AN214769

Collaborative Coexistence Interfaces - CYW20702

Associated Part Family: CYW20702

This application note describes the collaborative coexistence schemes available for use with the CYW20702 Bluetooth chip.

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1 Introduction

This application note describes the collaborative coexistence schemes available for use with the CYW20702 Bluetooth chip.

2 About This Document

2.1 Cypress Part Numbering Scheme

Cypress is converting the acquired IoT part numbers from Broadcom to the Cypress part numbering scheme. Due to this conversion, there is no change in form, fit, or function as a result of offering the device with Cypress part number marking. The table provides Cypress ordering part number that matches an existing IoT part number.

Table 1. Mapping Table for Part Number between Broadcom and Cypress

Broadcom Part Number	Cypress Part Number
BCM20702	CYW20702
BCM4319	CYW4319

2.2 Acronyms and Abbreviations

In most cases, acronyms and abbreviations are defined on first use. For a more complete list of acronyms and other terms used in Cypress documents, go to: http://www.cypress.com/glossary.

3 IoT Resources

Cypress provides a wealth of data at http://www.cypress.com/internet-things-iot to help you to select the right IoT device for your design, and quickly and effectively integrate the device into your design. Cypress provides customer access to a wide range of information, including technical documentation, schematic diagrams, product bill of materials, PCB layout information, and software updates. Customers can acquire technical documentation and software from the Cypress Support Community website (http://community.cypress.com/).

3.1 Problem

Bluetooth wireless devices and IEEE 802.11b/g Wireless LAN (WLAN) devices share the same 2.4 GHz Industrial, Scientific, and Medical (ISM) frequency band. Sharing the same frequency band inevitably results in collisions between the two signal types. This condition is a concern, especially when both Bluetooth and WLAN devices are installed in the same equipment.

Several factors affect the level of interference between collocated Bluetooth devices and WLAN devices:

- Physical separation between the WLAN and Bluetooth devices
- Amount of data traffic flowing over each link
- Power levels of the devices
- WLAN data rate

Also, different types of information have different degrees of sensitivity to the interference. For example, a voice link may be more sensitive to interference than a data link being used to transfer a data file. Bluetooth headsets and Human Interface Device (HID) links are especially sensitive.

3.2 Solution

The CYW20702 supports adaptive frequency hopping (AFH), which is included and described in the Bluetooth v1.2 specification. AFH is a non-collaborative coexistence scheme. In a non-collaborative scheme, no information is passed between the Bluetooth and WLAN devices. Instead, an AFH-enabled Bluetooth slave device identifies "bad" channels to the AFH-enabled Bluetooth master. These channels are then omitted from the channel map. This procedure ensures that WLAN and Bluetooth devices are not communicating simultaneously on the same channel. AFH is generally deemed insufficient in critical applications. It requires that both the master and slave be AFH-enabled and not backward compatible with Bluetooth 1.1 devices. Performance gains from AFH may be insufficient for audio, HID, and other sensitive applications. Thus, collaborative coexistence schemes are also supported by the CYW20702.

To facilitate collocation of the CYW20702 Bluetooth solution with WLAN devices, the supported collaborative coexistence schemes provide coordination between two MAC layers. Collaborative mechanisms involve a communication link between the two devices to mitigate interference. The supported collaborative coexistence schemes include standard three-wire and proprietary four-wire approaches using general-purpose I/O (GPIO) pins.

4 Concept Highlight

4.1 Atomic Sequence Defined

A discussion of the Cypress multiwire coexistence schemes must begin with a definition of the idea of an atomic sequence. The atomic sequence is a sequence of uninterruptible transmitting and receiving actions. The integrity of the atomic sequence allows the devices to maintain a reasonable communication channel defined by either the IEEE 802.11b/g standard or Bluetooth protocol semantics. Each of these protocols has its own mechanism for protecting these atomic units while occupying the medium. However, each device is not necessarily aware of the protocol of the other. Any break in the atomic operation causes retransmit or connection problems that seriously degrade network performance. The handshaking protocols described here protect the atomic sequence for both devices, thus achieving overall performance improvement.

An example of an atomic sequence is the typical Bluetooth transmit-receive transaction. Bluetooth transmissions are multiplexed in a time division duplex (TDD) fashion. Slave devices are allowed to transmit only in the slot immediately following the slot when the master device sends it a packet. This TX/RX (master) transaction is considered an unbreakable set. There are many other cases of atomic sequences in Bluetooth operations, such as the *connection process*, *from page*, *page response*, and *to connection establishment*. On the WLAN side, an example of an atomic sequence is a single TX/RX or RX/TX exchange that is separated by a short interframe space (SIFS) interval.

4.2 Host-Assisted AFH Channel Mapping

For platforms with collocated Bluetooth and WLAN devices, the dynamic channel classification algorithm can be unreliable. When there is insufficient isolation between the antennas, the RSSI scan measurements may be corrupted by receiver desensitization effects. The interference between WLAN and WPAN networks can be divided into two classes. The interference is said to be external if the interfering devices are physically separated by a distance of more than two meters. The interference is said to be internal if the devices are located at a distance of less than two meters, and devices are said to be collocated.

