802.15.4 MAC/PHY Blackbox Interface

User's Guide

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About This Book

This user's guide provides a detailed description of the 802.15.4 MAC/PHY Blackbox Interface, communication packet structure, available services and usage.

Audience

This reference manual is intended for application designers and users of the 802.15.4 MAC/PHY Blackbox interface.

Organization

This document contains the following chapters:

Chapter 1 — 802.15.4 MAC/PHY BlackBox Overview - Briefly describes 802.15.4 MAC/PHY BlackBox functionality and usage.

Chapter 2 — Interface Description - Describes the BlackBox interfaces which can be either a three wire UART connection, two wire I^2C connection or a 4 wire SPI connection to interface with the system.

Chapter 3 — 802.15.4 MAC/PHY BlackBox Messages - Details the messages that the BlackBox exchanges with the host.

Revision History

The following table summarizes revisions to this manual since the previous release (Rev. 0.0).

Revision History

Date / Author	Description / Location of Changes
June 2011, Dev Team	First release. New doc.

Definitions, Acronyms, and Abbreviations

The following list defines the abbreviations used in this document.

API	Application Programming Interface
CE	Consumer Electronics
I2C	Inter - Integrated Circuit
LQI	Link Quality Indicator
NW Layer	Network Layer
PAN	Personal Area Network
NV	Non volatile
NVM	Non volatile Memory

References

The following sources were referenced to produce this book:

1. IEEE 802.15.4 Standard -2003, Part 14.5: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (LR-WPANs), The Institute of Electrical and Electronics Engineers, Inc. October 2003
2. *802.15.4 MAC PHY Software Reference Manual* (802154MPSRM)
3. *BeeStack™ BlackBox ZigBee™ Test Client (ZTC) Reference Manual* (BSBBZTCRM)
4. *Freescale BeeKit Wireless Connectivity Toolkit User's Guide* (BKWCTKUG)

Chapter 1
Introduction

The Freescale 802.15.4 MAC/PHY black boxes are pre-compiled executable binary images ready to be downloaded on Freescale wireless platforms. They expose MAC layer functionality through a serial communication interface to a host system. The typical serial interfaces used by the Freescale MAC/PHY black boxes are UART, SPI and I2C. The communication protocol used by the black boxes is ZTC (ZigBee Test Client). The typical applications employing MAC/PHY black boxes are host systems such as a PC or an embedded system that has an upper layer (i.e. network) implementation which interacts with the 802.15.4 MAC functionality in the black box.

1.1 ZigBee Test Client Overview

1.1.1 Basics

The ZigBee Test Client (ZTC) diagnostic tool allows extensive testing of the protocol layer interfaces and for communication with a Host processor when using the Black Box application. With the Freescale Test Tool software and ZTC, a user can start a ZigBee network, join devices to the network, and run numerous commands to test the application services and interfaces.

Designed to run in the Freescale BeeKit Wireless Connectivity Toolkit development environment, additional software tools permit device configuration and setup for testing. These software tools are:

- BeeKit software plus the appropriate codebase, containing the libraries and some source code
- Freescale CodeWarrior IDE for HCS08 based devices serving as the compiler, linker, and debugger
- Freescale Test Tool software to initiate the ZTC tests, MC1231x Black Box application tests and download of firmware.

The architecture builds on the OSI Seven-Layer model, ensuring inter operability between network devices. In the ZigBee implementation, the IEEE 802.15.4 stack provides the physical (PHY) and media access control (MAC) layers. Those, along with the ZigBee stack's network (NWK) layer, create the foundation for the application (APL) layers. The application layer environment supports ZigBee-specific elements, including the ZigBee Device Objects (ZDO) in addition to other components. The combined PHY, MAC, NWK, and application layer elements comprise the full implementation.

The layers communicate by sending primitives via service access points (SAP). The ZTC permits the developer to test specific SAP handlers and SAPs.

The user should be very familiar with the concepts employed throughout this *MC1231x BlackBox ZigBee Test Client Reference Manual*. For additional reading, see the Freescale CodeWarrior and BeeKit documentation for assistance in understanding the BeeKit development requirements.

1.1.2 MAC/PHY Black Box ZigBee Test Client Architecture

The ZTC is a small application running separate of each layer in the stack, whether that node is a ZigBee Coordinator (ZC), ZigBee Router (ZR), ZigBee end device (ZED) or Combo.(Zx). The host PC or host processor connects to the device under test (DUT) via a USB, UART, RS-232 cable or I^2C (depending on the board type) in serial mode. The device can then be controlled by API calls generated by the host to test the interfaces between layers or implement a ZigBee application on the host CPU using the BlackBox Application.

The ZTC enables common service features for each device and allows monitoring of specific interfaces and API calls. Additionally, the ZTC injects or calls specific events and commands into the interfaces between layers.

1.1.3 MAC Interface Set

The protocol suite provides the building blocks, or layers, that drive the functionality of a ZigBee network. Designed to support a wireless sensor network, the network exposes each layer to the next through a service access point (SAP).

Data entities provide data transport services between layers, while the management entities handle management services. For example, the MAC Common Part Sublayer (MCPS) provides data services through the MCPS-SAP. The MAC Sublayer Management Entity (MLME) maintains a database of managed objects and provides management services through the MLME-SAP.

Each SAP provides primitives that an upper layer uses to access services provided by the lower layers. Through these primitives, one layer can request information from another layer, and that layer can confirm in response, returning an indication when required.

A SAP or SAP handler, depending on the direction, passes data or manages data passed to it. SAPs are implemented as functions in an application, although only the request can be called directly.

This manual includes a detailed but partial list of the primitives used in the testing procedures.

1.1.4 SAP Handler and API

The ZTC utilizes a series of commands enabling the host PC or processor to make API calls to SAP handlers and SAPs. Those control modes, selected as parameters in the software, include:

DisableMode	Ignores the layer when running the tests.
HookMode	Allows the ZTC to exclusively control a specific layer. The ZTC hooks only SAPs that receive messages from a lower layer. In this mode, the ZTC replaces the layer whose SAP is hooked, and returns, but does not process, messages sent to a specific SAP. this mode should not be used with the Black Box Application and can in general cause unexpected behavior as the upper layer can no longer process indications from lower layer.
MonitorMode	Allows the ZTC to capture all messages received by a SAP. This feature does not impact the flow of message between layers. When in monitor mode, the ZTC receives all messages except those disabled at compile time and those filtered out.

NOTE

Monitoring a large number of SAPs can cause serial overflow and potentially disable test network devices. Monitor only the SAP calls required, usually only one or two at a time.

Depending on the compile-time options used, some SAPs or commands may not be available. ZTC can be configured through BeeKit properties.If the Black Box application is used only a limited number of SAPs are available.

1.2 Using the 802.15.4 MAC/PHY Black Boxes

1.2.1 Basic PC Requirements

A complete BeeKit test environment requires the following:

- BeeKit software installed on host PC with a MAC codebase
- CodeWarrior for MCU Tools Suite installed on host PC for HCS08 based platforms
- IAR Embedded Workbench for ARM7 based platforms (MC1322x)
- Freescale Test Tool software installed on host PC
- Freescale development boards for testing
- Optional wireless sniffer for testing

A Complete Black Box environment requires the following

- BlackBox application loaded on to the appropriate development board or module using Freescale 802.15.4 capable chip sets
- Freescale test tool or another host processor capable of communicating through UART, SPI or I^2C

For more information about BeeKit, see the *BeeKit Wireless Connectivity Toolkit User's Guide*, for more information about Test Tool, see the *Freescale Test Tool User's Guide*. For more information about the ZTC and loading black box images on Freescale platforms using CodeWarrior or IAR EW, see the *BeeStack™ BlackBox ZigBee™ Test Client (ZTC) Reference Manual*.

1.2.2 Creating and Exporting the BeeKit MAC BlackBox Projects

1. Start BeeKit.
2. Select a MAC Codebase by choosing File -> Select Codebase...
3. From the menu, create a new project to configure a new device by selecting File -> Project. The New Project window appears as shown in Figure 1-1.
4. Select the BlackBox Application as shown in Figure 1-1.
5. Enter the following information for this example:

   Project name: BlackBox Application

   Solution Name: My Solution

   Location: \Project (Choose a sub directory on the host PC)

