40	2.60	2.60	1.30	1.40	1.30

NOTE: Red numbers are from the SpeedOf.Me site.

SPEED TEST DATA

NAME: Marty Vasey

ADDRESS: 2910 Hana Hwy.

IP ADDRESS: 24.94.69.12

[illegible]

SPEED TEST DATA

NAME: Kathleen Street

ADDRESS: 4209 Hana Hwy.

[illegible]

SPEED TEST DATA

NAME: John Romain
ADDRESS: 4869 Uakea Rd

DCCA SITE - <http://www.hibroadbandmap.org/speed-test/>

OCEANIC SITE - <http://speedtest.oceanic.com/>

DATE	TIME	MBPS - DOWNLOAD			MBPS - UPLOAD			MBPS - DOWNLOAD			MBPS - UPLOAD		
		TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
11/2	4:20 pm	15.72	15.67	15.13	1.05	1.05	1.05	16.08	16.08	16.12	1.14	1.19	1.19
11/3	7:45 am	15.74	15.73	12.74	1.05	1.05	1.05	16.15	15.94	16.10	1.16	1.18	1.19
11/4	3:25pm	15.72	15.06	13.84	1.05	1.05	1.05	16.03	16.06	14.35	1.18	1.12	1.17
11/5	8:55 am	15.75	5.98	7.69	1.05	1.03	1.02	15.66	16.09	16.11	1.19	1.16	1.13
11/5	1:25 pm	15.73	15.73	15.73	1.05	1.05	1.05	16.11	16.13	16.12	1.14	1.16	1.16
11/6	1:16pm	14.41	15.51	12.58	1.04	1.04	0.04	15.82	15.95	15.55	1.14	1.10	1.17
11/6	6:05 pm	7.73	14.26	15.64	1.04	1.05	1.05	15.66	15.95	15.98	1.20	1.21	1.14
11-7	12:02 pm	13.34	15.54	15.56	1.05	1.05	1.04	16.04	16.14	16.14	1.18	1.17	1.15
11/7	6:05 pm	11.24	15.75	15.73	1.03	1.05	1.05	16.17	16.10	16.09	1.13	1.14	1.13
11/8	6:00 am	12.93	14.73	15.39	1.05	1.01	1.05	16.13	16.08	16.05	1.21	1.13	1.21
11/9	9:08 am	12.89	15.74	7.43	1.04	1.05	1.05	15.83	16.02	15.93	1.15	1.15	1.17
11-10	11:46 am	13.41	13.24	15.66	1.04	1.05	1.04	15.99	16.11	16.12	1.20	1.14	1.15
11-12	9:am	13.10	5.71	8.56	1.04	1.05	1.05	14.60	16.09	16.12	1.16	1.21	1.16
11-12	1:18 pm	9.33	15.71	11.79	1.05	1.05	1.05	16.11	16.12	16.11	1.17	1.15	1.22
11-12	4:33 pm	13.56	15.70	11.33	1.04	1.05	1.05	16.13	16.07	16.13	1.14	1.19	1.14
11/14	7.05 am	10.05	15.53	14.86	1.05	1.05	1.05	16.12	16.08	16.10	1.20	1.20	1.16

11-15	2:40 am
11-16	9:06 am
11-16	5:11 pm
11-18	5:57 pm

8.04	15.72	15.73	1.05	1.05	1.05
8.69	15.73	12.20	1.05	1.05	1.05
6.24	2.79	8.31	1.04	1.04	1.04
12.79	14.87	15.72	1.05	1.05	1.05

16.11	16.11	16.08	1.17	1.21	1.21
16.15	16.14	16.13	1.18	1.15	1.21
15.84	16.08	16.03	1.12	1.17	1.16
16.11	16.07	16.12	1.16	1.18	1.16

SPEED TEST DATA

NAME: Judy Kinser

ADDRESS: 95 Kalo Rd. Hana HI 96713

DCCA SITE - <http://www.hibroadbandmap.org/speed-test/>

MBPS - DOWNLOAD

MBPS - UPLOAD

DATE	TIME	TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
11/11/14	3:38pm	15.87	10.55	11.65	1.06	1.05	1.05
11/14/14	9:00am	15.81	15.22	15.73	1.05	1.05	1.05
11/19/14	8:24 pm	12.25	13.35	15.72	1.06	1.05	1.05

OCEANIC SITE - <http://speedtest.oceanic.com/>

MBPS - DOWNLOAD

MBPS - UPLOAD

TEST 1	TEST 2	TEST 3	TEST 1	TEST 2	TEST 3
16.28	16.25	16.27	1.22	1.22	1.22
16.26	16.26	16.25	1.23	1.22	1.23
15.53	16.22	14.08	1.22	1.23	1.22

SPEED TEST DATA

NAME: Gaylord Stadshaug

ADDRESS: 290 Kalo Rd.

IP ADDRESS: 24.94.68.158[illegible]

SPEED TEST DATA

NAME: Bill Sides

ADDRESS: 4330 Hana Hwy.

IP ADDRESS: 192.168.100.1[illegible]

EXHIBIT V



2nd HOP RTT Measurements of Oceanic TWC Broadband Service to Hana, HI

by A. Chase Turner
Prepared 2015-09-15

Outline

- Executive Summary
- Measurements
- Observations
- Recommendations

Executive Summary

Measurements of Oceanic TWC Broadband Service to Hana, HI

by A. Chase Turner & Nick Buraglio
for Hana Business Council

2014-07-14 1700 - Work in Progress - For Discussion Purposes Only.
Please contact authors for permission to cite or use this report.

