Verizon Wireless

4G LTE “Open Access” Application Guidelines

Version 1.0 (09/10/10)

© 2010 Verizon Wireless. All rights reserved.
Contents:

- Introduction.........................................................................................................................Page 3
  - Goal
  - Feedback
- Application Guidelines........................................................................................................Page 5
  - Application Classification
  - Network Aware Applications
  - Network API Applications
  - Stand Alone Applications
  - Common Functional Tests (for reference only)
- 4G LTE Voluntary Application Test Program.................................................................Page 8
  - Process
  - Fees and Contacts

Revision History

<table>
<thead>
<tr>
<th>Revision No.</th>
<th>Amendments</th>
<th>Updated By</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Document creation</td>
<td></td>
<td>09/10/10</td>
</tr>
</tbody>
</table>
1 Introduction

These guidelines are addressed to developers of 4G LTE applications who do not plan to use the Verizon Developer Community (VDC) portal and do not plan to seek placement in the Verizon Wireless V-Cast Apps Catalog. Also, if your application is designed to operate on an Open Development device, rather than a Verizon Wireless-branded device, then these guidelines are informative only.

Our philosophy with respect to the FCC’s Upper 700 MHz C-block “open access” platform is that we are open. We have the best network and we want our customers to leverage it to drive success for their personal and business needs. We also want developers to be able to bring devices and applications to the network that will result in our customers, and their customers, having more and innovative choices.

At this time, there is no mandated 4G LTE application certification test program for applications that are designed specifically to work on the Verizon Wireless 4G LTE network on the 700 Upper C-Block (3GPP Band 13), or that may be used on that network by consumers, but will be marketed by the developer through a Non-Verizon Marketing Channel (NVMC).

Currently, we have a certification program to ensure modules/devices developed by third parties are compliant with our published technical specifications for the 4G LTE network. While there is no Verizon Wireless mandated application certification program for 4G LTE applications using an NVMC, Verizon Wireless does monitor application traffic to ensure that applications operating on our network are behaving responsibly. The guidelines in this document will be implemented as our standards to review the behavior of applications and products developed for use on the C-Block network, in accordance with the FCC’s rules for the 700 MHz Upper C-Block, 47 C.F.R. Section 27.16.

The intent of this document is to give 4G LTE application developers using an NVMC guidance with respect to acceptable application behavior. Verizon reserves the right to take the appropriate remedial action against applications that are not performing in a responsible manner as detailed in this guideline. This document thus complements the existing 4G LTE module/device certification specifications already published.

Verizon Wireless reserves the right to change this policy in the future, and to institute a formal application certification program or test plan without regard to marketing channel. We will give all interested parties notice of any such change in policy on the Open Development web portal where the 4G LTE device technical specifications are posted.

Again, please note that application developers planning to use the VDC portal should consult the procedures and guidelines posted at http://developer.verizon.com.
1.1 Goal

The Verizon Wireless network is a shared resource among all Verizon Wireless customers. It is important that no application has a detrimental effect on the overall operation of the network or on other customers. Applications developed for use on the network should be well behaved when using shared resources, limited resources, or resources required to maintain customer privacy and security.

The application developer is responsible for the user experience, functionality and quality of applications. The specifications in this guideline are intended to ensure that applications are safe for the network and do not violate the security or privacy of customers. Applications that are found to compromise the Verizon network, user security or privacy, or in general do not adhere to good engineering practices to avoid harm to the network or other users, are subject to removal or disabling from operating on the network.

1.2 Feedback

We are always interested in receiving your feedback. Please contact us with your comments and suggestions at www.verizonwireless-opendevolopement.com.
2 Application Guidelines

2.1 Application Classification
Verizon classifies applications in one of three categories. This classification helps us determine the impact of the application on our network resources. Classification groups may be modified, added, or removed at the sole discretion of Verizon.

- **Network Aware Applications**: Application runs both locally on the device and interacts with Verizon network features or resources
- **Network API Applications**: Application that makes use of Verizon’s network-based services via a Verizon exposed web services API
- **Standalone Applications**: Application runs locally on device and does not use any Verizon network features or resources

2.2 Network Aware Applications
Network Aware Applications make use of Verizon’s network resources or features. Examples are applications that explicitly create network connections (sockets), applications that use HTTP services, applications that generate SMS messages, etc.

The design and implementation of Network Aware Applications should make efficient and intelligent use of network resources. The number and frequency of connections to the network should be minimized such that the application only requests what is necessary for the correct and reliable operation of the application. The application should detect error conditions of the network and/or remote servers and act to avoid adding unnecessary congestion to the network. The bandwidth utilized by the applications should be optimized in order to maintain reliable use of the application, maintain a high level of responsiveness for the user, and reduce opportunities for network congestion.

