BT-AN-0050 (BRF6510 BRF6300 System integration Notes Rev 0.9)

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ABSTRACT

This document is a collection of BRF6150 and BRF6300 firmware tips, operational notes and explanations, derived as a response to customer questions.

It should be used together with BRF6150/6300 firmware release notes and BT specification Guidelines

Contents

1 Paging and accept connection at the same time

Question:

Is it possible to initiate an paging process at the same time as we accept an incoming call?

- Accept incoming call (ongoing), Device A <-- Device B.

- At the same time, initiate a paging process, Device A --> Device C.

- In the future, there will be more than 7 devices to be connected to, so new concepts about efficiently connecting devices are needed.

- Parallel paging should not be much longer than single paging - about 10% time would be acceptable.

- Interlaced page scan requires too much current.

Answer:

The BRF6150 will accept the connection request at the link level (Device A <--> Device B), but will not process it until paging is complete.

2 Paging and SCO connection at the same time

Question:

During an paging process is it possible to initiate a SCO/eSCO connection with HV1 packet type?

- Paging process, Device A --> Device B.

- During paging initiate an SCO/eSCO connection with HV1 packet type (e.g. Car Kit, HS) depending on

  an incoming call, Device A --> Device C.

- Is it possible to Create a HV1 SCO link while paging a different device

Answer:

No. Paging must complete before any SCO connection can be initiated.

3 Delay after RTS low during power up

Question:

After RTS goes low, they send Read BD Address and the command Complete arrives 15mS later.

- What is done after we lower RTS that makes the response time slow?
- What is max time needed to wait for the command complete?

Answer:

As a request from customers, the RTS goes low as soon as the UART transport is functional, but before all the initialization process is complete. The reason is to save time. At some customers, the host CTS line is the trigger to initialize the BT stack and since that takes time as well, the overall init time can be reduced. In case a command is sent to the BRF prior to it being ready to execute it, it will pend until such time.

With a 26Mhz clock, the BRF6150 will respond within 100ms. With slower clocks, the host timeout should not be at least 200ms.

4 HCI_Status_Event timing

Question:

How long does the host need to wait for a HCI_Status_Event?

Answer:

The host timeout for a Status Event response should be set to 30 seconds.

The BRF6150 handles one transaction at a time. New HCI Commands are not handled until the previous transaction is completed. A transaction can be prolonged due to a Page, Inquiry, Sniff interval or LMP response. Inquiry and pages are normally not longer than 5 seconds. If a transaction is pending on a Sniff connection, then 1 or 2 Tsniff's would normally get it done.

The longest it would take for a transaction to complete is in case an LMP is sent out but not acknowledged by the remote (bad RF for instance). In this case the Baseband timer that applies is the 'LMP timeout' which is 30 seconds. At this point the connection is dropped and any transaction on the connection is terminated.

5 Wrong order of event responses when create eSCO and HCILL enabled

Question:

ACL Connection in Sniff Mode. Try to establish a eSCO Connection. Then send the enable HCIll command. Response from BRF6150 is to first send a HCILL_SLEEP_IND, then a HCILL_WAKEUP_IND and only afterwards a command status event for the create connection command.

Answer:

This is valid behavior according to our low power protocol HCILL implementation and BRF6150 operation:

The HCILL sleep responses are sent immediately as per HCILL protocol. The Status event is only sent when we start processing the create connection command. In this case, there is the connection-parameter negotiation that needs to be completed before the status event is returned. Since the connection is in Sniff, this negotiation happens at the next Tsniff and therefore the delay.

6 Lost audio packets

Question:

What happens with audio samples which are lost over the air link?

Answer:

PCM type	Replacement PCM data	CVSD air data
Linear	0x0000	0xaaaa (silence)
uLaw	repeat last good byte	repeat last byte
aLaw	repeat last good byte	repeat last byte

For eSCO packets there is also an option to accept packets with bad CRC.

7 AFH in Park mode

Question:

Describe the use of AFH in Park mode

Answer:

AFH is disabled automatically by master when it puts a slave into park mode.