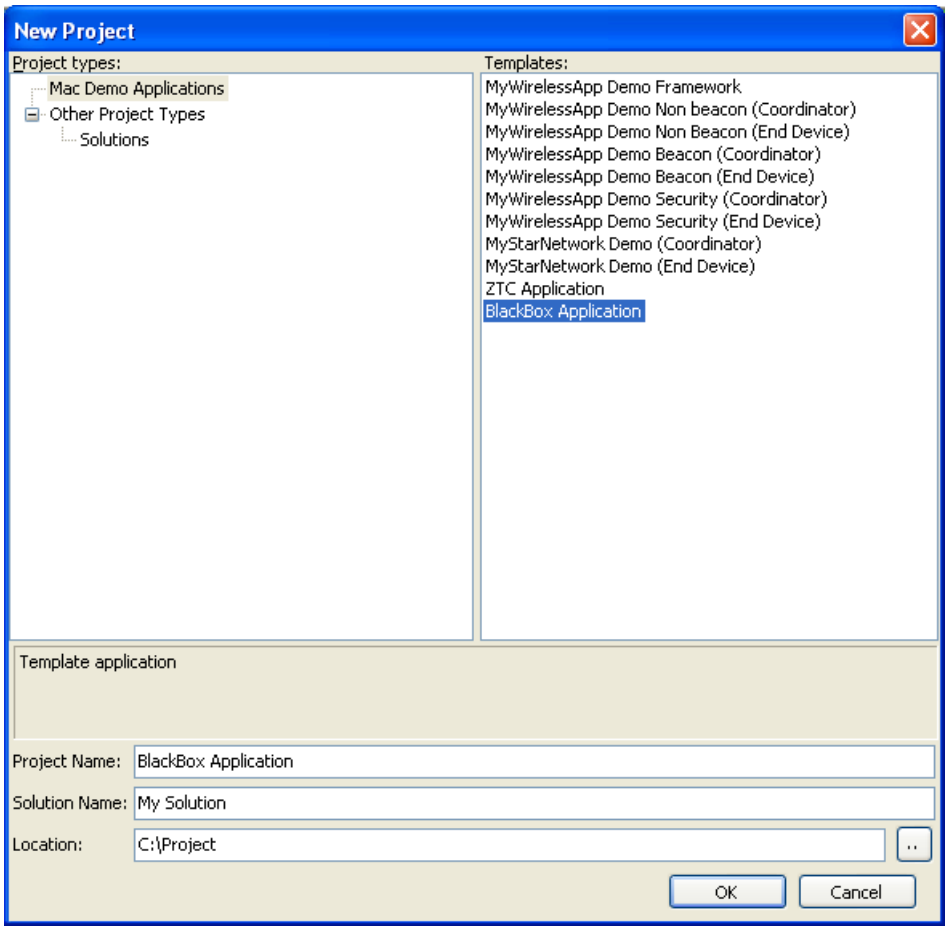

Figure 1-1. New BeeKit Project

6. Click the OK button and the solution overview window appears as shown in Figure 1-2

7. Choose the “MAC BlackBox Configuration” option as shown in the solution overview window in Figure 1-2.

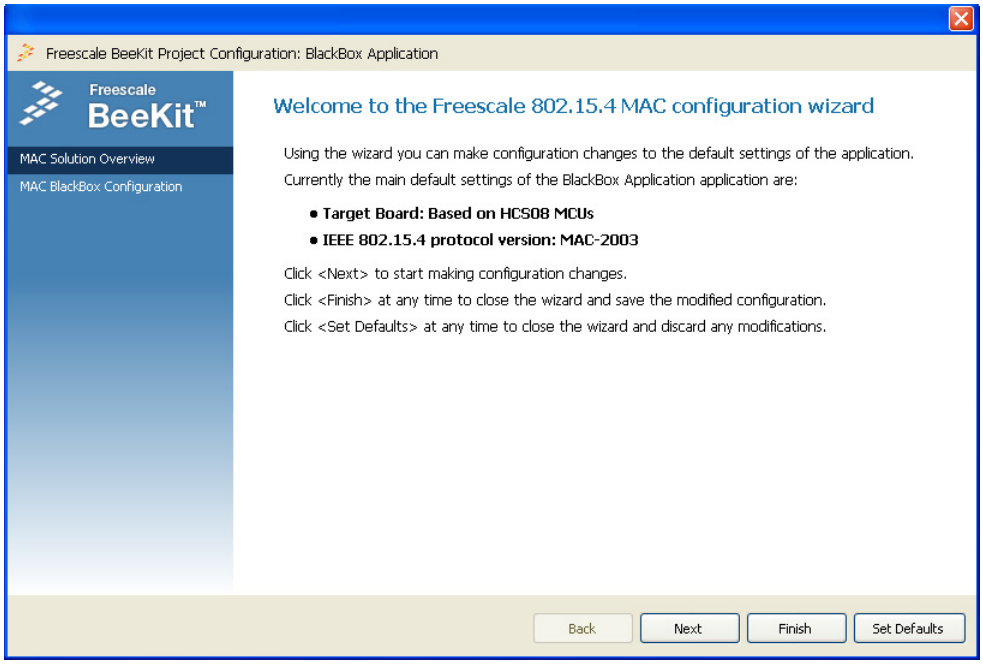

Figure 1-2. Solution Overview

8. Configure the BlackBox image file configuration options as shown in Figure 1-3.

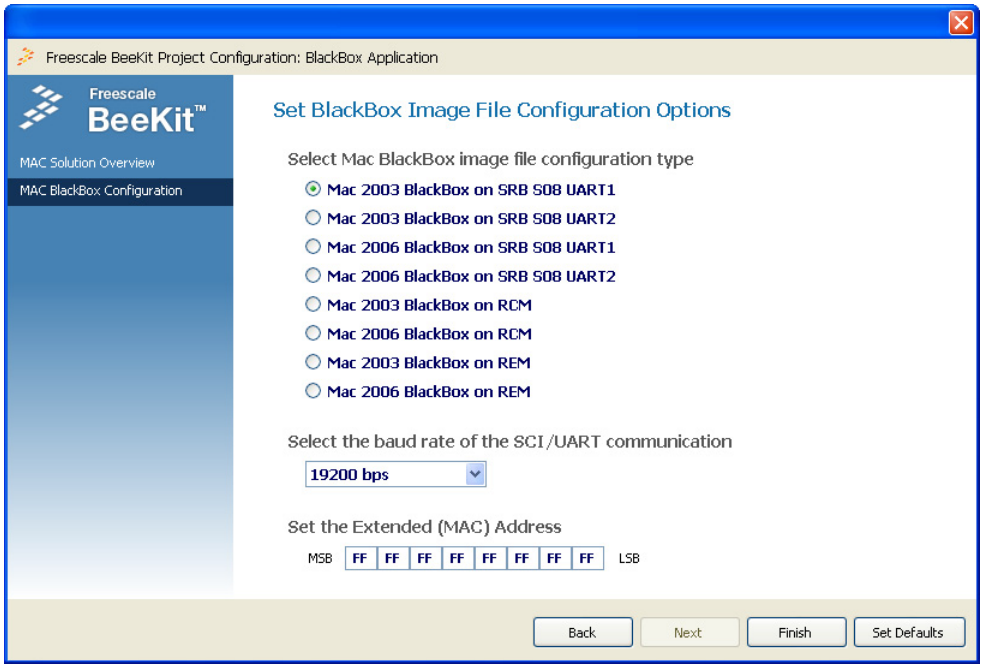

Figure 1-3. MAC BlackBox Configuration

9. Click on the “Finish” button.

10. The solution configuration is displayed in BeeKit with the selected configuration options as shown in Figure 1-4.

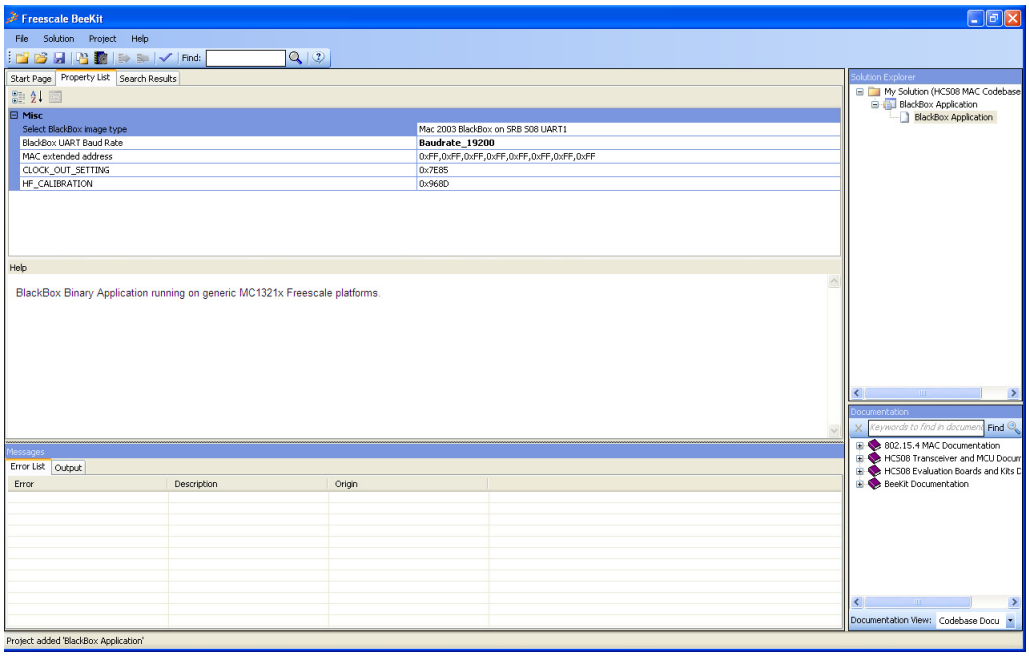

Figure 1-4. Solution Configuration

11. After reviewing the parameters, click the “Export Solution” option to export the solution to the appropriate IDE.

Chapter 2
Interface Description

The black boxes use one of the following interfaces for communications:

- A 3-wire UART connection (all platforms)
- A 2-wire I^2C connection (MC1323x)
- A 4-wire SPI connection (MC1323x)

2.1 Overview and Packet Structure

The BlackBox packet structure sends and receives messages as shown in Figure 2-1. This structure is not specific to a serial interface and is designed to offer the best communication reliability. The BlackBox device is expecting messages in little-endian format and responds with messages in little-endian format.

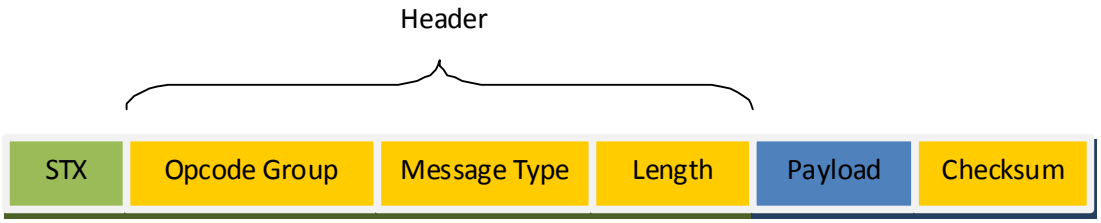

Figure 2-1. Packet Structure

2.1.1 Packet Field Description

STX	(1 bytes) Used for synchronization over the serial interface. The value is always 0x02.
Header	(3 bytes) Contains message information and is composed of the following three fields: 1. Opcode Group (1 byte) — Distinguishes between different MAC Service Access Primitives (e.g. MLME or MCPS). 2. Message Type (1 byte) — Specifies the exact message opcode that is contained in the packet. 3. Length (1 byte) — The length of the packet payload, excluding the header and FCS. The length field content shall be provided in little endian format.
Payload	(Variable length) (Optional) Payload of the actual message.
FCS	(1 byte) Checksum field used to check the data integrity of the packet.

The FCS is computed by XOR-ing all the fields except Stx filed and FCS field. This value is then compared to the received FCS field. If they are not equal, then the packet is considered corrupted and is dropped. If the FCS is good, then the message is processed.

Chapter 3
802.15.4 MAC/PHY Blackbox Messages

This appendix describes all MAC 2003 and MAC 2006 MAC/PHY commands (requests) and events (confirmations, indications and monitored requests) in detail. The `ZigBeePro.XML` document found in the Codebase directory (in the XML folder) provides an XML representation of all these commands.

3.1 General ZTC Messages

Messages of type General ZTC are usually not specific to any network layer but may have functions that either span multiple layers, or are used to configure and monitor the hardware, or are used to configure ZTC itself.

3.1.1 BlackBox.ReadSAS

Description

Reads the RAM Startup Attribute Set in the Black Box Application or ROM set.

Parameters

Table 3-1. BlackBox.ReadSAS Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x50
OpCode	1	0x02
Length	1	Length in bytes of the following parameters
SAS Source	1	Possible values: 0x00: RAM (Read SAS from RAM) 0x01: ROM (Read SAS from ROM)

3.1.2 BlackBox.ReadSASConfirm

Description

Returns the Startup Attribute Set requested in the BlackBox Read SAS request.

Parameters

Table 3-2. BlackBox.ReadSASConfirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x50
OpCode	1	0x03
Length	1	Length in bytes of the following parameters
Short Address	2	NWK short address
Extended PAN Id	8	
APS Use Extended PAN Id	8	
PAN Id	2	
Channels Mask	4	
Protocol Version	1	
Stack Profile	1	
Startup Control	1	
Trust Center Address	8	
Trust Center Master Key	16	
Network Key	16	
Use Insecure Join	1	
Preconfigured Trust Center Link Key	16	
Active Nwk Key Seq Number	1	
Network Key Type	1	
Network Manager Address	2	
Scan attempts	1	
Time between scans	2	
Rejoin Interval	2	
Maximum Rejoin Interval	2	
Indirect Poll Rate	2	
Parent Link Retry Threshold	1	
Is Concentrator	1	

Table 3-2. BlackBox.ReadSASConfirm Parameters

Parameter	Size (bytes)	Comments
Concentrator Radius	1	
Concentrator Discovery Time	1	

3.1.3 BlackBox.WriteSAS

Description

Writes the RAM startup Attribute Set residing in the Black Box Application.

Parameters

Table 3-3. BlackBox.WriteSAS Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x50
OpCode	1	0x01
Length	1	Length in bytes of the following parameters
Short Address	2	NWK short address
Extended PAN Id	8	
APS Use Extended PAN Id	8	
PAN Id	2	
Channels Mask	4	
Protocol Version	1	
Stack Profile	1	
Startup Control	1	
Trust Center Address	8	
Trust Center Master Key	16	
Network Key	16	
Use Insecure Join	1	
Preconfigured Trust Center Link Key	16	
Active Nwk Key Seq Number	1	
Network Key Type	1	
Network Manager Address	2	
Scan attempts	1	
Time between scans	2	
Rejoin Interval	2	

Table 3-3. BlackBox.WriteSAS Parameters

Parameter	Size (bytes)	Comments
Maximum Rejoin Interval	2	
Indirect Poll Rate	2	
Parent Link Retry Threshold	1	
Is Concentrator	1	
Concentrator Radius	1	
Concentrator Discovery Time	1	

3.1.4 ZTC-BeeStackSave.Confirm

Description

Confirmation for Updating NVM.