Applications could be denied access to the network if they violate the following guidelines:

1. Upon application termination, all Verizon network connections should be closed/terminated properly. Applications should use the device API to detect error states and close/cleanup network resources in the manner specified by the use of that API.
2. Applications should not make use of “heartbeats” or “keep alive” messages to maintain an “always on” connection with application servers. Applications should only acquire and use the Verizon network when communications are necessary.
3. Applications should not originate more than 1 SMS message per 10 second interval and more than 30 SMS messages over any 10 minute interval. Applications should not use
SMS as a data transport mechanism, but rather to establish a data connection. Applications should not originate SMS messages at these maximum rates for extended periods of time.

4. Excessive DNS queries to the Verizon network are to be avoided. Applications should limit external DNS requests as is appropriate for their application. Applications should not exceed more than twenty (20) unique external DNS queries per 60 second interval.

Excessive connection retries should be avoided. Applications making a data connection to a network service should only attempt a retry a maximum of two (2) times. Further connection attempts should be the result of direct user interaction.

The operation of applications generally should pose no harm to the network or users, and should not fail to comply with applicable statutory or regulatory obligations.

### 2.3 Network API Applications

Verizon network APIs are an upcoming feature and have not been released. This section will be updated in the future.

### 2.4 Stand Alone Applications

The behavior of Stand Alone Applications is determined by the device. By definition, a standalone application does not consume any network resources. If a developer were to submit an application to our VDC, we would validate that this application did not consume any network resources with the exception of the initial download and application revisions. For the purposes of this document, it is up to the developer to ensure proper application behavior.

### 2.5 Common Functional Tests

4G LTE applications are not required formally to pass the following tests. However, we would like 4G LTE developers using an NVMC to see the type of certification that we administer for applications that are published through the VDC portal in the Verizon Wireless catalog (V CAST Apps). We want our customers using independently-marketed 4G LTE applications to have a good experience as well!
1. Application fails to download and install from the developers server to the device (OTA install and update).

2. Use of common device navigation keys fail within the application.

3. The application installs and uses icons that duplicate existing icons standard for that device.

4. Application uses fonts or UI graphics that are not visible or legible to an average person.

5. Scrolling function does not work properly for the specific device – specifically the trackball, touch screen, 5-way controller should behave in the expected manner.

6. The application does not properly suspend/resume according to the best practices of the given device platform.

7. The graphics performance of the application is appropriate for the target device. Specifically the application must not be slow in response to the degree that the application is not usable. It must not cause an undo amount of flashing due to slow performance.

8. The screen resolution and aspect ratio of the device is not managed properly. The application must be designed for the screen resolution of the device. Examples are: UI controls not being laid out properly due to a larger screen then the application was designed to manage; Icon sizes result in the application being unusable.

9. The application does not properly manage screen rotation. For devices that allow screen rotation and where the application responds to the rotation request it should properly manage the new screen orientation.

10. The application blocks the native platform from requesting and or forces the application to switch, pause, resume, or exit.

11. The application fails, aborts, freezes or becomes usable for any reason during the testing process.
3 4G LTE Voluntary Application Test Program

3.1 Process

- If you are planning to distribute a 4G LTE application through an NVMC and would like it to be tested for use on Verizon Wireless-branded devices, please contact one of our approved testing houses listed below.
- Applications that are designed specifically for use on an OD device would not require such testing; note, however, that, if such test plan is pursued, the OD device on which the application is designed to operate may require certain components that are not included in the device technical specifications.
  - For example: If your OD device does not provide sufficient access to a USB port or come with supported drivers to allow data logging, certification could take longer than the normal 14 day interval.

Please note that this voluntary 4G LTE application test program is designed to provide assurance that the application will perform well on Verizon Wireless branded devices. Passing these tests does not guarantee that the application will always perform well. And, passing these tests does not insulate the application from remedial action if the application, or one of its iterations or revisions, behaves irresponsibly on the Verizon Wireless network. Verizon assumes no liability for the application distributed through a Non-Verizon Marketing Channel and our Customer Care team will not be able to support customer complaints related to applications distributed through such channels.

3.2 Fees and Contacts

Application certification will be at the expense of the developer.

Please contact the approved test labs below for current pricing and test procedures.

Intertek

John Campbell
Business Development Manager Carriers and Ecosystems
Office: (610) 832-8426
Fax: (610) 941-9952
Email: john.campbell@intertek.com
Web Site: http://www.intertek.com/wireless-mobile/applications-and-content/

-------------------------------------------------------------------------------------------------------------------

P3 Communications

Ron Housenick
VP Wireless Group
Office: (267) 377-0539
Fax: (973) 689-2760
Email: Ron.Housenick@P3-Group.com