Subject to revision upon availability of more information from TWC concerning details of their
network operations

- Summary and recommendations from 2014 report remain valid, despite OTWC claims of improved service;
- Since 2012, OTWC continues to deliver subpar OSI Level 1 and Level 2 quality of broadband service for Hana subscribers;
- A Service Level Agreement (SLA) establishing minimum quality of service metrics must be incorporated into the Charter purchase agreement. Anything less ensures that OWTC/Charter will be allowed 30 months to continue OTWC policies that specifically ignore normal quality of service metrics

Terminology

Measurements of Oceanic TWC Broadband Service to Hana, HI

by A. Chase Turner & Nick Buraglio
for Hana Business Council

2014-07-14 1700 - Work in Progress - For Discussion Purposes Only.
Please contact authors for permission to cite or use this report.

Subject to revision upon availability of more information from TWC concerning details of their
network operations

- Please see 2014 Report
- NOTE: download speed is one of three quality service metrics. The other two are RTT packet delay, and RTT packet drops
- This report only focuses on RTT packet delay

Measurements

- 2nd HOP RTTs measure the quality of service delivery for the last leg of broadband service
- atlas.ripe.net 2nd HOP RTT network health measurements from OTWC subscriber homes on Maui, Big Island, and Kauai to OTWC central broadband plant on Oahu

What is a 2nd HOP RTT?

- A 2nd HOP RTT network health measurement calculates the time (in milliseconds) it takes for a TCP/IP broadband packet to travel from a subscriber's home network, over to Oahu —where OTWC's central broadband interconnections from the islands are tied in together — and back again.
- An atlas.ripe.net network probe conduct 3 automated 2nd HOP RTT measurements every 240 seconds. That is 394,250 automated tests per year

What is a “good” 2nd HOP RTT value?

- Assuming a 1ms transit in ocean fiber from the Big Island and 1ms “overhead” in each switch, the nominal expectations for a 2nd HOP RTT should not exceed 3ms

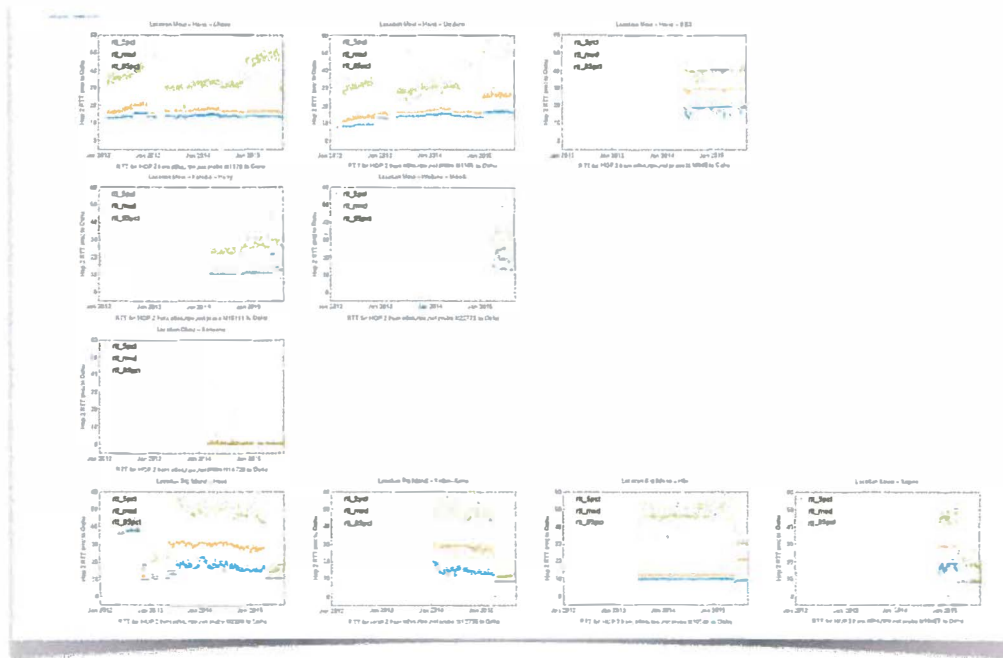
What is NOT in this report?

- The third quality of service — dropped packets — is not explicitly visualized. There is a separate visualization system to review the metrics that show RTT packet drops for Hana subscribers often exceed 1% — which precludes competitive alternatives to OTWC CableTV via broadband

