

From: O'DELL, CASEY
To: Rivera, Carlos I.
Cc: MUTHUSWAMY, ESWARAN <em574v@att.com>; Hite, Jason <Jason.Hite@ga-asi.com>; Lin, Susan <Susan.Lin@ga-asi.com>; PATEL, CHETAN <cp2626@att.com>; Lozada, Godfrey <Godfrey.Lozada@ga-asi.com>; JACOBSON, MARK E <LOPEZ, EUGENE N >
Subject: RE: -EXT-RE: Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.
Date: Thursday, June 13, 2019 8:21:09 AM

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Re-scheduling approved.

From: Rivera, Carlos I. [mailto:Carlos.I.Rivera@ga-asi.com]
Sent: Thursday, June 13, 2019 7:54 AM
To: O'DELL, CASEY <co6073@att.com>
Cc: MUTHUSWAMY, ESWARAN <em574v@att.com>; Hite, Jason <Jason.Hite@ga-asi.com>; Lin, Susan <Susan.Lin@ga-asi.com>; PATEL, CHETAN <cp2626@att.com>; Lozada, Godfrey <Godfrey.Lozada@ga-asi.com>
Subject: Re: -EXT-RE: Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.

Dear Mr. O'Dell,

There was an unexpected surprise with our equipment during integration with the aircraft and a cable connector adapter needs to be purchased. As a result, we would like to reschedule the ground test at YPG for Monday, June 17, at the same time. All else remains the same. I hope this rescheduling does not conflict with AT&T or your plans.

Kind regards,
Carlos
m. 858-753-8433

On Jun 10, 2019, at 3:18 PM, Rivera, Carlos I. <Carlos.I.Rivera@ga-asi.com> wrote:

Dear Mr. O'Dell,

After conferring with the Yuma Proving Grounds commanders and our company pilots, we would like to conduct the ground test on Thursday, June 13, beginning at 10:00 am. Our systems test engineer, Godfrey Lozada, will be overseeing the ground test and will be monitoring his cell phone at all times for any calls from you and your staff. His phone number is 619-708-7488.

Thank you so very much for your cooperation. The same sentiment goes for Warren and Chet.

Sincerely,
Carlos
m. 858-753-8433

From: Rivera, Carlos I.
Sent: Thursday, June 6, 2019 10:03 AM
To: 'O'DELL, CASEY' <co6073@att.com>
Cc: MUTHUSWAMY, ESWARAN <em574v@att.com>; Hite, Jason <Jason.Hite@ga-asi.com>; Lin, Susan <Susan.Lin@ga-asi.com>; PATEL, CHETAN <cp2626@att.com>
Subject: RE: -EXT-RE: Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.

Thank you, Sir. I will inform you shortly of the time and date, as well as phone number you can call to immediately stop the test in case any unforeseen issues arise.

Best regards,
Carlos

From: O'DELL, CASEY <co6073@att.com>
Sent: Thursday, June 6, 2019 9:59 AM
To: Rivera, Carlos I. <Carlos.I.Rivera@ga-asi.com>
Cc: MUTHUSWAMY, ESWARAN <em574v@att.com>; Hite, Jason <Jason.Hite@ga-asi.com>; Lin, Susan <Susan.Lin@ga-asi.com>; PATEL, CHETAN <cp2626@att.com>
Subject: RE: -EXT-RE: Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.

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I am good with the request.

From: Rivera, Carlos I. [mailto:Carlos.I.Rivera@ga-asi.com]
Sent: Thursday, June 06, 2019 9:31 AM
To: O'DELL, CASEY <co6073@att.com>
Cc: MUTHUSWAMY, ESWARAN <em574v@att.com>; Hite, Jason <Jason.Hite@ga-asi.com>; Lin, Susan <Susan.Lin@ga-asi.com>; PATEL, CHETAN <cp2626@att.com>
Subject: RE: -EXT-RE: Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.
Importance: High

Dear Mr. O'Dell,

I wanted to check if you had an opportunity to consider my request to perform a 20-minute aviation ground test of airborne cellular system at the Yuma Proving Grounds transmitting on LTE Band 14 (758-768 MHz) and Band 4 (2135 – 2140 MHz) prior to June 17. I apologize for the urgency, but we are scheduled to perform the flight test on June 19 and safety-of-flight rules require a ground test of new radios prior to flight.