In these cases, dynamic channel classification is disabled and AFH channel mapping information is obtained from the host. This ensures that the entire WLAN band is marked as bad in the AFH channel map. If this is not accomplished, WLAN performance may be severely degraded. For a given fragmentation threshold, the WLAN packet duration increases as the modulation rate is decreased. Thus, if a Bluetooth transmission occasionally hops into the WLAN band, it may interfere with the WLAN packet. The access point (AP) or STA would then perform an exponential backoff delay before retrying the packet. This delay would drop the modulation rate further until the WLAN link becomes congested, slowing traffic to a crawl.

In host-assisted AFH channel mapping, the host obtains WLAN channel information from the collocated STA and then passes the AFH mapping information to the collocated Bluetooth device using a Host Controller Interface (HCI) command.

Another option is the use of a host-assisted initial map in conjunction with dynamic channel classification. This option enables updates to center channel data and provides the ability to mark as bad other 1-MHz channels where interference occurs (other WLAN networks, for example).

Collocated WLAN and Bluetooth interfaces on the same platform offer a unique opportunity to take collaborative coexistence methods to a new quality level. The 4.3 Supported Collaborative Coexistence Schemes section describes coexistence schemes that are designed to improve WLAN throughput as well as increase Bluetooth performance and robustness.

4.3 Supported Collaborative Coexistence Schemes

4.3.1 Three-Wire

The CYW20702 Bluetooth solution follows the guidelines of IEEE 802.15.2, which recommend providing a three-wire coexistence scheme. Priority and status information are passed between the two devices. Table 2 shows how the three wires are defined.

Table 2. Three-Wire Pin Assignment

Coexistence Signal	IEEE 802.11.2 Name	Pin Assignment
WLAN_ACTIVITY	TX_REQUEST	COEX_IN
BT_ACTIVITY	TX_CONFIRM(STATUS)	PCM_SYNC/COEX_OUT0
BT_PRIORITY_AND_STATUS	STATUS	PCM_CLK/COEX_OUT1

4.3.2 Four-Wire

When a Cypress Wi-Fi solution, such as the CYW4313, is collocated with the CYW20702, an additional coexistence signal can be used to convey more information. Table 3 shows how the four wires are defined. The 4th coexistence signal is generally connected to the Cypress WLAN device BTCX_FREQ pin (refer to the WLAN device data sheet).

Table 3. Four-Wire Pin Assignment

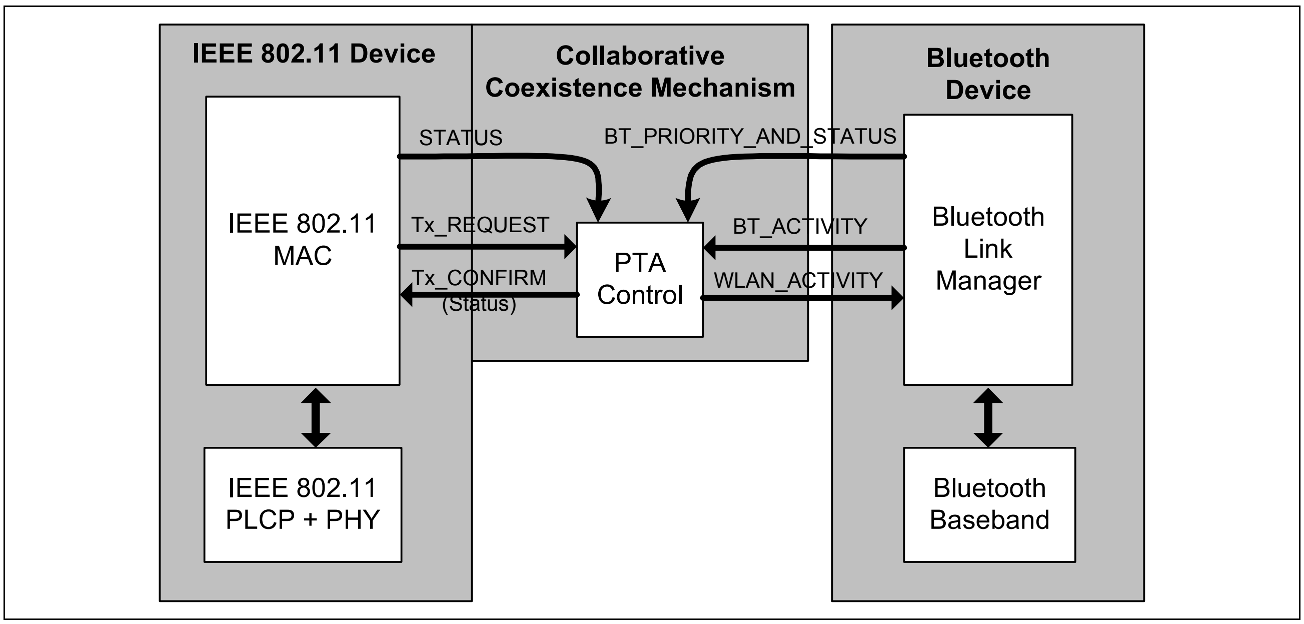
Coexistence Signal	IEEE 802.11.2 Name	Pin Assignment
WLAN_ACTIVITY	TX_REQUEST	COEX_IN
BT_ACTIVITY	TX_CONFIRM	PCM_SYNC/COEX_OUT0
BT_PRIORITY_AND_STATUS	STATUS	PCM_CLK/COEX_OUT1
BT_PRIORITY2	NONE (Cypress Proprietary)	PCM_OUT/COEX_OUT2