It is re-enabled automatically when slave exits park mode.

8 Behavior of HCI_Reset

Question:

Does the SW reset initialize the overall internal RAM as well? What about the BD address, is it initialized again? Does it restart with H4 or H5 synchronization. What about the H5 settings, UART FIFO etc?

What about IO settings / pulls?

Is the only difference between cold and warm start really the baud rate only?

Required: A high level chart on the boot sequence, that describes the state where the SW reset enters and what exactly is not initialized again.

Answer:

The following sections describe the state of the BRF device after an HCI_Reset command is issued by the host. In general, it is recommended for the Host to regard HCI_Reset as if it was a Power On reset, and resend the Init Script with all the patches, chip configurations (RF registers, HW registers etc.), system configurations (voice Settings, codec configuration, etc.).

HCI_Reset procedure

The following are the BRF6150 actions after receiving a HCI_Reset from the host:

- The BRF sets the Host's CTS high to indicate nothing more is to be sent.
- The BRF disables all interrupts to make sure nothing interferes with the reset process.
- The BRF resets and initializes the software and some of the Hardware subsystems.
- Interrupts are enabled again.
- The BRF sends the Host a Command Complete event to indicate that the HCI_Reset command was completed.
- The BRF sets the Host's CTS low to indicate it is ready for operation

Things that do not change after HCI Reset

- If an event/data is already being transmitted to the host, the reset process will wait for its completion.
- The same transport settings are kept (baud rate, H4 or H5 etc.).
- RAM is not erased so patches remain in memory.
- I/Os levels and pulls stay untouched.

- Sleep mode does not change. If Deep Sleep was enabled before the HCI_Reset, it remains enabled after the reset.

Things that are reset to default after HCI Reset

- All software variables.
- All buffers are released, so all history from prior to the reset is erased.
- All timers are reset. That includes Link Supervision Timeout, LMP timeout, Host timeout Just_Wakeup_Timer etc.
- All processes are restarted. All previous operations are stopped (Inquiry, Inquiry scan, Page scan etc.).
- The BT Core is reset (all HW registers).
- Clock detection is restarted.
- Frequency hopping is initialized.
- DMA is initialized.
- Interrupts are turned off at the beginning of the HCI_Reset process and are enabled towards its completion.
- Power algorithm (increase/decrease power) is reset.
- Link Manager is initialized.
- RF sub-chip is reset - all RF registers go back to their default.
- Power On Test is re-run.
- BD Address returns to the factory default.
- The Firmware version is re-read and sent to the Tx debug.
- UART FIFO is cleared (except for the packet was already in process when the HCI_Reset process started).
- Voice settings return to default.
- CODEC configuration returns to default.
- FREF returns to default.
- Settling Time returns to default.

9 Exiting and re-entering Park

Question:

When a slave exits park, master has problems to park it again.

- 2nd Park from Master works.
- If the Master waits 4sec. between Number_of_Completed_Packets and park, it works.

Answer:

When the slave initiates exit park, it will reject park requests from the Master for a duration of 1 park beacon interval. This feature was implemented to avoid cases where the master re-parks the slave before it can send anything to the master (like in the case of Auto Unpark).

10 Problems with changing baud rate

Question:

Customer is sending:

Send HCI_VS_Update_Uart_HCI_Baudrate.

Get Command_Complete

Send H5_ACK

Change Baudrate.

Send Command (on new Baudrate).

Get no response from Chip.

Answer:

BT is not receiving the "Send H5 ACK" because the baud rate is changing in the middle of this command.

Note BRF6150 takes 1-2mS to change baud rate after receiving the Change baud rate command.

Suggested solution:

Send HCI_VS_Update_Uart_HCI_Baudrate.

Get Command_Complete

Send H5_ACK. Wait until host Uart has physically finished sending ACK (Uart idle).

Change host baudrate.

Host to wait 2mS.

Send Command (on new Baudrate).