Should you have any questions, or prefer to talk through the request, please call my cell at your earliest convenience (858-753-8433).

Thank you,
Carlos

Carlos I. Rivera
Sr. Program Manager

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16761 Via Del Campo Court
San Diego, CA 92127

Cell: (858) 753-8433
Office: (858) 762-7136
Email: Carlos.I.Rivera@ga-asi.com

From: Rivera, Carlos I. <Carlos.I.Rivera@ga-asi.com>
Sent: Tuesday, June 4, 2019 11:51 AM
To: PATEL, CHETAN <cp2626@att.com>
Cc: O'DELL, CASEY <cp6073@att.com>; MUTHUSWAMY, ESWARAN <em574v@att.com>; Hite, Jason <Jason.Hite@ga-asi.com>; Lin, Susan <Susan.Lin@ga-asi.com>
Subject: Re: -EXT-RE: Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.

Hi Chet: Thank you for your prompt response and for the introduction to Mr. O'Dell.

Dear Mr. O'Dell: It is a pleasure to make your acquaintance. My team is working with National Guard to deploy an aerial cellular network on their predator drones to support first responders and carry 911 calls hours after a disaster strikes. We briefed Mr. Sambar on the benefits to FirstNet and he is supportive. We have been working with Chet to test the system 100 miles offshore on June 19, but need to find a location to run a 20-minute required ground test on the aircraft first. May we perform this ground test from the Yuma Proving Grounds during one of your maintenance windows at 0' dark hundred?

Thank you for your consideration,
Carlos

On Jun 4, 2019, at 10:46 AM, PATEL, CHETAN <cp2626@att.com> wrote:

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Hi Carlos,
I would not test any device on the ground at Montgomery field. I would rather do it at the destination. We have Sites surrounding the airport that will be directly impacted.
I have included the manager for Arizona market for you to coordinate with him. His name is Casey O'dell.

Chet

From: Rivera, Carlos I. <Carlos.I.Rivera@ga-asi.com>
Sent: Monday, June 3, 2019 4:37 PM
To: PATEL, CHETAN <cp2626@att.com>
Cc: MUTHUSWAMY, ESWARAN <em574v@att.com>; Hite, Jason <Jason.Hite@ga-asi.com>; Lin, Susan <Susan.Lin@ga-asi.com>
Subject: RE: Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.

I forgot one to ask for one very important item that precedes the flight test by several days: ground testing of the radios on the aircraft. For safety-of-flight purposes, the aircraft must first radiate the same radios on the ground at the same power level before they can radiate them in the air. The test takes 20 minutes.

Chet: Can we perform this ground test from Montgomery Field during one of your maintenance windows at 0' dark hundred?

Warren: If Chet cannot allow this ground test, would you please put us in contact with the Yuma Market Manager to see if we can perform the ground test at the Yuma Proving Ground (we have access to hangar facilities there and it is in the middle of nowhere).

<image006.jpg>

From: Rivera, Carlos I.
Sent: Monday, June 3, 2019 4:00 PM
To: 'PATEL, CHETAN' <cp2626@att.com>
Cc: 'MUTHUSWAMY, ESWARAN' <em574v@att.com>; Hite, Jason <Jason.Hite@ga-asi.com>; Lin, Susan <Susan.Lin@ga-asi.com>
Subject: RE: Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.

Hi Chet,

Please find our detailed schedule below:

June 19 / 8:30 am – Aircraft and boat arrive on station, 100 miles offshore.

- Aircraft loiters in Orbit #1 with boat at the center of the orbit. Boat remains stationary throughout testing.
- Establish VHF communications between aircraft and boat for coordination.
- Prepare for tests.