Parameters

Table 3-4. ZTC-BeeStackSave.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0xE4
Length	1	Length in bytes of the following parameters
Status	1	Possible values: 0x00: SUCCESS (Data set save has been queued.)

3.1.5 ZTC-CPUReset.Request

Description

Reset CPU. no confirm is received.

Parameters

Table 3-5. ZTC-CPUReset.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0x08
Length	1	0x00 - This message does not have any parameters

3.1.6 ZTC-Debug.event

Description

ZTC internal debug information.

Parameters

Table 3-6. ZTC-Debug.event Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0xFF
Length	1	Length in bytes of the following parameters
Message Address	2	Memory address of the SAP Handler message buffer
Status	1	Status value returned from the SAP Handler
Opcode Group	1	Opcode group in the message buffer
Opcode / Message type	1	Opcode (aka message type) in the message buffer
Data	32	First 32 byte of message data

3.1.7 ZTC-Error.event

Description

ZTC is reporting an error condition.

Parameters

Table 3-7. ZTC-Error.event Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0xFE

Table 3-7. ZTC-Error.event Parameters

Length	1	Length in bytes of the following parameters
Status	1	Which error occurred. Possible values: 0x00: gSuccess_c (Should not be seen in this event.) 0xF4: gZtcOutOfMessages_c (ZTC tried to allocate a message, but the allocation failed.) 0xF5: gZtcEndPointTableIsFull_c (Self explanatory.) 0xF6: gZtcEndPointNotFound_c (Self explanatory.) 0xF7: gZtcUnknownOpcodeGroup_c (ZTC does not recognize the opcode group, and there is no application hook.) 0xF8: gZtcOpcodeGroupIsDisabled_c (ZTC support for an opcode group is turned off by a compile option.) 0xF9: gZtcDebugPrintFailed_c (An attempt to print a debug message ran out of buffer space.) 0xFA: gZtcReadOnly_c (Attempt to set read-only data.) 0xFB: gZtcUnknownIBIdentifier_c (Self explanatory.) 0xFC: gZtcRequestIsDisabled_c (ZTC support for an opcode is turned off by a compile option.) 0xFD: gZtcUnknownOpcode_c (Self expanatory.) 0xFE: gZtcTooBig_c (A data item to be set or retrieved is too big for the buffer available to hold it.) 0xFF: gZtcError_c (Non-specific, catchall error code.)

3.1.8 ZTC-Event

Description

ZTC-Event gives the detail of SAP handler called and the message type passed.

Parameters

Table 3-8. ZTC-Event Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0x04
Length	1	Length in bytes of the following parameters

Table 3-8. ZTC-Event Parameters

Status	1	Possible values: 0x00: gSuccess (Success) 0xFF: gInvalidRequest_c (Event not implemented.)
SapID	1	SAP Handler ID Possible values: 0x00: gZtcNwkMcpsSap_c (Nwk to Mcps Saphandler is called) 0x01: gZtcMcpsNwkSap_c (Mcps to Nwk Saphandler is called) 0x02: gZtcNwkMlmeSap_c (Nwk to Mlme Saphandler is called) 0x03: gZtcMlmeNwkSap_c (Mlme to Nwk Saphandler is called) 0x04: gZtcNwkAspSap_c (Nwk to Asp Saphandler is called) 0x05: gZtcAspNwkSap_c (Mcps to Nwk Saphandler is called) 0x06: gZtcApsNldeSap_c (Aps to Nlde Saphandler is called) 0x07: gZtcNldeApsSap_c (Nlde to Aps Saphandler is called) 0x08: gZtcZdoNlmeSap_c (Zdo to Nlme Saphandler is called) 0x09: gZtcNlmeZdoSap_c (Nlme to Zdo Saphandler is called) 0xA: gZtcAfApsdeSap_c (Af to Apse Saphandler is called) 0xB: gZtcApsdeAfSap_c (Apsde to Af Saphandler is called) 0xC: gZtcAppAfdeSap_c (App to Afde Saphandler is called) 0xD: gZtcAfdeAppSap_c (Afde to App Saphandler is called) 0xE: gZtcZdoApsmeSap_c (Zdo to Apsme Saphandler is called) 0xF: gZtcApsmeZdoSap_c (Apsme to Zdo Saphandler is called) 0x10: gZtcAppZdpSap_c (App to Zdp Saphandler is called) 0x11: gZtcZdpAppSap_c (Zdp to App Saphandler is called)

3.1.9 ZTC-GetChannel.Request

Description

Get the current channel number.

Parameters

Table 3-9. ZTC-GetChannel.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0x12
Length	1	0x00 - This message does not have any parameters

3.1.10 ZTC-GetChannel.Confirm

Description

Get the current channel number.

Parameters

Table 3-10. ZTC-GetChannel.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0x12
Length	1	Length in bytes of the following parameters
Status	1	Possible values: 0x00: SUCCESS (It worked.)
Channel	1	Current channel number

3.1.11 ZTC-GetMode.Request

Description

Get ZTC mode select settings.

Parameters

Table 3-11. ZTC-GetMode.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0x02
Length	1	0x00 - This message does not have any parameters

3.1.12 ZTC-GetMode.Confirm

Description

Returns mode select settings currently used.

Parameters

Table 3-12. ZTC-GetMode.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0x02
Length	1	Length in bytes of the following parameters
Status	1	Possible values: 0x00: gSuccess (Success) 0xFF: gInvalidRequest_c (Internal error; should never happen.)

Table 3-12. ZTC-GetMode.Confirm Parameters

UART Tx Blocking	1	Enable UART driver blocking on Tx
SAP Handler Modes	Variable	Disable, Monitor, or Hook for each SAP handler group Structure type parameter. See detailed table below for parameter structure.

Table 3-13. SAP Handler Modes Parameter Structure

Parameter	Size (bytes)	Comments
MCPS	1	MCPS Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode) 0xFF: NotSupported (ZTC support for these SAP Handlers has been turned off by a compile switch)
MLME	1	MLME Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode) 0xFF: NotSupported (ZTC support for these SAP Handlers has been turned off by a compile switch)
ASP	1	ASP Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode) 0xFF: NotSupported (ZTC support for these SAP Handlers has been turned off by a compile switch)
NLDE	1	NLDE Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode) 0xFF: NotSupported (ZTC support for these SAP Handlers has been turned off by a compile switch)
NLME	1	NLME Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode) 0xFF: NotSupported (ZTC support for these SAP Handlers has been turned off by a compile switch)
APSDE	1	APSDE Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode) 0xFF: NotSupported (ZTC support for these SAP Handlers has been turned off by a compile switch)

Table 3-13. SAP Handler Modes Parameter Structure

APSME	1	APSME Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode) 0xFF: NotSupported (ZTC support for these SAP Handlers has been turned off by a compile switch)
AFDE	1	AFDE Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode) 0xFF: NotSupported (ZTC support for these SAP Handlers has been turned off by a compile switch)
ZDP	1	ZDP Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode) 0xFF: NotSupported (ZTC support for these SAP Handlers has been turned off by a compile switch)

3.1.13 ZTC-GetNumOfMsgs.Request

Description

Get the number of available small and big buffers.

Parameters

Table 3-14. ZTC-GetNumOfMsgs.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0x24
Length	1	0x00 - This message does not have any parameters

3.1.14 ZTC-GetNumOfMsgs.Confirm

Description

Get the number of available small and big buffers.

Parameters

Table 3-15. ZTC-GetNumOfMsgs.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0x24
Length	1	Length in bytes of the following parameters
SmallBuffers	1	Number of small buffers available
BigBuffers	1	Number of Big buffers available

3.1.15 ZTC-GetPanID.Request

Description

Get the current Pan ID.

Parameters

Table 3-16. ZTC-GetPanID.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0x14
Length	1	0x00 - This message does not have any parameters

3.1.16 ZTC-GetPanID.Confirm

Description

Get the current Pan ID.

Parameters

Table 3-17. ZTC-GetPanID.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0x14
Length	1	Length in bytes of the following parameters
Status	1	Possible values: 0x00: gSuccess (Success)
PanID	2	PanID value

3.1.17 ZTC-ModeSelect.Request

Description

Sets ZTC Sap mode select configuration for each SAP.

Parameters

Table 3-18. ZTC-ModeSelect.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0x00
Length	1	Length in bytes of the following parameters
UART Tx Blocking	1	Enable UART driver blocking on Tx
MCPS	1	MCPS Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode)
MLME	1	MLME Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode)
ASP	1	ASP Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode)
NLDE	1	NLDE Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode)
NLME	1	NLME Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode)
APSDE	1	APSDE Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode)

Table 3-18. ZTC-ModeSelect.Request Parameters

AFDE	1	AFDE Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode)
APSME	1	APSME Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode)
ZDP	1	ZDP Mode Possible values: 0x00: DisableMode (Disable Mode) 0x01: HookMode (Hook Mode) 0x02: MonitorMode (monitor Mode)

3.1.18 ZTC-ModeSelect.Confirm

Description

ZTC-ModeSelect request Confirmation.

Parameters

Table 3-19. ZTC-ModeSelect.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0x00
Length	1	Length in bytes of the following parameters
Status	1	Possible values: 0x00: gSuccess (Success) 0xFF: gInvalidRequest_c (Wrong number of mode settings, or invalid mode value.)

3.1.19 ZTC-NVGetDataSetDesc.Request

Description

Get the ID and size of each defined NV data set.

Parameters

Table 3-20. ZTC-NVGetDataSetDesc.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0xE5
Length	1	0x00 - This message does not have any parameters

3.1.20 ZTC-NVGetDataSetDesc.Confirm

Description

Get the ID and size of each defined NV data set.

Parameters

Table 3-21. ZTC-NVGetDataSetDesc.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0xE5
Length	1	Length in bytes of the following parameters
Status	1	Length of the payload
Count	1	Number of data sets.
Size and ID	3 x Count	ID and size of each data set.

3.1.21 ZTC-NVGetPageHeaders.Request

Description

Get the header of each NV storage page.

Parameters

Table 3-22. ZTC-NVGetPageHeaders.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0xE6
Length	1	0x00 - This message does not have any parameters

3.1.22 ZTC-NVGetPageHeaders.Confirm

Description

Get the header of each NV storage page.

Parameters

Table 3-23. ZTC-NVGetPageHeaders.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0xE6
Length	1	Length in bytes of the following parameters
Status	1	Length of the payload
NumberOfPages	1	Number of pages.
Headers	6 x NumberOfPages	Magic number, sequence number, and data set ID in each page.

3.1.23 ZTC-Ping.Request

Description

ZTC-Ping.Request simply echoes back the payload.

Parameters

Table 3-24. ZTC-Ping.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0x38
Length	1	Length in bytes of the following parameters
EchoLength	1	The number of payload echo bytes.
EchoData	EchoLength	The echo payload (raw bytes)

3.1.24 ZTC-Ping.Confirm

Description

ZTC-Ping.Confirm.

Parameters

Table 3-25. ZTC-Ping.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0x38
Length	1	Length in bytes of the following parameters
EchoLength	1	The number of payload echo bytes..
EchoData	EchoLength	The echo payload (raw bytes)

3.1.25 ZTC-ReadExtAddr.Request

Description

Read Extended Address.

Parameters

Table 3-26. ZTC-ReadExtAddr.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0xD2
Length	1	0x00 - This message does not have any parameters

3.1.26 ZTC-ReadExtAddr.Confirm

Description

Extended address read.

Parameters

Table 3-27. ZTC-ReadExtAddr.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0xD2
Length	1	Length in bytes of the following parameters
Status	1	Status Value
DeviceAddr	8	Devices extended address

3.1.27 ZTC-ReadMemoryBlock.Request

Description

Reads NumberOfBytes bytes from memory, starting from StartAddress.

