# DEVICE REQUIREMENTS BLUETOOTH

## VERSION 28.0

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## Revision History

| Author | Description of Changes | Version | Date |
|---|---|---|---|
| James Xanthos<br>Kathy Chylinski<br>John Seeman | Document Creation | 1.0 | July 2005 |
| Kathy Chylinski | Concurrent BT connections<br>User Manual<br>Bluetooth icons<br>User Interface requirements for non-MSUI devices<br>Other changes as marked | 2.0 | October 2005 |
| Kathy Chylinski | Vendor BT functionality chart added (5.1.2.1)<br>OEM BT Model Car kit chart updated (5.2.1) | 3.0 | February 2006 |
| John Seeman<br>Kathy Chylinski | Add PBAP<br>Add Stereo Profile<br>Add Basic Printing Profile<br>OEM BT Model Car kit chart updated (5.2.1)<br>Minimum BT profiles for device tiers (2.1.4.1)<br>Use cases (2.5.1)<br>BT trademark (2.6.3) | 4.0 | May 2006 |
| John Seeman<br>Kathy Chylinski | Added BIP (5.1.39 – 5.1.44)<br>Added references to DRM Reqs (2.1.4.1, 2.5.1)<br>Removed Voice Activated Dialing<br>Clarification for switch to functionality (5.1.5.2.3)<br>Stereo required for high tier (2.1.4.1.3, 5.1.29)<br>HFP 1.5 required (5.1.11, 10)<br>Use cases (2,5.1) | 5.0 | August 2006 |
| Kathy Chylinski | Use Cases clarified (2.5.1)<br>Clarification for Handsfree v1.5 devices to work with HFP 1.0 accessories (5.1.2)<br>BT functionality chart updated (5.1.2.1)<br>Bluetooth core specification versioning updated (5.1.4)<br>FTP and OPP versioning specified (5.1.4)<br>Accessory compatibility evaluation document added (5.2.2)<br>Low battery power and weak signal (6.4.2)<br>References updated (10)<br>Other changes as marked | 6.0 | December 2006 |
| Eric Wu<br>John Seeman | Updated OPP profile (5.1.4.2)<br>Updated BT Device Tiering (2.1.4)<br>Updated BT Use Case File (2.5.1)<br>Added Data/File Use Case<br>Removed LAN Use Case<br>Added Use Case Profile support (5.1.2)<br>Clarification to A2DP(5.1.38.2)<br>Additions to AT Commands for car kit support (5.1.20.6)<br>Addition of HID Profile 5.1.57<br>DUN NAI Clarification for 1xRTT only device | 7.0 | March 2007 |
| Eric Wu | Auto pairing added 2.1.5.2.1 | 8.0 | June 2007 |
| Eric Wu | Removal of initiated Three-Way calling | 9.0 | September |


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|---|---|---|---|
| John Seeman<br>Balaji Raghavachari | Updates to 6.4.2 device behavior when loss of Bluetooth connection<br>Clarification OPP 5.1.5.1.1 and addition vCalendar 2.0<br>Addition of BT Stereo volume control requirement 5.1.32.6<br>Addition of BT Stereo behavior when answering an incoming call 5.1.32.7<br>Formatting Changes | | 2007 |
| Eric Wu | Clarification to 6.4.2 device behavior when loss of Bluetooth connection<br>Clarification to Headset requirements 2.5.1 | 10.0 | December 2007 |
| Eric Wu | Updates to 6.4.2 device behavior when loss of Bluetooth connection<br>Addition of BT Core 2.0 + EDR for devices that support 1xEVDO and BT DUN devices<br>Update references to the Data Throughput Lab Test Plan<br>Update to BT Accessory Compatibility Letter | 11.0 | March 2008 |
| Eric Wu | Updates to BT DUN Data port setting<br>Updated advanced devices references to converged devices | 12 | June 2008 |
| Eric Wu<br>JR Ramos<br>Raj Damle | Update to tiers<br>Update to use cases<br>Update to Car Kits compatibility template<br>Update to HFP AT Commands<br>Update to AVRCP version<br>Update to A2DP version<br>Addition of HDP<br>Addtion of VDP<br>Update to PAN<br>Addtion of SYNC<br>Update to Bluetooth Functionality Chart | 13 | September 2008 |
| Eric Wu | Update to vCard support<br>Update to HSP and HFP to account for Mono Audio to headset behavior | 14 | March 2009 |
| Nidhi Rastogi<br>Nick Bennet<br>Eric Wu | Updated Bluetooth Security Risks, Sec 2.1.5.6<br>Added 6.4.3 device behavior when attempting to connect to pairing device<br>Update to profile support for device tiers section 2.1.4.1<br>Addition of reference to Bluetooth White paper section 5.1.30 | 15 | June 2009 |
| Kathy Chylinski<br>Yuk Li | Device will not automatically initiate connection to Car Kit (5.1.12.5.4) | 16 | September 2009 |
| Helen Wang<br>Farook Kaleem | Updated Connection Request duration (5.1.12.5.4)<br>Added the requirements for audio routing to BT car kits from applications. | 17 | December 2009 |
| Helen Wang | Updated Car Kit Matrix to add Text Message Readout | 18 | March 2010 |


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| | | | |
|---|---|---|---|
| Kathy Chylinski<br>Yuk Li<br>Anwarul Hannan<br>JR Ramos | support (5.2.1)<br>Added MAP profile support (2.1.4.1.1, 2.1.4.1.2, 5.1.61)<br>Specified automatic connect as the default after successful pairing (2.1.5.2.1)<br>Updated device categories (2.1.4.1.1, 2.1.4.1.2)<br>Added reference to MAP profile standard specification (10) | | |
| Helen Wang | Clarified auto connect pairing requirements applicability (2.1.5.2.1) | 19 | June 2010 |
| Helen Wang | Added Unique Requirements Tag ID.<br>Last Tag used - <VZW-REQS-119-724> | n/a | June 2010 |
| Helen Wang | Fixed the bad reference link (2.1.4.1.2) | 20 | September 2010 |
| Shyam T. Shyamalan | Removed references to MedaFLO<br>Updated tags<br>469,498,526,<br>Last Tag used –<br>724 | 21 | December 2010 |
| Helen Wang<br>Y. Li | Updated the requirements on device support of the HF Requests of Turning Off the AG's EC and NR (5.1.12.2.2)<br>Fix requirements tags<br>Updated Tags - 237<br>Last Tag used – 724 | 22 | March 2011 |
| Kenneth Hartman | Updated Bluetooth security risks with new attacks (1.1, 2.1.5.6).<br>Updated Tags – 2, 25<br>Last Tag used – 724 | 23 | September 2011 |
| Nanjun Qian<br>Helen Wang | Mandate the Bluetooth 4.0 at Chipset level<br>Added support of AT commands to support the interoperability of AAC device and VZW mobile device<br>Updated the Car Kit Matrix with a new car manufacture and updated the car kit manufacture info (5.2.1)<br>Updated Tags – 2, 30, 107, 244, 251, 252, 253, 331, 697, 724<br>New tags - 725, 726, 727<br>Last Tag used – 727 | 24 | December 2011 |
| Nanjun Qian<br>Helen Wang | Specified the required BT profiles to support BT 4.0 including BT Low energy (2.1.4.1.2, 2.1.4.1.3, 5.1.2.12)<br>Added Bluetooth radio interface support for simultaneous Basic Rate and Low Energy connections (4.1)<br>SIG certification requirements extended for BT 4.0 including BR low energy certification (5.1.5.1.1)<br>Added BT overview diagram with BT 4.0 including BT low energy (5.1.1)<br>Added Out of Band Pairing mode support ted for NFC enabled devices (2.1.5.2.2, 2.6.2.4)<br>Cleaned up the Device category and simplified the document structure<br>Updated AAC requirements to make some AT commands optional (5.1.7.5.1.1, 2.5.1.12)<br>Updated the Car Kit Matrix (5.2.1) | 25 | April 2012 |


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|---|---|---|---|
| | New tags – 728 - 730<br>Last Tag used – 730 | | |
| Helen Wang | Moved BT Carkit Matrix template to VZW Device Requirements and Compliance Test Plans document portal<br>BT Carkit Matrix template is updated | 26 | July 2012 |
| Nanjun Qian | Updated the BT profiles BIP and BPP requirements to allow device vendors, with VZW approval, to use an alternative wireless connectivity for printing and image sharing if BT basic printing and imaging profiles are not supported | 27 | October 2012 |
| Nanjun Qian | Update the BT profiles to support DI and DIS profile and service | 28 | February 2013 |


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# 1 Introduction <VZW-REQS-119-1>

Verizon Wireless requires Bluetooth functionality in certain wireless devices. This document describes the requirements to be met by a wireless device supplier. If any section does not apply it is marked as N/A.

All requirements generated, only apply to new product launches. Any running changes or field upgrades need to be handled as special cases under extraordinary circumstances involving coordination with Device Marketing and Network.

## 1.1 GLOSSARY/DEFINITIONS <VZW-REQS-119-2-APR2012>

This section defines acronyms and terms used throughout the document. For an extended list of Acronyms and Glossary terms refer to Verizon Wireless Glossary.

| Term [Abbreviation (if Applicable)] | Definition |
|---|---|
| AG | Audio gateway |
| ANS | Alert Notification Service |
| AT | Attention |
| AVR | Advance Voice Recognition |
| A2DP | Advance Audio Distribution Profile |
| AVDTP | Audio/Video Distribution Tranport Protocol |
| AVRCP | Audio/Video Remote Control Profile |
| Bluetooth SIG | Bluetooth Special Interest Group |
| BIP | Basic Imaging Profile |
| BPP | Basic Printing Profile |
| DTMF | Dual Tone Multi – Frequency |
| DUN | Dial Up Networking |
| EC | Echo Cancellation |
| FMP | Find Me Profile |
| FTP | File Transfer Profile |
| GAP | Generic Access Profile |
| GATT | General Attribute Profile |
| GAVDP | Generic Audio/Video Distribution Profile |
| GOEP | Generic Object Exchange Profile |
| HF | Hands Free Set |
| HFP | Hands Free Profile |
| HID | Human Interface Device - HID class consists primarily of devices that are used by humans to control the operation of computer systems |
| HS | Headset |
| HSP | Headset Profile |


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| | |
|---|---|
| ISO | International Standards Organization |
| L2CAP | Logical Link Control and Adaptation Protocol |
| LAN | Local Area Network |
| LMP | Link Manager Protocol |
| ME | Mobile Equipment |
| NR | Noise Reduction |
| OBEX | Object Exchange Profile |
| OPP | Object Push Profile |
| PAN | Personal Area Network |
| PBAP | Phonebook Access Profile |
| PIN | Personal Identifier Number, also known as passkey. |
| PSM | Protocol Service Multiplexer |
| PXP | Proximity Profile |
| RF | Radio Frequency |
| RFCOMM | Serial Port Transport Protocol over L2CAP |
| RSSI | Receive Signal Strength Indicator |
| SDP | Service Discovery Profile |
| SPP | Serial Port Profile |
| UI | User Interface |
| VCARD | Electronic Business Card |

## 1.2 APPLICABILITY TO EXISTING VZW DEVICE REQUIREMENTS AND COMPLIANCE TEST PLANS <VZW-REQS-119-3>

Unless specifically identified in this document, the device shall comply with Verizon Wireless Device Feature Definition/Requirements and Verizon Wireless Device Testing Process.

## 1.3 NEW VZW DEVICE COMPLIANCE TEST PLANS REQUIRED TO SUPPORT THESE DEVICE REQUIREMENTS <VZW-REQS-119-4>

Refer to the VZW Bluetooth Compliance Test Plan. Other required test activities refer to entrance criteria VZW Device Compliance Test Entrance Criteria[31].

## 1.4 BLUETOOTH PROFILES SUPPORT AND APPLICABILITY <VZW-REQS-119-5>

BT346 Device vendors shall provide their Bluetooth Profile support during product compliance lockdown. VZW Device Marketing Product Development Team will determine device roadmap based on segmentation and business needs.

## 1.5 HOW TO USE THIS DOCUMENT <VZW-REQS-119-6>

Section 1 – Introduction, definitions, and applicability.

Section 2 – Marketing requirements that are translated to technical requirements defined in sections 4 – 8.
Section 3 – User interface definition where applicable.
Section 4, 5, 6, 7, 8 – Technical requirements used in device compliance testing and acceptance.
Section 9 – References.

# 2 Marketing Requirements <VZW-REQS-119-7>

## 2.1 SERVICE, PRODUCT, FEATURE, AND/OR APPLICATION OFFERING DESCRIPTION <VZW-REQS-119-8>

### 2.1.1 OVERVIEW <VZW-REQS-119-9>

This document outlines Bluetooth requirements for wireless devices. The targeted classes of devices include:

- Feature Phones
- Smartphones
- Tablets

### 2.1.2 BACKGROUND <VZW-REQS-119-10>

Bluetooth is a low bandwidth, wireless networking technology designed primarily to replace cables for communication between personal computing and communication devices. It is intended to be used for both voice and data communications.

Bluetooth can be used to wirelessly synchronize and transfer data among devices. The Bluetooth audio capabilities can be used for headset and handsfree applications. Bluetooth can be thought of as a cable replacement technology. The exact functionality provided by a Bluetooth enabled device depends on the Bluetooth profiles included and supported.

### 2.1.3 TECHNICAL BACKGROUND INFORMATION <VZW-REQS-119-11>

Bluetooth operates in the unlicensed 2.4 GHz ISM (Industrial, Scientific, Medical) band. It uses Frequency-Hopping Spread-Spectrum (FHSS), which is a spread spectrum modulation scheme that uses a narrowband carrier (1 MHz) that changes frequency in a pattern known to both transmitter and receiver Bluetooth Profiles.

### 2.1.4 BLUETOOTH PROFILES <VZW-REQS-119-12>

Bluetooth Profiles will be addressed in more detail in relation to use cases in section 2.5.1.

#### 2.1.4.1 BLUETOOTH PROFILE AND PROTOCOL SUPPORT PER DEVICE TIER <VZW-REQS-119-13>

OEM's must work back through their Device Strategy Representatives if planning to support profiles above and beyond the minimum to differentiate your product in the market.


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Updates to new profiles will be updated as they are released from BT SIG.

2.1.4.1.1 Feature Phones, Smartphones and Tablets <VZW-REQS-119-14-Apr2012>

BT347 At minimum, a device supporting BT shall support the following profiles and protocols:

- **GAP = General Access Profile** - This profile defines the generic procedures related to discovery of Bluetooth devices.
- **HSP = Mono Headset(V1.2)** - Allows a Bluetooth Headset to connect to device which enables incoming & outgoing calls.
- **HFP = Hands-Free Profile(V1.6)** - Similar to HSP allows Audio transfer from device to handset and vice versa.
- **SPP = Serial Port Profile (V1.1)** - The Serial Port Profile defines the requirements for Bluetooth devices necessary for setting up emulated serial cable connections.
- [2,3,4]**OPP = Object Push Profile(V1.2)** - Allows an object to be transferred between devices that support OPP (i.e.vCards, vCalendar, images, and video) See restrictions outlined in Verizon Wireless Digital Rights Management Requirements
- [2,3]**PBAP = Phonebook Access Profile(V1.0)** - Especially tailored for the automotive hands-free use case where an onboard terminal device retrieves Phonebook objects from a mobile device.
- **DUN = Dial Up Networking(V1.1)** - Allows end user to use device as a wireless modem for connecting to a dial-up internet access server, or using other dial-up services. Applicable to devices that support 1xEVDO.
- [2]**AVDTP = Audio/Visual Distribution Transport Protocol(V1.2)** - Streaming of video content from a mobile device to another device. The video data is compressed in a specific format for efficient use of the limited bandwidth.
- [2]**AVCTP = Audio/Visual Control Transport Protocol(V1.3)** - Describes the transport mechanisms used to exchange messages for controlling Audio and/or Video devices.
- [2]**A2DP = Advanced Audio Distribution Profile(V 1.2)** – Supports Stereo and provides a way to distribute high-quality audio to Bluetooth headphones or speakers. Device Vendors shall implement this profile with approval from Verizon Wireless Device Product Development Marketing Group during feature lockdown.
- [2]**AVRCP = Audio/Visual Remote Control Profile** (V1.4)- Supports Wireless control of phone's audio / video player (Play, Pause, FF, RW, Forward, Rewind, Stop) and transfer metadata between devices. Device Vendors shall implement this profile with approval from Verizon Wireless Device Product Development Marketing Group during feature lockdown.
- [2]**GAVDP = Generic Audio/Video Distribution** Profile - Specifies signaling transaction procedures between two devices to set up, terminate, and reconfigure streaming channels
- **GOEP = Generic Object Exchange Profile(V2.0)** - The Generic Object Exchange profile defines the protocols and procedures that shall be used by the applications providing the usage models which need the object exchange capabilities. The usage model can be, for example, Synchronization, File Transfer, or Object Push model.

The most common devices using these usage models can be notebook PCs, PDAs, smart phones, and mobile phones.

- [1]**HDP** = Health Device Profile(V1.0) - This profile is used for connecting application data Source devices such as blood pressure monitors, weight scales, glucose meters, thermometers, and pulse oximeters to application data Sink devices such as mobile phones, laptops, desktop computers, and health appliances without the need for cables. Device Vendors shall implement this profile with approval from Verizon Wireless Device Product Development Marketing Group during feature lockdown.
- **DI** = Device ID Profile(V1.3) - This profile is provide a profile specification for the identification ofdevices based on brand and device information (such as manufacturer and product identifier). This is important in order to make best use of the features on the device identified.
- **MAP = Message Access Profile(V1.1) –** This profile is used to exchange messages between devices. It is especially tailored for the automotive hands free where an onboard terminal device (typically a Car-Kit installed in the car) takes advantage of the messaging capability of a communication device (typically a mobile phone).

2.1.4.1.2 Smartphones and Tablet Devices shall support additional profiles <VZW-REQS-119-16-Apr2012>

BT101 Smartphone and Tablet devices shall support the following BT profiles:

- [2,3]**BPP = Basic Printing Profile(V1.2)** - defines the requirements for the protocols and procedures used by applications providing the Basic Printing usage model. If Device Vendors are providing a printing solution other than using BT BPP profile for the device, the solution shall be presented on FLD meeting and BPP requirement can be waived.
- [2,3]**BIP = Basic Imaging Profile(V1.1)** - enables Bluetooth devices to negotiate the size and encoding of imaging data to be exchanged. (i.e Business card scanner sends images to the phone or prints directly from the phone) If Device Vendors are providing an image exchange solution other than using BT BIP profile for the device, the solution shall be presented on Feature Lock Down meeting and BIP requirement can be waived.
- [2,3,4]**FTP = File Transfer Profile(V1.2)** - Allows a device to receive or transfer files restricted to those outlined in Verizon Wireless Digital Rights Management Requirements.
- **HID = Human Interface Device(V1.0)** – Allows the use of a Bluetooth wireless joystick, mouse, or keyboard as an interface to the mobile device.
- **PAN = Personal Area Network Profile(V1.0)** - Enables use of the handset in an ad hoc network.
- [2,3]**SYNCH** = Synchronization Profile(V1.1) - Enables a mobile phone or PDA to exchange PIM (Personal Information Management) data. Types of the PIM data are, for example, phonebook and calendar items.
- **GATT = General Attribute Profile –**The Generic Attribute Profile (GATT) defines a service framework using the Attribute Protocol. This framework defines procedures and formats of services and their characteristics. The procedures defined include


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discovering, reading, writing, notifying and indicating characteristics, as well as configuring the broadcast of characteristics..