June 19 / 9:00 am – Cellular Testing commences

- Airborne LTE eNodeB (Band 14) and 3G NodeB (Band 1) begin radiating
- Test Card A - 3G calls and SMS messaging

<i>Leg</i>	<i>Maneuver</i>	<i>Test Description</i>	<i>Altitude MSL (ft)</i>	<i>SRP</i>	<i>Notes:</i>
1	Orbit 1	1. Verify aircraft is positioned in orbit 1 2. Aircraft continue to loiter in orbit 1 until directed otherwise 3. Boat personnel to make sure each active user equipment (UE) is in airplane mode (phones)	20k	Boat	Aircraft arrive on station and enter orbit 1: directly over boat

2	Orbit 1	1. From the (UE), turn airplane mode off 2. From the UE, go to settings > mobile network > network type 3. Search for the 3G network and select "GAN" 4. Search for the LTE network and select "GAN"	20k	Boat	This is an initial test for boat personnel to ensure UE capability of connectivity
3	Orbit 1	1. From the UE, go to settings > mobile network > network type 2. Search for the 3G network and select "GAN" 3. User one to conduct phone call with user two	20k	Boat	3G test During phone call – verify ringing occurs and communication is possible
4	Orbit 1	1. Repeat leg 3 from user two to user one	20k	Boat	
5	Orbit 1	1. From the call logs of the UE, user one select the recent number and send an SMS 2. User two send a reply SMS	20k	Boat	Verify SMS message has been sent

- Test Card B – 4G TCP/UDP data throughput

Leg	Maneuver	Test Description	Altitude MSL (ft)	SRP	Notes:
6	Orbit 1	1. From the UE, go to settings > mobile network > network type 2. Search for the LTE network and select "GAN" 3. Run the application "PingTools" on both UE's	20k	Boat	Both LTE users should be connected to the LTE network Verify UEs both have IP addresses
7	Orbit 1	1. run the application "Magic iPerf" on both UE's 2. User three run as the client and send TBD to user four for 30 seconds 3. User four run as the server	20k	Boat	Client UE will send data, server UE will receive
8	Orbit 1	1. Repeat leg 7 with user four as client and user three as server	20k	Boat	
9	Orbit 1	1. From the SGI laptop, run iPerf as the server 2. User three ping the SGI laptop from the UE 3. Run	20k	Boat	Verify latency is less than 100 ms

- Aircraft begins Orbit 2, six miles further west of Orbit 1. The boat remains in its original location.
- Repeat Test Cards A and B
- Aircraft begins Orbit 3, six miles further west of Orbit 2. The boat remains in its original location.
- Repeat Test Cards A and B

June 19 / 12:00 pm – Cellular Testing ends

Carlos I. Rivera
Sr. Program Manager
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San Diego, CA 92127

Cell: (858) 753-8433
Office: (858) 762-7136
Email: Carlos.I.Rivera@ga-asi.com

From: Rivera, Carlos I.
Sent: Thursday, May 16, 2019 3:02 PM
To: 'PATEL, CHETAN' <cp2626@att.com>
Cc: MUTHUSWAMY, ESWARAN <em574v@att.com>; Hite, Jason <Jason.Hite@ga-asi.com>; Lin, Susan <Susan.Lin@ga-asi.com>
Subject: RE: Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.

Thanks for your quick response, Chet. I will send you our detailed schedule in the next few days.

Regarding Band 1, we have an STA from the FCC approving it, but it asks that we coordinate with the license holders. We chose Band 1 because that is the specific NodeB equipment that our supplier had available to lend us for the test. The specific 5 MHz WCDMA channel that we want to test actually overlaps with your Band 2 PCS Block D Downlink and your Band 4 AWS Block D Downlink. Being 100 miles offshore should mitigate interference. Listed below are some helpful tables:

<image007.png>

The specific 5 MHz channel that we want to use is:

3G WCDMA:
TX: 2135 – 2140 MHz
RX: 1945 – 1950 MHz

The San Diego database shows AT&T owns both:

<image008.jpg>

Regards,
Carlos

From: PATEL, CHETAN <cp2626@att.com>
Sent: Thursday, May 16, 2019 1:51 PM
To: Rivera, Carlos I. <Carlos.I.Rivera@ga-asi.com>
Cc: MUTHUSWAMY, ESWARAN <em574v@att.com>; Hite, Jason <Jason.Hite@ga-asi.com>; Lin, Susan <Susan.Lin@ga-asi.com>
Subject: -EXT-RE: Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.