Parameters

Table 3-28. ZTC-ReadMemoryBlock.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0x31
Length	1	Length in bytes of the following parameters
StartAddress	2	Start address for read operation
NumberOfBytes	1	Number of bytes to be read from memory

3.1.28 ZTC-ReadMemoryBlock.Confirm

Description

ZTC-ReadMemoryBlock.Confirm.

Parameters

Table 3-29. ZTC-ReadMemoryBlock.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0x31
Length	1	Length in bytes of the following parameters
ReadData	PayloadLength	Data read memory

3.1.29 ZTC-S08RadioRegisterRead.Request

Description

ZTC-AbelRead.Request.

Parameters

Table 3-30. ZTC-S08RadioRegisterRead.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3

Table 3-30. ZTC-S08RadioRegisterRead.Request Parameters

OpCode	1	0x3A
Length	1	Length in bytes of the following parameters
Address	1	The address to read (0x00-0x3F)

3.1.30 ZTC-S08RadioRegisterRead.Confirm

Description

Read 16 bit data from ABEL.

Parameters

Table 3-31. ZTC-S08RadioRegisterRead.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0x3A
Length	1	Length in bytes of the following parameters
Value	2	The value read from ABEL

3.1.31 ZTC-S08RadioRegisterWrite.Request

Description

ZTC-AbelWrite.Request.

Parameters

Table 3-32. ZTC-S08RadioRegisterWrite.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0x39
Length	1	Length in bytes of the following parameters
Address	1	The address to write (0x00-0x3F)
Value	2	The data to write

3.1.32 ZTC-S08RadioRegisterWrite.Confirm

Description

ZTC-AbelWrite.Confirm.

Parameters

Table 3-33. ZTC-S08RadioRegisterWrite.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0x39
Length	1	Length in bytes of the following parameters
Status	1	

3.1.33 ZTC-SetChannel.Request

Description

Set the current channel number.

Parameters

Table 3-34. ZTC-SetChannel.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0x13
Length	1	Length in bytes of the following parameters
Channel	1	New channel number

3.1.34 ZTC-SetChannel.Confirm

Description

Set the current channel number.

Parameters

Table 3-35. ZTC-SetChannel.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0x13
Length	1	Length in bytes of the following parameters
Status	1	Did it work? Possible values: 0x00: SUCCESS (It worked.)

3.1.35 ZTC-SetPanID.Request

Description

Set the Pan ID.

Parameters

Table 3-36. ZTC-SetPanID.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0x15
Length	1	Length in bytes of the following parameters
Pan ID	2	The PanID of the network

3.1.36 ZTC-SetPanID.Confirm

Description

Set the PID.

Parameters

Table 3-37. ZTC-SetPanID.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0x15
Length	1	Length in bytes of the following parameters
Status	1	Possible values: 0x00: gSuccess (Success)

3.1.37 ZTC-WriteExtAddr.Request

Description

Write Extended Address.

Parameters

Table 3-38. ZTC-WriteExtAddr.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3

Table 3-38. ZTC-WriteExtAddr.Request Parameters

OpCode	1	0xDB
Length	1	Length in bytes of the following parameters
Address	8	The address to write

3.1.38 ZTC-WriteExtAddr.Confirm

Description

Extended address written.

Parameters

Table 3-39. ZTC-WriteExtAddr.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0xDB
Length	1	Length in bytes of the following parameters
Status	1	Result of write cmd

3.1.39 ZTC-WriteMemoryBlock.Confirm

Description

ZTC-WriteMemoryBlock.Confirm.

Parameters

Table 3-40. ZTC-WriteMemoryBlock.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0x30
Length	1	Length in bytes of the following parameters
NumberOfBytesWritten	1	In case the StartAddress is in flash, 0 bytes are written. In case the StartAddress is in RAM, NumberOfBytes are written.

3.1.40 ZTC-WriteRAMMemoryBlock.Request

Description

Writes NumberOfBytes bytes from Data array, starting from StartAddress. In case StartAddress is in flash, 0 bytes are written.

Parameters

Table 3-41. ZTC-WriteRAMMemoryBlock.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0x30
Length	1	Length in bytes of the following parameters
StartAddress	2	Start address for write operation
NumberOfBytes	1	Number of bytes to be written in memory
Data	NumberOfBytes	Data to be written in memory

3.1.41 ZTC-AddToAddressMapPermanent.Request

Description

Add an address map entry to the address table.

Parameters

Table 3-42. ZTC-AddToAddressMapPermanent.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0xC0
Length	1	Length in bytes of the following parameters
IeeeAddress	8	The Ieee address to write
ShortAddress	2	The short address to write

3.1.42 ZTC-AddToAddressMapPermanent.Confirm

Description

ZTC-AddToAddressMapPermanent Confirmation.

Parameters

Table 3-43. ZTC-AddToAddressMapPermanent.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0xC0
Length	1	Length in bytes of the following parameters
Status	1	The confirm status Possible values: 0x00: gZbSuccess_c (The address map entry was added with success.) 0xFD: gAddressMapFull_c (Address map table is full.)

3.1.43 ZTC-BlackBoxWriteSAS.Confirm

Description

BlackBoxWriteSAS Confirm.

Parameters

Table 3-44. ZTC-BlackBoxWriteSAS.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x50
OpCode	1	0x04
Length	1	Length in bytes of the following parameters
Status	1	The confirm status Possible values: 0x00: gZbSuccess_c (The SAS was writed with success.)

3.1.44 ZTC-GetSeed.Request

Description

Gets a seed from the device that may be used to generate a pseudo-random number.

Parameters

Table 3-45. ZTC-GetSeed.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3

Table 3-45. ZTC-GetSeed.Request Parameters

OpCode	1	0xD0
Length	1	0x00 - This message does not have any parameters

3.1.45 ZTC-GetSeed.Confirm

Description

Returns a generated seed that may be used to generate a pseudo-random number.

Parameters

Table 3-46. ZTC-GetSeed.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0xD0
Length	1	Length in bytes of the following parameters
Seed	2	Seed value

3.1.46 ZTC-RemoveFromAddressMap.Request

Description

Remove an address map entry from the address table.

Parameters

Table 3-47. ZTC-RemoveFromAddressMap.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA3
OpCode	1	0xC1
Length	1	Length in bytes of the following parameters
IeeeAddress	8	The Ieee address to remove

3.1.47 ZTC-RemoveFromAddressMap.Confirm

Description

ZTC-RemoveFromAddressMap Confirmation.

Parameters

Table 3-48. ZTC-RemoveFromAddressMap.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0xA4
OpCode	1	0xC1
Length	1	Length in bytes of the following parameters
Status	1	The confirm status Possible values: 0x00: gZbSuccess_c (The address map entry was removed with success.)

3.2 MAC 2003 Messages

3.2.1 MacAssociate.Request

Description

MacAssociate.Request.

Parameters

Table 3-49. MacAssociate.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x00
Length	1	Length in bytes of the following parameters
CoordAddress	8	The coordinator address
CoordPANId	2	The PAN coordinator ID
CoordAddrMode	1	The coordinator addressing mode Possible values: 0x02: Value16bitAddr (16 bit short addresses are used) 0x03: Value64bitAddr (64 bit extended addresses are used)
LogicalChannel	1	The current logical channel occupied by the network
SecurityEnable	1	Use Security for this transfer
CapabilityInformation	1	The operational capabilities of the associating device

3.2.2 MacAssociate.Confirm

Description

MacAssociate.Confirm.

Parameters

Table 3-50. MacAssociate.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x01
Length	1	Length in bytes of the following parameters
AssocShortAddress	2	The short device address allocated by the coordinator
Status	1	The status of the association attempt Possible values: 0x00: gSuccess_c (Association successful) 0x01: gPanAtCapacity_c (PAN at capacity) 0x02: gPanAccessDenied_c (PAN access denied) 0xE1: gChannelAccessFailure_c (Transmission failed due to activity on the channel) 0xE4: gFailedSecurityCheck_c (The received frame failed security check) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xE9: gNoAck_c (No acknowledgement was received) 0xEB: gNoData_c (No response data was available following a request) 0xF3: gUnavailableKey_c (The appropriate key is not available in the ACL)

3.2.3 MacAssociate.Indication

Description

MacAssociate.Indication.

Parameters

Table 3-51. MacAssociate.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x00
Length	1	Length in bytes of the following parameters

Table 3-51. MacAssociate.Indication Parameters

DeviceAddress	8	The address of the device requesting assiociation
SecurityUse	1	The received frame is using security
ACLEntry	1	The macSecurityMode parameter value from the ACL entry associated with the sender of the data frame
CapabilityInformation	1	The operational capabilities of the device requesting assiociation

3.2.4 MacAssociate.Response

Description

MacAssociate.Response.

Parameters

Table 3-52. MacAssociate.Response Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x01
Length	1	Length in bytes of the following parameters
deviceAddress	8	IEEE address
assocShortAddress	2	NWK address
securityEnable	1	Security enabled
status	1	Security enabled

3.2.5 MacBeaconNotify.Indication

Description

MacBeaconNotify.Indication.

Parameters

Table 3-53. MacBeaconNotify.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x04
Length	1	Length in bytes of the following parameters
BSN	1	The beacon sequence number

Table 3-53. MacBeaconNotify.Indication Parameters

PendAddrSpec	1	The beacon pending address specification
sduLength	1	The beacon frame payload length (in bytes)
AddrList16bit	2 x PendAddrSpec & (bitwise AND) 0x7	The list of 16-bit short addresses of the devices for which the beacon source has data
AddrList64bit	8 x PendAddrSpec >> 112 & (bitwise AND) 0x70	The list of 16-bit short addresses of the devices for which the beacon source has data
PanDescriptor	Variable	The PAN descriptor for the received beacon frame Structure type parameter. See detailed table below for parameter structure.
sdu	sduLength	The beacon frame payload (raw bytes)

Table 3-54. PanDescriptor Parameter Structure

Structure Parameter	Size (bytes)	Comments
CoordAddress	8	The coordinator address
CoordPANId	2	The PAN coordinator ID
CoordAddrMode	1	The coordinator addressing mode Possible values: 0x02: Value16bitAddr (16 bit short addresses are used) 0x03: Value64bitAddr (64 bit extended addresses are used)
LogicalChannel	1	The current logical channel occupied by the network
SecurityUse	1	The received beacon frame is using security
ACLEntry	1	The macSecyrityMode parameter value from the ACL entry associated with the sender of the data frame
SecurityFailure	1	The parameter is set to TRUE if there was an error in the security processing of the frame
SuperFrameSpec	2	The superframe specification
GTSPermit	1	TRUE if the beacon is from a PAN cordinator which is accepting GTS requests
LinkQuality	1	The link quality at witch the network beacon was received
TimeStamp	3	The time stamp (in symbols)

3.2.6 MacCommStatus.Indication

Description

MacCommStatus.Indication.

Parameters

Table 3-55. MacCommStatus.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x0C
Length	1	Length in bytes of the following parameters
SrcAddr	8	Source address
PANId	2	The PAN ID
SrcAddrMode	1	The source address mode Possible values: 0x00: None (No source address supplied) 0x01: Reserved (This address mode is reserved) 0x02: Value16bitAddr (16 bit address supplied) 0x03: Value64bitAddr (64 bit address supplied)
DestAddr	8	Destination address
DestAddrMode	1	The destination address mode Possible values: 0x00: None (No destination address supplied) 0x01: Reserved (This address mode is reserved) 0x02: Value16bitAddr (16 bit address supplied) 0x03: Value64bitAddr (64 bit address supplied)
Status	1	The COMM status Possible values: 0x00: gSuccess_c (COMM status OK) 0xE1: gChannelAccessFailure_c (Transmission failed due to activity on the channel) 0xE4: gFailedSecurityCheck_c (The received frame failed security check) 0xE5: gFrameTooLong_c (The frame was too long to send after security processing) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xE9: gNoAck_c (No acknowledgement was received) 0xF0: gTransactionExpired_c (The transaction has expired and its information discarded) 0xF1: gTransactionOverflow_c (There is no capacity to store the transaction) 0xF3: gUnavailableKey_c (The appropriate key is not available in the ACL)

3.2.7 MacData.Request

Description

MacData.Request.