5 Three-Wire Coexistence Scheme

The Cypress three-wire coexistence scheme supported by the CYW20702 Bluetooth solution follows the guidelines proposed by the Draft IEEE 802.15.2 recommended practice Packet Traffic Arbitration (PTA) scheme. The PTA function is provided by the WLAN module. The Bluetooth module interfaces with the PTA by way of three pins defined as:

- WLAN_ACTIVITY (Tx_CONFIRM [STATUS])—This pin is driven by PTA to grant or deny Bluetooth medium requests.
- BT_ACTIVITY (Tx_REQUEST)—This pin is driven by the Bluetooth device to request medium access and signal Bluetooth activity.
- BT_PRIORITY_AND_STATUS—This pin is driven by the Bluetooth device to first signal priority and then RX/TX.

Figure 1. IEEE 802.11b/g/Bluetooth Coexistence Mechanism Structure—Adapted from IEEE Draft 802.15.2/D05-2002



The IEEE 802.11b/g MAC and Bluetooth link manager + link control entities provide status information to the PTA control entity. PTA control receives a per-transmission request on BT_ACTIVITY and issues a per-transmission confirmation on WLAN_ACTIVITY, which indicates to each radio whether or not the transmission can proceed. WLAN_ACTIVITY carries a status value of either *allowed* or *denied*. The discrete signals, BT_ACTIVITY request and WLAN_ACTIVITY confirmation, are exchanged for every packet transmission attempt as illustrated on Figure .1

5.1 Three-Wire Implementation Details

The interface consists of three wires:

- BT_PRIORITY_AND_STATUS
- BT_ACTIVITY
- WLAN_ACTIVITY

The BT_PRIORITY_AND_STATUS pin signals both the Bluetooth priority and Bluetooth Tx/Rx state. The BT_ACTIVITY pin is asserted by the CYW20702 when a Bluetooth transaction is pending. The WLAN_ACTIVITY line is sampled by the CYW20702 to verify that the medium has been granted.

At least 150 µs before the next BT slot, BT_ACTIVITY is asserted to indicate a pending BT transaction (see Figure 2: "Three-Wire Coexistence Timing Diagram," on page 5). Within 1 µs of the assertion of BT_ACTIVITY, the priority of the pending transaction is signaled by BT_PRIORITY_AND_STATUS. A high during the next 20 µs indicates high priority. Immediately following the signaling of priority, the BT_PRIORITY_AND_STATUS signal is used to signal TX or RX. A high on the signal indicates a TX will occur, and a low indicates RX. Within 55 µs following the signaling of priority, the PTA will either assert (active-low) WLAN_ACTIVITY to grant access to the medium or deassert WLAN_ACTIVITY.

5.2 Three-Wire Priority

Table 4 lists examples of priority assignments. Care must be taken in setting priorities, and customers should work closely with Cypress support when considering making priority changes.

Table 4. Priority Assignments

Priority	Description
High	SCO-HV2, SCO-HV3, Sniff mode (if replacing Park mode), page, page scan, Park mode, Hold mode
Low	ACL-DM1/DH1, ACL-DM3/DH3, ACL-DM5/DH5, master/slave switch, inquiry, inquiry scan

The CYW20702 is able to modify these priority assignments using configuration records or vendor-specific HCI commands. Bluetooth activities not listed in Table 4 would, by default, be assigned a low priority.

5.3 Three-Wire Timing Parameters

The CYW20702 three-wire coexistence timing is illustrated in Figure 2, and the coexistence timing parameters are listed in Table 5.