2.1.4.1.3 BT368 Low Energy Profiles shall be supported by Smartphone and Tablet devices<VZW-REQS-119-728>

- **DIS = Device Information Service** – This service is to expose manufacturer and/or vendor information about a device
- **ANS = Alert NotificationService** –The Alert Notification service exposes alert information in a device. This information includes ☐ Type of alert occ device
- **FMP = Find Me Profile** - The Find Me profile defines the behavior when a button is pressed on a device to cause an immediate alert on a peer device. This can be used to allow users to find devices that have been misplaced.
- **PXP = Proximity Profile** - The Proximity profile defines the behavior when a device moves away from a peer device so that the connection is dropped or the path loss increases above a preset level, causing an immediate alert. This alert can be used to notify the user that the devices have become separated

**Notes:**
1. Profile is in VZW requirements and identified as optional. Device Vendors shall implement this profile with approval from Verizon Wireless Device Product Development Marketing Group during feature lockdown.
2. The underlying OBEX protocol supports Digital Rights Management (DRM) and will not allow transfer of licensed content.
3. Object Exchange - This profile is part of OBEX.
4. VZW DRM restrictions apply. Refer to VZW DRM Requirements document. .

### 2.1.5 BLUETOOTH SECURITY <VZW-REQS-119-18>

#### 2.1.5.1 SECURITY MODES AND ENCRYPTION <VZW-REQS-119-19>

BT103 The Bluetooth security model supports three different security modes:

- **Security Mode 1 (non-secure)** - This mode does not require encryption or authentication on the connection (i.e., all connections are considered non-secure).
- **Security Mode 2 (service level enforced security)** - This mode allows Bluetooth devices to establish links without authentication or encryption, and then enforces security on a service-by-service basis. Each Bluetooth service can have different security settings, making Mode 2 the most flexible of the three security modes. For example, one service could use authentication but not encryption, a second service could use authentication and encryption, and a third service could use authentication or encryption.
- **Security Mode 3 (link level enforced security)** - This mode requires authentication and encryption for all connections. Unlike Security Mode 2, different services may not have different security settings.

The device shall support Security Mode 2 this includes support for encryption.

### 2.1.5.2 PAIRING (BONDING) AND AUTHENTICATION <VZW-REQS-119-20>

BT104 The device shall support Pairing and Authentication.
BT105 In order to meet the Bluetooth specifications and operate with various accessories, the device shall support a PIN of up to 16 alphanumeric characters.
BT106 Devices that do not support the VZW Mobile Station User Interface specifications shall use the term pairing.

#### 2.1.5.2.1 Auto Pair <VZW-REQS-119-21>

BT107 If the user is attempting to pair a device that is part of the handsfree/headset profile, the device will automatically attempt to pair using a "0000" PIN. If PIN is rejected, the device shall prompt the user for the correct PIN.

BT108 The device shall be automatically connected by default after a successful pairing with a Bluetooth headset. Refer to 5.1.12.5.4 for Car Kit pairing specifications.

#### 2.1.5.2.2 Out of Band Pairing Through NFC – Applicable to NFC Enabled Devices<VZW-REQS-119-729-Apr2012>

The Out of Band (OOB) association model is primarily designed for scenarios where an Out of Band mechanism is used to both discover the devices as well as to exchange or transfer cryptographic numbers used in the pairing process.
BT356 Out of Band Pairing mode specified in Bluetooth Specification Version 4.0 shall be supported for NFC enabled devices

BT357 When User initiates the touch of two NFC enabled devices, the discovery information(such as Bluetooth device address) as well as Bluetooth Crypto information shall be exchanged through out of band NFC channel.

BT358 The Out Of Band mechanism shall be implemented for read only (NFC static Handover) and read/write NFC devices (NFC negotiated Handover).

BT359 If one side of pairing is Read Only NFC device, one-way Out of Band authentication (NFC static Handover) shall be performed.

BT360 If both sides of NFC devices are Read/Write, a two way Out of Band authentication (NFC negotiated Handover), shall be performed.

BT361 Bluetooth stack shall provide the local Out Of Band Crypto information (defined in Bluetooth Core Specification Version 4.0) to the module who is handling the Bluetooth Out of Band pairing through NFC channel.

BT362 Bluetooth stack shall accept the Remote Out of Band Crypto information and perform the authentication.


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Devices that comply with Verizon Wireless Mobile Station User Interface requirements should refer to section 6 Settings and Tools of the Verizon Wireless Mobile Station User Interface requirements

#### 2.1.5.3 DISCOVERABILITY <VZW-REQS-119-22>

BT109 The device shall support discovery as per the Bluetooth specification.

BT110 Discoverability is only necessary during the pairing process. Once devices have discovered each other and recorded necessary details (i.e., Bluetooth address, device name, services available), discoverability mode shall be disabled within one minute.

#### 2.1.5.4 BLUETOOTH POWER ON/OFF <VZW-REQS-119-23>

BT111 The device shall have the ability to power the Bluetooth radio on and off.

#### 2.1.5.5 TYPICAL CONNECTION SCENARIO <VZW-REQS-119-24>

Now that the major elements of Bluetooth security have been described, it is helpful to tie them together with the steps for a typical connection scenario.

1. **Discoverability** – Both devices must be placed in discoverable mode in order to interrogate each other for Bluetooth address, device name, and services available.
2. **Pairing** – Pairing is only required the first time that the devices connect. It requires the use of matching PINs on both devices. The PIN is then used to generate a link key, which is stored in the device's Bluetooth database and used for future connections.
3. **Authentication** – After pairing is successfully completed, authentication is used for all subsequent connections in order to verify that the requesting device has permission to access the desired service.
4. **Encryption** – If authentication is completed successfully, then encryption is used over the link to send and receive data.

It is important to note that after two devices have been successfully paired, the generated link keys are stored on the devices and only steps 3 and 4 are required for subsequent connections.

#### 2.1.5.6 SECURITY RISKS <VZW-REQS-119-25-SEP2011>

There have been many articles in the news describing the security risks for Bluetooth enabled devices. Some of the major risks include:

- **BlueSnarf** – Obtaining data stored on the victim's handset without permission.
- **BlueSnarf++** – Obtaining file system access to the victim's handset without permission.
- **BackDoor** – Establish a trusted relationship with the handset, and then remove the hacker's identity from the targeted handset's Bluetooth registry. This allows the hacker access to all data on the handset, as well as services, without detection by the victim.
- **BlueBug** – Direct the target handset to call the hacker, and then eavesdrop on the surrounding conversations.
- **Blue Smack-** This attack will cause a handset to malfunction based off of a malformed L2CAP ping request.


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- **Denial of Service attack –** Denial of service attack against a Bluetooth enabled device caused by a malformed ping request(BlueSmack) or a malformed L2CAP length field.
- **OBEX Security –** Several configurations can be made to restrict access to OBEX over Bluetooth. On boot up, the default configuration OBEX should be set to disabled. In the case of Windows mobile, baseDir should be set to an empty folder and Authentication and Encryption should be set to true.
- **Worms/Viruses** – Cabir is an example of the first worm to be spread via Bluetooth (it only affects Symbian devices).
- **Open PSM Channels** - attempt to enumerate open PSM channels on the device
- **Oversized L2CAP packet length Protocol** - This attack will cause a handset to malfunction based off of a malformed L2CAP length field where the stated length is less than the actual length of the packet.

### 2.1.6 AUDIO ROUTING FROM APPLICATIONS TO BT CAR KITS <VZW-REQS-119-26>

BT112 All VZW devices which support routing the audio to external BT enabled car kits using the BT interface supported on the device, shall provide the support for routing the audio from the applications on the device to the BT enabled car kit. At a minimum the device shall support routing the audio from the following applications:

VVM

VZNavigator

Supporting the audio routing from other applications supported on the device shall be supported after validation and approval by VZW Device Marketing Product Development team during the Feature lockdown process.

## 2.2 DEPLOYMENT PLANS <VZW-REQS-119-27>

Bluetooth has already been deployed on commercially launched VZW devices.

There is no specific VZW network interaction required for Bluetooth functionality. Accordingly, there are no required deployment plans for VZW network elements and servers.

## 2.3 APPLICATIONS TO BE SUPPORTED – N/A <VZW-REQS-119-28>

## 2.4 DETAILED DESCRIPTION OF CAPABILITIES TO BE SUPPORTED <VZW-REQS-119-29>

Descriptions for the features, functions and capabilities that the device is expected to support are detailed in sections 4 –9 of this document.

## 2.5 USER EXPERIENCE <VZW-REQS-119-30-DEC2011>

It is important to note that it is possible to implement a specific use case in different ways using different profiles. For example, phonebook syncing can be accomplished in a variety of different


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ways such as using AT commands over a dial-up networking (DUN) profile, or alternatively by using the object exchange (OBEX) profile.

In terms of version numbers, the Bluetooth SIG has separated the core Bluetooth version from the individual profiles. This means that it may be necessary to specify both the overall Bluetooth version number as well as the individual version numbers for specific Bluetooth profiles.

The device vendor shall support the Bluetooth Core Specification specified in section 5.1.5.1 Core Specification <VZW-REQS-119-126>
The goal of version 1.2 of the Bluetooth Specification was not to introduce new functionality, but rather to improve on the functionality from the previous version. These improvements target two fundamental areas, quality and speed, and do so in ways that are transparent to the end user.

Bluetooth 2.0. provides the following improvements over version 1.2:

- 3 times faster transmission speed (up to 10 times in certain cases).
- Lower power consumption through a reduced duty cycle.
- Simplification of multi-link scenarios due to more available bandwidth.
- Further improved BER (bit error rate) performance.

Bluetooth 2.1. provides the following improvements over version 2.0:

- Erroneous Data Reporting
- Encryption Pause and Resume
- Extended Inquiry Response
- Link Supervision Timeout Changed Event
- Non-Automatically-Flushable Packet Boundary Flag
- Secure Simple Pairing
- Sniff Subrating
- Security Mode 4

Bluetooth 3.0. provides the following improvements over version 2.1:

- AMP Manager Protocol (A2MP)
- Enhancements to L2CAP including
- Enhanced Retransmission Mode and Streaming Mode
- Improvements to the L2CAP state machine for AMP channels
- Fixed channel support
- Enhancements to HCI for AMP
- Enhancements to Security for AMP
- 802.11 Protocol Adaptation Layer
- Enhanced Power Control
- Unicast Connectionless Data
- HCI Read Encryption Key Size command
- Generic Test Methodology for AMP


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- Enhanced USB and SDIO HCI Transports

Bluetooth 4.0. provides the following improvements over version 3:

- Bluetooth Low Energy including
- Low Energy Physical Layer
- Low Energy Link Layer
- Enhancements to HCI for Low Energy
- Low Energy Direct Test Mode
- AES Encryption
- Enhancements to L2CAP for Low Energy
- Enhancements to GAP for Low Energy
- Attribute Protocol (ATT)
- Generic Attribute Profile (GATT)
- Security Manager (SM)

### 2.5.1 USE CASES (UPDATED 8/14/2008) <VZW-REQS-119-31>

Note that section 2 describes the marketing requirements, which includes additional capabilities that will be added to the technical sections over time. Technical sections 3 through 10 contain the requirements that device vendors shall support. Technical implementation of use cases covered in Section 5.

#### 2.5.1.1 Headset <VZW-REQS-119-32>

##### 2.5.1.1.1 Mono Audio (Voice) Headset <VZW-REQS-119-33>

This is the primary use case for mono Audio headset to allow bi-directional voice between the device and the headset

##### 2.5.1.1.2 BT116 Audio (Voice) Path Switching - Routed from Device to Headset <VZW-REQS-119-34>

Audio Path Switching is done automatically when headsets are connected and disconnected. When the Bluetooth Hands-Free (HF) accessory is connected, the Audio Gateway (AG) device shall route both receive and send audio paths to the HF accessory. Volume settings on the AG device for any volume related options (Master Volume, Keypad Volume, etc.) shall apply when the AG device is connected to a HF accessory. If the AG initiates a disconnect, the AG handset shall route both receive and send audio paths to the internal handset audio path. For scenario where HF accessory roams out of Bluetooth range or HF accessory loses power refer to section 6.4.2.


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When a AG device is connected to a Bluetooth HF accessory, the AG device shall have option to toggle audio path from AG device to HF accessory or from HF accessory to AG device during active voice call. Refer to MSUI Part 4 for user interface details for devices that follow.

In addition, the Hands-free Profile allows "Privacy mode" where audio is temporarily re-routed from the Hands-Free (HF) accessory to the Audio Gateway (AG) device during a call while keeping the HFP connection in place. When the call ends, the audio is automatically returned to the HF device.

#### 2.5.1.1.3 BT117 Audio (Voice) Path Switching - Not routed to Headset - remains on device <VZW-REQS-119-35>

See section 2.5.1.1.2

#### 2.5.1.1.4 BT118 Volume Control (HF Accessory) <VZW-REQS-119-36>

Adjusting the internal HF accessory volume while on a call does not impact the AG device. Activating volume up/down for the AG device ringer via the Bluetooth interface while idle or when an incoming call arrives shall result in the same user experience as when volume up/down is pressed on the AG device. Refer to Mobile Station User Interface Requirements for details .

#### 2.5.1.1.5 BT119 Mute (HF Accessory) <VZW-REQS-119-37>

Activating/deactivating Mute on the HF accessory impacts the AG device in the same ways as activating/deactivating Mute on the AG device. Refer to Mobile Station User Interface Requirements for details. Mute shall NOT be activated/deactivated by the same physical mechanism on the HF accessory as Send or End.

#### 2.5.1.1.6 BT120 Send (HF Accessory) <VZW-REQS-119-38>

Activating the Send function on the HF accessory impacts the AG device in the same ways as activating Send on the AG device. See Mobile Station User Interface Requirements for details.
Send on the HF accessory shall support the following:
- If incoming call, Send answers call
- If idle on a device without Advanced Voice Recognition, two quick short presses on Send calls the most recently dialed call.
- If idle and contact number entered, or in menu and phone number or contact name/icon is highlighted, Send initiates voice call.
- If on voice call and call waiting, Send toggles between call waiting and active voice call.

#### 2.5.1.1.7 BT121 Send (AG) <VZW-REQS-119-39>

Activating the Send function on the AG device while connected to HF accessory shall provide the same functionality as activating the Send function on the AG device with no connection to the HF accessory. The only difference is that the audio path goes to the HF device when the AG and HF accessory are connected. See audio path switching requirements in 2.5.1.1.2.
- If incoming call, Send from AG answers call, audio to HF accessory


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- If idle on a device without Advanced Voice Recognition, two quick short presses on Send calls the most recently dialed call, audio to HF accessory.
- If idle and contact number entered, or in menu and phone number or contact name/icon is highlighted, Send from AG initiates voice call, audio to HF accessory.
- If on a voice call and a second voice call comes in, Send from AG toggles back and forth between first and second voice call, audio remains on HF accessory.
- If on voice call and a contact number entered, or in menu and phone number or contact name/icon is highlighted, Send from AG initiates a three-way call, audio remains on HF accessory.

#### 2.5.1.1.8 BT122 End (HF Accessory) <VZW-REQS-119-40>

Activating the End function on the HF accessory impacts the AG device in the same ways as activating End on the AG device. See Mobile Station User Interface Requirements for details. End on the HF accessory shall support the following:
- If on voice call, End shall end the call
- If incoming call, End shall silence the ringer and release the call for the Network to send to secondary call treatment
- If on voice call and call waiting or after initiating a three-way call, End ends both calls

#### 2.5.1.1.9 DTMF Tones and Other Notification Tones(HF Accessory) <VZW-REQS-119-41>

BT123 DTMF tones and other notification tones, shall also be routed to the HF accessory. See Audio Requirements for details. Note: the first DTMF tone may be delayed.

#### 2.5.1.1.10 Answer Incoming Call (HF Accessory) <VZW-REQS-119-42>

BT124 When an incoming call arrives on the device, the HF accessory provides ring tone, both when the device is set to ring or vibrate. [Contrary to Audio Reqs with tethered (corded) headset.] The HF accessory shall be able to answer an incoming call. See Send in section 2.5.1.1.6 for further details.

#### 2.5.1.1.11 Redial (HF Accessory) <VZW-REQS-119-43>

BT125 The accessory shall be able to redial the last number dialed. See Send in section 2.5.1.1.6 for further details.

#### 2.5.1.1.12 Advanced Voice Recognition (a.k.a. Voice Command) (HF Accessory) <VZW-REQS-119-44>

BT126 For devices with the Advanced Voice Recognition (AVR) feature a short press of Send will activate the feature and open up the audio path (mono) between the device and accessory for use with Advance Voice Recognition.

#### 2.5.1.1.13 BT127 Mono Audio from BREW Applications (including VOD and MOD) <VZW-REQS-119-45>

This use case is to allow BREW applications to open a path to send audio (mono) from the device to a headset.

#### 2.5.1.1.14 BT128 Mono Audio from non-BREW Applications <VZW-REQS-119-46>


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This use case is to allow applications to open a path to send audio (mono) from the device to a headset.

2.5.1.1.15 BT129 Pairing/Connecting during active call <VZW-REQS-119-47>

The AG shall be able to pair/connect to a unpaired/unconnected HF accessory during a voice call. If the device successfully pairs and connects audio path switching shall occur per 2.5.1.1.2 and voice call shall continue with audio path to HF accessory.

### 2.5.1.2 Hands-Free Kit <VZW-REQS-119-48>

Similar to headset, but applies to Bluetooth devices that are installed somewhere (e.g., in a car, in a conference room). These devices may have additional functionality not found in the headset (e.g., a separate screen, access to a phone book).

2.5.1.2.1 All required Headset Features as defined in section 2.5.1 <VZW-REQS-119-49>

2.5.1.2.2 Play mono audio (voice) sent from the device thru the Hands-free Kit Speakerphone <VZW-REQS-119-50>

2.5.1.2.3 Speech Recognition (Advance Voice Recognition) <VZW-REQS-119-51>

2.5.1.2.4 Send Caller ID from device to the Hands-free Kit <VZW-REQS-119-52>

2.5.1.2.5 Send Contact Details (e.g. Name) from device to Hands-free kit <VZW-REQS-119-53>

### 2.5.1.3 PHONEBOOK ACCESS PROFILE (PBAP) <VZW-REQS-119-54>

With the adoption of the Phonebook Access Profile (PBAP), hands-free car kit, and auto manufacturers are quickly moving to this standard for passing Contact information between devices and the hands-free kits. For our devices to be compatible, this profile must be incorporated. This profile only allows the transfer of data, not the modification of data. Therefore devices will need to act as Servers only. The PBAP requires the following use cases.

2.5.1.3.1 Hands-free kit accesses the list of phone book entries stored in the phone. <VZW-REQS-119-55>

This use case allows the hands-free kits to search through the devices phonebook list while it still resides on the device.