Parameters

Table 3-56. MacData.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x87
OpCode	1	0x00
Length	1	Length in bytes of the following parameters
DestAddr	8	The destination address
DestPanId	2	The destination PAN identifier
DestAddrMode	1	The destination address mode to use Possible values: 0x00: None (No source address supplied) 0x01: Reserved (This address mode is reserved) 0x02: Value16bitAddr (16 bit address supplied) 0x03: Value64bitAddr (64 bit address supplied)
SrcAddr	8	The source address
SrcPanId	2	The source PAN identifier
SrcAddrMode	1	The source address mode to use Possible values: 0x00: None (No source address supplied) 0x01: Reserved (This address mode is reserved) 0x02: Value16bitAddr (16 bit address supplied) 0x03: Value64bitAddr (64 bit address supplied)
msduLength	1	The number of payload bytes
msduHandle	1	The msdu handle
TxOptions	1	Bitmask of valid tx options
msdu	msduLength	The msdu payload

3.2.8 MacData.Confirm

Description

MacData.Confirm.

Parameters

Table 3-57. MacData.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x86
OpCode	1	0x00
Length	1	Length in bytes of the following parameters
msduHandle	1	Handle of packet to be confirmed
Status	1	The status of the data request Possible values: 0x00: gSuccess_c (Association successful) 0xE1: gChannelAccessFailure_c (Transmission failed due to activity on the channel) 0xE4: gFailedSecurityCheck_c (The received frame failed security check) 0xE5: gFrameTooLong_c (The frame was too long to send after security processing) 0xE6: gInvalidGts_c (The requested GTS is invalid) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xE9: gNoAck_c (No acknowledgement was received) 0xF0: gTransactionExpired_c (The transaction has expired and its information discarded) 0xF1: gTransactionOverflow_c (There is no capacity to store the transaction) 0xF3: gUnavailableKey_c (The appropriate key is not available in the ACL)

3.2.9 MacData.Indication

Description

MacData.Indication.

Parameters

Table 3-58. MacData.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x86
OpCode	1	0x01
Length	1	Length in bytes of the following parameters
DestAddr	8	The destination address
DestPanId	2	The destination PAN identifier

Table 3-58. MacData.Indication Parameters

DestAddrMode	1	The destination address mode to use Possible values: 0x00: None (No source address supplied) 0x01: Reserved (This address mode is reserved) 0x02: Value16bitAddr (16 bit address supplied) 0x03: Value64bitAddr (64 bit address supplied)
SrcAddr	8	The source address
SrcPanId	2	The source PAN identifier
SrcAddrMode	1	The source address mode to use Possible values: 0x00: None (No source address supplied) 0x01: Reserved (This address mode is reserved) 0x02: Value16bitAddr (16 bit address supplied) 0x03: Value64bitAddr (64 bit address supplied)
msduLength	1	The number of payload bytes
mpduLinkQuality	1	The link quality measured
SecurityUse	1	The received frame is using security
ACLEntry	1	The macSecyrityMode parameter value from the ACL entry associated with the sender of the data frame
msdu	msduLength	The msdu payload

3.2.10 MacDisassociate.Request

Description

MacDisassociate.Request.

Parameters

Table 3-59. MacDisassociate.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x02
Length	1	Length in bytes of the following parameters
DeviceAddress	8	The address of the device requesting assiociation
SecurityEnable	1	Use Security for this transfer
DisassociateReason	1	The reason for the disassociation Possible values: 0x01: gCoordLeave_c (The coordinator wishes the device to leave the PAN) 0x02: gDeviceLeave_c (The device wishes to leave the PAN)

3.2.11 MacDisassociate.Confirm

Description

MacDisassociate.Confirm.

Parameters

Table 3-60. MacDisassociate.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x03
Length	1	Length in bytes of the following parameters
Status	1	The status of the disassociation attempt Possible values: 0x00: gSuccess_c (Disassociation successful) 0xE1: gChannelAccessFailure_c (Transmission failed due to activity on the channel) 0xE4: gFailedSecurityCheck_c (The received frame failed security check) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xE9: gNoAck_c (No acknowledgement was received) 0xF0: gTransactionExpired_c (The transaction has expired and its information discarded) 0xF1: gTransactionOverflow_c (There is no capacity to store the transaction) 0xF3: gUnavailableKey_c (The appropriate key is not available in the ACL)

3.2.12 MacDisassociate.Indication

Description

MacDisassociate.Indication.

Parameters

Table 3-61. MacDisassociate.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x02
Length	1	Length in bytes of the following parameters
DeviceAddress	8	The address of the device requesting assiociation
SecurityUse	1	The received frame is using security

Table 3-61. MacDisassociate.Indication Parameters

ACLEntry	1	The macSecyrityMode parameter value from the ACL entry associated with the sender of the data frame
DisassociateReason	1	The reason for the disassociation Possible values: 0x01: gCoordLeave_c (The coordinator wishes the device to leave the PAN) 0x02: gDeviceLeave_c (The device wishes to leave the PAN)

3.2.13 MacGetPIBAttribute.Request

Description

MacGetPIBAttribute.Request.

Parameters

Table 3-62. MacGetPIBAttribute.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x03
Length	1	Length in bytes of the following parameters

Table 3-62. MacGetPIBAttribute.Request Parameters

PIBAttribute	1	The MAC PIB attribute identifier Possible values: 0x40: macAckWaitDuration (The maximum number of symbols to wait for an acknowledgement) 0x41: macAssociationPermit (The coordinator is allowing association or not) 0x42: macAutoRequest (The device automatically sends data requests (if listed) or not) 0x43: macBattLifeExt (Extended battery life enabled or not) 0x44: macBattLifeExtPeriods (The number of backoff periods where the receiver is enabled) 0x45: macBeaconPayload (The contents of the beacon payload) 0x46: macBeaconPayloadLength (The length of the beacon payload in bytes) 0x47: macBeaconOrder (Specifies the beacon interval) 0x48: macBeaconTxTime (Time (in symbols) since last transmitted beacon frame) 0x49: macBSN (The beacon sequence number) 0x4A: macCoordExtendedAddress (The 64-bit address of the coordinator) 0x4B: macCoordShortAddress (The 16-bit address of the coordinator) 0x4C: macDSN (The data sequence number) 0x4D: macGTSPermit (The coordinator is allowing GTS requests or not) 0x21: macLogicalChannel (The channel to use) 0x4E: macMaxCSMABackoffs (The maximum number of backoff slots used) 0x4F: macMinBE (The minimum value of the backoff slot exponent) 0x50: macPANId (The id of the PAN on which the device is operating) 0x51: macPromiscuousMode (Promiscuous (receive all) mode enabled or not) 0x20: macRole (The current role of the device) 0x24: macBeaconResponseDenied (Beacon response denied - if set to true, no beacon will be issued for an active scan request) 0x27: macBeaconResponseLQIThreshold (Beacon response will be issued for an active scan request, only if the LQI is higher than threshold. Set to zero to ignore) 0x52: macRxOnWhenIdle (The receiver is enabled during IDLE periods) 0x53: macShortAddress (The 16-bit short address of the device) 0x54: macSuperframeOrder (The length of the active portion of the superframe) 0x55: macTransactionPersistenceTime (The maximum time (in superframe periods) that data is indicated in the beacon) 0x70: macACLEntryDescriptorSet (ACL entry descriptor list) 0x71: macACLEntryDescriptorSetSize (The number of entries in the ACL entry descriptor list)

Table 3-62. MacGetPIBAttribute.Request Parameters

PIBAttribute (contributed)	1	0x72: macDefaultSecurity (Tx/Rx of secure frames from non-ACL-list devices enabled or not) 0x73: macDefaultSecurityMaterialLength (The number of bytes contained in ACLSecurityMaterial) 0x74: macDefaultSecurityMaterial (The specific security material to use (array of bytes)) 0x75: macDefaultSecuritySuite (Unique identifier of the security suite) 0x76: macSecurityMode (The security mode identifier) 0x77: macAclEntryCurrent (Current entry in ACL descriptor table) 0x78: macAclEntryExtAddress (Extended address for the current entry in ACL descriptor table) 0x79: macAclEntryShortAddress (Short address for the current entry in ACL descriptor table) 0x7A: macAclEntryPanId (PAN ID for the current entry in ACL descriptor table) 0x7B: macAclEntrySecurityMaterialLength (Security material length for the current entry in ACL descriptor table) 0x7C: macAclEntrySecurityMaterial (Security material for the current entry in ACL descriptor table) 0x7D: macAclEntrySecuritySuite (Security suite for the current entry in ACL descriptor table)

3.2.14 MacGetPIBAttribute.Confirm

Description

MacGetPIBAttribute.Confirm.

Parameters

Table 3-63. MacGetPIBAttribute.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x05
Length	1	Length in bytes of the following parameters
Status	1	The result of the PhyGetPIBAttribute.Request Possible values: 0x00: gSuccess_c (The MacGetPIBAttribute.Request operation was successful) 0xF4: UNSUPORTED_ATTRIBUTE (Unknown PIB attribute)

Table 3-63. MacGetPIBAttribute.Confirm Parameters

PIBAttribute	1	The MAC PIB attribute identifier Possible values: 0x40: macAckWaitDuration (The maximum number of symbols to wait for an acknowledgement) 0x41: macAssociationPermit (The coordinator is allowing association or not) 0x42: macAutoRequest (The device automatically sends data requests (if listed) or not) 0x43: macBattLifeExt (Extended battery life enabled or not) 0x44: macBattLifeExtPeriods (The number of backoff periods where the receiver is enabled) 0x45: macBeaconPayload (The contents of the beacon payload) 0x46: macBeaconPayloadLength (The length of the beacon payload in bytes) 0x47: macBeaconOrder (Specifies the beacon interval) 0x48: macBeaconTxTime (Time (in symbols) since last transmitted beacon frame) 0x49: macBSN (The beacon sequence number) 0x4A: macCoordExtendedAddress (The 64-bit address of the coordinator) 0x4B: macCoordShortAddress (The 16-bit address of the coordinator) 0x4C: macDSN (The data sequence number) 0x4D: macGTSPermit (The coordinator is allowing GTS requests or not) 0x21: macLogicalChannel (The channel used) 0x4E: macMaxCSMABackoffs (The maximum number of backoff slots used) 0x4F: macMinBE (The minimum value of the backoff slot exponent) 0x50: macPANId (The id of the PAN on which the device is operating) 0x51: macPromiscuousMode (Promiscuous (receive all) mode enabled or not) 0x20: macRole (The current role of the device) 0x24: macBeaconResponseDenied (Beacon response denied - if set to true, no beacon will be issued for an active scan request) 0x27: macBeaconResponseLQIThreshold (Beacon response will be issued for an active scan request, only if the LQI is higher than threshold. Set to zero to ignore) 0x52: macRxOnWhenIdle (The receiver is enabled during IDLE periods) 0x53: macShortAddress (The 16-bit short address of the device) 0x54: macSuperframeOrder (The length of the active portion of the superframe) 0x55: macTransactionPersistenceTime (The maximum time (in superframe periods) that data is indicated in the beacon)

Table 3-63. MacGetPIBAttribute.Confirm Parameters

PIBAttribute (continued)	1	0x70: macACLEntryDescriptorSet (ACL entry descriptor list) 0x71: macACLEntryDescriptorSetSize (The number of entries in the ACL entry descriptor list) 0x72: macDefaultSecurity (Tx/Rx of secure frames from non-ACL-list devices enabled or not) 0x73: macDefaultSecurityMaterialLength (The number of bytes contained in ACLSecurityMaterial) 0x74: macDefaultSecurityMaterial (The specific security material to use (array of bytes)) 0x75: macDefaultSecuritySuite (Unique identifier of the security suite) 0x76: macSecurityMode (The security mode identifier) 0x77: macAclEntryCurrent (Current entry in ACL descriptor table) 0x78: macAclEntryExtAddress (Extended address for the current entry in ACL descriptor table) 0x79: macAclEntryShortAddress (Short address for the current entry in ACL descriptor table) 0x7A: macAclEntryPanId (PAN ID for the current entry in ACL descriptor table) 0x7B: macAclEntrySecurityMaterialLength (Security material length for the current entry in ACL descriptor table) 0x7C: macAclEntrySecurityMaterial (Security material for the current entry in ACL descriptor table) 0x7D: macAclEntrySecuritySuite (Security suite for the current entry in ACL descriptor table)
DataLength	2	Length of the attribute data
PIBAttributeValue	DataLength	The MAC PIB attribute value

3.2.15 MacGTS.Request

Description

MacGTS.Request.