Eye Chart Warning

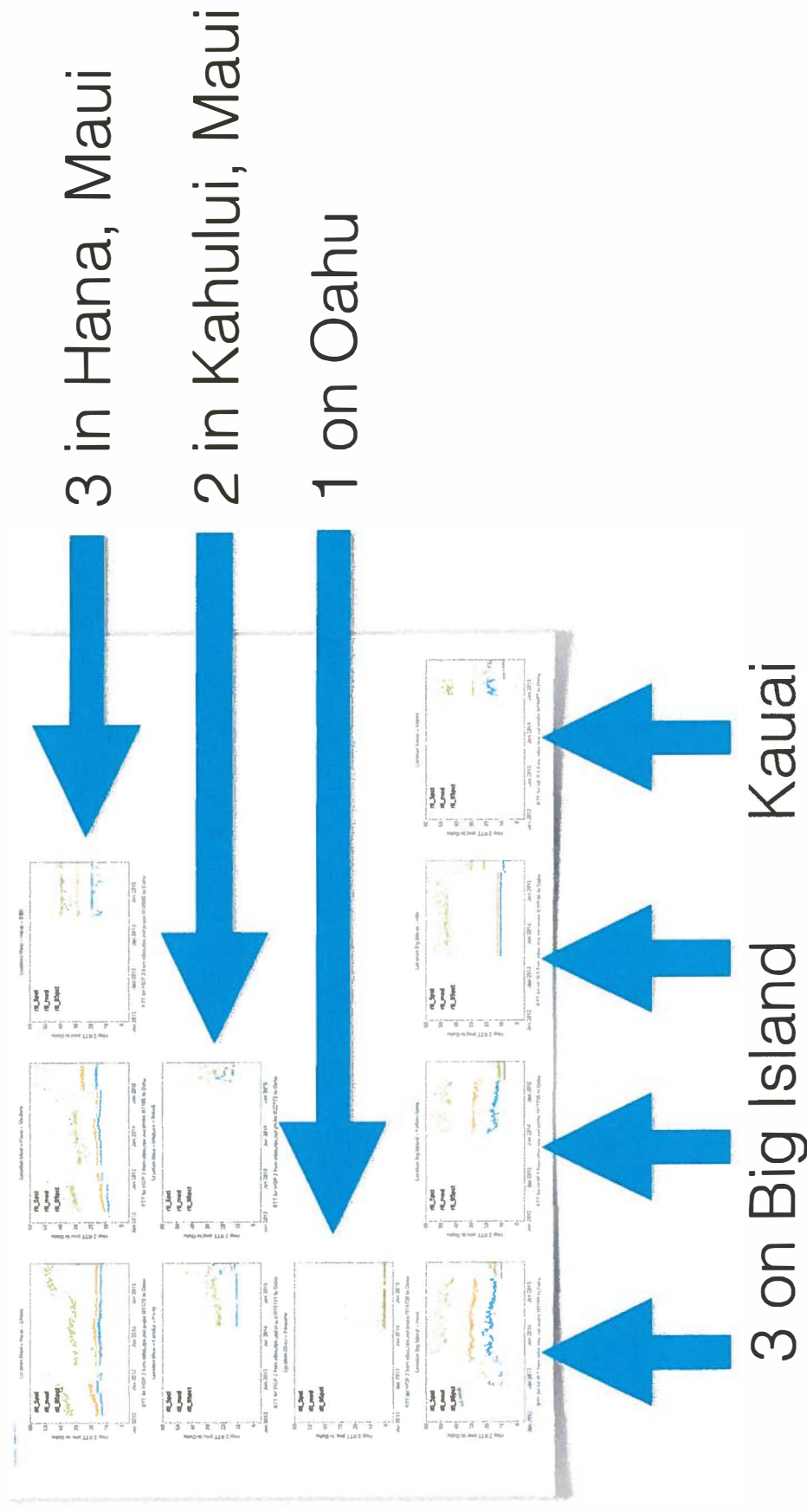
- In the subsequent slides, data graphics will first appear to be too small to read. That is intentional as the purpose of the slides is to orient you to their organization
- In successive slides, there will be zoomed callout views to highlight salient points

2nd HOP RTTs

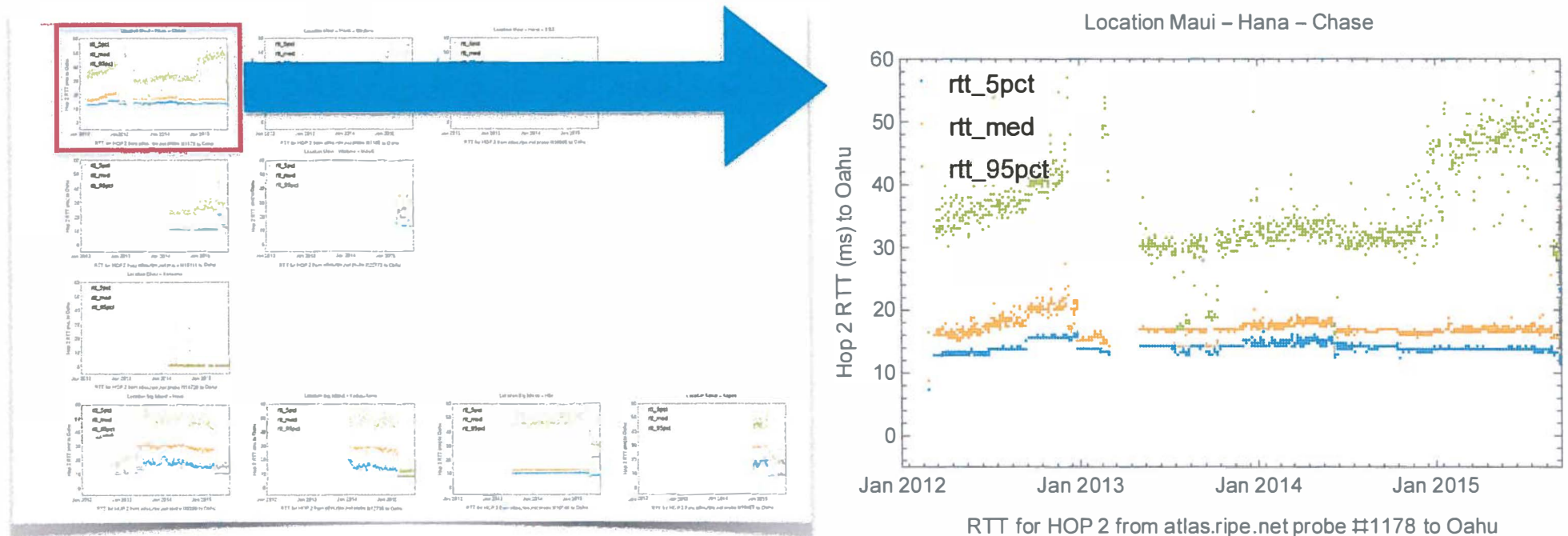


- Each Box to the left is an atlas.ripe.net network health measurement probe
- Each colored point is a 1 day average of 1,080 measurements