2.5.1.3.2 Hands-free kit downloads one entry, several entries or the complete phone book from the device. <VZW-REQS-119-56>

This allows the device to transfer a copy of the phonebook entries to the hands-free kits memory, while leaving the devices phonebook entries intact. This is a one-way transfer. There is no provision for passing information back to the device.

#### 2.5.1.3.3 Hands-free kit to access the various call histories from the device <VZW-REQS-119-57>

This allows the hands-free kit to access the incoming call, outgoing call, missed call, and combined call histories.

### 2.5.1.4 Dial up networking <VZW-REQS-119-58>

The devices shall support multiple NAI's. See section 5.1.18.6.1 for information about supported NAI's.

#### 2.5.1.4.1 1xRTT Only Devices <VZW-REQS-119-59>

1xRTT only devices shall not support dial-up networking via Bluetooth.

#### 2.5.1.4.2 EVDO Devices <VZW-REQS-119-60>

The device shall support modem functionality over 1xRTT or EVDO.

### 2.5.1.5 STEREO <VZW-REQS-119-61>

#### 2.5.1.5.1 Source stereo <VZW-REQS-119-62>

This allows the device to source stereo to a Bluetooth accessory that supports stereo.

#### 2.5.1.5.2 Remote Control Features. <VZW-REQS-119-63>

This use case allows the device/player to be controlled using a remote control. Required functions are Play/Stop/FF/Rew .

#### 2.5.1.5.3 BT138 Incoming call while on playback. <VZW-REQS-119-64>

While listening to stereo an incoming call should be handled as follows. The device shall send an in-band tone signaling an incoming call. If the user answers the call, the device shall pause its present function. If the accessory in use supports the HFP and HSP and is paired with the device, it shall suspend the stereo connection (ACL) and initiate an audio (SCO) channel to begin a voice call. If the device does not support HFP or HSP then it shall route the audio through the proper path. Upon completion of the call the device should resume its previous function.

#### 2.5.1.5.4 Video Playback <VZW-REQS-119-65>

BT370 If there is a video associated with the audio being sent through the stereo, then the device shall adjust the time for video processing so that the audio and video play in synch.


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### 2.5.1.6 Printing to a Bluetooth Capable printer <VZW-REQS-119-66>

This profile allows for the device to print files and images to a Bluetooth compatible printer. The following use cases shall be supported.

#### 2.5.1.6.1 Job Based Transfer of Data. <VZW-REQS-119-67>

This type of data transfer is used to send both information (job channel) from the Sender to the Printer and a Status channel to pass real time status and error messages. If supported on the device, the following file types shall be supported: vCard, vCal, JPEG, email, and txt messages.

### 2.5.1.7 DATA NETWORKING <VZW-REQS-119-68>

#### 2.5.1.7.1 Serial Port <VZW-REQS-119-69>

Using the serial port profile (SPP), two Bluetooth enabled devices establish a virtual serial port between themselves to enable the transfer of data objects or files. SPP shall support multiple concurrent serial connections to various devices, including multiple device of the same type (e.g., multiple bar code scanners). (The SPP will be exposed through a programming interface.)

#### 2.5.1.7.2 Personal Area Network <VZW-REQS-119-70>

Various Bluetooth enabled devices can connect with each other via a Personal Area Network (PAN). The Bluetooth PAN does not require any pre-existing infrastructure and enables the capability to set up a true ad-hoc network among various Bluetooth enabled devices.

### 2.5.1.8 DATA SYNCING <VZW-REQS-119-71>

Mass Market devices will only sync using VZW Mobile Office Kit or VZW Mobile Office Phone Kit See VZW Connectivity Requirements [33].
Microsoft Devices will use Active Sync
Palm will use Hot Sync
BlackBerry will use BlackBerry Synchronization

Please refer to section 2.5.1 spreadsheet for data synching use cases.

### 2.5.1.9 Data/File transfer <VZW-REQS-119-72>

The following use cases shall be supported for Mass Market, Converged Devices with BREW, Converged Devices and BlackBerry/RIM devices. For Modems and PCMCIA cards it does not apply.
A Bluetooth enabled device shall be able to transfer certain data and files to other Bluetooth enabled devices. These use cases shall deal with pushing of vCards and user generated content using Object Push Profile, File Transfer Profile, and Serial Port Profile. Allowed content


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transfer is restricted to those outlined in Verizon Wireless Digital Rights Management Requirements.

#### 2.5.1.10 Human Interface devices –<VZW-REQS-119-73>

A Bluetooth enabled mobile device shall allow for the use of Bluetooth Human Interface Devices such as keyboards, pointing devices, joystick, or mouse as an interface to the mobile device. This currently requires support of the Human Interface Device (HID) Profile.

#### 2.5.1.11 Health Devices - Determine At Lockdown <VZW-REQS-119-74>

A Bluetooth enabled Health Device such as a weight scale, blood pressure meter, pulse oximeter, EEG, ECG, thermometer, etc. which acts as a source may connect to a mobile phone used by a medical practitioner that acts as a sink (receptor) for information.

This connection may also happen in the other direction with the mobile phone requesting information or wanting to change settings on the source devices.

#### 2.5.1.12 BT355 Augmentative and Alternative Communication (AAC) device <VZW-REQS-119-725-Dec2011>

AAC device is a device for individuals with communication, speech, neurological, or severe physical disabilities or spinal cord injury. Non-Bluetooth Handfree Profile At commands shall be implemented in order to support AAC devices .

#### 2.5.1.13 USE CASES - AUDIO ROUTING FROM APPLICATIONS TO BT CAR KIT <VZW-REQS-119-75>

##### 2.5.1.13.1 Launching Application When The Device Is Paired with A BT Enabled Car kit <VZW-REQS-119-76>

***Initial Condition:*** User has a device with BT support and the device is paired with an external BT enabled car kit and the device has VVM application installed and provisioned on the device with few messages in the VVM inbox.

- User navigates via the device native interface and selects the VVM application.
- User launches the VVM application and selects a message from his Inbox.
- User plays the selected VVM message and listens to the audio via his BT enabled car kit.

##### 2.5.1.13.2 Pair A BT Enabled Car Kit When The Application Is Running On The Device <VZW-REQS-119-77>

***Initial Condition:*** User has a device with BT support and VVM application installed and provisioned on the device with few messages in the VVM inbox.

- User navigates via the device native interface and selects the VVM application.
- User launches the VVM application and selects a message from his Inbox.

- User plays the selected VVM message and listens to the audio via the device speaker.
- User turns his BT enabled car kit which was paired with the same device earlier.
- The device discovers BT enabled the car kit and pairs the device with the car kit.
- VVM message audio gets routed to the BT enabled car kit automatically.
- User continues to listen to the audio play of his VVM message via the BT enabled car kit.

#### 2.5.1.13.3 Disconnect A BT Enabled Car Kit When The Application Is Playing The Audio And Audio is Routed to the Car Kit. <VZW-REQS-119-78>

***Initial Condition:*** User has a device with BT support and the device is paired with an external BT enabled car kit and the device has VVM application installed and provisioned on the device with few messages in the VVM inbox.

- User navigates via the device native interface and selects the VVM application.
- User launches the VVM application and selects a message from his Inbox.
- User plays the selected VVM message and listens to the audio via his BT enabled car kit.
- User turns off his BT enabled car kit, the BT pairing between the device and the car kit gets disconnected.
- User continues listening to the audio play of his VVM message via the device speaker.

#### 2.5.1.13.4 Application Audio is Routed to A BT Enabled Car Kit And The Device Receives A MT Voice Call. <VZW-REQS-119-79>

***Initial Condition:*** User has a device with BT support and the device is paired with an external BT enabled car kit and the device has VVM application installed and provisioned on the device with few messages in the VVM inbox.

- User navigates via the device native interface and selects the VVM application.
- User launches the VVM application and selects a message from his Inbox.
- User plays the selected VVM message and listens to the audio via his BT enabled car kit.
- User receives an MT voice call and user accepts the call.
- The VVM message audio gets paused and the voice call audio gets routed to the BT enabled car kit.

NOTE: All the above uses cases are applicable for all the VZNav application also.

### 2.5.2 USER USAGE STATISTICAL ANALYSIS – <VZW-REQS-119-80>

The Bluetooth usage profile is the difference between the battery usage numbers provided for the device and the additional usage for the amount of time Bluetooth is in use. The usage profiles are defined in the Verizon Wireless Feature Definitions Requirements document [29] under the Battery Usage section.

The Bluetooth usage calculation is based on the device type usage profile found in other VZW documents and the following assumptions:

| | % Bluetooth usage |
|---|---|
| Occasional Bluetooth Use | 20% use across device profile |
| Moderate Bluetooth Use | 50% use across device profile |
| Heavy Bluetooth Use | 80% use across device profile |

#### 2.5.3 USER PERFORMANCE EXPECTATIONS <VZW-REQS-119-81>

##### 2.5.3.1 CONCURRENT CONNECTIONS <VZW-REQS-119-82>

BT146 The number of simultaneous Bluetooth connections supported shall be two data connections plus one audio connection.

## 2.6 ANCILLARY <VZW-REQS-119-83>

#### 2.6.1 ACCESSORIES <VZW-REQS-119-84>

Bluetooth capable devices shall support a Bluetooth headset, a Bluetooth car kit, and Bluetooth dial up networking, where applicable.

##### 2.6.1.1 ACCESSORY UI <VZW-REQS-119-85>

The functions of Send, End, Mute, and Volume on the Bluetooth accessory may be activated by a means other than pressing a button or using a jog wheel. Other methods include, but are not limited to, using a hinge to open or close a piece of the accessory. See VZW Accessories Team for approval.

#### 2.6.2 USER MANUAL <VZW-REQS-119-86>

##### 2.6.2.1 QUALIFIED DESIGN ID (QD ID) <VZW-REQS-119-87>

BT148 Vendor shall include the QDID issued by the Bluetooth SIG in the user manual.

##### 2.6.2.2 LIST PROFILES SUPPORTED <VZW-REQS-119-88>

BT149 Using easy to understand language, the vendor shall list all of the Bluetooth profiles that the device supports in the user manual, including any additional commands, e.g. supports GSM commands for car kits.

##### 2.6.2.3 OBEX DISCLOSURE <VZW-REQS-119-89>

BT150 For devices that do not support any of the OBEX profiles, the vendor shall print the following disclosure: "Phone does not support Bluetooth OBEX profiles."

This disclosure shall be placed in the user manual, quick reference guide, and on the outside of the box.

#### 2.6.2.4 INSTRUCTIONS FOR USING BLUETOOTH <VZW-REQS-119-90>

BT151 The vendor shall provide instructions in the user manual to cover the following:

- Bluetooth icon
- Turning the Bluetooth radio on/off
- Searching for and pairing with a new device, including the passkey
- Connecting to a recognized device
- Disconnecting from an active connection
- Switching between the paired device and the handset during a call
- Removing a device from the paired list
- Renaming the paired device
- Reviewing information about the paired device
- Changing my device's Bluetooth name
- Making my device visible to others (discovery mode)
- Phonebook/Calendar Sync with Handsfree Car Kits
- Using the device as a modem via the Bluetooth connection
- Networking the device to other Bluetooth data devices
- Phonebook, Calendar, Email synching to Bluetooth enabled computers
- Transferring of vCards, text, audio, video, pictures, other files from/to other Bluetooth enabled handsets
- Transferring of audio, video, pictures, other files from/to Bluetooth enabled computers
- Printing to Bluetooth enabled printers
- Using Bluetooth Keyboards and other Bluetooth (HID) input devices

#### 2.6.2.5 SECURITY INSTRUCTIONS <VZW-REQS-119-91>

##### 2.6.2.5.1 Accessories/Peripherals must have Passkey <VZW-REQS-119-92>

BT152 The user manual shall inform the user that Bluetooth accessories/peripherals MUST have a passkey (PIN) to work with the mobile device.

##### 2.6.2.5.2 Pairing in Secure Location <VZW-REQS-119-93>

BT153 For security reasons, the pairing of devices shall be mandatory for the profiles considered in this specification. Pairing is known, as per the "Bluetooth Security White Paper" [13] to be the weakest point in the Bluetooth security and as such it is recommended that the user receive a warning in the user manual that the process should be performed at a secure location.

##### 2.6.2.5.3 Passkey (PIN) <VZW-REQS-119-94>

BT154 For pairing with devices that do not have pre-defined PINs, the user manual shall include a recommendation that at least 8 characters be used for the passkey (PIN).

### 2.6.3 PACKAGING <VZW-REQS-119-95>

BT155 All product packaging shall use Bluetooth trademarks consistent with the Bluetooth Trademark License Agreement and the *Bluetooth* Brand Book.

# 3 User Interface <VZW-REQS-119-96>

Mass Market devices refer to the "Bluetooth" specifications defined in the Settings & Tools of the VZW Mobile Station User Interface Requirements (Part 6).

Non Mass Market device vendors will design their own User Interface and will review it with Device Marketing Product Development team.

## 3.1 BLUETOOTH ICONS <VZW-REQS-119-97>

BT156 Icons shall be used to assist the user in identifying devices as part of a search and when viewing the paired list. The icon will be displayed along side of the device name.

Minimally the following icons shall represent the device classes listed below:

- A computer icon shall be displayed when the major device class is computer and the minor device class is not a handheld PC/PDA
- A handheld PDA icon shall be displayed when the major device class is computer and the minor device class is a handheld PC/PDA
- A cellular phone icon shall be displayed when the major device class is a phone, independent of minor class
- A headset icon shall be displayed when major device class is audio/video, independent of minor class

Icons for major and minor device classes not covered above shall be determined by the device manufacturer and approved by VZW at compliance lockdown.

If a device class is not represented by one of the above icons, a generic Bluetooth device icon shall be displayed.

VZW specific icons for mass-market devices are detailed in the VZW UI Style Guide document.

## 3.2 USER INTERFACE REQUIREMENTS <VZW-REQS-119-98>

### 3.2.1 BLUETOOTH RADIO SETTING <VZW-REQS-119-99>

BT157 The device shall have a Bluetooth radio on/off setting, where the default value is off. See sections 2.1.5.4, 7.1 and 9 for more details.

### 3.2.2 DEVICE NAME <VZW-REQS-119-100>

BT158 The user shall be able to configure the device name via the user interface. See section 5.1.5.9 for default name and additional details.

### 3.2.3 DISCOVERY <VZW-REQS-119-101>

BT159 The user shall have the ability to initiate the discovery process, and select from a list of available devices with which to pair. See sections 2.1.5.3, 5.1.5.3 and 5.1.5.4 for more details.

### 3.2.4 PAIRING <VZW-REQS-119-102>

BT160 The device user interface shall use the term pairing. See sections 2.1.5.2 for more details.

The user shall have the ability to enter a passkey/PIN. See sections 2.1.5.2 and 5.1.5.7 for more details.

The device will provide the user with a trusted pair list which includes all devices it has successfully paired with and provides the ability for the user to delete any device from the trusted pair list. See sections 2.1.5.2, 2.1.5.5 and 5.1.5.6 for more details.

Pairing is known, as per the "Bluetooth Security White Paper" [13] to be the weakest point in the Bluetooth security. It is recommended that the UI warn the user if the remote device attempts to re-pair to prevent attack by the mechanism described in "Cracking the Bluetooth PIN" by Shaked and Wool [12].

### 3.2.5 CONNECTION SETTING <VZW-REQS-119-103>

BT161 The device shall also provide the user with the ability to set each device on the trusted pair list with a connection setting. The user will be able to choose, for each device on the list, to always connect when trusted device is detected, or always ask via the user interface before connecting. In either case, when the trusted device is connected, a confirmation screen is provided.

### 3.2.6 INFORMATION <VZW-REQS-119-104>

BT162 The user shall be able to view the following information on each Bluetooth device on the trusted pair list. The information provided shall include at a minimum: device name, type of device (headset, PC, etc.), connection status (connected, not connected), connection setting (always ask, always connect), and Bluetooth address.

## 3.3 AUDIO ROUTING FROM APPLICATIONS TO BT CAR KITS <VZW-REQS-119-105>

BT163 When the device routes the audio from the applications to the BT enabled car Kits which do not support A2DP BT profile, the device shall send the information to the BT enabled car kit like a voice call. The BT enabled car kit will have "restricted" or "Private" Caller ID displayed.


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# 4 Hardware Specifications <VZW-REQS-119-106>

## 4.1 GENERAL <VZW-REQS-119-107-APR2012>

BT164 The Bluetooth radio interface for Feature phones shall be compliant to the Bluetooth Core Specifications version 2.1+EDR or Core Specifications version 4.0 if device chipset can support.

BT353 The Bluetooth radio interface for all Smart phone and Tablet devices shall be compliant to the Bluetooth Core Specifications version 4.0 and higher including BT Low Energy at chipset level. Bluetooth High Speed is optional.

BT369 The Bluetooth radio interface for all Smart phone and Tablet devices shall support simultaneous Basic Rate and Low Energy connections.

Devices that support 1xEV-DO/LTE and Bluetooth Dial-up Networking profile shall support Bluetooth Core Specification v2.1+EDR

BT165 An OEM can always choose to support a later version of the Bluetooth Core Specifications provided that they are compliant with all Verizon Wireless Bluetooth requirements. If there are any unique items with later Bluetooth Core Specifications then the OEM is required is to document all changes/deltas from requirements and submit to Verizon Wireless for review.

BT166 The device shall be certified by the Bluetooth SIG for all profiles that are supported. For information relating to qualification see the Bluetooth Qualification Program Website at http://www.bluetooth.org/qualification/qual_approval.php


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# 5 Software Specifications <VZW-REQS-119-108>

## 5.1 DEVICE BASED <VZW-REQS-119-109>

### 5.1.1 BLUETOOTH OVERVIEW (INFORMATIVE) <VZW-REQS-119-110-APR2012>

This section specifies the Bluetooth software configuration required to implement the stated functionality. The objective of this section is to

- Identify and reference the required elements of the Bluetooth specifications
- Specify the use of any optional elements of the specification, where appropriate

The following diagram shows how the Bluetooth profiles that the device will support are structured including the dependencies between the profiles.

For the purposes of this specification document the profiles are divided into two sets;

- *Application* profiles (e.g. Headset, Handsfree, Dial-Up and Phonebook) that provided the top-level functionality.
- *Support* Profiles (e.g. General Attribute Profile, Attribute Profile, Object Exchange, Serial Port, Generic Access and Service Discoverability) that provide the connection features and transport.

The lower protocol layers (RFCOMM, LMP, L2CAP, etc.) are implicit and not shown.

In this specification document, the *application* profiles are defined in detail. Within the definition, those aspects of the *support* profiles that are specific to the *application* profile are also defined.