11 ScriptPad BTS handling of "any" in init script

Question:

When using the BTS ScriptPad application, it is not clear how it actually handles the "any" within the wait HCI command complete event. For example:

Send_HCI_VS_Enable_RF_Calibration 0xFF90, 0, 0xFFFF
Wait_HCI_Command_Complete_Event 5000, any, 0xFF90, 0x00

How does the BTSApp know what to do with it? How it is handled?

Answer:

The parameter "any" corresponds to Num_HCI_Command_Packets and tells the BTS application to ignore this parameter.

ScriptPad changes the "any" to 0x00 since the BTS format only allows 0x00 or 0x01. How this is used depends on the BT stack software. Today for example the MS stack does not really read the value of the response, just waits for a response. This is what is provided in the code example.

If the customer implementing the code wishes to wait for exact responses it must be implemented in their code.

12 Master communication with slaves during inquiry or page scans.

Questions:

- If a master to several slaves does an Inquiry/Page scan in order to find or to connect to new devices, will the chip still allow some minimum data traffic to / from the connected slaves? If not: does the chip at least POLL the slaves (and expect an answer from the slaves)?
- The phone has a SCO connection to a headset and the user wants to send some data to - for example a laptop. The phone performs an inquiry or page to detect the laptop. While doing this the user still needs to be connected to the headset.
- The phone has a data link connection to a laptop and is transferring a large file (which may take several minutes to transfer) - the user also wants to make another connection to for example send a business card. In this case the data link must not be lost.

Answers:

- A master to several slaves does not poll existing slaves while performing Inquiry or Page. It only transmits broadcast NULL packets in order to keep the slaves synchronized to master's clock.
- Transmission and reception of SCO packets are guaranteed during Page or Inquiry.

- The master in the file transfer connection maintains by broadcast NULL packets that are sent by the master during Page or Inquiry. The reception of those packets keeps the slave synchronized to the master's clock. Data transfer is resumed after Page or Inquiry is finished.

13 Turning off internal clock oscillator cell

Question:

BRF6150 powers up with internal crystal oscillator cell on. The causes the following problems when using external oscillator:

DC voltage of 1.6V present on the XTALP pin

Waste of current in BRF6150

Impedance problems for input signal.

Answer:

Upon chip startup, the internal oscillator circuit cell is turned on in order to allow operation of an external crystal as the fast clock source. This causes a DC voltage of 1.6V is present on the XTALP pin (from ANA_LDO, through a 100K resistor and a control signal).

When an external fast clock is supplied AC coupled, its p-p amplitude is summed with the 1.6 DC level and exceeds the limits of the XTALP pin inputs. This causes the ESD protection diode to conduct and a low impedance is seen.

Solution: The internal oscillator cell must be shut down by the following vendor specific command (only required once at power up or exit from nSHUT_DOWN):

*Send_HCI_VS_Write_RF_Register 0xFF61, 0x61, 0x2000, 0x00, 0*x00

14 Restore time for AFH bad channels

Question:

Unmasking bad channels after removing WLAN interferer is very slow. Problem was found during test session with Anritsu Tester MT8852 during UnplugFest 20.

Setup: AFH Test with WLAN Interferer.

It turned out that BRF 6150 detects bad channel quite quick but after removing the interfering channels the last masked channel pair did not recover for up to 2 minutes.

This behavior is no real bug, but decreases data throughput unnecessarily as free channels are masked out for usage.

Answer:

The BRF6150/ BRF6300 can implement a faster return time for previously bad channels. Three minutes was chosen as the correct balance between available channels and the risk of restoring a channel that is still bad (and would therefore require many retransmissions).

The channels are restored only if the last 3 quick learning channel map results indicate that they are good. When there is no interfere then the quick learning measurement is every 1 minute, Therefore, theoretically, the channels may be returned after 3 minutes.

If the timer is reduced to less then 1 minute, the channel will be returned quicker, but it will use more power consumption and overall data throughput will decrease.

Note that removing a channel may not necessarily decrease data throughput, as there is only a reduced number of frequencies. It will only reduce throughput if there is a lot of interference in the environment, but then if you have bad channels they are supposed to be removed.