Figure 2. Three-Wire Coexistence Timing Diagram

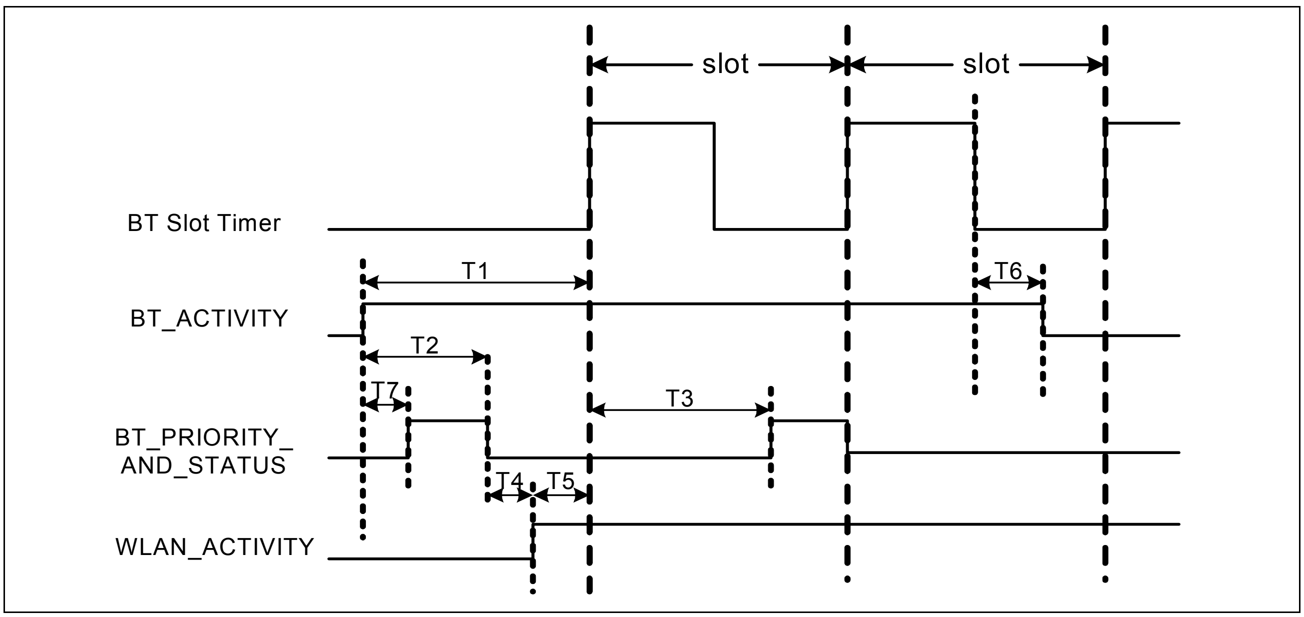


Table 5. CYW20702 Coexistence Timing Parameters

Timing	Minimum	Maximum	Units
T1	150	200	μs
T2	15	20	μs
T3	–	400	μs
T4[a]	–	55	μs
T5	75	–	μs
T6	–	25	μs
T7	–	1	μs

a. Depends on T1, T2, and T5. T4 represents the time for the PTA to process information.

6 Four-Wire Coexistence Scheme

The packet traffic arbitration (PTA) that is employed in Cypress devices is an extension of the PTA recommended by IEEE 802.15.2 and is designed as a part of the WLAN subsystem. The PTA and Bluetooth share a set of inputs and output that is based on IEEE 802.15.2.

Figure 3. PTA Architecture.