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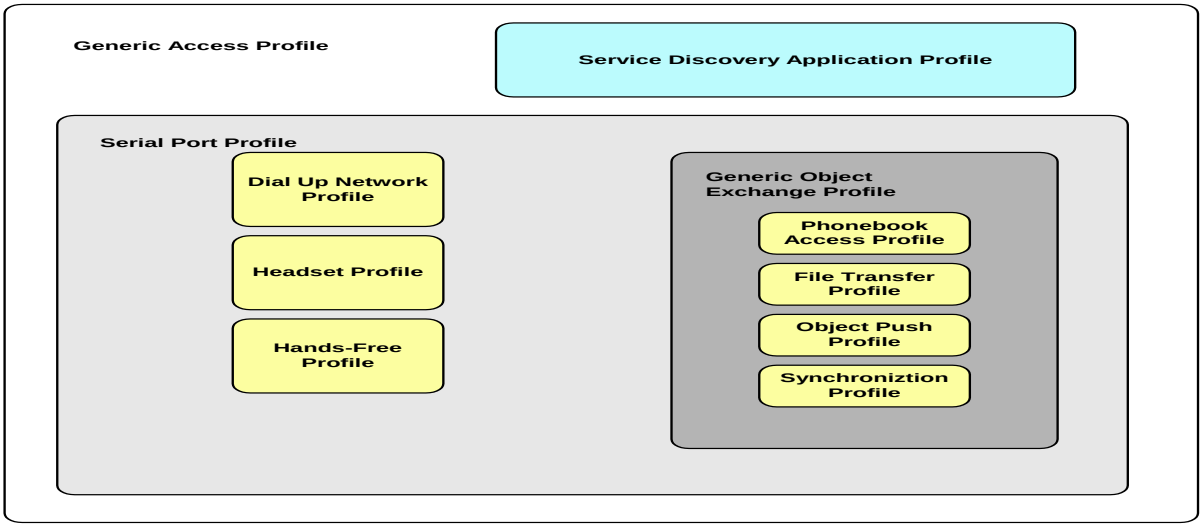



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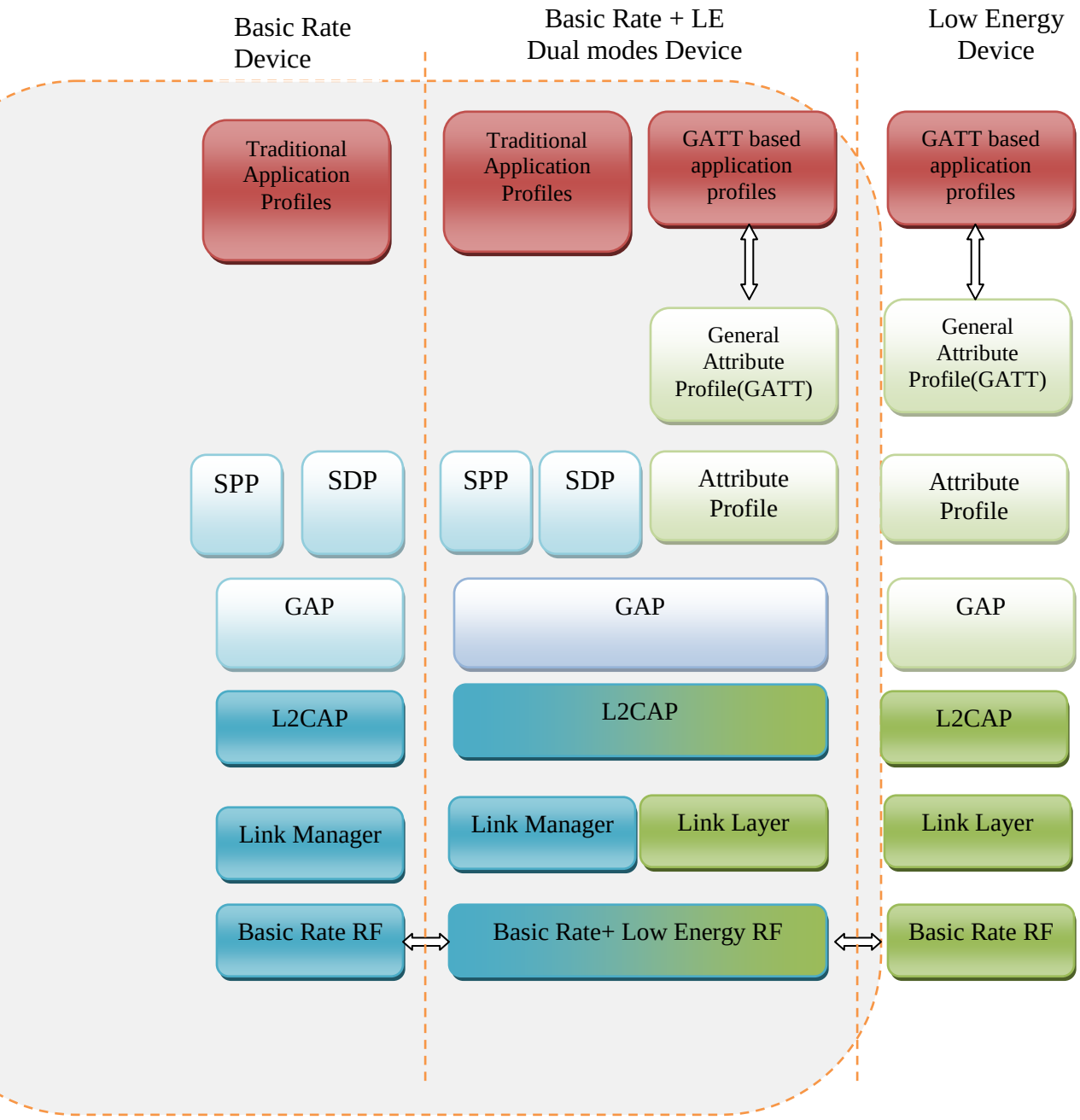



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### 5.1.2 USE CASE SUPPORT <VZW-REQS-119-111>

#### 5.1.2.1 HEADSET (MONO) USE CASE SUPPORT <VZW-REQS-119-112>

To support the headset use cases the following Bluetooth profiles shall be supported:

1. Headset Profile (HSP) (Refer to sections 5.1.6-5.1.11 for profile specifics)
    - Serial Port Profile (SPP)
    - Generic Access Profile (GAP)
    - Service Discovery Protocol (SDP)

2. Handsfree Profile (HFP) (Refer to sections 5.1.12-5.1.17 for profile specifics)
    - Serial Port Profile (SPP)
    - Generic Access Profile (GAP)
    - Service Discovery Protocol (SDP)

#### 5.1.2.2 HEADSET (STEREO) USE CASE SUPPORT <VZW-REQS-119-113>

To support the stereo headset use cases the following Bluetooth profiles shall be supported:

All profiles in 5.1.2 and the following must be supported:

1. Advanced Audio Distribution Profile (A2DP)
    - Generic Audio/Visual Distribution Profile (GAVDP)
    - Generic Access Profile (GAP)
    - Audio/Video Distribution Transport Protocol (AVDTP)

2. Audio/Video Remote Control Profile (AVRCP)
    - Audio/Video Control Transport Protocol (AVCTP)

Refer to 5.1.30-5.1.35 for Bluetooth Profile details pertaining to Stereo.

#### 5.1.2.3 CAR HANDS FREE KIT USE CASE SUPPORT <VZW-REQS-119-114>

To support the car hands-free kit use cases the following Bluetooth profiles shall be supported:

1. Handsfree Profile (HFP) (Refer to sections 5.1.12-5.1.17 for profile specifics)
    - Serial Port Profile (SPP)
    - Generic Access Profile (GAP)
    - Service Discovery Protocol (SDP)

2. Phone Book Access Profile (PBAP) (Refer to sections 5.1.24-5.1.29 for profile specifics)
    - Generic Object Exchange Profile (GOEP)

- Serial Port Profile (SPP)
- Generic Access Profile (GAP)

3. Non Hands-Free Profile AT Commands (Refer to section 5.1.12.5.1)

4. Message Access Profile (MAP) (Refer to sections 5.1.61 for profile specifics)
   - Generic Object Exchange Profile (GOEP)
   - Serial Port Profile (SPP)
   - Generic Access Profile (GAP)

#### 5.1.2.4 DIAL UP NETWORKING USE CASE SUPPORT <VZW-REQS-119-115>

To support the Dial Up Networking use cases the following Bluetooth profiles shall be supported:

1. Dial-Up Networking Profile (DUN) (Refer to sections 5.1.18-5.1.23 for profile specifics)
   - Serial Port Profile (SPP)
   - Generic Access Profile (GAP)
   - Service Discovery Protocol (SDP)

#### 5.1.2.5 DATA NETWORKING USE CASE SUPPORT <VZW-REQS-119-116>

To support the Data Networking use cases the following Bluetooth profiles shall be supported:

1. Serial Port Profile (SPP)

2. Personal Area Networking Profile (PANP) (Refer to 5.1.58 for profile specifics)
   - Generic Access Profile (GAP)

#### 5.1.2.6 DATA SYNCING USE CASE SUPPORT <VZW-REQS-119-117>

To support the Data Networking use cases the following Bluetooth profiles shall be supported:

1. Object Push Profile (OPP) (Refer to section 5.1.5.1.1 for profile specifics)
   - Generic Object Exchange Profile (GOEP)
   - Serial Port Profile (SPP)
   - Generic Access Profile (GAP)

In addition, Smartphone and Tablet Devices shall support

2. Synchronization Profile (SYNCH) (Refer to section 5.1.59 for profile specifics)

#### 5.1.2.7 DATA/FILE TRANSFER USE CASE SUPPORT <VZW-REQS-119-118>

To support the Data/File Transfer use cases the following Bluetooth profiles shall be supported:


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1. Object Push Profile (OPP) (Refer to section 5.1.5.1.1 for profile specifics)
   - Generic Object Exchange Profile (GOEP)
   - Serial Port Profile (SPP)
   - Generic Access Profile (GAP)

Determine at Lockdown

2. File Transfer Profile (FTP) Refer to section 5.1.5.1.2 for profile specifics)
   - Generic Object Exchange Profile (GOEP)
   - Serial Port Profile (SPP)
   - Generic Access Profile (GAP)

#### 5.1.2.8 AUDIO/VIDEO DISTRIBUTION USE CASE SUPPORT <VZW-REQS-119-119>

To support the Audio/Video distribution use cases the following Bluetooth profiles shall be supported:

1. Advanced Audio Distribution Profile (A2DP) (Refer to section 5.1.30-5.1.35)
   - Generic Audio/Visual Distribution Profile (GAVDP)
   - Generic Access Profile (GAP)
   - Audio/Video Distribution Transport Protocol (AVDTP)

2. Audio/Video Remote Control Profile (AVRCP) (Refer to section 5.1.30-5.1.35)
   - Audio/Video Control Transport Protocol (AVCTP)

3. Video Distribution Profile (VDP) (Refer to section 5.1.46-5.1.51) – Determine At Lockdown

#### 5.1.2.9 HUMAN INTERFACE DEVICES USE CASE SUPPORT <VZW-REQS-119-120>

To support the Human Interfaces Devices use case the following Bluetooth profiles shall be supported:

1. Human Interface Device (HID) Profile (Refer to section 5.1.60 for profile specifics)
   - Generic Access Profile (GAP)

#### 5.1.2.10 PRINTING USE CASE SUPPORT <VZW-REQS-119-121>

To support the Printing use cases the following Bluetooth profiles shall be supported:

1. Basic Printing Profile (BPP) (Refer to section 5.1.36-5.1.39 for profile specifics)
   - Generic Object Exchange Profile (GOEP)
   - Serial Port Profile (SPP)
   - Generic Access Profile (GAP)

2. Basic Imaging Profile (BIP) (Refer to section 5.1.40– 5.1.43)

- Generic Object Exchange Profile (GOEP)

- Serial Port Profile (SPP)
- Generic Access Profile (GAP)

#### 5.1.2.11 HEALTH DEVICE USE CASE SUPPORT – DETERMINE AT LOCKDOWN <VZW-REQS-119-122>

To support theHealth Device use cases the following Bluetooth profiles shall be supported:

- Health Device Profile (HDP) (Refer to section 5.1.52-5.1.57 for profile specifics)

#### 5.1.2.12 LOW ENERGY USE CASE SUPPORT – <VZW-REQS-119-730-APR2012>

To support the Bluetooth all the Low Energy use cases the following Bluetooth profiles shall be supported:

- General Attribute Profile(GATT)
- Alert NotificationService(ANS)
- Find Me Profile(FMP)
- Proximity Profile(PXP)

### 5.1.3 BLUETOOTH FUNCTIONALITY CHART (UPDATED 09/08) <VZW-REQS-119-123>

For device vendors that support Bluetooth, the attached chart must be completed as part of the VZW Device Evaluation and Approval Process. Refer to VZW Device Compliance Test Entrance Criteria document for specific submission details.

### 5.1.4 SPECIAL REQUIREMENT FOR ALL DEVICE TYPES(FEATURE PHONE, SMARTPHONE, TABLET) <VZW-REQS-119-124>

The Serial Port Profile shall be shown as a supported profile during Service Discovery.

### 5.1.5 SPECIFICATIONS COMMON TO ALL DEVICE TYPES <VZW-REQS-119-125>

#### 5.1.5.1 CORE SPECIFICATION <VZW-REQS-119-126>

5.1.5.1.1 Core Specifications For Smartphone and Tablet Device Types <VZW-REQS-119-726-Apr2012>

BT354 All Smartphone and Tablet Bluetooth functionality shall be compliant with the Bluetooth Core Specification V4.0, including BT Low Energy and shall be certified by Bluetooth SIG. Bluetooth High Speed feature is optional.

5.1.5.1.2 Core Specifications for Feature Phone Device Types <VZW-REQS-119-727-Dec2011>

BT178 All Feature Phone Bluetooth functionality shall be compliant with the Bluetooth Core Specification V2.1+EDR or Core Specification 4.0 if the chipset supports it . For devices that

support 1xEV-DO and the Bluetooth Dial-up Networking Profile, the device shall be compliant with Bluetooth Core Specification 2.1+EDR

BT179 An OEM can always choose to support a later version of the Bluetooth Core Specifications provided that they are compliant with all Verizon Wireless Bluetooth requirements. If there are any unique items with later Bluetooth Core Specifications then the OEM is required is to document all changes/deltas from requirements and submit to Verizon Wireless for review.

BT180 The device shall be certified by the Bluetooth SIG for compliance with the Bluetooth Core Specification.

#### 5.1.5.1.3 Object Push Profile. <VZW-REQS-119-127>

##### *5.1.5.1.3.1 General <VZW-REQS-119-128>*

BT181 The device shall be compliant with all the mandatory functions for OPP v1.1 [4], this includes the ability to act as either a Push Server or a Push Client.

The device shall have certification from the Bluetooth SIG for compliance with the OPP v1.1 [4]

##### *5.1.5.1.3.2 Profile Dependancies <VZW-REQS-119-129>*

The Object Push Profile v1.1 is dependent on the following:
Generic Object Exchange Profile

##### *5.1.5.1.3.3 Configurations and Roles <VZW-REQS-119-130>*

BT182 The device must enter a limited discoverability mode as described in the General Access Profile [10], it must also set the object transfer bit in the assigned numbers section of the BT core specification.
Push Server - This is the device that is acted on by the object exchange, either by having files pulled from it or pushed to it.
Push Client - This is the device that pushes and pulls objects to/from the Push Server by sending requests to the push server device.

The device shall support the role of Push Server and Push Client.

##### *5.1.5.1.3.4 Functional Descriptions <VZW-REQS-119-131>*

BT183 Object Push
This is when the Push Client wishes to push one or more objects to a Push Server. Support for the following object formats is mandatory:

Formats to support:
vCard 2.1 and 3.0
vCalendar 1.0 and 2.0
Non- Protected Pictures and Videos

When connecting with other devices it shall use the highest version of vCard that both devices support. Support for other formats is optional although the Push Server must be able to respond with an error code on a put request even if it doesn't support the requested format. Protected content shall not be sent via Bluetooth. Refer to VZW Digital Rights Management Device Requirements.

Formats to support:
vCard 2.1 and 3.0
vCalendar 1.0 and 2.0
Non- Protected Pictures and Videos

Business Card Pull
Usage of a Push Client to pull a (vCard) business card from a Push Server.

Business Card Exchange
Usage of a Push Client to exchange (vCards) business cards with a Push Server.

*5.1.5.1.3.5 Functional requirements <VZW-REQS-119-132>*

The following functional elements are covered under OPP v1.1

**5.1.5.1.3.5.1 Object Push – Mandatory <VZW-REQS-119-133>**

BT184 When device is acting as a Push server, the device shall be able to receive one or multiple objects within a single OBEX connection. Device shall acknowledge that Push client is trying to send objects. If multiple objects are being received(for example, multiple vcards, pictures, videos) only the first object needs to be acknowledged in the OBEX connection, all other objects sent shall be received without acknowledgement. If a received objects Name header has any of the following characters, "**:**", "/", "\", then the device shall strip out or change the characters from the Name header prior to saving the object. The Name header which does not allow for these characters should not be confused with the Name field in the actual vCard which does allow for these characters. The device shall continue to receive all objects after encountering a malformed Name header.

BT185 When device is acting as a Push client, the device shall use a single push command to push one or multiple objects during a single OBEX connection. If multiple objects are selected to be pushed, (ex. if all Contacts are selected), Push Client will send all objects with a single Push command within the same OBEX connection. Connection will not be torn down unless all objects have been sent. If object format is not present or supported, appropriate error response code shall be sent. The device shall not form a Name header with any of the following characters "**:**", "/", "\" when sending objects. The Name header which does not allow for these characters should not be confused with the Name field in the actual vCard which does allow for these characters.


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#### 5.1.5.1.3.5.2 Business Card Pull –Mandatory response <VZW-REQS-119-134>

BT186 Devices that support the business card pull services must store the owner's business card in the OBEX Default Get Object. A Push Client can optionally supply the functionality needed to pull a business card from a Push Server. However, the Push Server MUST be able to respond to pull requests with an error message. This response is mandatory. If there is no Default Get Object, the Push Server must respond with the error response code for "NOT FOUND" " in the IrOBEX document [24]. The Push Client must be able to understand this error response code.

#### 5.1.5.1.3.5.3 Business Card Exchange- Mandatory response <VZW-REQS-119-135>

BT187 Devices that support the business card exchange service must store the owner's business card in the OBEX Default Get Object. A Push Client can optionally supply the functionality needed to exchange business cards with a Push Server. However, the Push Server MUST be able to respond to pull requests with an error message, This response is mandatory. If there is no Default Get Object, the Push Server must respond with the error response code for "NOT FOUND" " in the IrOBEX document [24]. The Push Client must be able to understand this error response code.

#### 5.1.5.1.4 File Transfer Profile <VZW-REQS-119-136>

The Bluetooth Core Specification includes the features defined in File Transfer Profile v1.1

### 5.1.5.2 SECURITY ASPECTS <VZW-REQS-119-137>

BT188 The table below shows a collation of the security aspects that shall be supported within the defined profiles

| Mode | Support | Comments |
|---|---|---|
| Authentication | Shall be supported | |
| Security Mode 1 | Shall not be supported | |
| Security Mode 2 | Shall be supported | |
| Security Mode 3 | Note 1 | |
| Encryption | Shall be supported | Encryption is required when the remote device supports encryption. Encryption will not be used when the remote device does not support it. |

Note 1: The device shall support Security Mode 2. If device vendors are looking to support Security Mode 3 contact VZW Device Marketing Product Development Team during feature lock down. VZW would like to understand the implementation and user interface plans. Where the remote device operates more than one simultaneous profile (e.g. HFP and PBAP in a car) only a single security procedure shall be required.