atlas.ripe.net Locations

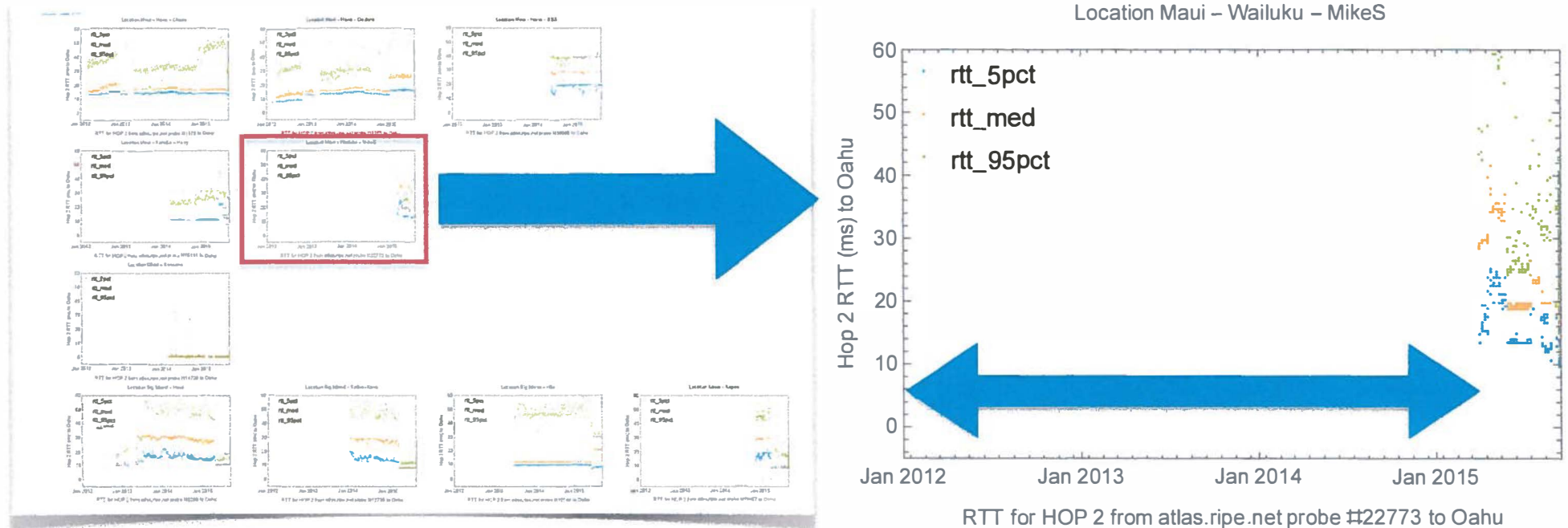


Color Coding



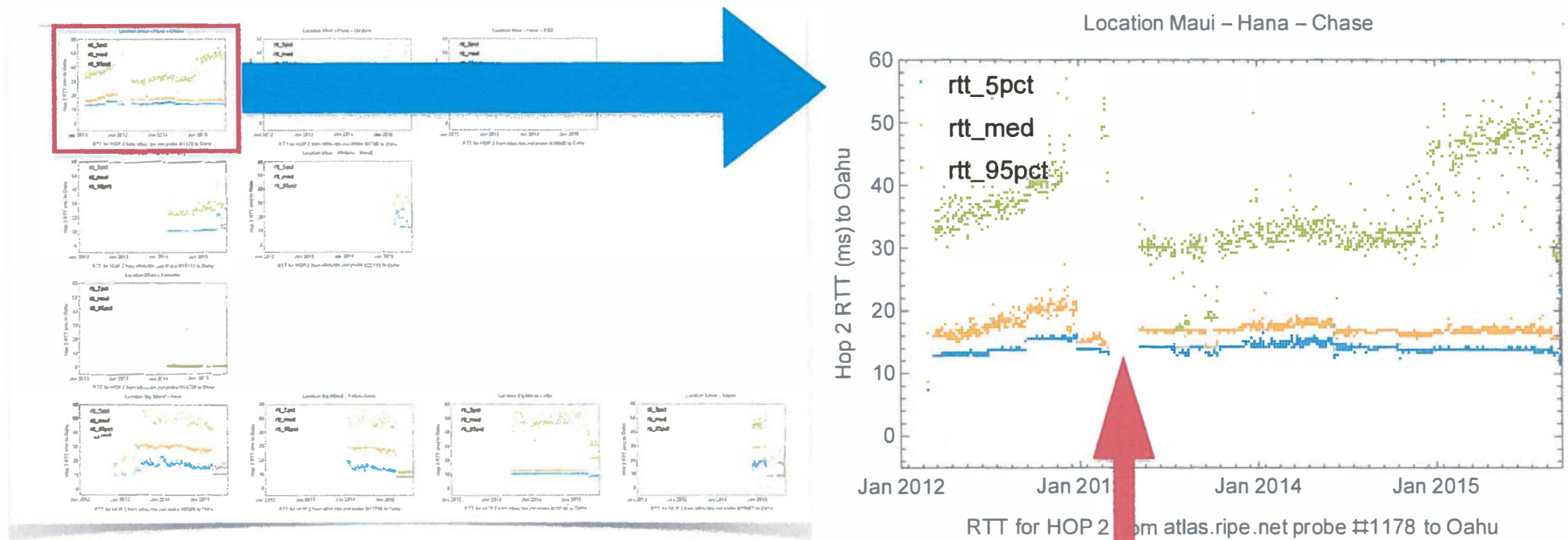
- Blue dots (rtt_5pct) are the top 5% fastest results
- Orange dots (rtt_med) are average of all results
- Green dots (rtt_95%) are the worst 5% of all results

Leading White Space



- When there is leading white space, that indicates the atlas.ripe.net probe was not yet deployed