15 Patch ram size

Question:

How many patches can the BRF6xxx accommodate and what ram size does this occupy?

Customer's SW department needs this information to define the Mobile Flash size area, which must be reserved for the Patch-RAM concept.

Answer:

BRF6150: 12 Patches max. 4KB ram max.

BRF6300: 24 Patches max. 4KB ram max.

16 Recommended sniff parameters

Question:

For data transfer on an ACL Link during Sniff Mode (using the sniff intervals):

Which sniff parameters are recommended? What are the limitations? Is it possible to send commands during sniff?

Answer:

There is no 'golden' parameter set for sniff. It depends on how fast a response is needed and how much data is expected to be exchanged.

Minimum sniff interval = 8.

It is possible to send commands and data in the sniff intervals

Sniff with Headset / Handsfree profile:

During this sniff mode the commands like volume up, volume down, hang up, etc., can be transmitted.

Sniff parameters for the best compromise of best interoperability, user experience and current consumption are required.

Recommend parameters: Tsniff = 0.5 - 1s, Attempts = 2 - 8, Timeout = 1 - 4

Sniff with Sim Access profile:

For this profile it is very important to get out of sniff fast. Car kit needs to establish ACL link to mobile sim card very quickly.

Shorten the Tsniff to 0.5 seconds. If for the actual transfer of data there is an exit sniff, then polls and timeout can be kept small since they will probably be used only for exiting sniff.

Sniff with HID profile:

When using HID for (e.g.) transmitting pressed keys or mouse activity within the sniff slots, keys pressed and mouse movement are sent without exiting Sniff. However these can not wait a long time. Therefore, shorted Tsniff to 0.5 seconds. Use more Attempts and Timeout to allow for more data to go through faster once the Tsniff comes around.

17 Recommended hold parameters

Question:

What is max usable hold time? What are our limitations?

What is max hold time possible before we lose sync due to clock drift?

Answer:

Although the BRF supports up to the specification limit, it is recommended to use a value that is less than 40 seconds., as more than that may be unreliable. When a Hold interval is requested that is longer than the LSTO, the BRF automatically extends the LSTO to compensate.

18 Recommended park parameters

Question:

What is park "golden range"? i.e. between too small - no advantage, and too large - lose sync due to clock drift.

Answer:

Normally recommended to use Sniff rather than Park. The reason is that there is absolutely no power saving advantage using Park. Park is also less interoperable as it is much more complex from sniff.

The only time when Park should be used is when there is a need to be connected simultaneously to more than 7 devices.

19 HCI processing order

Question:

If we send a HCI_Write_Link_Supervision_Timeout to the chip (chip is master to a remote slave), and then send a HCI_Inquiry / HCI_Create_Connection / HCI_Remote_Name_request directly afterwards, what will the chip do?

Will the chip first complete the HCI_Write_Link_Supervision_Timeout (so send the LMP command to the slave, wait for slave's answer, then give back the Command Complete to the Host), and then start the Inquiry / Page, or will the Inq / Page be done first, delaying completion of the HCI_Write_Link_Supervision_Timeout?

Answer:

BRF6150 processes the HCI commands by the order they are received from the host. In your example, when BRF6150 receives HCI_Write_Link_Supervision_Timeout and right after that HCI_Inquiry / HCI_Create_Connection / HCI_Remote_Name_request, it starts processing the HCI_Write_Link_Supervision_Timeout first. I.e. puts LMP command in the Link Controller TX buffer and sends HCI_Command_Complete to the host in order to enable it to send the next command. Only then, it starts processing the next HCI command (which is, in this case HCI_Inquiry / HCI_Create_Connection / HCI_Remote_Name_request).

20 Effects of fast clock phase jump on the BRF6300

Questions:

On some phones, the GSM fast clock (Bluetooth ext. clock input) shows a frequency jump of 0.1 ppm (which can be seen as basically a phase jump on the receiver / transmitter) whenever there is a GSM state change, e.g. from idle to active, from tx to rx, etc.