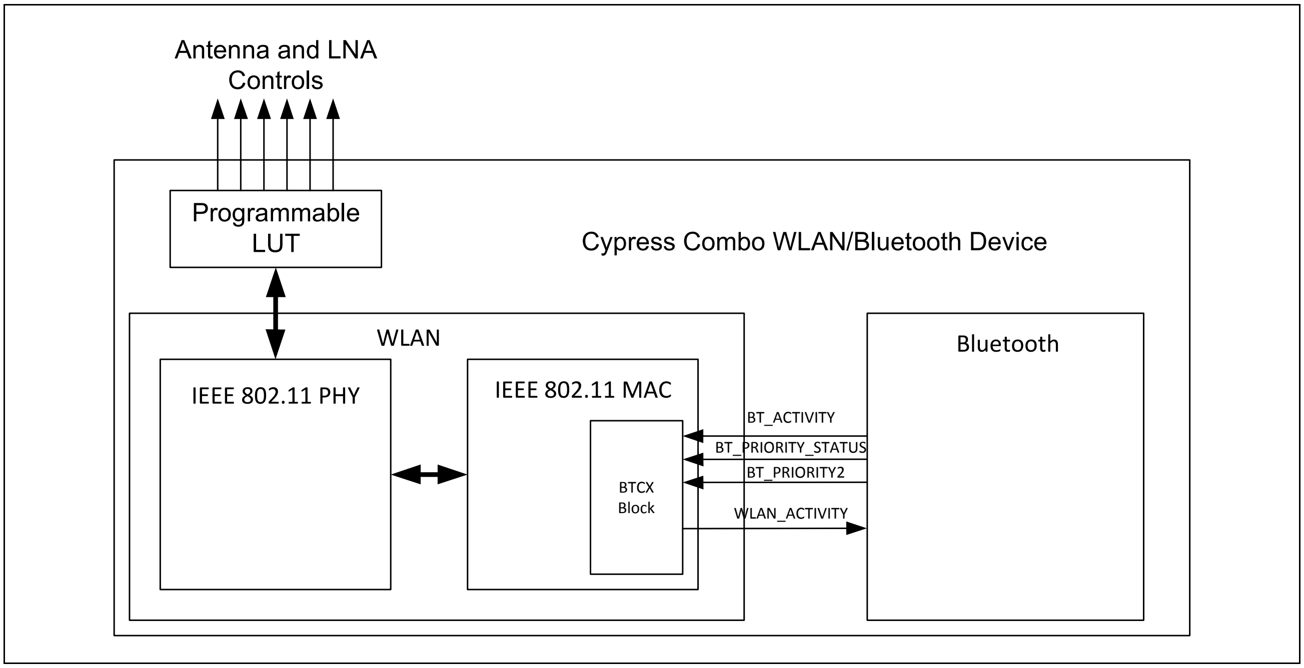


Table 6. PTA Signaling

PTA Signal	Description
BT_ACTIVITY	Asserted prior to upcoming Bluetooth activity. The lead time is programmable.
BT_PRIORITY_STATUS	BT priority and BT RX/TX status
WLAN_ACTIVITY	Medium access confirmation; permission for Bluetooth to receive or transmit.
BT_PRIORITY2	Signals a high priority Bluetooth transaction.

PTA, which operates at the WLAN MAC layer, provides per-packet authorization of all transmissions talking place between collocated WLAN and Bluetooth devices. A Bluetooth device requests medium access authorization from PTA, which may either allow or deny, depending on the status of the WLAN device. WLAN programs PTA into one of the following four settings:

- PTA grants all Bluetooth medium requests.
- PTA grants high priority Bluetooth requests only (the BT_PRIORITY_STATUS signal is asserted at the time when BT_ACTIVITY is asserted).
- PTA grants high priority Bluetooth requests (the BT_ PRIORITY_STATUS signal is asserted or the BT_PRIORITY2 signal is asserted at the time when BT_ACTIVITY is asserted).
- PTA does not grant any Bluetooth medium requests.

The PTA setting is changed dynamically by the WLAN device and is dependent on the WLAN activity at the time of the request.

7 Using Coexistence

7.1 Hardware Considerations for Collocation

The following guidelines should be observed when collocating the CYW20702 with a WLAN adapter:

- Minimum antenna spacing: ~5 cm
  - Worst-case path loss: ~14 dB
- Maximum antenna spacing: ~30 cm
  - Based on laptop dimensions
  - Worst-case path loss: ~30 dB

Note:

- An IEEE 802.11b/g WLAN device is a 20 dBm transmitter.
- A Bluetooth wireless device is a 0 dBm transmitter.
- A Class 2 Bluetooth device is a 4 dBm maximum transmitter.
- A Class 1 Bluetooth device typically transmits at levels up to 10 dBm.

7.2 CYW20702 GPIO Pin Assignments

Note: Pin assignments are subject to change. Refer to the CYW20702 data sheet for updated information.

Table 7. CYW20702 GPIO Pin Assignments

Pin Number	Pin Name	Description
B6	COEX_IN	Coexistence signaling between Bluetooth device and WLAN device Built-in programmable internal pull-up and pull-down
G5	PCM_CLK/COEX_OUT1	Coexistence signaling between the Bluetooth device and the WLAN device Built-in programmable internal pull-up and pull-down
C4	PCM_SYNC/COEX_OUT0	Coexistence signaling between the Bluetooth device and the WLAN device Built-in programmable internal pull-up and pull-down
F5	PCM_OUT/COEX_OUT2	Coexistence signaling between the Bluetooth device and the WLAN device Built-in programmable internal pull-up and pull-down

7.3 Configuring Collaborative Coexistence

Collaborative coexistence is configured in the project-specific configuration file provided by a Cypress representative. Many of these settings can be customized further using a vendor-specific HCI command. This section describes the parameters of the VSC HCI_WRITE_COLLABORATION_MODE.

7.3.1 Write_Collaboration_Mode OCF 0x041

Description

This command writes WLAN/Bluetooth collaboration configurations.

Command Parameters

CS_Encoded Size: 1 byte

Type: uint8

Bit 7 This bit specifies the architecture and must be set to 1 (CYW2045 architecture).

Bits 6:0: Specifies the collaboration solution to use.

Value	Description
0x0	No collaboration
0x1	2-pin 2-pin solution
0x2	3-pin 2-pin solution
0x3	WCS

For both 3-wire and 4-wire coexistence, select 2 (3-pin 2-pin solution).

This first parameter shall have a value of 0x82 if 3-wire or 4-wire coexistence is used.

Priorities Size: 4 bytes (if present)

Type: uint32 (little endian)

Defines the priorities of Bluetooth tasks. A 0 bit indicates a low priority task, whereas a 1 bit indicates a high priority task. A setting of high priority for a particular task will cause the coexistence signal BT_PRIORITY_STATUS to be asserted high when priority is signaled.

