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Are you Ready for the FCC CAF Speed and Latency Test Requirement?
Session Speakers

Thomas Cohen
Kelley Drye & Warren LLP Partner

Michael Romano
NTCA – The Rural Broadband Association, Sr. Vice President of Industry Affairs and Business Development

Michael McCalpin
Calix Principal Solutions Engineer

Greg Bathrick
Calix Solutions Marketing Director
Eight months and counting!
At what stage are you?

1. Not Started?
2. Reviewing the Order?
3. Investigation?
4. Implementation?

Source: Calix FCC CAF Testing Webinar Poll Results – September 28, 2018
Why are we here today?

Thomas Cohen  |  Kelley Drye & Warren LLP, Partner
Michael Romano  |  NTCA – The Rural Broadband Association, SVP
Understanding the details

Michael McCalpin | Principal Solutions Engineer
What are its key points?

Affects price cap, rate-of-return, Alaska plan and CAF phase II carriers and RBE support recipients

Mandates speed, latency and voice MOS tests

Begins testing July 1, 2019
When to start testing?

- Testing must start July 2019 to meet the first certification date of 7/1/2020.
- Process on how to annually certify and the data format to be provided to USAC, has only defined that every test result is to be kept.

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<table>
<thead>
<tr>
<th>Certification Date</th>
<th>Testing Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/1/2020</td>
<td>2H 2019</td>
</tr>
<tr>
<td>7/1/2021</td>
<td>Full year 2020</td>
</tr>
<tr>
<td>7/1/2022</td>
<td>Full year 2021</td>
</tr>
</tbody>
</table>
Where to test

- Test clients must be at an active subscriber location
- All tests must terminate or pass through one of these 16 IXP cities
- FCC believes that up to 500 air miles between test client and server is reasonable
- Recommend you pretest your target location ahead of time
How many test locations?

**Rules of thumb:**

- Carriers must identify the set of testing locations at the beginning of the testing and cannot exclude some locations during or after the testing.
- Test subjects must be randomly* selected every two years.
- Random selection also used to replace subscribers no longer active.
- *WCB will provide guidance regarding random selection by public notice.

<table>
<thead>
<tr>
<th>Total Subs*</th>
<th>Subs per test</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 or fewer</td>
<td>5</td>
</tr>
<tr>
<td>51 – 500</td>
<td>10% of subs</td>
</tr>
<tr>
<td>Over 500</td>
<td>50</td>
</tr>
</tbody>
</table>

* Number per state and per service tier combination
* Only active subscribers (not homes passed)
How many test locations?

- Carriers may use inducements to encourage subscribers to participate
- Latency test candidates may be selected from speed test candidates
- CAF BLS not currently included in the rules at this time, but his may change in the near future

CAF A-CAM example:

<table>
<thead>
<tr>
<th>Service Tier*</th>
<th>25/3</th>
<th>10/1</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homes Passed</td>
<td>99</td>
<td>210</td>
<td>309</td>
</tr>
<tr>
<td>Active Subscribers</td>
<td>45</td>
<td>115</td>
<td>160</td>
</tr>
<tr>
<td>Test Clients Required</td>
<td>5</td>
<td>12</td>
<td>17</td>
</tr>
</tbody>
</table>

* No decision on 4/1 service tier at this time
How to test network latency

How you test
- Single UDP packet or a group of 3 ICMP or UDP packets sent at essentially the same time. Similar to Ping Test

Test Frequency
- Full week per quarter, from 6:00 pm -12:00 am
- 1 test per minute (60 tests/hr * 6 hrs * 7 days = 2,520 tests per location)
- All test results (pass and fail) must be submitted

Test Exceptions
- If consumer load exceeds 64 Kbps downstream, retry in next minute. It is recommended that you save information on what the load was when this happens

Awaiting Clarification
- Format of the data will be provided by USAC
How to test network speed

How you test
- Single measurement of download/upload speed of 10 - 15 seconds duration

Test Frequency
- Full week per quarter, from 6:00 pm – 12:00 am
- One download and one upload test per hour (6 tests/day * 7 days = 42 tests per location)
- All test results (pass or fail) must be submitted
- Testing for all locations in a single speed tier in a single state must be done during the same week

Test Exceptions
- If consumer load exceeds 64 Kbps downstream, or 32 Kbps upstream; record the load and retry
- The load check-and-retry must continue at one minute intervals until the test can be run or the hourly test window ends

Awaiting Clarification
- Format of the data will be provided by USAC
How will the FCC interpret the results?

To reach 100% compliance

- **Latency** - 95% or more of all testing hours measurements of round-trip latency are at or below 100 ms
- **Speed** - 80% of download and upload measurements must be at or above 80 percent of the CAF-required speed tier.