Parameters

Table 3-64. MacGTS.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x04
Length	1	Length in bytes of the following parameters
SecurityEnable	1	Use Security for this transfer
GTSCharacteristics	1	The characteristics of the GTS request

3.2.16 MacGTS.Confirm

Description

MacGTS.Confirm.

Parameters

Table 3-65. MacGTS.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x07
Length	1	Length in bytes of the following parameters
Status	1	The status of the GTS request Possible values: 0x00: gSuccess_c (Disassociation successful) 0xE1: gChannelAccessFailure_c (Transmission failed due to activity on the channel) 0xE2: gDenied_c (The GTS request has been denied by the PAN coordinator) 0xE4: gFailedSecurityCheck_c (The received frame failed security check) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xE9: gNoAck_c (No acknowledgement was received) 0xEB: gNoData_c (No response data was available following a request) 0xEC: gNoShortAddress_c (The operation failed due to a short address not being allocated) 0xF3: gUnavailableKey_c (The appropriate key is not available in the ACL)
GTSCharacteristics	1	The characteristics of the GTS request

3.2.17 MacGTS.Indication

Description

MacGTS.Indication.

Parameters

Table 3-66. MacGTS.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x06
Length	1	Length in bytes of the following parameters

Table 3-66. MacGTS.Indication Parameters

DeviceAddress	2	The short address of the device that has been allocated or deallocated a GTS
SecurityUse	1	The received frame is using security
ACLEntry	1	The macSecurityMode parameter value from the ACL entry associated with the sender of the data frame
GTSCharacteristics	1	The characteristics of the GTS request

3.2.18 MacInputError.Confirm

Description

generic message for indicating errors in input parameters.

Parameters

Table 3-67. MacInputError.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x11

Table 3-67. MacInputError.Confirm Parameters

Length	1	Length in bytes of the following parameters
Error	1	Error code from input parsing Possible values: 0x00: gSuccess_c (...) 0x01: gPanAtCapacity_c (...) 0x02: gPanAccessDenied_c (...) 0xD0: gRxEnableDone_c (...) 0xE0: gBeaconLoss_c (...) 0xE1: gChannelAccessFailure_c (...) 0xE2: gDenied_c (...) 0xE3: gDisableTrxFailure_c (...) 0xE4: gFailedSecurityCheck_c (...) 0xE5: gFrameTooLong_c (...) 0xE6: gInvalidGts_c (...) 0xE7: gInvalidHandle_c (...) 0xE8: gInvalidParameter_c (...) 0xE9: gNoAck_c (...) 0xEA: gNoBeacon_c (...) 0xEB: gNoData_c (...) 0xEC: gNoShortAddress_c (...) 0xED: gOutOfCap_c (...) 0xEE: gPanIdConflict_c (...) 0xEF: gRealignment_c (...) 0xF0: gTransactionExpired_c (...) 0xF1: gTransactionOverflow_c (...) 0xF2: gTxActive_c (...) 0xF3: gUnavailableKey_c (...) 0xF4: gUnsupportedAttribute_c (...)

3.2.19 MacOrphan.Indication

Description

MacOrphan.Indication.

Parameters

Table 3-68. MacOrphan.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x08
Length	1	Length in bytes of the following parameters
OrphanAddress	8	Extended address of orphaned device
SecurityUse	1	Security used in received frame
ACLEntry	1	Security mode from ACL list, if entry was found for orphaned device (0x08 otherwise)

3.2.20 MacOrphan.Response

Description

MacOrphan.Response.

Parameters

Table 3-69. MacOrphan.Response Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x05
Length	1	Length in bytes of the following parameters
OrphanAddress	8	Address of orphaned device
ShortAddress	2	Orphans association address, if applicable
AssociatedMember	1	Indicates if orphaned device was associated to this coord
SecurityEnable	1	Use Security for this transfer

3.2.21 MacPoll.Request

Description

MacPoll.Request.

Parameters

Table 3-70. MacPoll.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x0C
Length	1	Length in bytes of the following parameters
CoordAddress	8	The coordinator address
CoordPANId	2	The PAN coordinator ID
CoordAddrMode	1	The coordinator addressing mode Possible values: 0x02: Value16bitAddr (16 bit short addresses are used) 0x03: Value64bitAddr (64 bit extended addresses are used)
SecurityEnable	1	Use Security for this transfer

3.2.22 MacPoll.Confirm

Description

MacPoll.Confirm.

Parameters

Table 3-71. MacPoll.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x10
Length	1	Length in bytes of the following parameters
Status	1	The status of the poll request Possible values: 0x00: gSuccess_c (Association successful) 0xE1: gChannelAccessFailure_c (Transmission failed due to activity on the channel) 0xE4: gFailedSecurityCheck_c (The received frame failed security check) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xE9: gNoAck_c (No acknowledgement was received) 0xEB: gNoData_c (No response data was available following a request) 0xF3: gUnavailableKey_c (The appropriate key is not available in the ACL)

3.2.23 MacPollNotify.Indication

Description

MacPollNotify.Indication.

Parameters

Table 3-72. MacPollNotify.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x14
Length	1	Length in bytes of the following parameters

Table 3-72. MacPollNotify.Indication Parameters

SrcAddrMode	1	The source address mode Possible values: 0x00: None (No source address supplied) 0x01: Reserved (This address mode is reserved) 0x02: Value16bitAddr (16 bit address supplied) 0x03: Value64bitAddr (64 bit address supplied)
SrcAddr	8	Source address
PANId	2	The PAN ID

3.2.24 MacPurge.Request

Description

MacPurge.Request.

Parameters

Table 3-73. MacPurge.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x87
OpCode	1	0x01
Length	1	Length in bytes of the following parameters
msduHandle	1	Handle of packet to be purged

3.2.25 MacPurge.Confirm

Description

MacPurge.Confirm.

Parameters

Table 3-74. MacPurge.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x86
OpCode	1	0x02
Length	1	Length in bytes of the following parameters
msduHandle	1	Handle of packet to be purged
status	1	The status of the purge request Possible values: 0x00: gSuccess_c (Purge successful) 0xE7: gInvalidHandle_c (Invalid handle)

3.2.26 MacReset.Request

Description

MacReset.Request.

Parameters

Table 3-75. MacReset.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x06
Length	1	Length in bytes of the following parameters
SetDefaultPib	1	Reset MAC PIB attributes to default values

3.2.27 MacReset.Confirm

Description

MacReset.Confirm.

Parameters

Table 3-76. MacReset.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x09
Length	1	Length in bytes of the following parameters
Status	1	The status of the reset attempt Possible values: 0x00: gSuccess_c (Reset successful) 0xE3: gDisableTrxFailure_c (Failed to disable the transceiver)

3.2.28 MacRxEnable.Request

Description

MacRxEnable.Request.

Parameters

Table 3-77. MacRxEnable.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x07
Length	1	Length in bytes of the following parameters
DeferPermit	1	Defer receiver enable
RxOnTime	3	Number of symbols from the start of the superframe before receiver is to be enabled
RxOnDuration	3	The number of symbols the receiver is turned on

3.2.29 MacRxEnable.Confirm

Description

MacRxEnable.Confirm.

Parameters

Table 3-78. MacRxEnable.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x0A
Length	1	Length in bytes of the following parameters
Status	1	Status field Possible values: 0x00: SUCCESS (RxEnable success) 0xD0: gRxEnableDone_c (RxEnable done) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xF2: gTxActive_c (The transceiver was in the transmitter enabled state when the receiver was requested to be enabled.) 0xED: gOutOfCap_c (A receiver enable request was unsuccessful because it could not be completed within the CAP.)

3.2.30 MacScan.Request

Description

MacScan.Request.

Parameters

Table 3-79. MacScan.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x08
Length	1	Length in bytes of the following parameters
ScanType	1	Type of scan to perform Possible values: 0x00: EnergyDetection (Request energy detection (ED) scan) 0x01: ActiveScan (Request active scan, transmitting Beacons (FFD only)) 0x02: PassiveScan (Request passive scan, not transmitting Beacons) 0x03: OrphanScan (Request scanning for orphans)
ScanChannels	4	List of bits, indicating (=1) channels to scan
ScanDuration	1	Duration of scan (order of 2), for each channel

3.2.31 MacScan.Confirm

Description

MacScan.Confirm.

Parameters

Table 3-80. MacScan.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x0B
Length	1	Length in bytes of the following parameters

Table 3-80. MacScan.Confirm Parameters

Status	1	Status field Possible values: 0x00: SUCCESS (Scan completed with requested info found) 0xEA: NO_BEACON (No coordinator responded with requested info) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range)
ScanType	1	Type of scan to perform Possible values: 0x00: EnergyDetection (Request energy detection (ED) scan) 0x01: ActiveScan (Request active scan, transmitting Beacons (FFD only)) 0x02: PassiveScan (Request passive scan, not transmitting Beacons) 0x03: OrphanScan (Request scanning for orphans)
ResultListSize	1	Number of elements in result list
UnscannedChannels (only PS/AS)	4	Bit mask indicating unscanned channels
ResultList	Variable	List of results "Union" type parameter. Its structure is based on the value of parameter ScanType. See detailed table below for parameter structure.

Table 3-81. ResultList Parameter Structure

ScanType	Structure Parameter	Size (bytes)	Comments
0x00	EnergyDetection	ResultListSize	List of energy detect results
0x01	Active Scan	22 x ResultListSize	List of PAN Descriptors
0x02	Passive Scan	22 x ResultListSize	List of PAN Descriptors
0x03	Orphan Scan	1	No result list for orphan scan

3.2.32 MacSetPIBAttribute.Request

Description

MacSetPIBAttribute.Request.

