Universal Service Administrative Co.

July 9, 2019

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

RE: Modernizing the FCC Form 477 Data Program (WC Docket No. 11-10)

Dear Ms. Dortch:

The Universal Service Administrative Company (USAC) provides the preliminary results of USAC's recent use of airborne drones to measure mobile wireless coverage in Puerto Rico post-hurricane Maria. USAC's vendor conducted a total of 20 drone tests in Puerto Rico; one of which was overlapped by a drive test in order to compare relative performance. The remaining 19 drone tests were conducted in impassible areas.

The attached PowerPoint presentation provides additional detail regarding the results of the drone test.

I would be happy to answer any questions you may have regarding this information.

Sincerely,

//s// Victor Gaither
Vice President, High Cost, Universal Service Administrative Company

cc: Garnet Hanly, Chief, Competition and Infrastructure Policy Division, WTB
Jonathan Lechter, Deputy Chief, Competition and Infrastructure Policy Division, WTB
Dana Shaffer, Deputy Chief and Chief of Staff, WTB

Verification of Mobile Wireless Service in Puerto Rico Post Hurricane Maria

September 2018 - January 2019

USAC I High Cost Division

OVERALL PROJECT OBJECTIVE

Independent verification of coverage and quality of mobile wireless services for voice and data in the Commonwealth of Puerto Rico by all commercially available facilities-based carriers.

Project Goals and Design

Goals:

Determine the feasibility of using drones for measuring mobile wireless signal strength and coverage in disaster and remote areas.

Benchmark the performance of mobile wireless services for all commercially available facilities-based carriers in Puerto Rico. Vendor performed detailed drone tests in small areas.

Design:

- Drone and drive tests conducted with (1) InfoVista "TEMS Portable" software and (2) crowdsourcing cell survey app (developed by Samknows) on payload phones.
  - Note: TEMS Portable has the same features and functionalities as software used on commercial grade Key Performance Indicators (KPIs) Drive Tests. Other software such as XCAL, Nemo outdoor, JDSU Umetrix, Viavi drive test Solution could be used.
- Note: drive tests and drone tests where performed in Puerto Rico.