Values (may be combined bitwise):

Value	Description
0x00000001	STANDBY
0x00000002	LOW_PRI_CONNECTION
0x00000004	AFH_RSSISCAN
0x00000008	BROADCAST
0x00000010	INQUIRY
0x00000020	PAGE
0x00000040	CONNECTION
0x00000080	DONT_RESET_LCU_MASTER_SCO
0x00000100	TPOLL
0x00000200	INQSCAN
0x00000400	PAGESCAN
0x00000800	MASTER_SLAVE_SWITCH
0x00001000	NEW_CONNECTION
0x00002000	SCAN_INVERSE_PRI_DURING_SCO
0x00004000	MODULO
0x00008000	HOLD
0x00010000	SNIFF
0x00020000	PARK
0x00040000	SCO
0x00080000	ESCO
0x00100000	HI_PRI_PAGESCAN
0x00200000	HI_PRI_CONNECTION
0x00400000	SLAVE_POLL_LMP
0x00800000	DISABLE_COEX_IF_AFH_ENABLE
0x01000000	DEFER_HIGH_PRIORITY_FRAME
0x02000000	INCREASE_PRIORITY_AFTER_DEFFER_ENABLED
0x04000000	DONT_RESET_LCU
0x08000000	NON_CONNECTION_HW_SUPPORT
0x40000000	PAGE_SCAN_HW_SUPPORT_BIT_0
0x80000000	PAGE_SCAN_HW_SUPPORT_BIT_1

RESERVED_1 Size: 2 bytes (if present)

Type: uint16 (little endian)

Set to 0x0000

Priority_Inverse_Threshold Size: 1 byte (if present)

Type: uint8

Effective if the priority INCREASE_PRIORITY_AFTER_DEFFER_ENABLED is enabled. This parameter is a number that specifies how many times the frame is deferred by the WLAN before its priority is increased. For example, if the value of this parameter is 100, after the frame is deferred 100 times (for 100 frames), the priority of the deferred frame is increased.

Configuration_Flags_1 Size: 4 bytes (if present)

Type: uint32 (little endian)

Additional configuration flags:

The configuration flag `HW coexistence mode` should be set for both 3-wire and 4-wire coexistence.

The configuration flag `5Wire support` is set to enable 4-wire coexistence. This option can be used if the collocated WLAN solution is one provided by Cypress, such as CYW4319, which supports the proprietary 4-wire coexistence scheme.

Values (may be combined bitwise):

Value	Description
0x00000001	COEX auto selection
0x00000002	COEX auto pad config
0x00100000	Back power workaround
0x00200000	Sample Rx
0x00400000	Dynamic LCU reset
0x00800000	Simurx workaround
0x01000000	5Wire support
0x02000000	A2DP_ACL_Priority_inv
0x04000000	EIR scan mode
0x08000000	Nonconnection LCU reset
0x10000000	Connection HW support
0x40000000	Nonconnection multi-sampling
0x80000000	HW coexistence mode

Configuration_Flags_2 Size: 4 bytes (if present)

Type: uint32 (little endian)

Additional configuration flags:

Values (may be combined bitwise):

Value	Description
0x40000000	PS and FHS low priority
0x80000000	LMP high priority

The following are examples of the execution of the VSC HCI_WRITE_COLLABORATION_MODE using Cypress BlueTool™:

3-wire configuration

```
com4@115200: 5/5/10 10:14:58.539                # HCI Command

HCICommand

{[41 FC 10]: 82 30 19 05 C9 00 00 64 00 00 00 90 00 00 00 00}

# opcode = 0xFC41 (64577, "Write_Collaboration_Mode")

# CS_Encoded = 0x82 (130)

# Architecture = 0x1 (1, "2045")

# 2045_Collaboration_Solution = 0x2 (2, "3 pin 2 pin solution")

# Priorities = 0xC9051930 (3372554544, "INQUIRY | PAGE | TPOLL | MASTER_SLAVE_SWITCH
| NEW_CONNECTION | SNIFF | SCO | DEFER_HIGH_PRIORITY_FRAME) | NON_CONNECTION_HW_SUP-
PORT  | PAGE_SCAN_HW_SUPPORT_BIT_0 | PAGE_SCAN_HW_SUPPORT_BIT_1 ")

# RESERVED_1 = 0x0 (0)

# Priority_Inverse_Threshold = 0x64 (100)

# Configuration_Flags_1 = 0x90000000 (2415919104, "Connection HW support  | HW coex-
istence mode ")

# Configuration_Flags_2 = 0x0 (0, "")

#-----------------------------------------------------------------------------


com4@115200: 5/5/10 10:14:58.548                # HCI Command Complete Event

HCIEvent

{[0E 04]: 01 41 FC 00}

# event = 0xE (14, "Command Complete")

# Num_HCI_Command_Packets = 0x1 (1)

# Command_Opcode = 0xFC41 (64577, "Write_Collaboration_Mode")

# Status = 0x0 (0, "Success")

#-----------------------------------------------------------------------------
```