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Please send us a detailed schedule and I will let the performance manager know. I should have a contact person doing the test so if we see anything, we can instantly call as a stop switch.

I think, we may need to coordinate this to LA market as well to see if they have any objections due to Catalina islands or Navy Base. As for the spectrum, ATT does not won BAND1 so we are OK.
Chet

From: Rivera, Carlos I. <Carlos.I.Rivera@ga-asi.com>
Sent: Thursday, May 16, 2019 12:52 PM
To: PATEL, CHETAN <cp2626@att.com>
Cc: MUTHUSWAMY, ESWARAN <em574v@att.com>; Hite, Jason <Jason.Hite@ga-asi.com>; Lin, Susan <Susan.Lin@ga-asi.com>
Subject: RE: Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.

Hi Chet,

We would like to perform our "over the ocean - 100 miles out" manned flight cellular testing on June 19. What process would like for us to follow in terms of coordination (establishing the day's lines of communications, the "Stop Button" in case any problems arise, etc.)?

Also I would like to ask if on the same day that we test on LTE Band 14, could we also test 3G WCDMA voice on Band 1 (specifically TX: 2135 – 2140 MHz and RX: 1945 – 1950 MHz) out in the same spot over the ocean.

I'd be happy to set up a conference call if you think it's best for coordination.

Kind regards,
Carlos
m. 858-753-8433

P.S. We met earlier this week with Chris Sambar to brief him on our airborne cellular network for disaster recovery (FirstNet support) and humanitarian assistance (route 911 calls to PSAP). We informed him that the National Guard is going to be putting this solution on their Air National Guard MQ-9 UAVs. Mr. Sambar saw value in this solution (especially since it helps FN at no cost to his budget 😊) and asked for a three-way meeting between the Air National Guard, AT&T/FN, and GA-ASI for coordination purposes.

From: PATEL, CHETAN <cp2626@att.com>
Sent: Friday, March 29, 2019 2:23 PM
To: Rivera, Carlos I. <Carlos.I.Rivera@ga-asi.com>
Cc: MUTHUSWAMY, ESWARAN <em574v@att.com>; FILLEY, MICHAEL J <mf3714@att.com>; LEWIS, MIKE <ml2487@att.com>; BANCHONGSIRICHAREON, SOONTORN <sb3291@att.com>; Hite, Jason <Jason.Hite@ga-asi.com>; Lin, Susan <Susan.Lin@ga-asi.com>; Lozada, Godfrey <Godfrey.Lozada@ga-asi.com>; Oyekan, Aziz <Aziz.Oyekan@ga-asi.com>
Subject: -EXT-Re: Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.

Yes 100 mile off shore is not a problem.

Sent from my iPhone

On Mar 29, 2019, at 1:34 PM, Rivera, Carlos I. <Carlos.I.Rivera@ga-asi.com> wrote:

Hi Chet,

Would a hundred miles offshore be a workable solution for AT&T? The proposed lat/long for the aircraft loiter is 32.594338 and -118.857295.

Thank you for your consideration.

Carlos

<image009.jpg>

From: PATEL, CHETAN <cp2626@att.com>
Sent: Wednesday, March 20, 2019 10:26 AM
To: Rivera, Carlos I. <Carlos.I.Rivera@ga-asi.com>; MUTHUSWAMY, ESWARAN <em574v@att.com>; FILLEY, MICHAEL J <mf3714@att.com>; LEWIS, MIKE <ml2487@att.com>; BANCHONGSIRICHAREON, SOONTORN <sb3291@att.com>; Hite, Jason <Jason.Hite@ga-asi.com>; Lin, Susan <Susan.Lin@ga-asi.com>; Lozada, Godfrey <Godfrey.Lozada@ga-asi.com>; Oyekan, Aziz <Aziz.Oyekan@ga-asi.com>
Subject: -EXT-RE: Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.