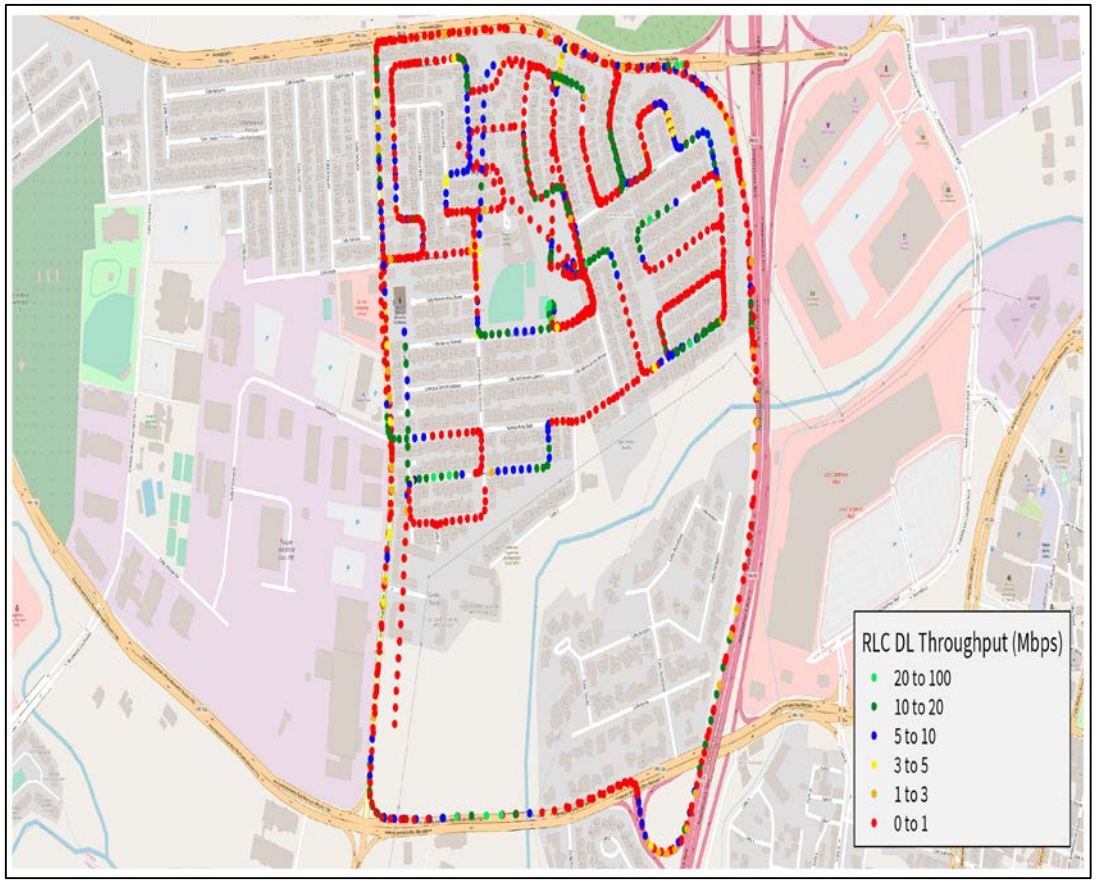
Test Parameters

- Used FEMA's list of damaged areas such as washed-away roads and collapsed bridges as starting points for areas for drone tests
- Used additional input from Drive Teams on inaccessible areas to add to updated list of areas to be tested
- 20 Drone Flights Across Puerto Rico Over 14 Days:
  - one drone test overlapped with a drive test to compare relative test performance
  - remaining 19 drone tests conducted over undrivable, impassible areas
  - Tested 4 operators simultaneously
- Drones flown no more than 100 ft. above ground
- Collected 7.2 Total Hours of Video

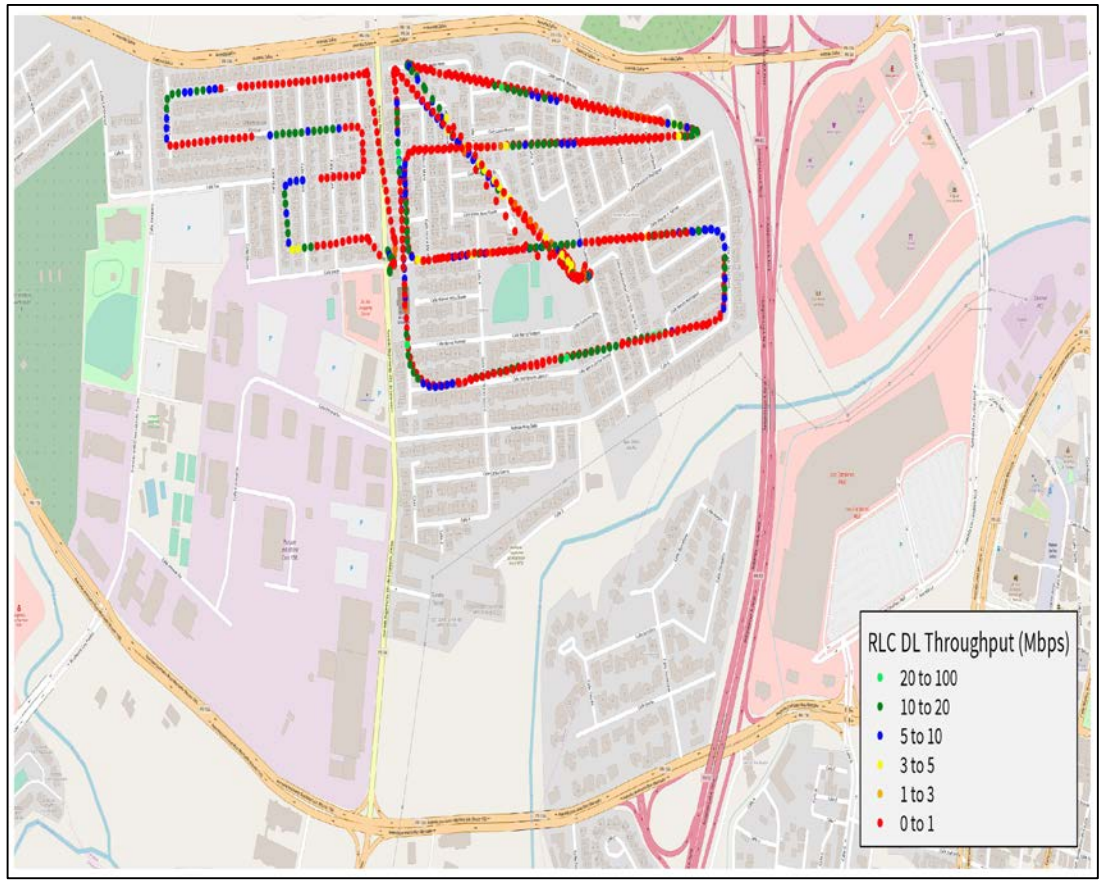
Drone Still Video Captures in Puerto Rico (Post Hurricane Maria)