White Space gaps are significant service outages



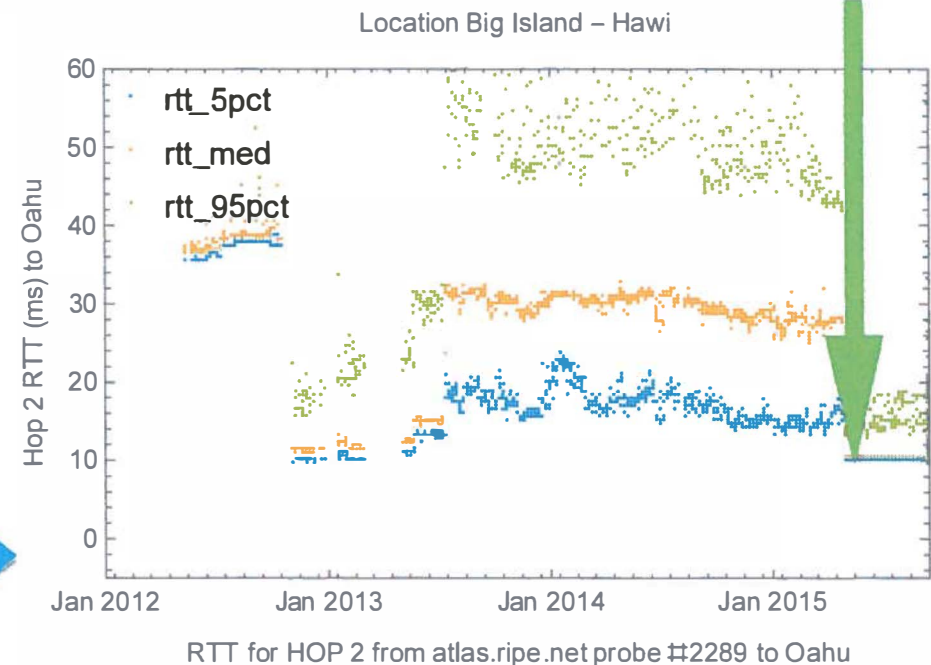
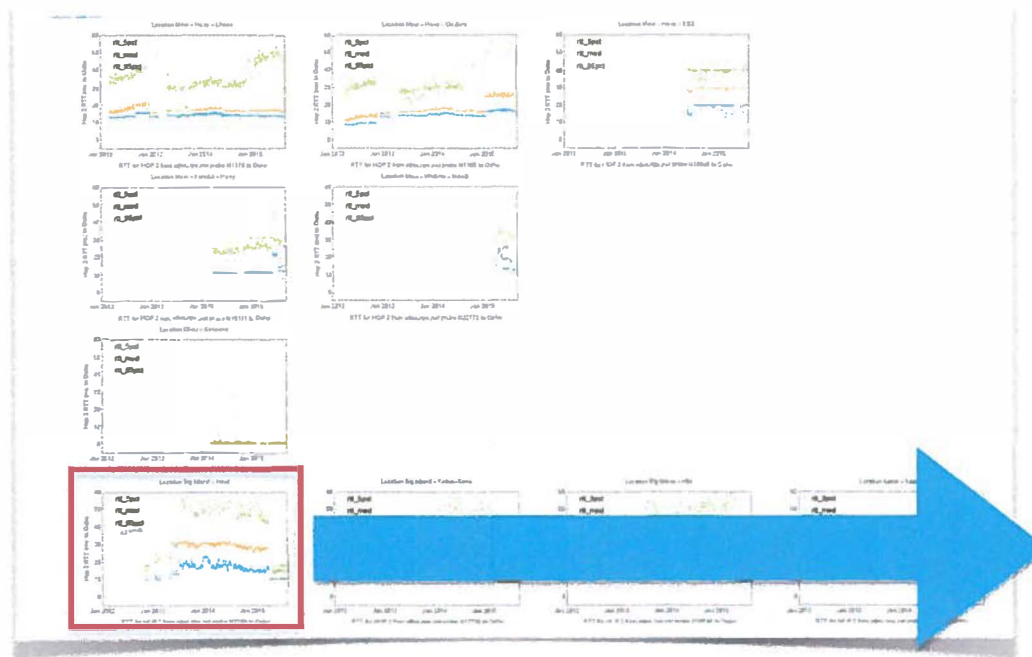
- White space in graphics indicate significant OTWC service outage events
- Graphics of smaller ranges of time will reveal more frequent outages

Compare GOOD and BAD RTT health measurement



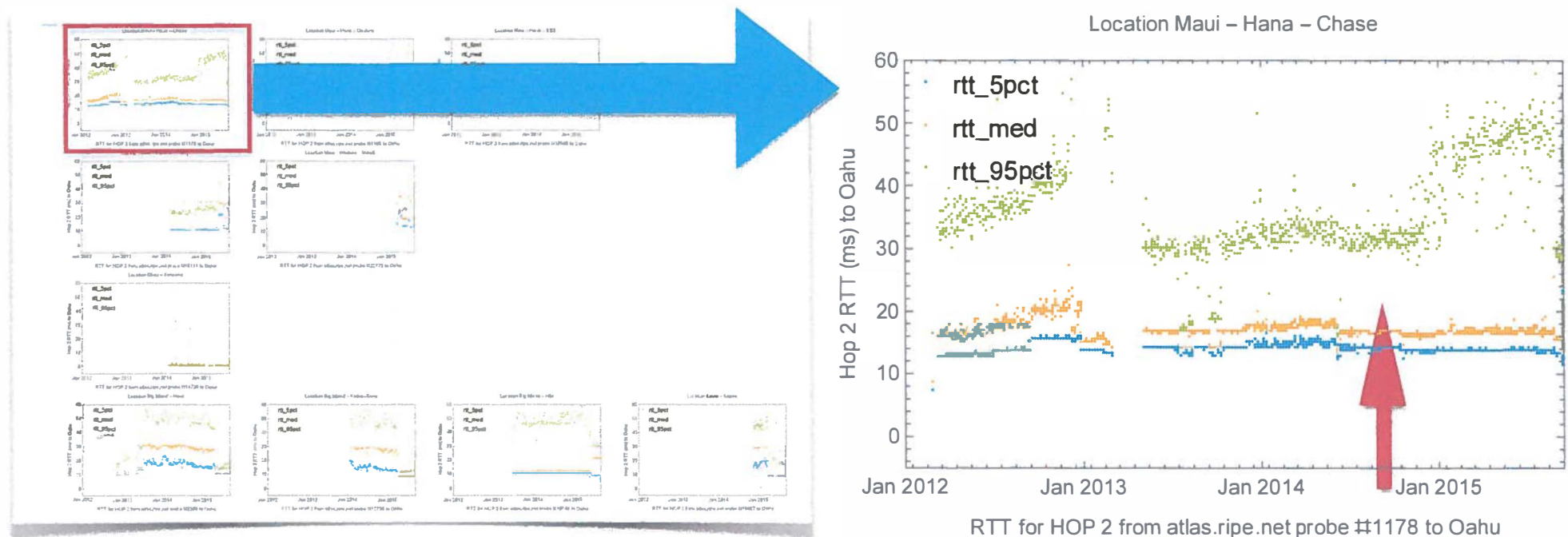
- **Bad** : the colors are separated and there is “fuzzy” set of dots
- **Good** : all three colors are combined together in a tight straight line