The worst case will occur when this frequency jump happens at the beginning of a symbol during a packet.

Q1: Assuming a fast clock of 26 MHz, 0.1 ppm results in a frequency change of 2.6 Hz obviously.

How will this affect 8DPSK modulation scheme?

A1: The instantaneous freq jump of 0.1ppm won't cause any harm. In Tx, the instantaneous freq-shift will be smoothed by the ADPLL's loop-filter and since the modulation is differential, this change won't be sensed.

Q2: In our BRF6300 product preview we state a Jitter of 42 pSRMS, which would be about 500 ppm for a 26Mhz frequency. Can you please explain what is the background of this jitter number? Where does this number come from? It seems high and incorrect for 8DPSK.

A2: The 42pSec jitter on Fref is not correct. It describes the peak-to-peak jitter. The true value for integrated jitter is 7.5pSec (which is 42pSec/6). This number comes from integrating the allowed phase noise in the Tx and Rx that won't cause degradation (-123dBc/Hz at 1KHZ and -130dBc/Hz at 10KHZ and on).

Another way of looking on this is by observing the amount of SNR error floor (either in dB or in DEVM). The 7.5pSec RMS-jitter comparing to 417pSec duration time will produce:

20*log10(7.5/417) = -34dB of error-floor which is 1.8% to the DEVM

Q3: 0.1ppm related to 2.4 GHz results in 240Hz frequency deviation, which after 1 symbol would give a phase shift of 0.09 degree. In relation to a 45 degree PSK, this is about 0.2% phase error. Is this sufficiently small not to cause and problems?

A3: No problems will be caused. The DEVM contribution should not be compared to 45degrees, the calculation should be as follows:

As mentioned, in case of 0.1ppm, the phase-shift within one symbol is deltaPhase=2*pi*deltaF*Tsym. This is given in radians. In order to convert it to DEVM (which is the "EVM" notation in case of pi-4DQPSK or 8DPSK), this phase-shift should simply multiplied by 100, to convert to percentage.

If, for example, there is a 0.1ppm freq shift than it will yield a 240Hz (on 2.4GHZ) which will produce 0.0015Radians. This is 0.15% DEVM on the Phase Domain contribution.

The DEVM is translated to SNR (assuming only ANGN) by the following formula:

SNR = 20*log10(1/DEVM-Phase).

This means that this 0.15% DEVM produces 20*log10(0.0015) = 56dB error floor.

The SNR required for working (BER of 1e-4) is 19.5dB (excluding all the implementation losses) for 8DPSK. This means that 56dB error floor won't cause any degradation.

In fact, the max instantaneous freq-shift that the BRF6300 can tolerate is about 3.5ppm (1ppm worst than the 2.5ppm of the BTS). This ppm will generate a 8500HZ freq shift. This will cause a 0.0528 Radians phase shift (which is 5.23% DEVM). This will be translated into 25.5dB error floor (which will degrade the sensitivity by 1dB).

Q4: When changing the GSM base station, there is about 2.5 ppm frequency jump, which would result into 2.2 degree. In relation to a 45 degree PSK, its about 4.8% phase error. Would this cause problems for the BRF?

A4: The main effect of a 2.5ppm jump in the clock will be that the center-frequency of the RF will jump 6kHz (out of 10khz stability allowed by the spec). This jump will be filtered by the ADPLL loop but on long packets the total “drift” resulting will still be 6khz. Taking into account internal ADPLL jitter, 2.5 ppm should be viewed as the maximum limit.

TI therefore recommends limiting the frequency jump resulting from clock instability during 1 packet to 1-2khz at most i.e. **<** 2ppm drift of the fast clock for each BT packet. This is particularly important if the jump occurs during the packet header, but less critical afterwards.

A larger jitter/drift/synchronizing with base-station (<20ppm) can be allowed over longer time covering many packets

21 HCI_VS commands with too few parameters

Question:

Send HCI_VS_Set_Sleep_Mode with only one Parameter 0x01 and do not send the 2nd Parameter. Nevertheless, the Host receives a Command Complete event with Status Success. After that the Chip tries to go into Sleep_Mode. The Chip can be woken if a remote device tries to connect, but if the Host sends a Wakeup_Ind, the chip does not respond.