4-wire configuration

```
com4@115200: 5/5/10 10:03:27.045                # HCI Command

HCICommand

{[41 FC 10]: 82 30 19 05 C9 00 00 64 00 00 00 93 00 00 00 00}

# opcode = 0xFC41 (64577, "Write_Collaboration_Mode")
```

```
# CS_Encoded = 0x82 (130)

# Architecture = 0x1 (1, "2045")

# 2045_Collaboration_Solution = 0x2 (2, "3 pin 2 pin solution")

# Priorities = 0xC9051930 (3372554544, "INQUIRY | PAGE | TPOLL | MASTER_SLAVE_SWITCH
| NEW_CONNECTION | SNIFF | SCO | DEFER_HIGH_PRIORITY_FRAME | NON_CONNECTION_HW_SUP-
PORT  | PAGE_SCAN_HW_SUPPORT_BIT_0 | PAGE_SCAN_HW_SUPPORT_BIT_1")

# RESERVED_1 = 0x0 (0)

# Priority_Inverse_Threshold = 0x64 (100)

# Configuration_Flags_1 = 0x93000000 (2466250752, "5Wire support  | A2DP_ACL_Prior-
ity_inv  | Connection HW support  | HW coexistence mode ")

# Configuration_Flags_2 = 0x0 (0, "")

#-----------------------------------------------------------------------------


com4@115200: 5/5/10 10:03:27.060                # HCI Command Complete Event

HCIEvent

{[0E 04]: 01 41 FC 00}

# event = 0xE (14, "Command Complete")

# Num_HCI_Command_Packets = 0x1 (1)

# Command_Opcode = 0xFC41 (64577, "Write_Collaboration_Mode")

# Status = 0x0 (0, "Success")

#-----------------------------------------------------------------------------
```

7.4 WLAN Requirement for Successful Coexistence Operation

For a WLAN adapter to successfully function with the CYW20702, it is critical that the WLAN adapter be properly configured. Otherwise, bus contention and premature CYW20702 enumeration during start-up can occur.

One of the more common problems is the WLAN adapter falsely driving the Bluetooth GPIO output pin during the boot process. When this occurs during power-up, bus contention can occur.

Another common problem is the WLAN adapter driving the Bluetooth GPIO input line high during system start-up, or when the CYW20702 is powered down. Driving a CYW20702 GPIO line high during system start-up causes a problem if the CYW20702 main power (VDDO) has not been supplied before the GPIO is driven high. In this instant, the CYW20702 can incorrectly enumerate and not be properly recognized by the host. The same problem can occur in low-power mode if the WLAN adapter drives the Bluetooth GPIO high when the Bluetooth adapter does not have main (VDDO) power.

To prevent improper enumeration or contention during system start-up, the WLAN adapter should not drive the Bluetooth GPIO line high when the Bluetooth adapter is not being powered. If the host separately powers down the Bluetooth adapter while the WLAN adapter is still active, the WLAN adapter should not drive the Bluetooth GPIO high. If it is not possible to separately control the WLAN GPIO, the WLAN adapter and the Bluetooth adapter should be powered simultaneously.

This problem is dependent on when the host machine supplies power to the WLAN adapter and the CYW20702. No problem results with any WLAN adapter if:

- The host simultaneously supplies power to the WLAN adapter and the Bluetooth adapter.
- The host supplies power to the Bluetooth adapter before it supplies power to the WLAN adapter.

8 Recommended Settings

8.1 Recommended Default Coexistence Settings

The recommended default coexistence settings for the CYW20702 are shown in Table 8. Users can issue a vendor-specific command to the CYW20702: WRITE_COLLABORATION_MODE with the coexistence bit field = 0x8B37DF3D.

Table 8. Recommended Default Coexistence Settings

Bluetooth Activity	Priority	Comment
STANDBY	Low	–
LOW_PRI_CONNECTION	Low	–
AFH_RSSISCAN	Low	–
BROADCAST	Low	–
INQUIRY	High	–
PAGE	High	–
CONNECTION	Low	–
DON'T_RESET_LCU_MASTER_SCO	High	–
TPOLL	High	–
INQSCAN	High	–
PAGESCAN	High	–
MASTER_SLAVE_SWITCH	High	–
NEW_CONNECTION	High	–
SCAN_INVERSE_PRI_DURING_SCO	High	–
AV CONNECTION	Low	–
HOLD	High	–
SNIFF	High	–
PARK	High	–
SCO	High	–
ESCO	High	–
HI_PRI_PAGESCAN	High	–
HI_PRI_CONNECTION	High	–
SLAVE_POLL_LMP	High	–
DISABLE_COEX_IF_AFH_ENABLE	Low	–

Table 8. Recommended Default Coexistence Settings (Continued.)

Bluetooth Activity	Priority	Comment
Feature	**Status**	**Feature Description**
DEFER_HIGH_PRIORITY_FRAME (three-wire only)	Enabled	Must always be enabled for three-wire to operate
INCREASE_PRIORITY_AFTER_DEFFER_ENABLED	Enabled	If the frame is deferred after Priority_Threshold by WLAN coexistence, raise its priority over WLAN.
DON'T_RESET_LCU	Disabled	Allows the hardware to reset the LCU in all states
NON_CONNECTION_HW_SUPPORT	Enabled	Allows the hardware to assist during mid-state functioning of Page, Page Scan, Inquiry, Inquiry Scan. If this bit is not set, the firmware forces the LCU to reset.
PAGE_SCAN_HW_SUPPORT_BIT0	Enabled	This bit and the next bit coincide with the programming of the hardware. This bit should always be set to 0.
PAGE_SCAN_HW_SUPPORT_BIT1	Enabled	This bit should always be set to 1.