Unit keys shall not be used and combination keys shall be used.


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#### 5.1.5.3 DISCOVERABILITY MODES <VZW-REQS-119-138>

BT189 The table below shows the collation of the discoverability modes that shall be supported within the defined profiles.

| Mode | Support | Comments |
|---|---|---|
| Non-discoverable mode | Shall be supported | Activated via the UI |
| Limited discoverable mode | Shall be supported | This mode of discoverability which shall be used where discoverability is required and general discoverability is not mandated |
| Discoverable mode | Shall not be supported. See Note 2 | |

Note 2: A vendor who will be using the PBAP shall contact the VZW Device Marketing Product Development Team during device lock down.

When the device is in limited discovery mode, parallel scanning shall be used and the device shall remain discoverable for 60 seconds.

Discovery modes shall use the Interlaced Inquiry scan and the device shall enter the INQUIRY_SCAN state every 500ms (+/- 100ms)

#### 5.1.5.4 SERVICE DISCOVERY PROTOCOL <VZW-REQS-119-139>

BT190 The service discovery allows devices to query other devices in order to determine what services are available. If the device is being queried for supported profiles, it shall answer with only the profiles that are supported and shall not reply with any profile that it does not support. If the device is being queried for a specific profile that is supported, it shall reply and show itself as being able to connect. If the device is being queried for a specific profile that it does not support it shall reply indicating that it does not support the profile.

#### 5.1.5.5 CONNECTABILITY MODES <VZW-REQS-119-140>

BT191 The table below shows collation of the connectability modes that shall be supported within the defined profiles

| Mode | Support |
|---|---|
| Non-connectable mode | Shall not be supported |
| Connectable mode | Shall be supported |

The R1 Page Scan scenario shall be used


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#### 5.1.5.6 PAIRING MODES (BONDING) <VZW-REQS-119-141>

BT192 The table below shows the collation of the pairing modes for the GAP that shall be supported by the profiles.

| Mode | Support |
|---|---|
| Non-pairable mode | Shall not be supported |
| Pairable mode | Shall be supported |

After the devices have been successfully paired, the generated link keys are stored in the devices. So in future interactions only authentication and encryption (if supported by the accessory) will need to be performed.

##### 5.1.5.6.1 Pairing Security User Information <VZW-REQS-119-142>

BT193 Pairing is known, as per the "Bluetooth Security White Paper" [13] to be the weakest point in the Bluetooth security. It is recommended that the UI warn the user if the remote device attempts to re-pair to prevent attack by the mechanism described in "Cracking the Bluetooth PIN" by Shaked and Wool [12]. See VZW Mobile Station User Interface Requirements for details.

#### 5.1.5.7 PERSONAL ID <VZW-REQS-119-143>

#### 5.1.5.8 IDENTIFICATION NUMBER <VZW-REQS-119-144>

BT194 The user shall enter the PIN via the UI. Provision for alphanumeric PINs from 1 to 16 characters shall be supported.
The UI for the PIN shall use the term "passkey"

#### 5.1.5.9 DEVICE NAME <VZW-REQS-119-145>

BT195 A default Device name shall be used to identify the Bluetooth device where the default text shall relate to the Device model (e.g. VZW Smartphone BFG3000). The device name shall be configurable by the user via the UI. The default name shall be a maximum of 40 characters and approved by the VZW Device Marketing Product Development team during product compliance lockdown.

#### 5.1.5.10 DATA/FILE TRANSFERS <VZW-REQS-119-146>

The device shall conform to the VZW Device Requirements Digital Rights Management (DRM) document [39]

### 5.1.6 PROFILE SPECIFICATION – HEADSET <VZW-REQS-119-147>

#### 5.1.6.1 GENERAL <VZW-REQS-119-148>

The headset profile shall be compliant with Bluetooth Specification v1.1 [6] and shall support the role of Audio Gateway.

For the following functions the device shall support the VZW Audio Quality and Performance Requirements document [40] sections that cover Bluetooth

- Auto Answer
- DTMF and other notification tones
- Audio notification of incoming calls
- Remote Audio Volume Control
- Independent Volume Control Settings

#### 5.1.6.2 FUNCTIONAL OPTIONS <VZW-REQS-119-149>

The following functional elements shall be supported.

##### 5.1.6.2.1 Incoming Audio Connection <VZW-REQS-119-150>

This is covered in sections 4.2 and 4.4 of [6]

##### 5.1.6.2.2 Outgoing Audio Connection <VZW-REQS-119-151>

This is covered in sections 4.3 and 4.4 of [6]

##### 5.1.6.2.3 Audio Connection Transfer <VZW-REQS-119-152>

The device shall support switching of the audio from the device to the headset and from the headset to the device. This is covered in section 4.5 of [6]

When audio is routed through the AG device, all device functions shall operate, e.g. speakerphone, corded headset, etc.

##### 5.1.6.2.4 Remote Audio Volume Control <VZW-REQS-119-153>

This is covered in section 4.6 of [6]

#### 5.1.6.3 AT COMMAND/RESPONSE SET <VZW-REQS-119-154>

BT199 The following external (Bluetooth <> Host) AT commands and responses contained in the headset profile document [6] shall be supported

| AT Command | Description |
|---|---|
| ERROR | Standard error indication |
| OK | Standard acknowledgement to the execution of a command |
| RING | Standard incoming call notification |

BT200 The following internal (Bluetooth <> Bluetooth) AT commands contained in the headset profile document [6] shall be supported.

| AT Command | Description |
|---|---|
| | |
| AT+VGS | Command issued by the HF to report the speaker gain setting |
| +VGM | Unsolicited result code issued by the AG to set the microphone gain of the HF |
| +VGS | Unsolicited result code issued by the AG to set the speaker gain of the HF |
| AT+CKPD=200 | Command issued by the HS to indicate that the button on the headset has been pressed. |

#### 5.1.6.4 SUPPORTING PROFILES <VZW-REQS-119-155>

##### 5.1.6.4.1 Generic Access Profile <VZW-REQS-119-156>

*5.1.6.4.1.1 Modes <VZW-REQS-119-157>*

BT201 The table below defines the modes that shall be supported in this profile

| Mode | Support |
|---|---|
| Non-discoverable mode | N/A |
| Limited discoverable mode | N/A |
| Discoverable mode | N/A |
| Non-connectable mode | N/A |
| Connectable mode | Shall be supported |
| Non-pairable mode | Not Required |
| Pairable mode | Shall be supported |

*5.1.6.4.1.2 Security Aspects <VZW-REQS-119-158>*

BT202 The table below shows the security aspects that shall be supported by this profile

| Mode | Support | Comments |
|---|---|---|
| Authentication | Shall be supported | |
| Security Mode 1 | Shall not be supported | |
| Security Mode 2 | Shall be supported | |
| Security Mode 3 | See Note 1 in section 5.1.5.2 | |
| Encryption | Shall be supported | Encryption is required when the remote device supports encryption. Encryption will not be used when the remote device does not support it. |

Note:


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Accessories that only support Security Mode 1 will not be able to do any authentication with the device and will not be able to do pairing with a device that requires security mode 2. The device shall display the message device pairing incomplete.

*5.1.6.4.1.3 Idle Mode Procedures <VZW-REQS-119-159>*

BT203 The table below shows the idle mode procedures that shall be supported by this profile

| Mode | Support | Comments |
|---|---|---|
| General Inquiry | Shall be supported | Mandated by profile specification |
| Limited Inquiry | Shall be supported | Not mandated by profile specification, but provides additional functionality |
| Name Discovery | Shall be supported | Not mandated by profile specification, but provides additional functionality |
| Device Discovery | Shall be supported | Not mandated by profile specification, but provides additional functionality |
| Bonding | Shall be supported | Not mandated by profile specification, but provides additional functionality |

5.1.6.4.2 Serial Port Profile <VZW-REQS-119-160>

The table below defines the requirements associated with the serial port profile for this profile.

| Interoperability Requirements | Support | Comments |
|---|---|---|
| RFCOMM | As defined in the Serial Port Profile specifications | |
| L2CAP | As defined in the Serial Port Profile specifications | |
| SDP | The optional display name text shall be supported | |
| Link Manager | As defined in the Serial Port Profile specifications | |
| Link Control | As defined in the Serial Port Profile specifications | |

### 5.1.6.5 REQUIREMENTS ADDITIONAL TO BLUETOOTH PROFILE SPECIFICATION <VZW-REQS-119-161>

5.1.6.5.1 End Call <VZW-REQS-119-162>

BT205 When the Device is on a call a button press on the headset (AT+CKPD=200) shall end the current call.

5.1.6.5.2 Last number Redial <VZW-REQS-119-163>

BT206 When the Device is not on a call, two presses of the button on the headset (AT+CKPD=200) in succession shall call the last number dialled.

The timeout period for the second button press shall be 2 seconds.

5.1.6.5.3 DTMF Tones <VZW-REQS-119-164>

BT207 The Device shall provide audible DTMF tones over the audio channel to the headset.

5.1.6.5.4 Low Battery Warning <VZW-REQS-119-165>

BT208 The Device shall provide an audible warning to the speaker of the headset that the battery in the Device is low.

5.1.6.5.5 Muting <VZW-REQS-119-166>

BT209 There is no provision in the Bluetooth Headset Profile for a mute function. Muting can be available separately via the accessory and/or the device.

5.1.6.5.6 Mono-Audio Support For Applications <VZW-REQS-119-167>

BT210 Once a SCO channel connection has been established to allow Mono Audio from an application to be sent from the device, the SCO channel shall not be torn down until the application has been terminated. This applies to the following applications:

- VZNavigator
- Visual Voice Mail

### 5.1.7 PROFILE SPECIFICATION – HANDSFREE (HFP) <VZW-REQS-119-233>

#### 5.1.7.1 GENERAL <VZW-REQS-119-234>

The device shall be compliant with Hands-Free Profile v1.5 [7] The Device shall support the role of Audio Gateway.
The device shall have certification from the Bluetooth SIG for compliance to HFP v1.5.

If the device is interacting with a headset that contains the Headset Profile and the Handsfree Profile, the default profile shall be the Handsfree Profile.

If the device is interacting with a headset using the handsfree profile the following functions shall be supported as per the VZW Audio Quality and Performance Requirements Document [40] sections that cover Bluetooth

- Auto Answer
- DTMF and other notification tones
- Audio notification of incoming calls
- Remote Audio Volume Control
- Independent Volume Control Settings


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#### 5.1.7.2 FUNCTIONAL OPTIONS <VZW-REQS-119-235>

In addition to the mandatory functions required by the profile, the following optional requirements shall be supported.

##### 5.1.7.2.1 Reject incoming voice call <VZW-REQS-119-236>

The device shall support the option of rejecting an incoming call.
This is covered in section 4.9 of the Hands-Free Profile v1.5 [7]

##### 5.1.7.2.2 Echo Cancelling and Noise Reduction <VZW-REQS-119-237-Mar2011>

BT371 The device shall support Hands-Free Profile v1.5 [7], section 4.24 "The HF Requests Turning Off the AG's EC and NR".

BT221 If Echo Cancelling & Noise Reduction is supported on the Device, the device shall support the handsfree's requests to turn off the AG's EC and NR. The device shall turn off its EC and NR in response to the handsfree devices AT command of AT + NREC.

BT222 If Echo Cancelling & Noise Reduction are not supported by the Device the Device must return an 'ERROR' message in response to the handsfree devices AT command of AT+NREC.

BT223 The device shall have a parameter "Echo Canceling and Noise Reduction Status" to indicate the device Echo Canceling and Noise Reduction status. This parameter shall be stored in device non-volatile memory accessible by Lab/Field Support PST tool. Refer to Verizon Wireless Product Support Tool & Keypad Programming & PRI Settings Requirements.

##### 5.1.7.2.3 Attach a phone number to a voice tag <VZW-REQS-119-238>

The device allows for a handsfree device to read numbers from the device and link them to a voice tag.
This is covered in section 4.26 of the Hands-Free Profile v1.5 [7]

##### 5.1.7.2.4 Remote audio volume control <VZW-REQS-119-239>

BT225 If this profile is being used for a headset, the UI for the Bluetooth Headset volume adjustment is identical to the UI for the wired headset volume adjustment.
Remote Audio Volume control is covered in section 4.23 of the Hands-Free Profile v1.5 [7]

##### 5.1.7.2.5 Phone Status Information Enhancement <VZW-REQS-119-240>

BT226 The device shall support the following features

- Signal Strength Indication
- Roaming Status Indication
- Battery Level indication
- Query of Operator Selection
- Report Enhanced Audio Gateway or Error Result Code

##### 5.1.7.2.6 Subscriber Number Information (Optional) <VZW-REQS-119-241>

BT227 The subscriber number information allows the hands-free accessory to query the device for its subscriber phone number.

5.1.7.2.7 Advanced Voice Recognition <VZW-REQS-119-242>

BT228 When the device receives the command for voice recognition it shall open a voice path and activate the AVR feature.. Refer to the VZW Mobile Station User Interface Part 7 (Advanced Voice Recognition) for additional information on Advanced Voice Recognition.

5.1.7.2.8 Last Number Redial. <VZW-REQS-119-243>

BT229 If the device in using a headset accessory with the handsfree profile, and is not on a call, two presses of the button on the headset in succession shall call the last number dialled.

The timeout period for the second button press shall be 2 seconds.

Non- Headset accessories should use the AT+BLND command.

### 5.1.7.3 AT COMMAND SET <VZW-REQS-119-244-DEC2011>

BT230 Devices shall support the following external (Bluetooth <> Host) AT commands

| **AT Command** | **Description** |
|---|---|
| ATA | Standard call answer command |
| ATDdd..dd | Standard command to place a call to a phone number |
| ATD>nnn | Extension to standard ATD command for memory dialing |
| ERROR | Standard error indication |
| OK | Standard acknowledgement to the execution of a command |
| RING | Standard incoming call notification |
| AT+CCWA | Standard call waiting notification command |
| +CCWA | Standard call waiting notification unsolicited result code |
| AT+CHLD | Standard call hold and multiparty handling command |
| AT+CHUP | Standard hang up command |
| AT+CIND | Standard indicator update command |
| +CIND | Standard phone indicator code response |
| AT+CLCC | Standard List Current calls command |
| +CLCC | Standard List Current calls response |
| AT+CLIP | Standard call line notification activation command |
| +CLIP | Standard call line notification unsolicited response |
| AT+CMER | Standard event reporting activation command |
| +CIEV | Standard indicator events reporting unsolicited result |


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| | |
|---|---|
| | code |
| AT+VTS | Standard DTMF generation command |
| AT+COPS? | Standard command for reading network operator |
| +COPS | Standard command to set the current format to long alphanumeric and the standard response used to return the current mode and currently selected operator |
| AT+CMEE | Standard command used to enable the use of result code +CME ERROR: |
| +CME ERROR | Extended audio gateway error result format |
| NO ANSWER | extended response |
| DELAYED | extended response |
| BLACKLISTED | extended response |

The following internal (Bluetooth <> Bluetooth) AT commands shall be supported.

| **AT Command** | **Description** |
|---|---|
| AT+BINP | Command for requesting some data input from the AG |
| +BINP | Response to AT+BINP |
| AT+BLDN | Command for calling the last phone number dialed |
| AT+BVRA | Enables / Disables voice recognition function in the AG |
| +BVRA | Unsolicited response used to notify the HF when the voice recognition function in the AG is switched on/off from the AG. |
| AT+BRSF | Notifies the AG of the Bluetooth features supported by the HF and requests information about features from the AG |
| +BRSF | Result code sent by the AG to AT+BRSF |
| AT+NREC | Command to disable echo canceling / noise reduction in the AG |
| AT+VGM | Command issued by the HF to report the microphone gain setting |
| AT+VGS | Command issued by the HF to report the speaker gain setting |
| +VGM | Unsolicited result code issued by the AG to set the microphone gain of the HF |
| +VGS | Unsolicited result code issued by the AG to set the speaker gain of the HF |
| +BSIR | Unsolicited result code issued by the AG to indicate to the HF that the in-band ring tone setting has been locally changed |
| AT+BTRH | Command issued by the HF for the "response and |


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| | |
|---|---|
| | hold" feature in the AG. |
| +BTRH | Result code used to notify the HF when the incoming call is either put on hold or accepted/rejected. |
| AT+CNUM | Command issued by the HF for the "Subscriber Number Information" feature in the AG |
| +CNUM | Standard response used for sending the "Subscriber Number Information" from AG to HF |

### 5.1.7.4 SUPPORTING PROFILES <VZW-REQS-119-245>

#### 5.1.7.4.1 Generic Access Profile <VZW-REQS-119-246>

*5.1.7.4.1.1 Modes <VZW-REQS-119-247>*

The table below defines the modes that shall be supported in this profile

| Mode | Support |
|---|---|
| Non-discoverable mode | N/A |
| Limited discoverable mode | N/A |
| Discoverable mode | N/A |
| Non-connectable mode | N/A |
| Connectable mode | Shall be supported |
| Non-pairable mode | Not Required |
| Pairable mode | Shall be supported |

*5.1.7.4.1.2 Security Aspects <VZW-REQS-119-248>*

The table below shows the security aspects that shall be supported by this profile

| Mode | Support | Comments |
|---|---|---|
| Authentication | Shall be supported | |
| Security Mode 1 | Shall not be supported | |
| Security Mode 2 | Shall be supported | |
| Security Mode 3 | See Note 1 in section 5.1.5.2 | |
| Encryption | Shall be supported | Encryption is required when the remote device supports encryption. Encryption will not be used when the remote device does not support it. |

Note: Accessories that only support Security Mode 1 will not be able to do any authentication with the device and will not be able to do pairing with a device that requires security mode 2.