Parameters

Table 3-82. MacSetPIBAttribute.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85

Table 3-82. MacSetPIBAttribute.Request Parameters

OpCode	1	0x09
Length	1	Length in bytes of the following parameters
PIBAttribute	1	The MAC PIB attribute identifier Possible values: 0x40: macAckWaitDuration (The maximum number of symbols to wait for an acknowledgement) 0x41: macAssociationPermit (The coordinator is allowing association or not) 0x42: macAutoRequest (The device automatically sends data requests (if listed) or not) 0x43: macBattLifeExt (Extended battery life enabled or not) 0x44: macBattLifeExtPeriods (The number of backoff periods where the receiver is enabled) 0x45: macBeaconPayload (The contents of the beacon payload) 0x46: macBeaconPayloadLength (The length of the beacon payload in bytes) 0x47: macBeaconOrder (Specifies the beacon interval) 0x48: macBeaconTxTime (Time (in symbols) since last transmitted beacon frame) 0x49: macBSN (The beacon sequence number) 0x4A: macCoordExtendedAddress (The 64-bit address of the coordinator) 0x4B: macCoordShortAddress (The 16-bit address of the coordinator) 0x4C: macDSN (The data sequence number) 0x4D: macGTSPermit (The coordinator is allowing GTS requests or not) 0x21: macLogicalChannel (The channel to use) 0x4E: macMaxCSMABackoffs (The maximum number of backoff slots used) 0x4F: macMinBE (The minimum value of the backoff slot exponent) 0x50: macPANId (The id of the PAN on which the device is operating) 0x51: macPromiscuousMode (Promiscuous (receive all) mode enabled or not) 0x20: macRole (The current role of the device) 0x24: macBeaconResponseDenied (Beacon response denied - if set to true, no beacon will be issued for an active scan request) 0x27: macBeaconResponseLQIThreshold (Beacon response will be issued for an active scan request, only if the LQI is higher than threshold. Set to zero to ignore) 0x52: macRxOnWhenIdle (The receiver is enabled during IDLE periods) 0x53: macShortAddress (The 16-bit short address of the device) 0x54: macSuperframeOrder (The length of the active portion of the superframe) 0x55: macTransactionPersistenceTime (The maximum time (in superframe periods) that data is indicated in the beacon)

Table 3-82. MacSetPIBAttribute.Request Parameters

PIBAttribute (continued)	1	0x70: macACLEntryDescriptorSet (ACL entry descriptor list) 0x71: macACLEntryDescriptorSetSize (The number of entries in the ACL entry descriptor list) 0x72: macDefaultSecurity (Tx/Rx of secure frames from non-ACL-list devices enabled or not) 0x73: macDefaultSecurityMaterialLength (The number of bytes contained in ACLSecurityMaterial) 0x74: macDefaultSecurityMaterial (The specific security material to use (array of bytes)) 0x75: macDefaultSecuritySuite (Unique identifier of the security suite) 0x76: macSecurityMode (The security mode identifier) 0x77: macAclEntryCurrent (Current entry in ACL descriptor table) 0x78: macAclEntryExtAddress (Extended address for the current entry in ACL descriptor table) 0x79: macAclEntryShortAddress (Short address for the current entry in ACL descriptor table) 0x7A: macAclEntryPanId (PAN ID for the current entry in ACL descriptor table) 0x7B: macAclEntrySecurityMaterialLength (Security material length for the current entry in ACL descriptor table) 0x7C: macAclEntrySecurityMaterial (Security material for the current entry in ACL descriptor table) 0x7D: macAclEntrySecuritySuite (Security suite for the current entry in ACL descriptor table)
Value	7	The value to set the attribute to

3.2.33 MacSetPIBAttribute.Confirm

Description

MacSetPIBAttribute.Confirm.

Parameters

Table 3-83. MacSetPIBAttribute.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x0D
Length	1	Length in bytes of the following parameters
Status	1	The result of the MacSetPIBAttribute.Request Possible values: 0x00: gSuccess_c (The PhySetPIBAttribute.Request operation was successful) 0xF4: UNSUPORTED_ATTRIBUTE (Unknown PIB attribute) 0xE8: gInvalidParameter_c (Unknown PIB attribute)

Table 3-83. MacSetPIBAttribute.Confirm Parameters

PIBAttribute	1	The MAC PIB attribute identifier Possible values: 0x40: macAckWaitDuration (The maximum number of symbols to wait for an acknowledgement) 0x41: macAssociationPermit (The coordinator is allowing association or not) 0x42: macAutoRequest (The device automatically sends data requests (if listed) or not) 0x43: macBattLifeExt (Extended battery life enabled or not) 0x44: macBattLifeExtPeriods (The number of backoff periods where the receiver is enabled) 0x45: macBeaconPayload (The contents of the beacon payload) 0x46: macBeaconPayloadLength (The length of the beacon payload in bytes) 0x47: macBeaconOrder (Specifies the beacon interval) 0x48: macBeaconTxTime (Time (in symbols) since last transmitted beacon frame) 0x49: macBSN (The beacon sequence number) 0x4A: macCoordExtendedAddress (The 64-bit address of the coordinator) 0x4B: macCoordShortAddress (The 16-bit address of the coordinator) 0x4C: macDSN (The data sequence number) 0x4D: macGTSPermit (The coordinator is allowing GTS requests or not) 0x21: macLogicalChannel (The channel to use) 0x4E: macMaxCSMABackoffs (The maximum number of backoff slots used) 0x4F: macMinBE (The minimum value of the backoff slot exponent) 0x50: macPANId (The id of the PAN on which the device is operating) 0x51: macPromiscuousMode (Promiscuous (receive all) mode enabled or not) 0x20: macRole (The current role of the device) 0x24: macBeaconResponseDenied (Beacon response denied - if set to true, no beacon will be issued for an active scan request) 0x27: macBeaconResponseLQIThreshold (Beacon response will be issued for an active scan request, only if the LQI is higher than threshold. Set to zero to ignore) 0x52: macRxOnWhenIdle (The receiver is enabled during IDLE periods) 0x53: macShortAddress (The 16-bit short address of the device) 0x54: macSuperframeOrder (The length of the active portion of the superframe) 0x55: macTransactionPersistenceTime (The maximum time (in superframe periods) that data is indicated in the beacon)

Table 3-83. MacSetPIBAttribute.Confirm Parameters

PIBAttribute (continued)	1	0x70: macACLEntryDescriptorSet (ACL entry descriptor list) 0x71: macACLEntryDescriptorSetSize (The number of entries in the ACL entry descriptor list) 0x72: macDefaultSecurity (Tx/Rx of secure frames from non-ACL-list devices enabled or not) 0x73: macDefaultSecurityMaterialLength (The number of bytes contained in ACLSecurityMaterial) 0x74: macDefaultSecurityMaterial (The specific security material to use (array of bytes)) 0x75: macDefaultSecuritySuite (Unique identifier of the security suite) 0x76: macSecurityMode (The security mode identifier) 0x77: macAclEntryCurrent (Current entry in ACL descriptor table) 0x78: macAclEntryExtAddress (Extended address for the current entry in ACL descriptor table) 0x79: macAclEntryShortAddress (Short address for the current entry in ACL descriptor table) 0x7A: macAclEntryPanId (PAN ID for the current entry in ACL descriptor table) 0x7B: macAclEntrySecurityMaterialLength (Security material length for the current entry in ACL descriptor table) 0x7C: macAclEntrySecurityMaterial (Security material for the current entry in ACL descriptor table) 0x7D: macAclEntrySecuritySuite (Security suite for the current entry in ACL descriptor table)

3.2.34 MacStart.Request

Description

MacStart.Request.

Parameters

Table 3-84. MacStart.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x0A
Length	1	Length in bytes of the following parameters
PANId	2	The PAN ID to be used by the beacon
LogicalChannel	1	The logical channel on which to start transmitting beacons
BeaconOrder	1	The beacon order
SuperframeOrder	1	The superframe order
PANCoordinator	1	Device will be PAN coordinator if true
BatteryLifeExtension	1	Battry life extention enabled

Table 3-84. MacStart.Request Parameters

CoordRealignment	1	Transmit coordinator realignment command
SecurityEnable	1	Use Security for beacon transfers

3.2.35 MacStart.Confirm

Description

MacStart.Confirm.

Parameters

Table 3-85. MacStart.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x0E
Length	1	Length in bytes of the following parameters
Status	1	The status of the start attempt Possible values: 0x00: gSuccess_c (Success) 0xE4: gFailedSecurityCheck_c (The received frame failed security check) 0xE5: gFrameTooLong_c (The frame was too long to send after security processing) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xEC: gNoShortAddress_c (No short address was allocateda) 0xF3: gUnavailableKey_c (The appropriate key is not available in the ACL)

3.2.36 MacSync.Request

Description

MacSync.Request.

Parameters

Table 3-86. MacSync.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x0B
Length	1	Length in bytes of the following parameters

Table 3-86. MacSync.Request Parameters

LogicalChannel	1	The logical channel on which to attempt synchronization
TrackBeacon	1	Track the beacon

3.2.37 MacSyncLoss.Indication

Description

MacSyncLoss.Indication.

Parameters

Table 3-87. MacSyncLoss.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x0F
Length	1	Length in bytes of the following parameters
LossReason	1	The Possible values: 0xEE: gPanIdConflict_c (PAN ID conflict) 0xEF: gRealignment_c (Coordinator realignment) 0xE0: gBeaconLoss_c (Beacon lost)

3.3 MAC 2006 Messages

3.3.1 MacAssociate.Request

Description

MacAssociate.Request description.

Parameters

Table 3-88. MacAssociate.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x00
Length	1	Length in bytes of the following parameters
CoordAddress	8	The coordinator address
CoordPANId	2	The PAN coordinator ID

Table 3-88. MacAssociate.Request Parameters (continued)

CoordAddrMode	1	The coordinator addressing mode Possible values: 0x02: Value16bitAddr (16 bit short addresses are used) 0x03: Value64bitAddr (64 bit extended addresses are used)
LogicalChannel	1	The current logical channel occupied by the network
securityLevel	1	The security level for the packet
keyIdMode	1	The key identifier mode for the packet
keySource	8	The key source for the packet
keyIndex	1	The key index for the packet
CapabilityInformation	1	The operational capabilities of the associating device

3.3.2 MacAssociate.Confirm

Description

MacAssociate.Confirm description.

Parameters

Table 3-89. MacAssociate.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x01
Length	1	Length in bytes of the following parameters
AssocShortAddress	2	The short device address allocated by the coordinator
Status	1	The status of the association attempt Possible values: 0x00: gSuccess_c (Association successful) 0x01: gPanAtCapacity_c (PAN at capacity) 0x02: gPanAccessDenied_c (PAN access denied) 0xDF: gUnsupportedSecurity_c (Unsupported Security) 0xE1: gChannelAccessFailure_c (Transmission failed due to activity on the channel) 0xE4: gFailedSecurityCheck_c (The received frame failed security check) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xE9: gNoAck_c (No acknowledgement was received) 0xEB: gNoData_c (No response data was available following a request) 0xF3: gUnavailableKey_c (The appropriate key is not available in the ACL)
securityLevel	1	The security level for the packet
keyIdMode	1	The key identifier mode for the packet

Table 3-89. MacAssociate.Confirm Parameters

keySource	8	The key source for the packet
keyIndex	1	The key index for the packet

3.3.3 MacAssociate.Indication

Description

MacAssociate.Indication description.

Parameters

Table 3-90. MacAssociate.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x00
Length	1	Length in bytes of the following parameters
DeviceAddress	8	The address of the device requesting assiociation
securityLevel	1	The security level used
keyIdMode	1	The mode used to identify the key used
keySource	8	The originator of the key used
keyIndex	1	The index of the key used
CapabilityInformation	1	The operational capabilities of the device requesting assiociation

3.3.4 MacAssociate.Response

Description

MacAssociate.Response description.

Parameters

Table 3-91. MacAssociate.Response Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x01
Length	1	Length in bytes of the following parameters
DeviceAddress	8	The address of the device requesting assiociation
AssocShortAddress	2	The short device address allocated by the coordinator
securityLevel	1	The security level for the packet

Table 3-91. MacAssociate.Response Parameters

keyIdMode	1	The key identifier mode for the packet
keySource	8	The key source for the packet
keyIndex	1	The key index for the packet
Status	1	The status of the association attempt Possible values: 0x00: gSuccess_c (Association successful) 0x01: gPanAtCapacity_c (PAN at capacity) 0x02: gPanAccessDenied_c (PAN access denied)

3.3.5 MacBeaconNotify.Indication

Description

MacBeaconNotify.Indication description.

