

Digital Transceiver for the Raspberry Pi

1.1

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Chapter 1

Overview

The AX5043 library provides an interface to program the transceiver. The library is currently configured with the following settings:

- Carrier Frequency - 435.3 MHz
- Symbol Rate - 4.8 kS/s
- Modulation - GFSK
- Transmit Deviation - 13.6 kHz
- Transmit Power - 15.0 dBm
- Receive Bandwidth - 28.2 kHz
- Encoding: HDLC with FEC
- Error Detection: CRC-16

Next Steps

Over time, the AX5043 library will have new functions to change these settings.

Chapter 2

Data Structure Index

2.1 Data Structures

Here are the data structures with brief descriptions:

axradio_address	Structure containing a four byte X.25 address	7
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Chapter 3

File Index

3.1 File List

Here is a list of all documented files with brief descriptions:

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- [axradio/axradiomode_p.h](#)
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Chapter 4

Data Structure Documentation

4.1 axradio_address Struct Reference

Structure containing a four byte X.25 address.

```
#include <axradioinit_p.h>
```

Data Fields

- `uint8_t addr` [4]
Four byte X.25 address.

4.1.1 Detailed Description

Structure containing a four byte X.25 address.

The documentation for this struct was generated from the following file:

- [axradio/axradioinit_p.h](#)

Chapter 5

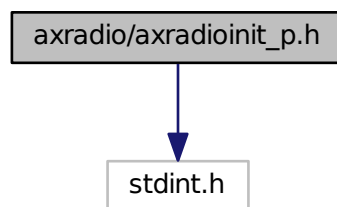
File Documentation

5.1 axradio/axradioinit_p.h File Reference

Provides an interface to initialize the AX5043 transceiver.

```
#include <stdint.h>
```

Include dependency graph for axradioinit_p.h:



Data Structures

- struct [axradio_address](#)
Structure containing a four byte X.25 address.

Macros

- #define [AXRADIO_ERR_NOERROR](#) 0x00
Operation successful.
- #define [AXRADIO_ERR_NOTSUPPORTED](#) 0x01
Operation not supported.
- #define [AXRADIO_ERR_BUSY](#) 0x02
Transceiver busy.

- #define `AXRADIO_ERR_TIMEOUT` 0x03
Operation timed out.
- #define `AXRADIO_ERR_INVALID` 0x04
Invalid parameter.
- #define `AXRADIO_ERR_NOCHIP` 0x05
Transceiver not found.
- #define `AXRADIO_ERR_RANGING` 0x06
Frequency could not be ranged.
- #define `AXRADIO_ERR_LOCKLOST` 0x07
Lost PLL lock.
- #define `AXRADIO_ERR_RETRANSMISSION` 0x08
Retrasnmitted packet.
- #define `AXRADIO_ERR_RESYNC` 0x09
Restarts synchronization.
- #define `AXRADIO_ERR_RESYNCTIMEOUT` 0x0a
Synchronization timed out.
- #define `AXRADIO_ERR_RECEIVESTART` 0x0b
Receiver restarted.

Functions

- `uint8_t axradio_init` (void)
Initialize the AX5043 radio transceiver.
- `uint8_t axradio_setfreq` (int32_t f)
Set the receive and transmit frequency.

5.1.1 Detailed Description

Provides an interface to initialize the AX5043 transceiver.

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5.1.2 Function Documentation

5.1.2.1 axradio_init()

```
uint8_t axradio_init (
    void )
```

Initialize the AX5043 radio transceiver.

Returns

AXRADIO_ERR_NOERROR on success, otherwise a value indicating an error.

See also

[AXRADIO_ERR_NOERROR](#)

5.1.2.2 axradio_setfreq()

```
uint8_t axradio_setfreq (
    int32_t f )
```

Set the receive and transmit frequency.

Parameters

<i>f</i>	The frequency in Hertz.
----------	-------------------------

Returns

AXRADIO_ERR_NOERROR on success, otherwise a value indicating an error.

See also

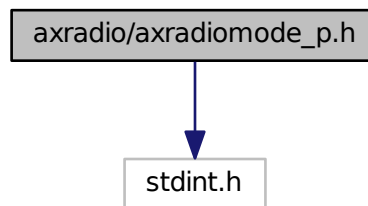
[AXRADIO_ERR_NOERROR](#)

5.2 axradio/axradiomode_p.h File Reference

Provides an interface to change the transceiver mode.

```
#include <stdint.h>
```

Include dependency graph for axradiomode_p.h:

**Functions**

- `uint8_t mode_tx` (void)
Switch the transceiver into transmit mode.
- `uint8_t mode_rx` (void)
Switch the transceiver into receive mode.

5.2.1 Detailed Description

Provides an interface to change the transceiver mode.

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5.2.2 Function Documentation

5.2.2.1 mode_rx()

```
uint8_t mode_rx (  
    void )
```

Switch the transceiver into receive mode.

The receive buffer may contain garbage and reading from the buffer will obtain and discard that garbage.

Returns

AXRADIO_ERROR_NOERROR on success, otherwise a value indicating an error.

See also

[AXRADIO_ERR_NOERROR](#)

5.2.2.2 mode_tx()

```
uint8_t mode_tx (
    void )
```

Switch the transceiver into transmit mode.

Returns

AXRADIO_ERROR_NOERROR on success, otherwise a value indicating an error.