GOOD: OTWC improved quality of service on BI



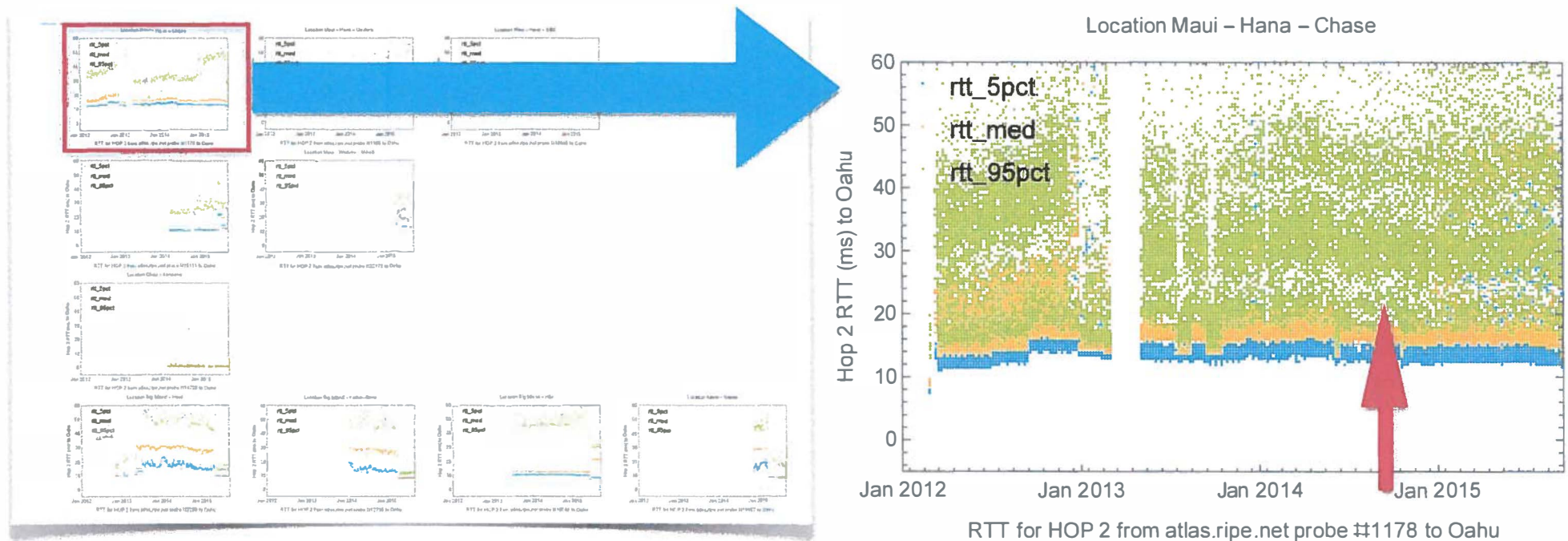
- In mid July 2015, there is significant improvement in network quality of service at two locations on Big Island that collapsed blue and orange together in a straight line. Also green was significantly reduced and consolidated

BAD : OTWC increased download speed and ignored reliability and capacity



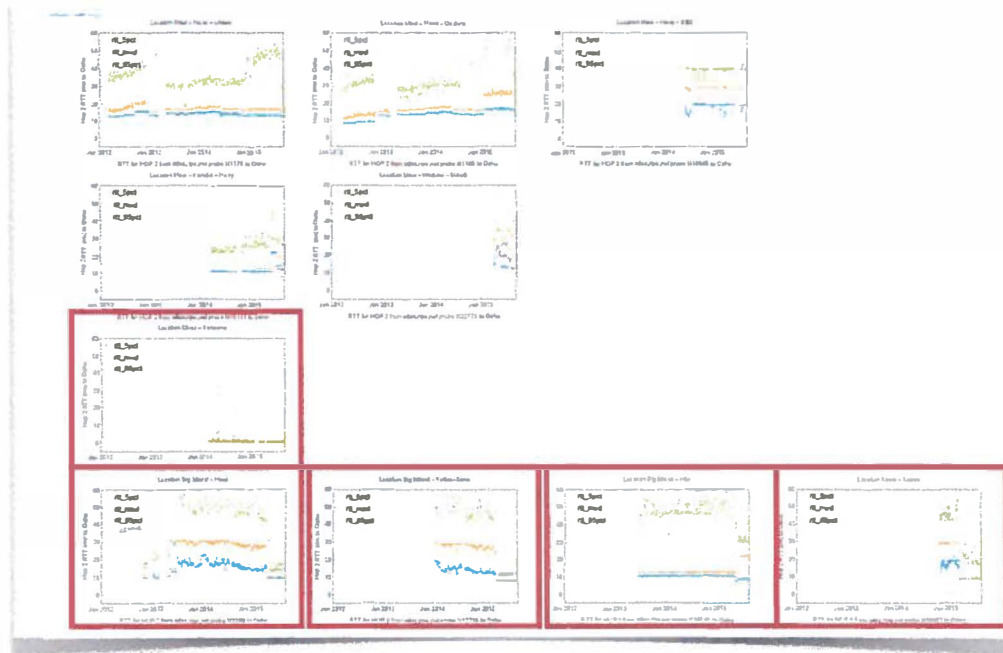
- Increasing download speed from 4mb/sec to 15mb/sec — without improving Layer 1 and Layer 2 OSI capacity and reliability — resulted in worse quality of service for customers with network streaming requests