*5.1.7.4.1.3 Idle Mode Procedures <VZW-REQS-119-249>*

The table below shows the idle mode procedures that shall be supported by this profile

| Mode | Support | Comments |
|---|---|---|
| General Inquiry | Shall be supported | Mandated by profile specification |
| Limited Inquiry | Shall be supported | Not mandated by profile specification, but provides additional functionality |
| Name Discovery | Shall be supported | Not mandated by profile specification, but provides additional functionality |
| Device Discovery | Shall be supported | Not mandated by profile specification, but provides additional functionality |
| Bonding | Shall be supported | Mandated by profile specification |

5.1.7.4.2 Serial Port Profile <VZW-REQS-119-250>

The table below defines the interoperability requirements associated with the serial port profile for this profile.

| Interoperability Requirements | Support | Comments |
|---|---|---|
| RFCOMM | As defined in the Serial Port Profile specifications | |
| L2CAP | As defined in the Serial Port Profile specifications | |
| SDP | The optional display name text shall be supported | |
| Link Manager | As defined in the Serial Port Profile specifications | |
| Link Control | As defined in the Serial Port Profile specifications | |

### 5.1.7.5 REQUIREMENTS ADDITIONAL TO BLUETOOTH PROFILE SPECIFICATION <VZW-REQS-119-251-DEC2011>

5.1.7.5.1 Non Hands-Free Profile AT Commands <VZW-REQS-119-252-Dec2011>

*5.1.7.5.1.1 Supported AT commands <VZW-REQS-119-253-Dec2011>*

BT235 The following external (Bluetooth <> Host) AT commands shall be supported to allow full functionality with some car kits and Augmentative and Alternative Communication(**AAC)** Devices, These commands are GSM07.07 [16] and GSM07.05[30] commands and may work as the extension of standard BT HFP AT commands

| AT Command | Description |
|---|---|
| +CPBS | Select phonebook memory |
| +CPBR | Read phonebook entries |
| +CSCS | Select character set |


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| | |
|---|---|
| +CPBF | Find phonebook entries |
| +CPBW | Write phonebook entries |
| +MVPB | Phonebook change notification |
| +CGMI | Request manufacturer |
| +CGMM | Request model number |
| +CPMS | Preferred message storage location |
| +CNMI | New message indication |
| +CMGR | Read message |
| +CMTI | SMS delivery results |
| +CMGS | Send message |
| +CMGL | List SMS messages |
| +CMGF | Message format |
| +CMS Error | Error codes for message service failure |
| +CMGC | Send Command |
| > | Response for +CMGC command. prompt to enter SMS, message is terminated with 0x1A) |
| +CMGD | Delete Message |
| +CMGW | Write Message to Memory |
| +CMSS | Send Message from Storage |
| +CNMA | New Message Acknowledgement to ME/TA |
| +CRES | Restore Settings |
| +CSAS | Save Settings |
| +CSMS | Select Message Service |
| +CDS | forward a newly received SMS status report to the computer / PC |
| +CDSI | notify the computer / PC that a new SMS status report has been received and the memory location where it is stored |
| +CMT | forward a newly received SMS message to the computer / PC |
| +CBC* | Battery charge |
| +CSQ* | Signal quality, gets the rssi indicator |

Note:
*: CBC and CSQ are optional. The AAC ECO2 will issue both of those commands periodically to get battery and signal strength information from the phone. But only if the phone does not support the status indicator message: +CIND. What this means is that the ECO checks to see if battery information is supplied with +CIND, if it is not then the ECO2 will periodically poll the phone with the CBC command.

#### 5.1.7.5.2 Muting <VZW-REQS-119-254>

There is no provision in the Bluetooth Handsfree Profile for a mute function. Muting can be available separately via the device and/or the accessory it is paired to.

#### 5.1.7.5.3 Mono-Audio Support For Applications <VZW-REQS-119-255>

BT237 Once a SCO channel connection has been established to allow Mono Audio from an application to be sent from the device, the SCO channel shall not be torn down until the application has been terminated. This applies to the following applications:

- VZNavigator
- Visual Voice Mail

#### 5.1.7.5.4 Car Kit Support <VZW-REQS-119-256>

BT238 The device shall delay initiating a connection request to a Car Kit to reduce the chance for an LMP Error Transaction Collision.

When a connection request follows the pairing of a device and car kit identified with a Minor Device Class designation of Car audio, the device delays sending the connection request for 3 seconds. If the device does not receive a connection request during the 3 seconds, then the device initiates a connection request to the car kit. Refer to https://www.bluetooth.org/apps/content/Default.aspx?doc_id=49706 for more information on Class of Service Field.

### 5.1.8 PROFILE SPECIFICATION – DIAL-UP NETWORKING (DUN) <VZW-REQS-119-325>

#### 5.1.8.1 DUN FOR 1XRTT ONLY DEVICES – N/A <VZW-REQS-119-326>

1xRTT only devices shall not support the dial up networking Bluetooth profile.

#### 5.1.8.2 GENERAL <VZW-REQS-119-327>

BT239 The Dial-Up Networking profile shall be compliant with the Dial Up Networking Profile Specification Part K:7 Bluetooth specification v1.1 (DUN)[8]

BT240 The Device shall support the role of Gateway.

BT241 The device shall have certification from the Bluetooth SIG for Dial Up Network Profile v1.1

BT242 Devices that support the 1xEV-DO and the Bluetooth Dial Up Network Profile shall support the Bluetooth Core Specification v2.0 +EDR .

##### 5.1.8.2.1 Qualcomm solution <VZW-REQS-119-328>

For devices that utilize a Qualcomm solution the following approved Verizon Wireless AMSS releases support Bluetooth Core Specification v2.0 + EDR:

- 6800/6575 – AMSS 5.6
- QSC6055 - AMSS 3.1, AMSS 3.2
- QSC6065 – AMSS 3.2

### 5.1.8.3 FUNCTIONAL OPTIONS <VZW-REQS-119-329>

The following functional elements shall be supported.

#### 5.1.8.3.1 Data Call without Audio Feedback <VZW-REQS-119-330>

This is covered in sections 4.1,4.2 & 4.3 of the Dial Up Network [8]

### 5.1.8.4 AT COMMAND/RESPONSE SET <VZW-REQS-119-331-DEC2011>

BT245 The following external (Bluetooth <> Host) AT commands and responses contained in the Dial Up Networking Specification [8] shall be supported.

| AT Command | Description |
|---|---|
| &C | Circuit 109 (Received line signal detector) Behavior |
| &D | Circuit 108 (Data terminal ready) Behavior |
| &F | Set to Factory-defined Configuration |
| +GCAP | Request Complete Capabilities List |
| +GMI | Request Manufacturer Identification |
| +GMM | Request Model Identification. |
| +GMR | Request Revision Identification |
| A | Answer |
| D | Dial |
| E | Command Echo shall be supported. |
| H | Hook Control |
| L | Monitor Speaker Loudness |
| M | Monitor Speaker Mode |
| O | Return to Online Data State |
| P | Select Pulse Dialing |
| Q | Result Code Suppression |
| S0 | Automatic Answer |
| S10 | Automatic Disconnect Delay |
| S3 | Command Line Termination Character |
| S4 | Response Formatting Character |
| S5 | Command Line Editing Character |
| S6 | Pause Before Blind Dialing |
| S7 | Connection Completion Timeout (The setting of this parameter may be ignored.) |
| S8 | Comma Dial Modifier Time |
| T | Select Tone Dialing |
| V | DCE Response Format |
| X | Result Code Selection and Call Progress Monitoring Control |
| Z | Reset To Default Configuration |
| OK | Acknowledges execution of a command. |
| CONNECT | Connection has been established. |


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| | |
|---|---|
| RING | The DCE has detected an incoming call signal from the network. |
| NO CARRIER | The connection has been terminated or the attempt to establish a connection failed. |
| ERROR | Error. |
| NO DIALTONE | No dial tone detected. |
| BUSY | Busy signal detected. |
| | |
| | |
| | |

### 5.1.8.5 SUPPORTING PROFILES <VZW-REQS-119-332>

#### 5.1.8.5.1 Generic Access Profile <VZW-REQS-119-333>

*5.1.8.5.1.1 Modes <VZW-REQS-119-334>*

The table below defines the modes that shall be supported in this profile

| Mode | Support |
|---|---|
| Non-discoverable mode | Shall be supported |
| Limited discoverable mode | Shall be supported |
| Discoverable mode | Shall not be supported |
| Non-connectable mode | Shall not be supported |
| Connectable mode | Shall be supported |
| Non-pairable mode | Shall not be supported |
| Pairable mode | Shall be supported |

*5.1.8.5.1.2 Security Aspects <VZW-REQS-119-335>*

The table below shows the security aspects that shall be supported by this profile

| Mode | Support | Comments |
|---|---|---|
| Authentication | Shall be supported | |
| Security Mode 1 | Shall not be supported | |
| Security Mode 2 | Shall be supported | |
| Security Mode 3 | See Note 1 in section 5.1.5.2 | |
| Encryption | Shall be supported | Encryption is required when the remote device supports encryption. Encryption will not be used when the remote device does not support it. |


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Note: Accessories that only support Security Mode 1 will not be able to do any authentication with the device and will not be able to do pairing with a device that requires security mode 2.

*5.1.8.5.1.3 Idle Mode Procedures <VZW-REQS-119-336>*

The table below shows the idle mode procedures that shall be supported by this profile

| Mode | Support | Comments |
|---|---|---|
| General Inquiry | N/A | Not required for this profile |
| Limited Inquiry | N/A | Not required for this profile |
| Name Discovery | N/A | Not required for this profile |
| Device Discovery | N/A | Not required for this profile |
| Bonding | Shall be supported | |

5.1.8.5.2 Serial Port Profile <VZW-REQS-119-337>

The table below defines the interoperability requirements associated with the serial port profile for this profile.

| Interoperability Requirements | Support | Comments |
|---|---|---|
| RFCOMM | As defined in the Serial Port Profile specifications | |
| L2CAP | As defined in the Serial Port Profile specifications | |
| SDP | The optional display name text shall be supported. Audio feedback support shall not be supported. | |
| Link Manager | As defined in the Serial Port Profile specifications | |
| Link Control | As defined in the Serial Port Profile specifications | |

### 5.1.8.6 REQUIREMENTS ADDITIONAL TO BLUETOOTH PROFILE SPECIFICATION <VZW-REQS-119-338>

5.1.8.6.1 DUN NAI <VZW-REQS-119-339>

Refer to VZW 1xEV-DO1xRTT Device Requirements for DUN NAI device requirements for embedded applications and tethered data (dial-up networking via cable or Bluetooth).

5.1.8.6.2 Data rate limitation <VZW-REQS-119-340>

BT250 In the case where the sustained data rate capability over the VZW network is greater than the sustained data rate over the Bluetooth link, the device shall limit the data rate of the service to prevent overflow (in forward link) or underflow (in reverse link) using the appropriate control mechanism defined within the air interface protocol.

#### 5.1.8.6.3 Signal Strength Indication <VZW-REQS-119-341>

BT251 An indication of the signal strength shall be available at the data terminal. The Bluetooth transport mechanism shall be as defined in the Handsfree profile using the defined AT command.

#### 5.1.8.6.4 DUN Throughput <VZW-REQS-119-342>

BT252 The following table shows the minimum acceptable data throughput for the Bluetooth Dial Up Networking transferring a file thorough ftp.

| CDMA Interface | CDMA Received Power | Minimum Uplink Data Rate | Minimum Downlink Data Rate |
|---|---|---|---|
| 1xRTT | -65 dBm | 80 kbs | 80 kbs |
| EV-DO | -65 dBm | 80 kbs | 400kbs |

For 1xEV-DO follow the setup procedure in section 2.3 (forward file (downlink) transfer connecting to ftp) and 2.4 (reverse file (uplink) transfer connecting to ftp) in the Data Throughput Lab Test Plan. The USB data cable shall be replaced with a Bluetooth DUN connection with the devices no more than 18 inches apart. The tests will be done with SCI set to 1.

For 1xRTT follow the setup procedure in sections 2.3 (forward file (downlink) transfer connecting to ftp) and 2.4 (reverse file (uplink) transfer connecting to ftp) of the Data Throughput Lab Test Plan. The USB data cable shall be replaced with a Bluetooth DUN connection, with the devices no more than 18 inches apart.

#### 5.1.8.6.5 Data Port Setting <VZW-REQS-119-343>

When tethered via Bluetooth (i.e. Bluetooth is on, and the devices are paired and connected) to a device (e.g. laptop) that supports BT DUN, the tethered device shall enable the Bluetooth data port setting when a BT DUN session is initiated. When the BT DUN session ends, the device shall revert to the data port setting that was in use prior to the BT DUN session.

The USB data port setting shall be used whenever Bluetooth is off.

### 5.1.9 PROFILE SPECIFICATION – PHONEBOOK (PBAP) <VZW-REQS-119-403>

#### 5.1.9.1 GENERAL <VZW-REQS-119-404>

BT260 The device shall be compliant with the Phone Book Access Profile Specification v1.0 The Device shall support the role of Phonebook Server Equipment (PSE).

The device shall support vCard versions 2.1 and 3.0. When connecting with other devices it shall use the highest version of vCard that both devices support.


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#### 5.1.9.2 SECURITY <VZW-REQS-119-405>

5.1.9.2.1 Bonding <VZW-REQS-119-406>

BT261 The Device shall be bonded with the Phonebook Client Equipment (PCE) before any PBAP connection is available.

5.1.9.2.2 Encryption <VZW-REQS-119-407>

BT262 The link between the PSE and the PCE shall be encrypted using BT encryption keys of length 64 bits or greater.

5.1.9.2.3 PIN (Passkey) <VZW-REQS-119-408>

Refer to Section 5.1.5.8

5.1.9.2.4 Link Keys <VZW-REQS-119-409>

Refer to Part H, Section 3.1 of the Bluetooth Core Specification.

5.1.9.2.5 Connection <VZW-REQS-119-410>

BT263 The user shall be required to confirm, at a minimum the first PBAP connection.

#### 5.1.9.3 FUNCTIONAL OPTIONS <VZW-REQS-119-411>

The following functional elements shall be supported.

5.1.9.3.1 Download <VZW-REQS-119-412>

BT264 The device shall support downloading of the content of a phone book. This is accomplished using OBEX commands in the Object Push Profile.
NOTE: OPP shall allow vCard and vCal files to be transferred.
This is covered in sections 4.1, 4.2, 5.1 of the PBAP – it shall also include all call list entries.

5.1.9.3.2 Browsing <VZW-REQS-119-413>

This allows for scrolling through the phone book.
This is covered in Sections 4.1, 4.3, 5.2, 5.3, and 5.4 of the PBAP. – It shall also include all call list entries.

#### 5.1.9.4 SUPPORTING PROFILES <VZW-REQS-119-414>

5.1.9.4.1 Generic Access Profile <VZW-REQS-119-415>

*5.1.9.4.1.1 Modes <VZW-REQS-119-416>*

The table below defines the modes that shall be supported in this profile

| Mode | Support |
|---|---|

| | |
|---|---|
| Non-discoverable mode | Shall be supported |
| Limited discoverable mode | Not required |
| Discoverable mode | Shall be supported |
| Non-connectable mode | N/A |
| Connectable mode | Shall be supported |
| Non-pairable mode | Not Required |
| Pairable mode | Shall be supported |

*5.1.9.4.1.2 Security Aspects <VZW-REQS-119-417>*
The table below shows the security that shall be supported by this profile

| **Mode** | **Support** | **Comments** |
|---|---|---|
| Authentication | Shall be supported | |
| Security Mode 1 | Shall not be supported | |
| Security Mode 2 | Shall be supported | |
| Security Mode 3 | See Note 1 in section 5.1.5.2 | |
| Encryption | Shall be supported | Encryption is required. |

Note: Accessories that only support Security Mode 1 will not be able to do any authentication with the device and will not be able to do pairing with a device that requires security mode 2.

*5.1.9.4.1.3 Idle Mode Procedures <VZW-REQS-119-418>*
The table below shows the idle mode procedures that shall be supported by this profile

| **Mode** | **Support** |
|---|---|
| General Inquiry | Shall be supported |
| Limited Inquiry | Shall be supported |
| Name Discovery | Shall be supported |
| Device Discovery | Shall be supported |
| Bonding | Shall be supported |

5.1.9.4.2 Generic Object Exchange Profile (OBEX) commands <VZW-REQS-119-419>
The table below defines the requirements associated with this profile.

| **Requirements** | **Support** | **Comments** |
|---|---|---|
| OBEX Operations Used | The following OBEX operations shall be implemented<br>1. Connect<br>2. Disconnect<br>3. Get<br>4. Abort<br>5. Set Path | |


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| | | |
|---|---|---|
| OBEX Headers | The following OBEX headers shall be implemented<br>1. Name<br>2. Type<br>3. Length<br>4. Body<br>5. End Of Body<br>6. Target<br>7. Who<br>8. Connection ID<br>9. Authentication Challenge<br>10. Authentication Response<br>11. Application Parameters | |
| Application Parameter Header | The following ID tags shall be used in the Application Parameters<br>1. Order<br>2. Search Value<br>3. Search Attribute<br>4. MaxListCount<br>5. ListStartOffset<br>6. Filter<br>7. Format<br>8. PhonebookSize<br>9. NewMissedCalls | |
| OBEX Headers in Multipacket Responses | All Headers other than the BODY header shall be placed in the first packet | |
| OBEX Error Codes | The following Error Codes shall be defined in the PSE<br>1. Bad Request<br>2. Not Implemented<br>3. Unauthorized<br>4. Precondition Failed<br>5. Not Found<br>6. Not Acceptable<br>7. Service Unavailable<br>8. Forbidden | |
| Initializing OBEX | Support For OBEX Authentication shall be implemented, including support for OBEX user IDs<br>Two devices with fixed PIN codes cannot connect when this authentication is used.<br>The authentication can be:<br>- mutual, requested by the PSE or PCE<br>- one way, the PCE identifying the PSE | |
| Establishing an OBEX Session | The Target Header shall be used and the UUID is defined in the reference. | |
| Terminate and | The OBEX session can be terminated by the PCE using | |


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| | | |
|---|---|---|
| OBEX Session | the disconnect command or indirectly by the PSE by terminating the RFComm channel used for the OBEX session | |

#### 5.1.9.4.3 Serial Port Profile <VZW-REQS-119-420>

The table below defines the interoperability requirements associated with the serial port profile for the PBAB.

| **Interoperability Requirements** | **Support** | **Comments** |
|---|---|---|
| RFCOMM | As defined in the Serial Port Profile specifications | |
| L2CAP | As defined in the Serial Port Profile specifications | |
| SDP | The optional display name text shall be supported. . | |
| Link Manager | As defined in the Serial Port Profile specifications | |
| Link Control | As defined in the Serial Port Profile specifications | |

### 5.1.9.5 REQUIREMENTS ADDITIONAL TO BLUETOOTH PROFILE SPECIFICATION <VZW-REQS-119-421>

#### 5.1.9.5.1 VZW PC Clients (VZW Mobile Office Kit, VZW Mobile Office Phonebook kit) <VZW-REQS-119-422>

##### *5.1.9.5.1.1 Phonebook Transfer Support <VZW-REQS-119-423>*

The device shall support the Serial Port Profile and utilize the Wireless Modem Control (WMC) interface as defined in the VZW Connectivity Requirements document [33] for the exchange or transfer of phone book information.

### 5.1.10 SPECIFICATION – BT STEREO <VZW-REQS-119-468>

BT273 To support Bluetooth Stereo the following profiles and Protocols are required.

- Advanced Audio Distribution Profile (A2DP)
- Generic Audio/Video Distribution Profile (GAVDP)
- Audio/Video Distribution Transport Protocol (AVDTP)
- Audio/Video Remote Control Profile (AVRCP)
- Audio/Video Control Transport Protocol (AVCTP)

*Note: Any Bluetooth solutions can be utilized, but with no impact to any call performance as tested under the existing Device Evaluation and Approval Process.*

### 5.1.10.1 BREW APPLICATION (I.E., MOD, VOD, ETC.) SUPPORT <VZW-REQS-119-469-DEC2010>

5.1.10.1.1 Applicability <VZW-REQS-119-470>

Bluetooth stereo headset support is required for:

- MOD 2.0 and above

The Bluetooth stereo headset support is optional (future) for:

- VOD

5.1.10.1.2 Qualcomm solution <VZW-REQS-119-471>

The following AMSS releases support Bluetooth stereo:

- 6500 – AMSS 6.3 patch 01 or later with Bluetooth enabled – currently available
- 6550 – AMSS 4.1 patch 01 or later with Bluetooth enabled – currently available

The user controls the audio output path from the device native UI controls, and not from the application. The user will use device native UI to choose audio output path, and this audio output path will be used by the BREW application.