Sample of Download Speeds –Carrier 1

Drive Test



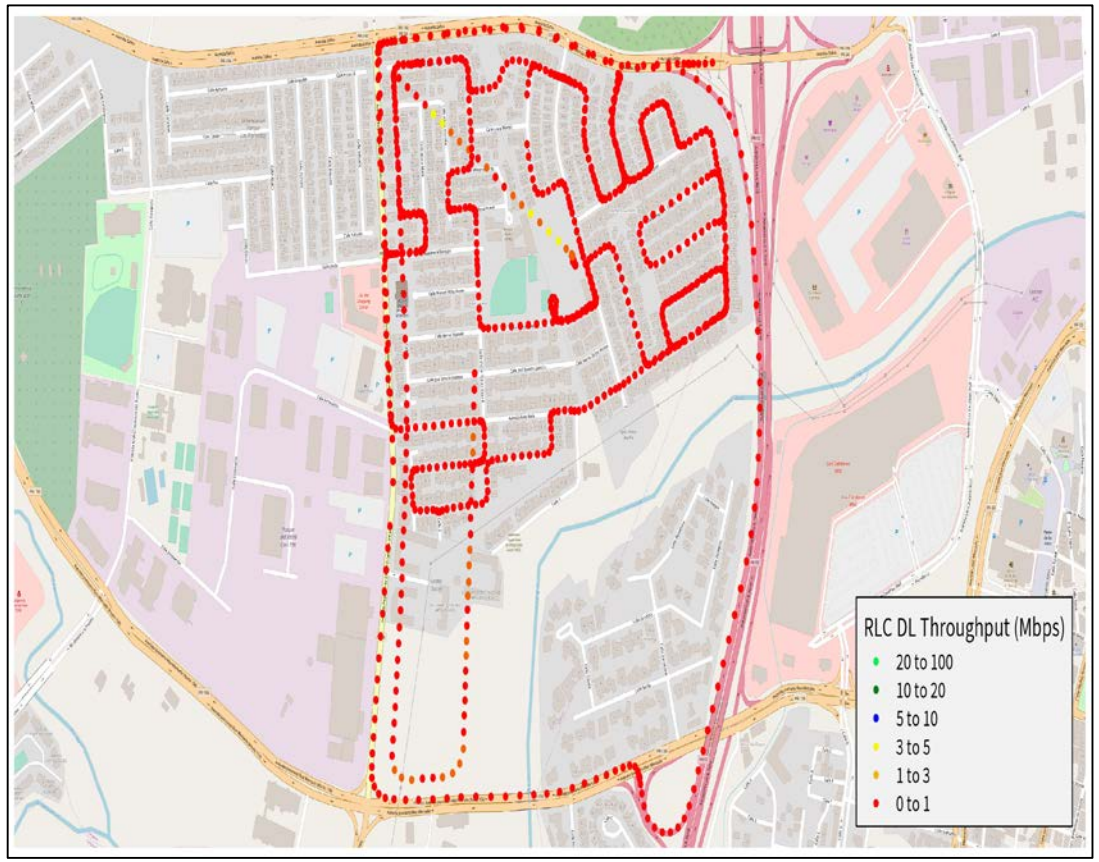
Drone Test



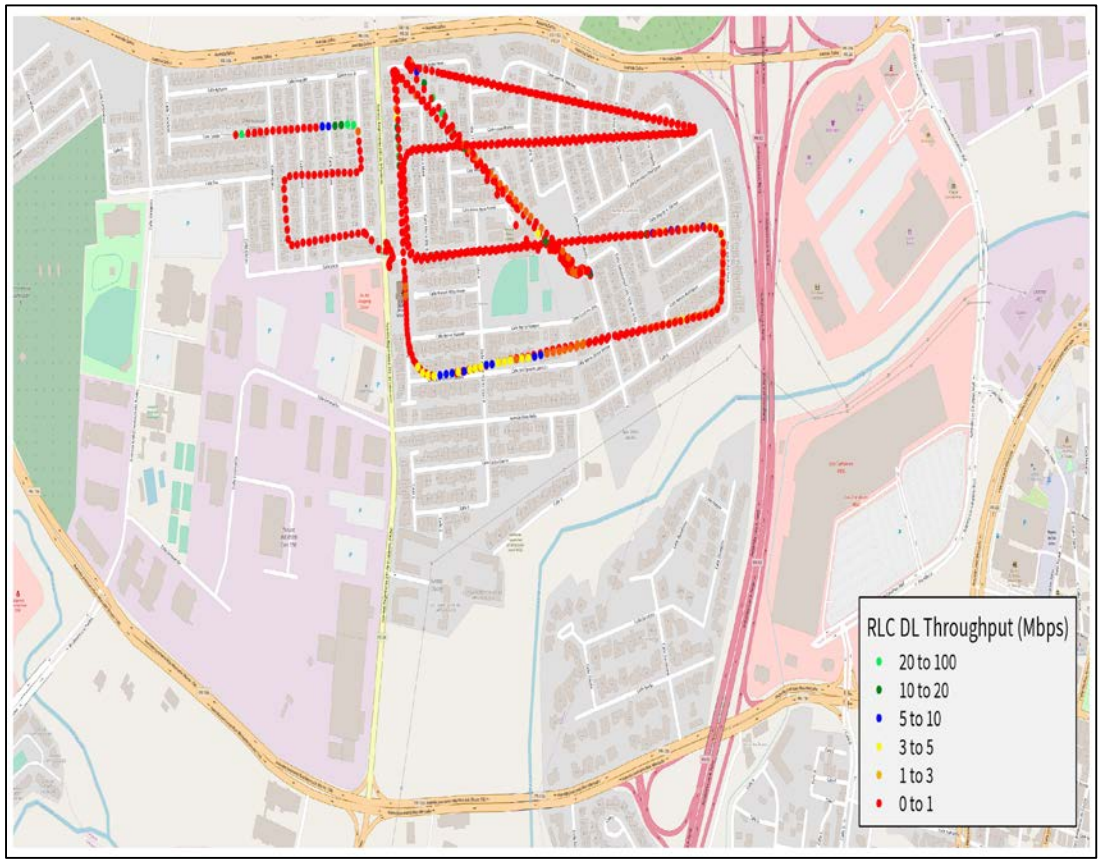
The Data shown on Slides 5-7 show comparison maps for drive test wireless data collection using vehicle (ground transportation) versus an Unmanned Aerial Vehicle (a.k.a Drone). RLC DL Throughput means “Radio Link Control Download Throughput” which is measured by Megabits per second.