BAD : OTWC increased download speed and ignored reliability and capacity



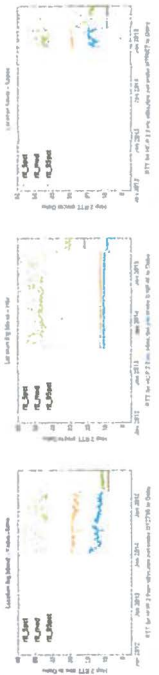
- Same as previous slide, but the expanded graphic is a data view where each point represents a 1 hour average of 43 RTT health measurements

Sites with improved RTTs as of August, 2015



- All Islands other than Maui have improved service since 2015

-
- | Temperature (°C) | Rate of Reaction (g/min) |
|------------------|--------------------------|
| 10 | 0.10 |
| 20 | 0.25 |
| 30 | 0.50 |
| 40 | 0.80 |
| 50 | 0.95 |



atlas.ripe.net Summary

- Hana is consistently showing BAD quality of service metrics compared to other TWC service areas in Hawaii
- 3 years of atlas.ripe.net measurements make clear the TWC High Speed Internet service to Hana is frequently network congested and at times, unavailable for multiple days

Observations

Observations

- Measurements of TWC's High Speed Internet service for Hana are consistent with a pattern of network congestion resulting in unpredictably fast, slow and unusable broadband services spanning several years and typically peaks during prime time viewing hours between 6pm and 12am — with severe congestion during weekend and holidays when concurrent use by Hana subscribers is higher than normal
- TWC's broadband management policies are said to upgrade network links and equipment upon reaching 70% congestion - but TWC's network congestion reports and policies detailing how long and how frequent congestion is observed before taking action to upgrade are not available for outside review
- TWC's proposal to double microwave transit capacity from 198Mb/s to 396Mb/s will slightly improve but ultimately will fail to alleviate significant network congestion for 400+ Hana TWC High Speed Internet users allotted each with 15Mb/sec download rates — particularly as Hana resident's broadband usage increasingly extends beyond casual web browsing and email delivery.
- Capacity planning estimates based upon current Hana broadband utilization is a “false summit” and will under-estimate future demand due to current network congestion that creates a negative feedback loop for end-user experience.
- TWC's past, current and future broadband provisioning ensures there is no competitive alternative to TWC CableTV, nor does TWC offer reliable access to services such as VoIP and other virtual meeting technologies that are available elsewhere in TWC High Speed Internet Service areas

Recommendations

Recommendations

- HBC to define a Service Level Agreement (SLA) with TWC to define minimum Quality of Service (QuOS) metrics, including concurrent traffic capacity
- HBC and TWC to monitor QuOS compliance by way of measurement infrastructure whose performance results are timely, accurate and open to the public
- TWC to adjust infrastructure to meet requirements defined under SLA
- Revise SLA on an annual basis to adjust for new technologies and evolving traffic streams and demands

EXAMPLE: SLA for improved Quality of broadband service

SLA General Expectations

Meet or exceed FCC broadband service minimums to all communities in
Hawaii

SLA

OSI Level 2 (TCP/IP)

At any point of the day or night, assume 99% of the subscriber base is concurrently operating at their subscription tier maximum download and upload speeds. Subscriber download and upload speeds to destinations within or through OTWC/Charter managed networks to destinations outside must not drop more than 0.1% of the total monthly packets per subscriber.

SLA

Network Latency

RTT Guarantee for OTWC/Charter managed infrastructure connecting an originating source and terminating end point:

- not to exceed 5ms for connections originating and ending on same Hawaii island
- not to exceed 8ms for connections originating and ending on different Hawaiian islands
- not to exceed 0.05% of speed-of-light transit time in fiber for connections originating on any Hawaiian island and arriving at the beachhead end point of the connecting continent. From the beachhead on:
 - Intra-North America : 45 milliseconds or less
 - Intra-Europe : 35 milliseconds or less
 - Intra-Asia - 35 milliseconds or less

SLA Reliability

99.9% Uptime guarantee

SLA Auditing

OTWC/Charter must make network and signaling hardware performance data available for inspect (direct or remotely) by the public or third party within 1 week of data capture. Data formats are electronic and conform to regular formats used for network analysis. Additionally, OTWC/Charter must allow third party measurement at co-location facilities. OTWC/Charter must never engage in traffic shaping to alter network measurements. OTWC/Charter must demonstrate they have their network configuration settings under version control so as to allow qualified third-party audit to ascertain the effective network settings for the associated network measurements provided to third party auditors.