The device vendor is responsible for mapping audio output to the BT Stereo Headset when a connection to such a device is established. From the application perspective, this is much like the user connecting a wired stereo headset.

- The application continues to provide PCM data to the IMediaPCM interface.

To support this, the device vendor must do the following:

- Detect the connection of a BT Stereo Headset and set the active sound device to AEE_SOUND_DEVICE_BT_STEREO_HEADSET.
- Properly route all PCM audio through this device as long as it is connected.
- Handle calls to ISOUND_SetVolume() while the BT Stereo Headset is connected, ensuring that the volume settings for this audio device are properly modified.
- When the BT Stereo Headset is disconnected, the previously active audio path must be restored.

For further information on support for BT stereo headsets in the AMSS layer, refer to document number **80-V6504-1 Rev. D.**

The ISOUND API and IMEDIA API are documented in the BREW API Reference.

AEE_SOUND_DEVICE_BT_STEREO_HEADSET is defined in AEESound.h beginning in BREW 3.1.4, and is included in both the BREW SDK and Porting Kit.

*Note: AEE_SOUND_DEVICE_BT_STEREO_HEADSET is only an identifier. While it was introduced in BREW 3.1.4, device vendors can use this identifier in previous versions of BREW.*

5.1.10.1.3 3rd Party Solution <VZW-REQS-119-472>

Any 3rd Party Bluetooth stereo solution shall be able to convert the PCM output from the BREW applications into a Bluetooth protocol to be transmitted to a Bluetooth Accessory.

For further information on support for BT stereo headsets using 3rd party solutions and Qualcomm chipsets, refer to document number **80-VC001-1** for MSM6xxx and MSM7xxx.

### 5.1.10.2 PROFILE SPECIFICATION – ADVANCED AUDIO DISTRIBUTION PROFILE (A2DP) <VZW-REQS-119-473>

5.1.10.2.1 General <VZW-REQS-119-474>

BT275 The Advanced Audio profile shall be compliant with the A2DP profile specification v1.2.

The Device shall support the role of Source.

If the audio is part of a video displayed on the device, the device shall account for the time delay caused by the encoding, RF transfer and decoding of the audio so that the audio and video will be in sync.

The device shall have certification from the Bluetooth SIG for Advanced Audio Distribution v1.2

5.1.10.2.2 Codec's <VZW-REQS-119-475>

BT276 All mandatory Codec's must be supported. A2DP mandates SBC codec to ensure operability. The device shall transcode other formats into the mandatory SBC format for audio streaming.

5.1.10.2.3 Streaming Setup <VZW-REQS-119-476>

See Section 5.1.30.3 GAVDP for signalling procedures to initiate streaming audio.

5.1.10.2.4 Streaming <VZW-REQS-119-477>

BT277 When both the device and the Bluetooth accessory are streaming the device shall initiate a Send Stream procedure.

### 5.1.10.3 GENERIC AUDIO/VIDEO DISTRIBUTION PROFILE (GAVDP) <VZW-REQS-119-478>

BT278 The device shall support all the mandatory features for this profile.

5.1.10.3.1 Initiation of Streaming <VZW-REQS-119-479>

The following procedures are mandatory.

*5.1.10.3.1.1Connection Establishment <VZW-REQS-119-480>*

This procedure requires an L2CAP channel for signaling to have been already established.


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This procedure sets up a connection between the Device and a Bluetooth Accessory (headset, stereo, etc). Upon completion of this procedure the device must execute the start streaming procedure. Refer to Section 4.11 of [19]

*5.1.10.3.1.2Start Streaming <VZW-REQS-119-481>*
This procedure begins the streaming of data between the devices. Refer to Section 4.12 of [19]

5.1.10.3.2 Connection Release <VZW-REQS-119-482>

This procedure releases the L2CAP channel from streaming and moves both devices into an idle state. Refer to Section 4.13 of [19]

5.1.10.3.3 Signaling Control <VZW-REQS-119-483>

This resets the devices to idle. It is used if signaling control between devices is lost. Refer to Section 4.16 of [19]

5.1.10.3.4 Error Codes. <VZW-REQS-119-484>

The device shall support the following error codes. Refer to Section 4.3 of [19]

*5.1.10.3.4.1Bad Service <VZW-REQS-119-485>*
The service category stated is not a valid service.

*5.1.10.3.4.2Insufficient Resource <VZW-REQS-119-486>*
There is a lack of resources for any new streams.

### 5.1.10.4 AUDIO/VIDEO DISTRIBUTION TRANSPORT PROTOCOL (AVDTP) <VZW-REQS-119-487>

5.1.10.4.1 General <VZW-REQS-119-488>

AVDTP is the transport mechanism for streaming higher quality audio (stereo) and video across the Bluetooth air interface.

5.1.10.4.2 Mandatory Functions <VZW-REQS-119-489>

This protocol is solely about transportation of information. There are no options for this protocol. The device must meet all the specifications listed in [20].

### 5.1.10.5 AUDIO/VIDEO REMOTE CONTROL PROFILE (AVRCP) <VZW-REQS-119-490>

5.1.10.5.1 General <VZW-REQS-119-491>

This profile defines features and procedures needed to allow A/V control functions using Bluetooth.

#### 5.1.10.5.2 Security <VZW-REQS-119-492>

There is no security associated with this profile. An established link is required before this profile can be used.

#### 5.1.10.5.3 Mandatory Features <VZW-REQS-119-493>

BT284 The device shall support all mandatory features for remote control between 2 devices. It shall act as both the Target and the Controller. Refer to AVRCP v1.4 [21].

#### 5.1.10.5.4 Supported Stereo Device Categories <VZW-REQS-119-494>

BT285 The device shall support the mandatory Category 1 – Player/Recorder, and Category 4-Menu commands. Category 2 – Monitor/Amplifier is future. Refer to Section 4.5.1 of [21]. When the device is acting as a Target, the device shall support the following commands: Play, Stop, Pause, Rewind, Fast Forward, Forward (track), and Backward (track).

### 5.1.10.6 BLUETOOTH STEREO VOLUME CONTROL <VZW-REQS-119-495>

BT286 Bluetooth Stereo Volume adjustment shall be available from the handset. This shall be achieved by adjusting audio gain level prior to Bluetooth encoding.

### 5.1.10.7 ANSWERING OR PLACING A CALL WHILE DEVICE ACTIVE ON A2DP <VZW-REQS-119-496>

BT287 While the device is active in A2DP and user answers an incoming call or attempts to place a call, the device shall perform the following steps:

1. Pause the player
2. Suspend the A2DP stream
3. Suspend the ACL channel
4. Start an SCO channel and begin sending voice.

Upon completion of the call the device shall do the following steps.

1. Terminate the SCO channel
2. Unsuspend the ACL channel
3. Resume playing the stereo audio
4. Resume the A2DP stream.

For more information refer to “Simultaneous use of HFP,A2DP, and AVRCP Profiles Whitepaper” from https://www.bluetooth.org/Technical/Specifications/whitepapers.htm. (login required)


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### 5.1.11 PROFILE SPECIFICATION – BASIC PRINTING PROFILE (BPP) – DETERMINE AT LOCKDOWN <VZW-REQS-119-556>

#### 5.1.11.1 GENERAL <VZW-REQS-119-557>

BT292 The device shall be compliant with all the mandatory features of the sender in the Basic Printing Profile (BPP) v1.0.
BT293 Images shall be in the JPEG format with a MIME specified as image\jpeg.

BT294 The device shall have certification from the Bluetooth SIG for compliance with Basic Printing Profile (BPP) v1.0

#### 5.1.11.2 FUNCTIONAL OPTIONS <VZW-REQS-119-558>

##### 5.1.11.2.1 CreateJob <VZW-REQS-119-559>

This command can be used to submit the job attributes for the Print Job. This function is required since we are not requiring the Simple Push Model for transfer. Refer to Section 7.1.2 of [22]

##### 5.1.11.2.2 SendDocument <VZW-REQS-119-560>

This action is used to transfer the actual print content to the printer. It will be used in conjunction with the CreateJob command. This function is required since we are not requiring the Simple Push Model for transfer. Refer to Section 7.1.2 of [22]

#### 5.1.11.3 SUPPORTING PROFILES <VZW-REQS-119-561>

##### 5.1.11.3.1 Generic Access Profile <VZW-REQS-119-562>

*5.1.11.3.1.1Modes <VZW-REQS-119-563>*
The table below defines the modes that shall be supported in this profile

| Mode | Support |
|---|---|
| Non-discoverable mode | Shall be supported |
| Limited discoverable mode | Not required |
| Discoverable mode | Shall be supported |
| Non-connectable mode | N/A |
| Connectable mode | Shall be supported |
| Non-pairable mode | Not Required |
| Pairable mode | Shall be supported |

*5.1.11.3.1.2Security Aspects <VZW-REQS-119-564>*
The table below shows the security that shall be supported by this profile

| Mode | Support | Comments |
|---|---|---|
| Authentication | Shall be supported | Authentication is required |
| Security Mode 1 | Shall not be | |

| | | |
|---|---|---|
| | supported | |
| Security Mode 2 | Shall be supported | |
| Security Mode 3 | See Note 1 in section 5.1.5.2 | |
| Encryption | Shall be supported | Encryption is required. |

Note: Accessories that only support Security Mode 1 will not be able to do any authentication with the device and will not be able to do pairing with a device that requires security mode 2.

*5.1.11.3.1.3Idle Mode Procedures <VZW-REQS-119-565>*
The table below shows the idle mode procedures that shall be supported by this profile

| **Mode** | **Support** |
|---|---|
| General Inquiry | Shall be supported |
| Limited Inquiry | Shall be supported |
| Name Discovery | Shall be supported |
| Device Discovery | Shall be supported |
| Bonding | Shall be supported |

5.1.11.3.2 Generic Object Exchange Profile (OBEX) commands <VZW-REQS-119-566>
The table below defines the requirements associated with this profile.

| **Requirements** | **Support** | **Comments** |
|---|---|---|
| OBEX Operations Used | The following OBEX operations shall be implemented<br>1. Connect<br>2. Disconnect<br>3. Push<br>4. Get<br>5. Abort | |
| OBEX Headers | The following OBEX headers shall be implemented<br>1. Name<br>2. Type<br>3. Target<br>4. Body<br>5. End of Body<br>6. Who<br>7. Authentication Challenge<br>8. Authentication Response<br>9. Connection Id | |
| OBEX Response Codes | The following Response Codes shall be defined in the Device<br>1. Not Found<br>2. Precondition failed | |


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| | | |
|---|---|---|
| | 3. Requested entity is too large<br>4. Internal receiver error | |
| Initializing OBEX | Support For OBEX Authentication shall be implemented, including support for OBEX user IDs | |

### 5.1.12 PROFILE SPECIFICATION – BASIC IMAGING PROFILE (BIP) <VZW-REQS-119-602>

#### 5.1.12.1 GENERAL <VZW-REQS-119-603>

BT299 The device shall be compliant with all the mandatory features of the sender in the Basic Imaging Profile (BIP) v1.0 [23].
User interaction is required to initiate any actions in this profile.
Requires JPEG compliant thumbnail.
The device shall not allow DRM protected material to be sent through this profile. Refer to VZW DRM Requirements document.

The device shall have certification from the Bluetooth SIG for compliance with Basic Imaging Profile (BIP) v1.0

#### 5.1.12.2 MANDATORY FUNCTIONS <VZW-REQS-119-604>

##### 5.1.12.2.1 OBEX transfer <VZW-REQS-119-605>

BT300 The device is required to open an OBEX imaging service session before beginning any mandatory or optional functions.

#### 5.1.12.3 FUNCTIONAL OPTIONS. <VZW-REQS-119-606>

We will support the following functions.

##### 5.1.12.3.1 Image Push <VZW-REQS-119-607>

This is the ability to move one or more images from the device to a compatible Bluetooth Accessory. The following functions must be supported.

- GetCapabilities
- PutImage
- PutLinkedThumbnail

##### 5.1.12.3.2 Image Pull <VZW-REQS-119-608>

This is the ability to move one or more images from a compatible Bluetooth Accessory to the device. The following functions shall be supported.

- GetCapabilities
- GetImagesList
- GetImageProperties
- GetImage
- GetLinkedThumbnail

#### 5.1.12.3.3 BT303 Advanced Image Printing <VZW-REQS-119-609>

Allows the device to send print jobs to a compatible Bluetooth enabled printer. The following functions shall be supported.

- GetCapabilities
- StartPrint

### 5.1.12.4 SUPPORTING PROFILES <VZW-REQS-119-610>

#### 5.1.12.4.1 Generic Access Profile <VZW-REQS-119-611>

*5.1.12.4.1.1Modes <VZW-REQS-119-612>*

The table below defines the modes that shall be supported in this profile

| Mode | Support |
|---|---|
| Non-discoverable mode | Shall be supported |
| Limited discoverable mode | Not required |
| Discoverable mode | Shall be supported |
| Non-connectable mode | N/A |
| Connectable mode | Shall be supported |
| Non-pairable mode | Not Required |
| Pairable mode | Shall be supported |

*5.1.12.4.1.2Security Aspects <VZW-REQS-119-613>*

The table below shows the security that shall be supported by this profile

| Mode | Support | Comments |
|---|---|---|
| Authentication | Shall be supported | Authentication is required |
| Security Mode 1 | Shall not be supported | |
| Security Mode 2 | Shall be supported | |
| Security Mode 3 | See Note 1 in section 5.1.5.2 | |
| Encryption | Shall be supported | Encryption is required. |

Note: Accessories that only support Security Mode 1 will not be able to do any authentication with the device and will not be able to do pairing with a device that requires security mode 2.

*5.1.12.4.1.3Idle Mode Procedures <VZW-REQS-119-614>*
The table below shows the idle mode procedures that shall be supported by this profile

| **Mode** | **Support** |
|---|---|
| General Inquiry | Shall be supported |
| Limited Inquiry | Shall be supported |
| Name Discovery | Shall be supported |
| Device Discovery | Shall be supported |
| Bonding | Shall be supported |

5.1.12.4.2 Generic Object Exchange Profile (OBEX) commands <VZW-REQS-119-615>
The table below defines the requirements associated with this profile.

| **Requirements** | **Support** | **Comments** |
|---|---|---|
| OBEX Operations Used | The following OBEX operations shall be implemented<br>1. Connect<br>2. Disconnect<br>3. Put<br>4. Get<br>5. Abort | |
| OBEX Headers | The following OBEX headers shall be implemented<br>1. Name<br>2. Type<br>3. Length<br>4. Target<br>5. Body<br>6. End of Body<br>7. Who<br>8. Img-Description<br>9. Img-Handle<br>10. Authentication Challenge<br>11. Authentication Response<br>12. Connection Id<br>13. Application Parameters | |
| OBEX Response Codes | The following Response Codes shall be defined in the Device<br>1. Bad Request<br>2. Not Implemented | |


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| | | |
|---|---|---|
| | 3. Forbidden<br>4. Unauthorized<br>5. Precondition Failed<br>6. Not Found<br>7. Not Acceptable<br>8. Service Unavailable | |

### 5.1.13 PROFILE SPECIFICATION – VIDEO DISTRIBUTION PROFILE (VDP) – DETERMINE AT LOCKDOWN <VZW-REQS-119-660>

BT308 This profile is for the distribution of video via Bluetooth. Therefore the device shall support all the mandatory features required for VDP v1.0. All other features are optional. The device shall be certified by the Bluetooth SIG for Video Distribution Profile v1.0.

### 5.1.14 PROFILE SPECIFICATION – HEALTH DEVICE PROFILE (HDP) – DETERMINE AT LOCKDOWN <VZW-REQS-119-666>

BT309 This profile is used for connecting application data Source devices such as blood pressure monitors, weight scales, glucose meters, thermometers, and pulse oximeters to application data Sink devices such as mobile phones. Therefore the device shall support all the mandatory features required for HDP v1.0. All other features are optional. The device shall be certified by the Bluetooth SIG for Health Device Profile v1.0.

### 5.1.15 PROFILE SPECIFICATION – PERSONAL AREA NETWORK (PAN) – <VZW-REQS-119-672>

BT310 The LAN profile has been deprecated by Bluetooth SIG and will no longer be supported. For LAN operation the PAN profile shall be used.

The Personal Area Networking profile provides the ability to form networks and exchange information using Bluetooth. Therefore the device shall support all the mandatory features required for PAN v1.0. All other features are optional.
The device shall be certified by the Bluetooth SIG for Personal Area Networking Profile v1.0 [15]

### 5.1.16 PROFILE SPECIFICATION – SYNCHRONIZATION PROFILE (SYNCH) <VZW-REQS-119-673>

BT311 The Synchronization Profile allows for the synchronization of data between two Bluetooth Enabled devices. Therefore the device shall support all the mandatory features required for SYNCH v1.1. All other features are optional.
The device shall be certified by the Bluetooth SIG for Synchronization Profile v1.1.

### 5.1.17 PROFILE SPECIFICATION – HUMAN INTERFACE DEVICE (HID) <VZW-REQS-119-674>

#### 5.1.17.1 GENERAL <VZW-REQS-119-675>

BT312 This profile has many uses, ours is for keyboards. Therefore the device shall support all the mandatory features required for HID v1.0 [14] and also keyboard specific requirements. All other interface devices are optional

The device shall act as the host for this profile.

Special compensation will be needed for pairing with the keyboard, since there is no display on the keyboard. Pairing should be done similarly to headsets, where the device has a code that is entered by the converged device.

Keyboard Boot Protocol is not required.

#### 5.1.17.2 SUPPORTING PROFILES <VZW-REQS-119-676>

5.1.17.2.1 Generic Access Profile <VZW-REQS-119-677>

*5.1.17.2.1.1Modes <VZW-REQS-119-678>*

The table below defines the modes that shall be supported in this profile

| Mode | Support |
|---|---|
| Non-discoverable mode | Shall be supported |
| Limited discoverable mode | Shall be supported |
| Discoverable mode | Shall be supported |
| Non-connectable mode | N/A |
| Connectable mode | Shall be supported |
| Non-pairable mode | Not Required |
| Pairable mode | Shall be supported |

*5.1.17.2.1.2Security Aspects <VZW-REQS-119-679>*

The table below shows the security that shall be supported by this profile

| Mode | Support | Comments |
|---|---|---|
| Authentication | Shall be supported | Authentication is required |

| | | |
|---|---|---|
| Security Mode 1 | Shall not be supported | |
| Security Mode 2 | Shall be supported | |
| Security Mode 3 | See Note 1 in section 5.1.5.2 | |
| Encryption | Shall be supported | Encryption is required. |

Note: Accessories that only support Security Mode 1 will not be able to do any authentication with the device and will not be able to do pairing with a device that requires security mode 2.