Sample of Download Speeds – Carrier 2

Drive Test



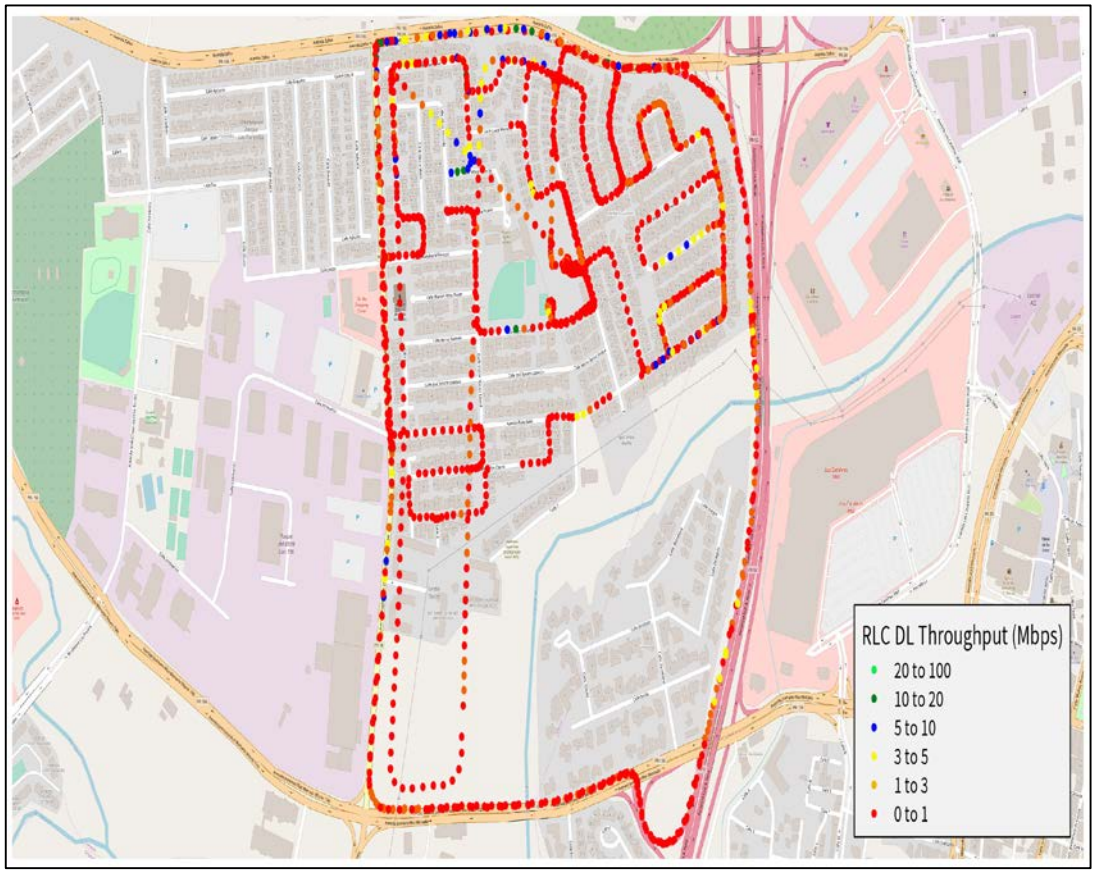
Drone Test



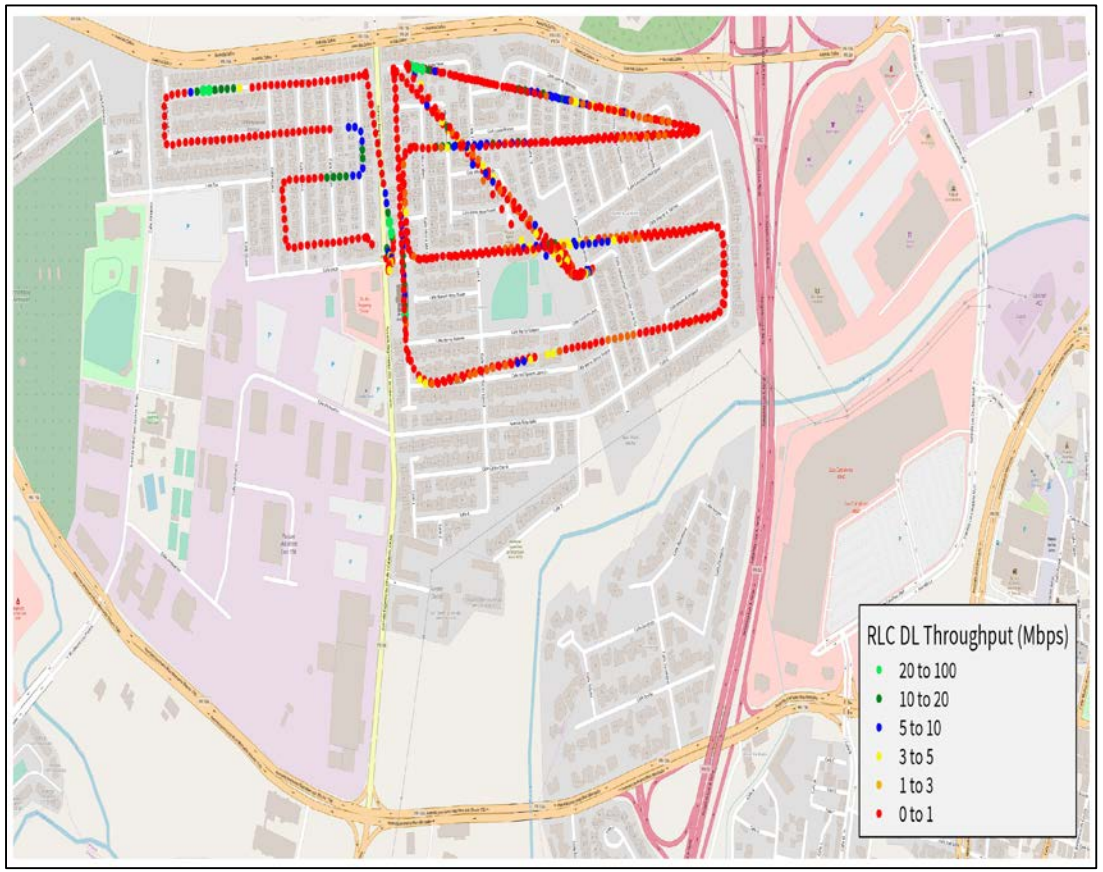
RLC DL Throughput: Radio Link Control Download Throughput

Sample of Download Speeds – Carrier 3

Drive Test



Drone Test



RLC DL Throughput: Radio Link Control Download Throughput

Results from Drone Testing

USAC is continuing to evaluate the test results.

- Both testing methods have limitations due to the inherent probabilistic nature of signal testing.
- Drone testing Limitations:
  - Testing is impacted by adverse weather conditions such as rain and wind.
  - Because of battery life and fuel limitations require more frequent “pit stops” compared to driving.
  - Flights require experienced drone operators.
  - FAA rules limit the length and scope of flight plans.
  - Due to these challenges, it took approximately two to three times the cost and time for the drone testing to complete a one-mile square signal survey, as compared to a traditional drive test for a comparable area, leading to a higher per-area drone test cost.
  - Drones tests can provide comparable results to drive tests for a given area.

  Currently, drones are best employed as a complementary testing approach for areas in which vehicles cannot easily reach, such as disaster areas.

Conclusion:

- Within Puerto Rico, the test evidence suggests that drones are capable of quickly surveying smaller areas, but may not be as useful for surveying larger areas in a cost-effective manner at this time.