Required: Please implement an indication that a Parameter count, Parameter value,... is not correct and
send this indication in the Status (like 0x11 = Unsupported Feature or Parameter Value, 0x12 = Invalid HCI Command Parameters).

Answer:

TI does do not plan to implement HCI_VS parameter checking in the BRF6300, other than that the number of parameters agree with the "length" specified in the VS, as currently being done.

The reasons are the following:

- We need to conserve Rom & Ram space and do not feel the extra code will be justified.
- Very few VS commands are actually used by customers and these are usually contained within the init script. This makes checking for this type of error (by the customer) relatively easy.
- The effects are usually obvious (to the customer) when an incorrect VS command is used. E.g. sleep mode does not work (as above).
- There are many different effects of wrong parameter sending and it is difficult to check for them all. E.g. valid parameter, but sent at wrong time.

22 Multiple paging simultaniously

Question:

Does BRF6300 support 2-3 simultaneous paging?

Answer:

This feature is supported by the following method: Multiple paging requests are queued in the BRF6300 create connection command list and then performed sequentially.

23 H5: BRF6150 does not reset after sync message.

Question:

H5 spec page 15 chapter 8.3:

If a SYNC message is received while in the Active State, it is assumed that the peer device has reset. The local device should therefore perform a full reset of the upper stack, and start Link Establishment again at the uninitialized State.

BRF6150 does not reset after SYNC message the chip does not Reset. It is still possible to inquire or page the Board.

- BRF6150 is in Scan Mode with H5.

- the Host sends a "SYNC Message"

- based on H5 spec: The host / host controller has to perform a RESET after getting the "SYNC Message"

- The BRF6150 is still visible for other devices?!

Answer:

According to the H5 spec, it is the host responsibility to perform the reset. It explicitly states that the Upper stack needs to be reset. Resetting of the device gives no indication to the host, but reset of the host stack will eventually perform an HCI_Reset, so BRF6150 does not need to internally reset in this case.

24 Frequency drift in BRF6150 during BT testing with ZOZO pattern

Question:

Some BRF6150 boards fail BT drift rate testing during measuring with the RHODE & SCHWARTS TS8960 & TS8965 Testers, [the test is done using the ZOZO data pattern (01010101…) in LOOPBACK mode]. The same measurements performed on the CMU200 or Agilent Bluetooth test set (E1852B), do not have this problem.

The measurements logs show the frequency drift and the frequency drift rate failed unexpectedly on all measured devices, if the DUT is placed in LOOPBACK mode, changing the setting to TX TEST makes the failures dissapeare. This occurs even with the TI BRF6150 evaluation board. Based on the measurements, the drift rate exceeds the 20 KHz limit that is specified in the Bluetooth standard.

Answer:

The BRF6150 does have a problem receiving data with the ZOZO pattern. This problem does not exist in the real world (due to data whitening) and is seen only with BT testers. This problem is due to the near zero IF freq (500 KHz) used in the BRF6150. This causes a DC effect which degrades the detector DC estimator. The Bluetooth specification takes this problem into account with the following:

Whitening mode: Whitening mode makes sure there will be no long sequence of 1010. If you test the BER with pattern which is slightly changed from the 1010 pattern (for example 1010 1010 1010 1011) the performance is OK.

The Bluetooth RF test specification makes special allowances when testing this kind of pattern, by specifying that only correctly received packets are to be considered, or that the TX test mode to be used instead of loopback mode.

From Bluetooth RF test specification 1.1, section 5.1.9.7 NOTES:

"Whitening must be disabled while the test case is performed. Alternatively it is allowed to use TX mode instead of loop back mode for sending the 1010.. bit pattern and 1111000 … bit pattern, if possible.

The test case should be performed using loopback mode. If so, the test system must ensure that the testcase is not failed due to not correctly recognized return packets or payload failure, i.e: The test system must provide a means to check the correct packet type.