*5.1.17.2.1.3L2CAP Channel <VZW-REQS-119-680>*

Example of parameters for a keyboard for low latency

| Parameter | Control Channel Values | | Interrupt Channel Values | |
|---|---|---|---|---|
| Service Type | Device to Host | Host to Device | Device to Host | Host to Device |
| Token Rate | 800 Bytes/sec | 800 Bytes/sec | 900 Bytes/sec | 200 Bytes/sec |
| Token Bucket Size | 8 Bytes | 8 Bytes | 9 Bytes | 2 Bytes |
| Peak Bandwidth | Unknown | Unknown | 900 Bytes/sec | 200 Bytes/sec |
| Latency | Don't Care | Don't Care | 10ms – 100Hz polling rate | Don't Care |
| Delay Variation | Don't Care | Don't Care | 10 ms | Don't Care |
| OutFlush TO | Infinite Retries | Infinite Retries | Infinite Retries | Infinite Retries |
| InMTU | 48 Bytes | 672 Bytes | 48 Bytes | 672 Bytes |

*5.1.17.2.1.4Idle Mode Procedures <VZW-REQS-119-681>*

The table below shows the idle mode procedures that shall be supported by this profile

| **Mode** | **Support** |
|---|---|
| General Inquiry | Shall be supported |
| Limited Inquiry | Shall be supported |
| Name Discovery | Shall be supported |
| Device Discovery | Shall be supported |
| Bonding | Shall be supported |
| Authentication | Shall be supported |
| Encryption | Shall be supported |

### 5.1.18 PROFILE SPECIFICATION – MESSAGE ACCESS PROFILE (MAP) DETERMINE AT LOCKDOWN <VZW-REQS-119-682>

#### 5.1.18.1 GENERAL <VZW-REQS-119-683>

BT316 The device shall be compliant with all the mandatory features of the sender in the Message Access Profile (MAP) v1.0 (V10R00 or newer version) [28].


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### 5.1.19 BLUETOOTH EMAIL SYNCHRONIZATION . <VZW-REQS-119-684>

BT317 If the device supports Bluetooth email synchronization, the solution must be approved by VZW Device Marketing Product Development team as part of the device lock down.

### 5.1.20 BREW API SUPPORT - DETERMINE AT LOCKDOWN <VZW-REQS-119-685>

BREW 3.1.5SP01 exposes APIs for supporting the following Bluetooth profiles:

- Generic Access Profile (GAP)
- Serial Port Profile (SPP)
- Headset Profile (HSP)
- Handsfree Profile (HFP)
- Advanced Audio Distribution Profile (A2DP)
- Audio Video Remote Control Profile (AVRCP)
- Generic Object Exchange Profile (GOEP).

Refer to VZW BREW Device requirements for specific API information.

VZW Device Marketing Product Development team will determine specific support as part of the device lock down.

### 5.1.21 AUDIO ROUTING FROM APPLICATIONS TO BT CAR KIT – ALL DEVICES. <VZW-REQS-119-686>

BT319 If the device supports pairing up with an external BT enabled car kit via the device BT interface, the device shall support the specifications listed in the sections below when the following applications on the device play the audio:

- VZNavigator
- Visual Voice Mail

These requirements are applicable only for the BT enabled car kits which support HFP BT profile. For BT enabled car kits which support A2DP BT profile, the device shall route the audio to the BT enabled car kits as per the A2DP BT profile specifications.

#### 5.1.21.1 PSEUDO VOICE CALL AUDIO <VZW-REQS-119-687>

BT320 The device shall mimic Voice Call audio routing scenario similar to a “Restricted” or “Private” call. In order to mimic the voice call audio routing the device shall establish a pseudo voice call with the BT enabled car kit and send the caller ID information as “restricted” or “private” to the BT enabled car kit. Once the voice call audio path is established successfully with the BT enabled car kit and the device, the device shall route all the application audio to the BT enabled car kit.


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#### 5.1.21.1.1 END Key Behavior <VZW-REQS-119-688>

BT321 When END key is pressed during the pseudo voice call, the device shall send the END key event to the application and the pseudo voice call with the car kit shall be terminated.

#### 5.1.21.1.2 Incoming Voice Call Interruption <VZW-REQS-119-689>

BT322 During the pseudo voice call, if the device receives a MT voice call, the device shall behave in the same way that it would if the pseudo voice call were not present. If the MT voice call is accepted by the end user the application audio shall be paused and the voice call audio shall be routed to the BT car kit.

#### 5.1.21.1.3 Background Mode Of Operation <VZW-REQS-119-690>

BT323 When the applications are moved into the background mode of operation during the pseudo voice call, the device shall terminate the pseudo voice call with the car kit.

### 5.1.21.2 DEVICE PAIRED WITH BT ENABLED CAR KIT <VZW-REQS-119-691>

BT324 When the device is already paired with the BT enabled car kit, when the application on the device is launched and the application starts playing the audio, the device shall support the requirements specified in section 5.1.64.1 of this document

### 5.1.21.3 BT LINK USED BY AN ACTIVE BACKGROUND APPLICATION <VZW-REQS-119-692>

BT325 If the device is already paired with the BT enabled car kit and if the BT link is used by an active background application such as device music player and when another application which uses the audio on the device such as VVM is launched, the device shall pause the audio playback from the background application and support the audio playback from the foreground application via the BT link.

### 5.1.21.4 BT ENABLED CAR KIT DISCOVERY AND PAIRING WHILE PLAYING THE APPLICATION AUDIO <VZW-REQS-119-693>

BT326 While playing the audio from an application if the device discovers an external BT enabled car kit and pairs with it successfully in the background, the device shall support routing the audio to the BT enabled car kit automatically without the need for user interaction. To support the audio routing to the BT enabled car kit the device shall support the specifications listed in section 5.1.64.1 of this document.


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#### 5.1.21.5 DISCONNECTION OF A PAIRED BT ENABLED CAR KIT FROM THE DEVICE <VZW-REQS-119-694>

BT327 When the device is paired up with an external BT enabled car kit and is in the process of routing the audio from an application to the external BT enabled car kit using the specifications listed in section 5.1.64.1 and the BT link gets disconnected by the following:

- The device roaming out of the BT range of the car kit
- The power to the car kit is removed.
- By user interaction from the car kit

The device shall bring down the BT link. The device shall also bring down the audio path and exit successfully the pseudo voice call audio scenario and shall start routing the audio to the device speaker automatically without the need for user interaction.

##### 5.1.21.5.1 Re-establish Link <VZW-REQS-119-695>

BT328 If the Bluetooth link is re-established, the audio associated with an active application shall be routed to the BT enabled car kit using the specifications listed in section 5.1.64.1 of this document.

## 5.2 DEVICE TO/FROM ACCESSORIES AND ASSOCIATED DEVICES BASED <VZW-REQS-119-696>

For VZW branded Bluetooth accessory requirements, refer to the VZW Accessory Requirements document.

### 5.2.1 CAR KIT SUPPORT <VZW-REQS-119-697-JUL2012>

For device vendors that support Bluetooth Hands Free Kits, the Bluetooth Carkit matrix shall be completed as part of the VZW Device Evaluation and Approval Process. Refer to VZW Device Compliance Test Entrance Criteria document for specific submission details.

Device vendors shall obtain the current Bluetooth Carkit matrix spreadsheet template "OEM_BT_Model_Car_Kit_Support.xls" located on VZW Device Requirements and Compliance Test Plans document portal under folder:
Device Requirements > Document Library > VZW-Branded Documents > Device Development Submission Documents

### 5.2.2 ACCESSORY COMPATIBILITY EVALUATION - (FILE UPDATED 3/08) <VZW-REQS-119-698>

Device vendors must complete the attached file as part of the VZW Device Evaluation and Approval Process. Refer to VZW Device Compliance Test Entrance Criteria document for specific submission details.

# 6 Scenarios <VZW-REQS-119-699>

This section describes the information flow between the system and the device that support the offer in the form of message sequences, user interactions, data storage, etc.

## 6.1 NETWORK & DEVICE MESSAGE TRANSMISSION & RETRIEVAL – N/A <VZW-REQS-119-700>

## 6.2 DEVICE TO DEVICE (PEER TO PEER) <VZW-REQS-119-701>

This section defines the events and responses of similar and different devices interacting. Critical intervals shall be labeled and described in this section and quantified in the Performance Section 8.

## 6.3 ERROR CONDITIONS AND CAUSE CODES <VZW-REQS-119-702>

This section defines the error conditions between the network and device, device and roaming networks, non-capable devices or networks and where appropriate referring to the user interactions defined in User Interface Section 3. Critical intervals should be labeled and described in this section and quantified in the Performance Section 8.

## 6.4 INTERRUPTIONS <VZW-REQS-119-703>

See Feature Interactions, Interruptions, Matrix in VZW Feature Definitions Requirements document

### 6.4.1 INCOMING CALL <VZW-REQS-119-704>

The Device shall behave in the same way that it would if the Bluetooth link were not present.

### 6.4.2 REMOTE DEVICE ROAMS OUT OF BLUETOOTH RANGE OR BLUETOOTH HEADSET LOSES POWER <VZW-REQS-119-705>

BT330 If the remote device roams out of range of the Bluetooth link or the Bluetooth Headset or Hands-free device loses power, the Device shall remain in the same state of any network connection and wait for the Bluetooth Headset or Hands-free device to re-establish the Bluetooth link. In order to avoid a race condition with the Bluetooth Headset or Hands-free device, the remote device shall not attempt to re-establish the Bluetooth link. The assumption is that the Bluetooth Headset or Hands-free device will attempt to re-establish the Bluetooth link. The specified security procedure will apply to the re-establishment of the link.

#### 6.4.2.1 CLAMSHELL OR SLIDER OPEN, OR CANDYBAR <VZW-REQS-119-706>

If a clamshell or slider type device is open or the device is a candy bar style and the user has not manually transferred an active call to the device through the device UI, then the device remains in the same state of network connection for a maximum of 30 seconds without audio transfer to device. A prompt to transfer the call to device with countdown timer shall display for 30 seconds. This prompt shall allow the user to resume the connection with the active call at which


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point any audio associated with the active call is transferred to the device. If user does not resume within 30 seconds, the active voice call shall be dropped. If Bluetooth link is re-established prompt for transfer of audio to device shall disappear and device shall follow procedure in 6.4.2.3.

#### 6.4.2.2 CLAMSHELL OR SLIDER CLOSED <VZW-REQS-119-707>

If either a clamshell or slider device is closed then the device remains in the same state of network connection for a maximum of 30 seconds

- If the user opens the device, presses the speakerphone button (if available within the 30 seconds, any audio associated with an active call shall be transferred to the device and the device displays an informative notification with an audible beep played through the alert path.
- If device remains unchanged, then after 30 seconds any active voice call shall be dropped.

#### 6.4.2.3 RE-ESTABLISH LINK <VZW-REQS-119-708>

BT333 If the Bluetooth link is re-established, the audio associated with an active call is routed to the Bluetooth accessory and an informative notification is displayed with an audible beep through the Bluetooth link.

If the Bluetooth link is re-established during an active call which the user has manually transferred the active call to the device through the device UI, then active call shall remain on device and there shall not be an informative notification or audible beep. After the call has ended, all audio shall return to the Bluetooth accessory.

### 6.4.3 BLUETOOTH AUDIO HEADSET AND HANDSET INTERACTION <VZW-REQS-119-709>

The device shall meet the relevant Bluetooth requirements in the VZW Audio Quality and Performance document[40].

### 6.4.4 FAILED MANUAL CONNECTION ATTEMPT TO A PAIRED DEVICE <VZW-REQS-119-710>

BT335 The handset shall inform the user that “Bluetooth Connection Failed” when a manual connection fails to a previously paired device that is:

- In pairing mode
- Turned off
- Out of range


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# 7 Provisioning <VZW-REQS-119-711>

## 7.1 DEFAULT BLUETOOTH STATE <VZW-REQS-119-712>

BT336 The factory default for Bluetooth shall be set to off. Subsequent power cycling of the phone shall put the Bluetooth power setting to the state the device was in before powering off.

## 7.2 DEFAULT DISCOVERABILTY MODE <VZW-REQS-119-713>

BT337 The Device shall have the Bluetooth in non-discoverable mode by default every time the Device is turned on.


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# 8 Performance <VZW-REQS-119-714>

## 8.1 ELECTRICAL <VZW-REQS-119-715>

## 8.2 RADIO SPECIFICATIONS <VZW-REQS-119-716>

### 8.2.1 GENERAL <VZW-REQS-119-717>

BT338 The Bluetooth radio interface shall be compliant to Part A Radio Specification of the Bluetooth specification. All performance aspects shall be met with the cellular transmitter active at maximum power.

### 8.2.2 POWER CLASS AND OUTPUT POWER <VZW-REQS-119-718>

BT339 Devices shall support Power Class 2 as per Part A Radio Specification of the Bluetooth Specifications. This is defined as having an output power less than +4 dBm. If no antenna connector is available a 0dBi antenna is assumed and calculations shall be adjusted accordingly.

### 8.2.3 POWER CONTROL & RSSI <VZW-REQS-119-719>

BT340 As per Part A Radio Specification of the Bluetooth Specifications, power control shall be supported as defined in [9] and used to preserve battery life and minimize risk of eavesdropping wherever possible.

An RSSI should be used to implement the power control.

### 8.2.4 RECEIVER SENSITIVITY <VZW-REQS-119-720>

BT341 As per Part A Radio Specification of the Bluetooth Specifications, the minimum radiated sensitivity shall be equivalent to a conducted sensitivity of –70dBm with a 0dBi antenna for a raw BER of 0.1%. This performance shall be met with the cellular transmitter active at maximum power.

### 8.2.5 DEGRADATION OF CELLULAR RECEIVER PERFORMANCE <VZW-REQS-119-721>

BT342 The cellular receiver performance specifications described in the document A002 – Feature Definitions [29] shall be met with the Bluetooth transmitter active at maximum power and modulated with a reference signal as defined in section 4.7 of [2]. Of special interest is the affect that the Bluetooth operation can have on the following.

- Sensitivity
- Spurious Frequencies
- Single Tone Desensitization (blocking)
- Two signal Intermodulation

### 8.2.6 OUT-OF-BAND SPURIOUS EMISSIONS <VZW-REQS-119-722>

BT343 The out-of-band spurious emissions shall comply the FCC regulations parts 15.247, 15.249, 15.205 and 15.209 with the Bluetooth transmitter active at maximum power modulated with a reference signal as defined in section 4.7 of Bluetooth Core Specification.


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# 9 BT344 Security <VZW-REQS-119-723>

The following aspects of security shall be adopted.

1. On initial power up any non-cellular radio shall be defaulted in the off position. (partially for security, partially for power management)
2. Bluetooth devices shall be defaulted into non-discoverable mode except when the user initiates discoverable mode the device shall become discoverable for 60 seconds, at which time it shall return to non-discoverable mode.
3. When devices are deleted from a paired list any existing connections shall be terminated.
4. All ports/services should be subject to individual authentication, i.e. just because you accept a VCARD from a device, that device shall not be placed on a permanent trust list with access to all other profiles/ports/services. Also, no temporary trusted state shall be given to a device during an OBEX transfer. (this is to protect against BlueStep, BlueBump, Headset Masquerade)
5. Unused Protocol Service Multiplexer (PSM) channels shall reject connections.
6. OBEX PUSH channel shall allow connections to OPUSH profile only, or reject any connections that specify a target, since OPUSH does not require a target (protection against BlueSnarf++)
7. Unused Protocol Service Multiplexer (PSM) channels shall reject connections (protect against an L2CAP Denial of Service (DOS) attack).
8. VCARD parser shall be capable of rejecting oversize VCARD's and issue an error or an unexpected or missing input statement for incorrect or malformed VCARDs. (Protection against DOS attacks.)
9. OBEX PUSH shall only send the default business card. (protection against BlueSnarf)
10. All RFCOMM ports SHALL be subject to authentication. (protection against BlueBug)
11. ACL connections shall be denied to untrusted or unpaired devices when in non-discoverable mode if applicable. To prevent L2CAP 'ping' while device is in non-discoverable mode and SDP being browsable by unknown devices while in non-discoverable mode. (type of BlueSmack DOS attack).
12. If a device is sent a payload that exceeds the maximum transmission unit (MTU) (65,535bytes) L2CAP shall reject the data with a denied response and not pass the payload on to a higher layer in the stack. (protection against BlueSmack).


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# 10 References <VZW-REQS-119-724-Dec2011>


1. Bluetooth Core Specification v1.1
2. Bluetooth Core Specificationv1.2
3. Bluetooth Core Specification v2.0 + EDR
4. Bluetooth Core Specification v3.0
5. Bluetooth Core Specification v4.0
6. Object Push Profile v1.1
7. File Transfer Profile v1.1
8. Headset Profile Specification Part K:6 Bluetooth Specification v1.1
9. Handsfree Profile Specification Hands-Free Profile Adopted v1.5
10. Dial Up Networking Profile Specification Part K:7 Bluetooth specification v1.1
11. Phone Book Access Profile Specification v1.0
12. Generic Access profile Specification, volume 3, Part C of Bluetooth Core Specifications
13. Service Discovery Profile Specification, volume 3 Part B of Bluetooth Core Specifications
14. “Cracking the Bluetooth PIN”, Shaked & Wool, 2005
15. “Bluetooth Security White Paper”, Bluetooth SIG Security Expert Group, May 14 2002
16. Human Interface Device Profile v1.0
17. Personal Area Network Profile v1.0
18. ETS 300 916, “Digital Cellular Telecommunications System (Phase 2); AT command set for GSM Mobile Equipment (ME) (GSM07.07 version 7.5.0)
19. ETS 300 585, “Digital Cellular Telecommunications System (Phase 2); Use of Data Terminal Equipment (GSM 07.05 version 4.8.1)
20. Advanced Audio Distribution Profile v1.2
21. Generic Audio/Video Distribution Profile v1.0
22. Audio/Video Distribution Transport Protocol v1.0
23. Audio/Video Remote Control Profile v1.4
24. Basic Printing Profile v1.0
25. Basic Imaging Profile v1.0
26. Infared Data Association, IrDA Object Exchange Protocol (IrOBEX) Version 1.2 April 1999
27. Synchronization Profile v1.1
28. Video Distribution Profile v1.0
29. Health Device Profile v1.0
30. Message Access Profile v1.0 (v10r00 or newer version)

For device vendors using a Qualcomm chip set, refer to Qualcomm document 80-V6624-1 on Bluetooth audio format support.

Verizon Wireless specific documentation

31. Verizon Wireless Device Feature Definition/Requirements
32. Verizon Wireless Device Testing Process
33. Verizon Wireless Device Compliance Test Entrance Criteria

34. Verizon Wireless Mobile Station User Interface
35. Verizon Wireless Connectivity Requirements
36. Verizon Wireless Data Requirements
37. Verizon Wireless Converged Devices
38. Verizon Wireless Accessory Requirements
39. Verizon Wireless Multi-Mode 1xEV-DO/1xRTT Device Requirements
40. Verizon Wireless Audio Quality and Performance Requirements
41. Verizon Wireless Digital Rights Management Requirements
42. Verizon Wireless Mobile Station User Interface Requirements
43. Verizon Wireless – VZWGlossary
44. Verizon Wireless – Data Throughput Lab Test Plan


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