**Other Stipulations**

- To ensure that outlying observations do not impact results, results with values greater than 150% of the advertised speed will be considered invalid
- The speed for which the provider should be testing is the speed required by the relevant CAF rules, not the advertised speed. If a provider must deploy 10/1 but advertises and sells 12/2, the compliance will be calculated against 10/1 not 12/2
How will penalties be determined?

- Using the compliance percentage from the previous slide

<table>
<thead>
<tr>
<th>Compliance Levels and Support Reductions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Qualifying Compliance Percentage x</strong></td>
</tr>
<tr>
<td>Full Compliance</td>
</tr>
<tr>
<td>Level 1</td>
</tr>
<tr>
<td>Level 2</td>
</tr>
<tr>
<td>Level 3</td>
</tr>
<tr>
<td>Level 4</td>
</tr>
</tbody>
</table>

Source: FCC DA 18-710, section 64, page 25

From the order:

“All carriers not fully compliant in a particular state must submit quarterly reports providing one week of testing hours test results, subject to the same requirements we establish in this Order, and describing steps taken to resolve the compliance gap, and USAC will withhold a percentage of a non-compliant carrier’s monthly support.”

Source: FCC DA 18-710, section 63 (page 24)
How to test high-latency voice

- High-latency providers subject to testing must demonstrate a MOS of four or higher
- High-latency providers required to conduct ITU-T P.800 conversational-opinion test

### Required Test Locations for MOS Testing

<table>
<thead>
<tr>
<th>Number of Subscribers at CAF-Supported Locations Nationally</th>
<th>Number of MOS Test Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>3500 or fewer</td>
<td>100</td>
</tr>
<tr>
<td>Over 3500</td>
<td>370</td>
</tr>
</tbody>
</table>

Source: FCC DA 18-710, section 46, page 18
Where to go next?

Gregory Bathrick  | Solutions Marketing Director
What test frameworks are allowed?

1. MBA testing infrastructure (Measuring Broadband America)
2. Existing network management systems and tools
3. Provider-developed self-testing
What to consider when choosing the best framework for your company

- Expenses… can you afford a fully “paid” service?
- Operations… do you want something that fits into your current operations?
- Time … do you have the time to architect your own solution?
Framework #1: Measuring Broadband America (MBA) testing method

What is it? Subscription-based performance measurement service
How it works? Testing using 3rd party test clients and servers
Important things to consider
- Cost of new hardware and on-going subscription costs?
- Incremental operational costs to install and support another box
- Risk of testing across an unmanaged home network
Primary observation(s) A single source solution

Source: MBA Whitepaper (FCC)
Framework #2: Existing network management systems

What is it? Test software installed on new gen RGs and systems
How it works? Testing using own residential gateway and controller
What’s Important to consider?
- No additional hardware costs
- No operational burden to install and support new box
- No testing across unmanaged home network
- Advantages of latest RG technology

Primary observation(s) No new boxes, No truck roll, No testing across unmanaged network
Framework #3: Provider-developed self-testing

What is it? Off-the-shelf test boxes to be architected by you

How it works? Testing is completed by a 3rd party test clients (e.g., R Pi3+)

Important things to consider
  - Incremental operational costs to install and support another box
  - Risk of testing across an unmanaged home network
  - Risk of designing it yourselves
  - Cost of new hardware

Primary observation(s) Operator must architect, maintain and certify
Comparing testing frameworks: What is most important to you?

- Avoiding additional hardware and Truck rolls
- Avoid in-home testing
- All while Introducing latest gateway technology

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meets FCC Requirement</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>No additional test client/technician dispatch</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Avoids unmanaged home network testing</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Latest gateway technology</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
</tbody>
</table>
Recommended FCC CAF Testing solution – based on framework #2

Solution
- Controller: CSC schedules, initiates, reports testing
- Client: GigaSpire conducts speed and latency testing
- Server: Emerging test server companies per FCC

Advantages
- Stands up quickly
  - Test controller is built into the CSC cloud infrastructure
  - Test client is built into GigaSpire
- Eliminates cost associated with additional test client
- Avoids testing across an unmanaged home network
- No operational burden to install and support new box
- Introduces latest smart home subscriber experience
Introducing to TR-143 to Recommended solution

TR-143 based solutions

- **Controller**: TR-143 enabled CSC - schedules, initiates, reports testing
- **Client**: TR-143-based CPE; Interoperability test required
- **Server**: Emerging test server companies per FCC
- **TR-143 interoperability testing** introduces schedule and compliance risk
Regulatory Update

Tom Cohen | Kelley Drye & Warren LLP
Michael Romano | NCTA - The Rural Broadband Association
Discussion/Q&A
Thank you!

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