However, if it is required and the test system does not provide a means to distinguish packet types, the TX mode might be used instead if supported by both, test system and IUT."

Different results will be obtained with different Bluetooth testers depending on the following: The BRF6150 indicates reception of a bad packet using the FLOW and ARQN bits in the header. The CMU 200, measures the drift only on packets which the DUT reports as being received correctly. The TS8960 / TS8965 testers, however, ignore these bits and measure the drift on all received packets. This leads to a higher number of failed packets.

25 BRF6150 periodic RF calibration

Question:

Part of BRF6150 power up sequence is DRP calibrations according to temperature and process. These calibrations require the use of the local oscillator. BRF6150 emission is what mentioned in the Out-of-Band Emission specification for RX and it has specific exceptions which are the LO Leakage frequencies. The highest emissions are at 2 x Fref and 1 x Fref.

This suggests the DRP calibrations occur during power-up only?

If the device is in deep sleep and Page and Inquiry disabled, is there any RF activity or DRP calibration taking place?

Answer:

BRF6150 always calibrates the DRP at power up. In addition it calibrates the DRP periodically (approximately once every 5 minutes) in order to follow temperature changes.

Since the calibration involves running the local oscillator, it is done only if BRF6150 has no other RF activity running.

Even in deep sleep the device will wake up from time to time and perform the periodic DRP calibration.

26 Paging and inquiry during active connection

Question:

Why do active links sometimes fail during inquiry, paging or Remote Name Request (RNR)?

Answer:

Ideally before paging or inquiry, all ACL links should be placed in sniff or hold modes, to prevent timeout disconnect. If this is not possible, then the following must be noted:

Inquiry, paging and RNR's require communication with remote devices that are not synchronized to the sending device's BT clock. This requires extra slots and therefore the BRF device cannot maintain an active ACL link during this time.

The BRF, however, does do the following during inquiry, paging and RNR:

* Maintain links in sniff, hold and park

* Maintain voice (synchronous) links as usual.

* Broadcast a null beacon train, which can be used by slaves to maintain synchronization

It is recommended, therefore, is to set the ACL link into sniff, park or hold.

Q1) What happens when the peer device sends unsniff request during inquiry? Does the stack gets an event at all?

A1) The host gets mode change event and the link goes back into active mode. Therefore it is important that the supervision timeout is larger than the remaining inquiry time, or else the link will fail.

Q2) When setting a link into sniff, is there a max time until a mode change event is sent to host?

A2) The inquiry can be only started only after the mode change event is received by the host.

Q3) What to do if sniff, hold or park is unsuccessful or not possible?

A3) Need short inquiry period <10s.

27 Continuous TX stops in BRF6150

Question:

After sending the continuous command, continuous TX can be seen on the spectrum analyzer. However this stops after a few minutes. How can it be kept on.

Answer:

The BRF6150 does a periodic RF calibration every 5 minutes. This stops the continuous TX. You can use the following to disable periodic RF calibration, before enabling continuous TX:

Send_HCI_VS_Enable_RF_Calibration 0xFF90, 0xff, 0xFFFF
Wait_HCI_Command_Complete_Event 5000, any, 0xFF90, 0x00

28 Link power increase during sniff

Question:

Why does the power sometimes increase to a slave in sniff?

Answer:

Slaves in sniff mode are be treated the same as ACL connection from a power control point of view. Every Tsniff the device will be monitored through the sniff interval and the RSSI will be sampled every 25mS. However for sniff intervals > 400mS the BRF6150 master uses max power- when entering sniff mode it sends a series of increase requests until max power is received.

29 Output Voltage of Internal LDOs

Question:

What is the output voltage of the BRF6300 internal LDOs?

Answer:

LDO Name	PIN #	Output Voltage
BBLDO	A4, F8	1.1 [V]
ANABGAP V/I	B1	0.4 [V]
FLDO	H5	1.4 [V]
ANALDO	D2	1.3 [V]
RFIOLDO	F2	1.4 [V]
OSCLDO	G3	1.4[V]

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