8.2 Recommended Settings for Bluetooth As High Priority over WLAN

The recommended coexistence settings for the CYW20702 when Bluetooth is high priority over WLAN are shown in Table 9. Users can issue a vendor-specific command: WRITE_COLLABORATION_MODE with the Priorities bit field = 0x8B3FDF7F.

Table 9. Recommended Settings for Bluetooth High Priority over WLAN

Bluetooth Activity	Priority	Comment
STANDBY	High	–
LOW_PRI_CONNECTION	High	–
AFH_RSSISCAN	High	–
BROADCAST	High	–
INQUIRY	High	–
PAGE	High	–
CONNECTION	High	–
DON'T_RESET_LCU_MASTER_SCO	Low	–
TPOLL	High	–
INQSCAN	High	–
PAGESCAN	High	–
MASTER_SLAVE_SWITCH	High	–
NEW_CONNECTION	High	–
SCAN_INVERSE_PRI_DURING_SCO	Low	–
AV CONNECTION	High	–
HOLD	High	–
SNIFF	High	–
PARK	High	–
SCO	High	–
ESCO	High	–
HI_PRI_PAGESCAN	High	–
HI_PRI_CONNECTION	High	–
SLAVE_POLL_LMP	Low	–
DISABLE_COEX_IF_AFH_ENABLE	Low	–
Feature	**Status**	**Description**
DEFER_HIGH_PRIORITY_FRAME (three-wire only)	Enabled	Must always be enabled for three-wire to operate.

Table 9. Recommended Settings for Bluetooth High Priority over WLAN (Continued.)

Bluetooth Activity	Priority	Comment
INCREASE_PRIORITY_AFTER_DEFFER_ENABLED	Enabled	If the frame is deferred after Priority_Threshold by WLAN coexistence, raise its priority over WLAN.
DON'T_RESET_LCU	Disabled	Allows the hardware to reset the LCU in all states
NON_CONNECTION_HW_SUPPORT	Enabled	Allows the hardware to assist during mid-state functioning of Page, Page Scan, Inquiry, Inquiry Scan. If this bit is not set, the firmware forces the LCU to reset.
PAGE_SCAN_HW_SUPPORT_BIT0	Disabled	This bit and the next bit coincide with the programming of the hardware. This bit should always be set to 0.
PAGE_SCAN_HW_SUPPORT_BIT1	Enabled	This bit should always be set to 1.

8.3 Recommended Settings for Bluetooth As Low Priority over WLAN

The recommended coexistence settings for the CYW20702 when Bluetooth is low priority over WLAN are shown in Table 10. Users can issue a vendor-specific command: WRITE_COLLABORATION_MODE with the Priorities bit field = 0x89000000.

Table 10. Recommended Settings for Bluetooth Low Priority over WLAN

Bluetooth Activity	Priority	Comment
STANDBY	Low	–
LOW_PRI_CONNECTION	Low	–
AFH_RSSISCAN	Low	–
BROADCAST	Low	–
INQUIRY	Low	–
PAGE	Low	–
CONNECTION	Low	–
DON'T_RESET_LCU_MASTER_SCO	Low	–
TPOLL	Low	–
INQSCAN	Low	–
PAGESCAN	Low	–
MASTER_SLAVE_SWITCH	Low	–
NEW_CONNECTION	Low	–
SCAN_INVERSE_PRI_DURING_SCO	Low	–
AV CONNECTION	Low	–
HOLD	Low	–
SNIFF	Low	–
PARK	Low	–
SCO	Low	–
ESCO	Low	–
HI_PRI_PAGESCAN	Low	–
HI_PRI_CONNECTION	Low	–
SLAVE_POLL_LMP	Low	–
DISABLE_COEX_IF_AFH_ENABLE	Low	–

Table 10. Recommended Settings for Bluetooth Low Priority over WLAN (Continued.)

Bluetooth Activity	Priority	Comment
Feature	**Status**	**Feature Description**
DEFER_HIGH_PRIORITY_FRAME (three-wire only)	Enabled	Must always be enabled for three-wire to operate
INCREASE_PRIORITY_AFTER_DEFFER_ENABLED	Disabled	If the frame is deferred after Priority_Threshold by WLAN coexistence, raise its priority over WLAN.
DON'T_RESET_LCU	Disabled	Allows the hardware to reset the LCU in all states.
NON_CONNECTION_HW_SUPPORT	Enabled	Allows hardware to assist during mid-state functioning of Page, Page Scan, Inquiry, Inquiry Scan. If this bit is not set, the firmware forces the LCU to reset.
PAGE_SCAN_HW_SUPPORT_BIT0	Disabled	These bit and the next bit coincide with the programming of the hardware. This bit should always be set to 0.
PAGE_SCAN_HW_SUPPORT_BIT1	Enabled	This bit should always be set to 1.

Document History Page

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*A	5461840	UTSV	10/19/2016	Updated in Cypress template Added Cypress part numbering scheme
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