See also

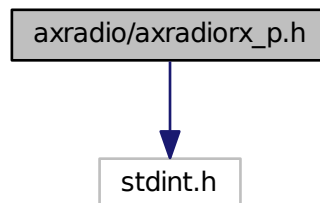
[AXRADIO_ERR_NOERROR](#)

5.3 axradio/axradiorx_p.h File Reference

Provides an interface to receive packets using the digital transceiver.

```
#include <stdint.h>
```

Include dependency graph for axradiorx_p.h:



Functions

- `uint8_t receive_packet` (void)
Receive a packet from the digital transceiver receive buffer.

5.3.1 Detailed Description

Provides an interface to receive packets using the digital transceiver.

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5.3.2 Function Documentation

5.3.2.1 receive_packet()

```
uint8_t receive_packet (  
    void )
```

Receive a packet from the digital transceiver receive buffer.

Returns

AXRADIO_ERROR_NOERROR on success, otherwise a value indicating an error.

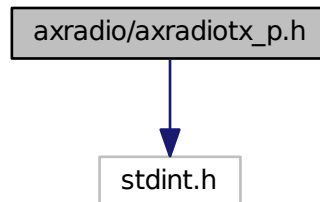
See also

[AXRADIO_ERR_NOERROR](#)

5.4 axradio/axradiotx_p.h File Reference

Provides an interface to transmit packets using the digital transceiver.

```
#include <stdint.h>  
Include dependency graph for axradiotx_p.h:
```



Functions

- `uint8_t transmit_packet` (const struct `axradio_address` *addr, const `uint8_t` *pkt, `uint16_t` pktlen)
Transmit a packet using the digital transceiver.

5.4.1 Detailed Description

Provides an interface to transmit packets using the digital transceiver.

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5.4.2 Function Documentation

5.4.2.1 transmit_packet()

```
uint8_t transmit_packet (
    const struct axradio_address * addr,
    const uint8_t * pkt,
    uint16_t pktlen )
```

Transmit a packet using the digital transceiver.

Parameters

<i>addr</i>	The address of the desired destination radio, if used.
<i>pkt</i>	The byte data to be transmitted.
<i>pktlen</i>	The number of bytes in pkt to be transmitted.

Returns

AXRADIO_ERROR_NOERROR on success, otherwise a value indicating an error.

See also

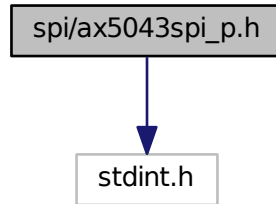
[AXRADIO_ERR_NOERROR](#)

5.5 spi/ax5043spi_p.h File Reference

Provides an abstraction layer for the SPI interface communicating to the digital transceiver.

```
#include <stdint.h>
```

Include dependency graph for ax5043spi_p.h:



Macros

- `#define SPI_CHANNEL (0)`
The default SPI channel for the digital transceiver.
- `#define SPI_SPEED (32000000)`
The default SPI bus speed for the digital transceiver.

Functions

- void `setSpiChannel` (int newSpiChannel)
Set the SPI channel for the digital transceiver.
- void `setSpiSpeed` (int newSpiSpeed)
Set the SPI bus speed for the digital transceiver.
- void `initializeSpi` (void)
Initilize the SPI bus to communicate with the digital transceiver.
- void `ax5043WriteReg` (uint16_t reg, uint8_t val)
Write a value to an AX5043 register.
- uint8_t `ax5043ReadReg` (uint16_t reg)
Read a value from an AX5043 register.

5.5.1 Detailed Description

Provides an abstraction layer for the SPI interface communicating to the digital transceiver.

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5.5.2 Function Documentation

5.5.2.1 ax5043ReadReg()

```
uint8_t ax5043ReadReg (
    uint16_t reg )
```

Read a value from an AX5043 register.

Parameters

<i>reg</i>	The register to read.
------------	-----------------------

Returns

The value read from the register.

5.5.2.2 ax5043WriteReg()

```
void ax5043WriteReg (
    uint16_t reg,
    uint8_t val )
```

Write a value to an AX5043 register.

Parameters

<i>reg</i>	The register to write.
<i>val</i>	The value to write to the register.

5.5.2.3 initializeSpi()

```
void initializeSpi (
    void )
```

Initilize the SPI bus to communicate with the digital transceiver.

[setSpiChannel\(\)](#) and [setSpiSpeed\(\)](#) must both be called before initializeSPI().

See also

[setSpiChannel](#)
[setSpiSpeed](#)

5.5.2.4 setSpiChannel()

```
void setSpiChannel (
    int newSpiChannel )
```

Set the SPI channel for the digital transceiver.

setSpiChannel must be called before [initializeSpi\(\)](#). The default is SPI_CHANNEL.

Parameters

<i>newSpiChannel</i>	The SPI channel for the digital transceiver.
----------------------	--

See also

[SPI_CHANNEL](#)
[initializeSpi](#)

5.5.2.5 setSpiSpeed()

```
void setSpiSpeed (
    int newSpiSpeed )
```

Set the SPI bus speed for the digital transceiver.

setSpiSpeed must be called before [initializeSpi\(\)](#). The default is SPI_SPEED.

Parameters

<i>newSpiSpeed</i>	The SPI bus speed for the digital transceiver.
--------------------	--

See also

[SPI_SPEED](#)
[initializeSpi](#)

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