Hi Team,

Thanks for the info. I can only speak for San Diego. The other proposed location is in Arizona Market. But that area does seem to be more isolated than Imperial County. As for the third location, doing it over the ocean West of San Diego, that would depend how far as

Propagation over water and LOS can hit the San Diego coastline of 70 miles with a lot of sites.

Hope that helps.
Chet

From: Rivera, Carlos I. <Carlos.I.Rivera@ga-asi.com>
Sent: Tuesday, March 19, 2019 1:44 PM
To: MUTHUSWAMY, ESWARAN <em574v@att.com>; PATEL, CHETAN <cp2626@att.com>; FILLEY, MICHAEL J <mf3714@att.com>; LEWIS, MIKE <ml2487@att.com>; BANCHONGSIRICHAREON, SOONTORN <sb3291@att.com>; Hite, Jason <Jason.Hite@ga-asi.com>; Lin, Susan <Susan.Lin@ga-asi.com>; Lozada, Godfrey <Godfrey.Lozada@ga-asi.com>; Oyekan, Aziz <Aziz.Oyekan@ga-asi.com>
Subject: RE: Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.

Dear Chet, Warren, Michael, Mike, and Soontorn:

Thank you for your participation in last week's conference call regarding our request for airborne cellular network testing near the Anza Borrego desert; it was very informative. It's a shame that we missed testing in that area prior to AT&T initiating Band 14 and AWS-3 service.

Following the conference call, the GA-ASI team met to come up with next steps and these three suggestions were raised for aerial testing:

- **Option 1: AT&T to recommend a location which hasn't been placed in FirstNet service yet**

Based on your knowledge of AT&T's LTE Band 14 deployment plans, is there another area that AT&T still has not placed these bands into service and could serve as a candidate area for our airborne testing for a day or two? It doesn't have to be in San Diego County; it can be over any county or state so long as can avoid interference.

- **Option 2: GA-ASI proposes a more remote location, further away from roads, population and AT&T towers (see Maps 2 below)**

We would like to propose an area east of Yuma, AZ and west of Phoenix, AZ (shown in Map 1 below) which is significantly farther from AT&T towers than the Anza Borrego desert test area we discussed on Thursday (left red rectangle below). Whilst transmissions from our airborne eNodeB would not reach your AT&T cell sites below at noise levels (-118 dBm at ??? bandwidth), they would be considerably attenuated based on the distances involved (see Map 2). The airborne test would take place 50 miles from Arizona State Routes 95 and 85, and 30 miles from Interstates 8 and 10.

- **Option 3: Propose testing offshore, west of San Diego**

Testing offshore could be a last option.

Attached is the information that you requested during our conference call. Please let me know if you have any questions or concerns with this information.

We look forward to receiving your feedback.

MAP 1. Visual size comparison of proposed test area vs. Anza Borrego

<image010.png>

MAP 2. Proposed test area

<image011.png>

Best regards,
Carlos

Carlos I. Rivera
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Comm & Cyber Assurance
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-----Original Appointment-----

From: MUTHUSWAMY, ESWARAN <em574v@att.com>
Sent: Monday, March 11, 2019 5:16 PM
To: MUTHUSWAMY, ESWARAN; PATEL, CHETAN; FILLEY, MICHAEL J; LEWIS, MIKE; BANCHONGSIRICHAREON, SOONTORN; Hite, Jason; Lin, Susan; Lozada, Godfrey; Oyekan, Aziz; Rivera, Carlos I.
Subject: -EXT-Discuss - General Atomics Test of LTE IOPS on Band 14 over the Anza Borrego desert.
When: Thursday, March 14, 2019 12:00 PM-1:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where:

Hi Carlos,
I am sending this invite out since it is easier for me to look up calendars internally. Hope this slot works for everyone. We may or may not need the full hour.