SLA

Penalties for non-conformance

TBD

References

2nd HOP RTT documentation

- <https://atlas.ripe.net/docs/built-in>

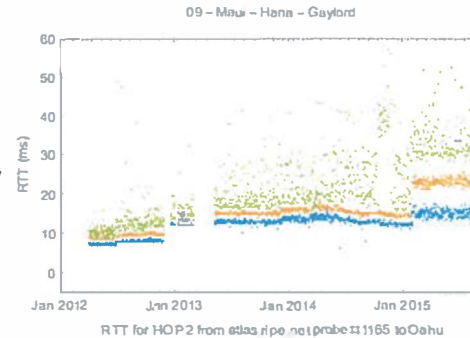
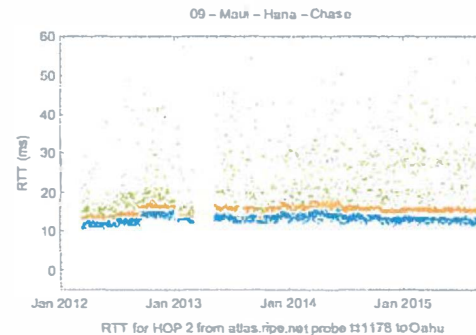
2nd HOP RTT datums

- All visualizations presented in this report are for dates 2012-01-01 to 2015-09-15 GMT
- Links to each probe's built-in 2nd HOP RTT measurements for 1 hour averaged RTT measurement.

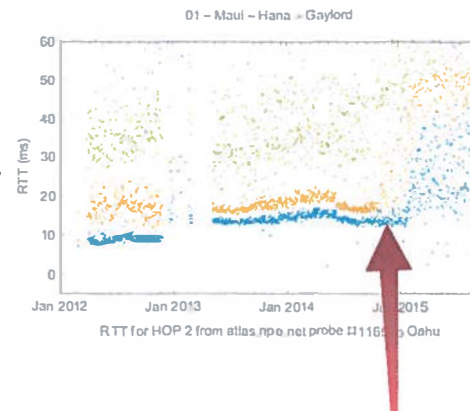
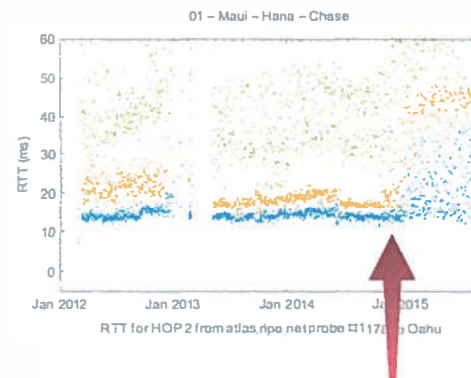
- https://stat.ripe.net/data/atlas-ping-measurements/data.json?probe_id=1178&measurement_id=2&starttime=2012-01-01T00%3A00%3A00&endtime=2015-09-16T00%3A00%3A00&resolution=1h&format=json&display_mode=condensed
- https://stat.ripe.net/data/atlas-ping-measurements/data.json?probe_id=1165&measurement_id=2&starttime=2012-01-01T00%3A00%3A00&endtime=2015-09-16T00%3A00%3A00&resolution=1h&format=json&display_mode=condensed
- https://stat.ripe.net/data/atlas-ping-measurements/data.json?probe_id=16065&measurement_id=2&starttime=2012-01-01T00%3A00%3A00&endtime=2015-09-16T00%3A00%3A00&resolution=1h&format=json&display_mode=condensed
- https://stat.ripe.net/data/atlas-ping-measurements/data.json?probe_id=15111&measurement_id=2&starttime=2012-01-01T00%3A00%3A00&endtime=2015-09-16T00%3A00%3A00&resolution=1h&format=json&display_mode=condensed
- https://stat.ripe.net/data/atlas-ping-measurements/data.json?probe_id=22773&measurement_id=2&starttime=2012-01-01T00%3A00%3A00&endtime=2015-09-16T00%3A00%3A00&resolution=1h&format=json&display_mode=condensed
- https://stat.ripe.net/data/atlas-ping-measurements/data.json?probe_id=14720&measurement_id=2&starttime=2012-01-01T00%3A00%3A00&endtime=2015-09-16T00%3A00%3A00&resolution=1h&format=json&display_mode=condensed
- https://stat.ripe.net/data/atlas-ping-measurements/data.json?probe_id=2289&measurement_id=2&starttime=2012-01-01T00%3A00%3A00&endtime=2015-09-16T00%3A00%3A00&resolution=1h&format=json&display_mode=condensed
- https://stat.ripe.net/data/atlas-ping-measurements/data.json?probe_id=12735&measurement_id=2&starttime=2012-01-01T00%3A00%3A00&endtime=2015-09-16T00%3A00%3A00&resolution=1h&format=json&display_mode=condensed
- https://stat.ripe.net/data/atlas-ping-measurements/data.json?probe_id=10546&measurement_id=2&starttime=2012-01-01T00%3A00%3A00&endtime=2015-09-16T00%3A00%3A00&resolution=1h&format=json&display_mode=condensed
- https://stat.ripe.net/data/atlas-ping-measurements/data.json?probe_id=18657&measurement_id=2&starttime=2012-01-01T00%3A00%3A00&endtime=2015-09-16T00%3A00%3A00&resolution=1h&format=json&display_mode=condensed

OTWC willfully oversold available network capacity in order to meet a checkbox requirement of providing 15mbps download speeds to Hana broadband subscribers

Early Morning Hours



Prime Time Viewing Hours



Graphic above tracks packet delay. It does not include packet drops.

Notice when OTWC raised download speeds to 15mbps, the “fastest 5% of 1 hour averaged RTT measures” (blue dots) and the “average of 1 hour averaged RTT measures” (orange dots) become scattered during prime time viewing when the largest number of subscribers in Hana are trying to use the broadband service. That is *clear indication* that there is not sufficient capacity and reliable signal delivery in the OTWC cabling system to handle the demand.

OTWC knew this would happen, but their goal was to meet a DCCA/FCC checkbox requirement to match download speeds available in their other service areas of Hawaii. By willfully ignoring the two other quality of service metrics — packet delay and packet drop — OTWC is able to oversell an under provisioned broadband service that ensures Hana broadband subscribers have no reliable alternative to OTWC CableTV ... because the alternative services cannot stream reliably due to excessive packet delay and packet drop caused by OTWC under provisioned network infrastructure