Parameters

Table 3-92. MacBeaconNotify.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x04
Length	1	Length in bytes of the following parameters
BSN	1	The beacon sequence number
PendAddrSpec	1	The beacon pending address specification
sduLength	1	The beacon frame payload length (in bytes)
AddrList16bit	2 x PendAddrSpec & (bitwise AND) 0x7	The list of 16-bit short addresses of the devices for which the beacon source has data
AddrList64bit	8 x PendAddrSpec >> 112 & (bitwise AND) 0x70	The list of 16-bit short addresses of the devices for which the beacon source has data
PanDescriptor	Variable	The PAN descriptor for the received beacon frame Structure type parameter. See detailed table below for parameter structure.
sdu	sduLength	The beacon frame payload (raw bytes)

Table 3-93. PanDescriptor Parameter Structure

Structure Parameter	Size (bytes)	Comments
CoordAddress	8	The coordinator address
CoordPANId	2	The PAN coordinator ID

Table 3-93. PanDescriptor Parameter Structure

CoordAddrMode	1	The coordinator addressing mode Possible values: 0x02: Value16bitAddr (16 bit short addresses are used) 0x03: Value64bitAddr (64 bit extended addresses are used)
LogicalChannel	1	The current logical channel occupied by the network
SecurityFailure	1	The parameter is set to TRUE if there was an error in the security processing of the frame
SuperFrameSpec	2	The superframe specification
GTSPermit	1	TRUE if the beacon is from a PAN cordinator which is accepting GTS requests
LinkQuality	1	The link quality at witch the network beacon was received
TimeStamp	3	The time stamp (in symbols)
securityLevel	1	The security level for the packet
keyIdMode	1	The key identifier mode for the packet
keySource	8	The key source for the packet
keyIndex	1	The key index for the packet

3.3.6 MacBeaconStart.Indication

Description

MacBeaconStart.Indication.

Parameters

Table 3-94. MacBeaconStart.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x12
Length	1	Length in bytes of the following parameters
source	1	

3.3.7 MacCommStatus.Indication

Description

MacCommStatus.Indication description.

Parameters

Table 3-95. MacCommStatus.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x0C
Length	1	Length in bytes of the following parameters
SrcAddr	8	Source address
PANId	2	The PAN ID
SrcAddrMode	1	The source address mode Possible values: 0x00: None (No source address supplied) 0x01: Reserved (This address mode is reserved) 0x02: Value16bitAddr (16 bit address supplied) 0x03: Value64bitAddr (64 bit address supplied)
DestAddr	8	Destination address
DestAddrMode	1	The destination address mode Possible values: 0x00: None (No destination address supplied) 0x01: Reserved (This address mode is reserved) 0x02: Value16bitAddr (16 bit address supplied) 0x03: Value64bitAddr (64 bit address supplied)
Status	1	The COMM status Possible values: 0x00: gSuccess_c (COMM status OK) 0xE1: gChannelAccessFailure_c (Transmission failed due to activity on the channel) 0xE4: gFailedSecurityCheck_c (The received frame failed security check) 0xE5: gFrameTooLong_c (The frame was too long to send after security processing) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xE9: gNoAck_c (No acknowledgement was received) 0xF0: gTransactionExpired_c (The transaction has expired and its information discarded) 0xF1: gTransactionOverflow_c (There is no capacity to store the transaction) 0xF3: gUnavailableKey_c (The appropriate key is not available in the ACL)
securityLevel	1	The security level for the packet
keyIdMode	1	The key identifier mode for the packet
keySource	8	The key source for the packet
keyIndex	1	The key index for the packet

3.3.8 MacData.Request

Description

MacData.Request description.

Parameters

Table 3-96. MacData.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x87
OpCode	1	0x00
Length	1	Length in bytes of the following parameters
DestAddr	8	The destination address
DestPanId	2	The destination PAN identifier
DestAddrMode	1	The destination address mode to use Possible values: 0x00: None (No source address supplied) 0x01: Reserved (This address mode is reserved) 0x02: Value16bitAddr (16 bit address supplied) 0x03: Value64bitAddr (64 bit address supplied)
SrcAddr	8	The source address
SrcPanId	2	The source PAN identifier
SrcAddrMode	1	The source address mode to use Possible values: 0x00: None (No source address supplied) 0x01: Reserved (This address mode is reserved) 0x02: Value16bitAddr (16 bit address supplied) 0x03: Value64bitAddr (64 bit address supplied)
msduLength	1	The number of payload bytes
msduHandle	1	The msdu handle
TxOptions	1	Bitmask of valid tx options
securityLevel	1	The security level for the packet
keyIdMode	1	The key identifier mode for the packet
keySource	8	The key source for the packet
keyIndex	1	The key index for the packet
msdu	msduLength	The msdu payload

3.3.9 MacData.Confirm

Description

MacData.Confirm description.

Parameters

Table 3-97. MacData.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x86
OpCode	1	0x00
Length	1	Length in bytes of the following parameters
msduHandle	1	Handle of packet to be confirmed
Status	1	The status of the data request Possible values: 0x00: gSuccess_c (Association successful) 0xE1: gChannelAccessFailure_c (Transmission failed due to activity on the channel) 0xE4: gFailedSecurityCheck_c (The received frame failed security check) 0xE5: gFrameTooLong_c (The frame was too long to send after security processing) 0xE6: gInvalidGts_c (The requested GTS is invalid) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xE9: gNoAck_c (No acknowledgement was received) 0xF0: gTransactionExpired_c (The transaction has expired and its information discarded) 0xF1: gTransactionOverflow_c (There is no capacity to store the transaction) 0xF3: gUnavailableKey_c (The appropriate key is not available in the ACL)

3.3.10 MacData.Indication

Description

MacData.Indication description.

Parameters

Table 3-98. MacData.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x86
OpCode	1	0x01
Length	1	Length in bytes of the following parameters
DestAddr	8	The destination address
DestPanId	2	The destination PAN identifier
DestAddrMode	1	The destination address mode to use Possible values: 0x00: None (No source address supplied) 0x01: Reserved (This address mode is reserved) 0x02: Value16bitAddr (16 bit address supplied) 0x03: Value64bitAddr (64 bit address supplied)
SrcAddr	8	The source address

Table 3-98. MacData.Indication Parameters

SrcPanId	2	The source PAN identifier
SrcAddrMode	1	The source address mode to use Possible values: 0x00: None (No source address supplied) 0x01: Reserved (This address mode is reserved) 0x02: Value16bitAddr (16 bit address supplied) 0x03: Value64bitAddr (64 bit address supplied)
msduLength	1	The number of payload bytes
mpduLinkQuality	1	The link quality measured
dsn	1	The dsn for the received data frame
timeStamp	4	The timestamp for the received data frame
securityLevel	1	The security level for the packet
keyIdMode	1	The key identifier mode for the packet
keySource	8	The key source for the packet
keyIndex	1	The key index for the packet
msdu	msduLength	The msdu payload

3.3.11 MacDisassociate.Request

Description

MacDisassociate.Request description.

Parameters

Table 3-99. MacDisassociate.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x02
Length	1	Length in bytes of the following parameters
DeviceAddress	8	The address of the device to dissasociate [from]
DevicePanId	2	The PAN Id of the device to dissasociate [from]
DeviceAddrMode	1	The device addressing mode Possible values: 0x02: Value16bitAddr (16 bit short addresses are used) 0x03: Value64bitAddr (64 bit extended addresses are used)
DisassociateReason	1	The reason for the disassociation Possible values: 0x01: gCoordLeave_c (The coordinator wishes the device to leave the PAN) 0x02: gDeviceLeave_c (The device wishes to leave the PAN)

Table 3-99. MacDisassociate.Request Parameters

txIndirect	1	Indirect or direct transmission of the Disassociate Request command
securityLevel	1	The security level for the packet
keyIdMode	1	The key identifier mode for the packet
keySource	8	The key source for the packet
keyIndex	1	The key index for the packet

3.3.12 MacDisassociate.Confirm

Description

MacDisassociate.Confirm description.

Parameters

Table 3-100. MacDisassociate.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x03
Length	1	Length in bytes of the following parameters
DeviceAddress	8	The address of the device that has either requested disassociation or been instructed to disassociate by its coordinator.
DevicePanID	2	The PanID of the device that has either requested disassociation or been instructed to disassociate by its coordinator.
DeviceAddrMode	1	The addressing mode of the device that has either requested disassociation or been instructed to disassociate by its coordinator.
Status	1	The status of the disassociation attempt Possible values: 0x00: gSuccess_c (Disassociation successful) 0xE1: gChannelAccessFailure_c (Transmission failed due to activity on the channel) 0xE4: gFailedSecurityCheck_c (The received frame failed security check) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xE9: gNoAck_c (No acknowledgement was received) 0xF0: gTransactionExpired_c (The transaction has expired and its information discarded) 0xF1: gTransactionOverflow_c (There is no capacity to store the transaction) 0xF3: gUnavailableKey_c (The appropriate key is not available in the ACL)

3.3.13 MacDisassociate.Indication

Description

MacDisassociate.Indication description.

Parameters

Table 3-101. MacDisassociate.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x02
Length	1	Length in bytes of the following parameters
DeviceAddress	8	The address of the device requesting assiociation
DisassociateReason	1	The reason for the disassociation Possible values: 0x01: gCoordLeave_c (The coordinator wishes the device to leave the PAN) 0x02: gDeviceLeave_c (The device wishes to leave the PAN)
securityLevel	1	The security level for the packet
keyIdMode	1	The key identifier mode for the packet
keySource	8	The key source for the packet
keyIndex	1	The key index for the packet

3.3.14 MacGetPIBAttribute.Request

Description

MacGetPIBAttribute.Request description.

Parameters

Table 3-102. MacGetPIBAttribute.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x03
Length	1	Length in bytes of the following parameters

Table 3-102. MacGetPIBAttribute.Request Parameters

PIBAttribute (Part One of Two)	1	The MAC PIB attribute identifier Possible values: 0x40: macAckWaitDuration (The maximum number of symbols to wait for an acknowledgement) 0x41: macAssociationPermit (The coordinator is allowing association or not) 0x42: macAutoRequest (The device automatically sends data requests (if listed) or not) 0x43: macBattLifeExt (Extended battery life enabled or not) 0x44: macBattLifeExtPeriods (The number of backoff periods where the receiver is enabled) 0x45: macBeaconPayload (The contents of the beacon payload) 0x46: macBeaconPayloadLength (The length of the beacon payload in bytes) 0x47: macBeaconOrder (Specifies the beacon interval) 0x48: macBeaconTxTime (Time (in symbols) since last transmitted beacon frame) 0x49: macBSN (The beacon sequence number) 0x4A: macCoordExtendedAddress (The 64-bit address of the coordinator) 0x4B: macCoordShortAddress (The 16-bit address of the coordinator) 0x4C: macDSN (The data sequence number) 0x4D: macGTSPermit (The coordinator is allowing GTS requests or not) 0x21: macLogicalChannel (The channel to use) 0x4E: macMaxCSMABackoffs (The maximum number of backoff slots used) 0x4F: macMinBE (The minimum value of the backoff slot exponent) vel Command Frame Identifier) 0x8D: macSecLevSecurityMinimum (MAC - Minimum Security Level) 0x8E: macSecLevDeviceOverrideSecurityMinimum (MAC - Minimum Security Level) 0x8F: macDeviceDescriptorPanId (MAC Device Descriptor PAN id) 0x90: macDeviceDescriptorShortAddress (MAC Device Descriptor Short Address) 0x91: macDeviceDescriptorExtAddress (MAC Device Descriptor Extended Address) 0x92: macDeviceDescriptorFrameCounter (MAC Device Descriptor Frame Counter) 0x93: macDeviceDescriptorExempt (MAC Device Descriptor Exempt) 0x94: macKeyIdLookupData (MAC Key Id Lookup Data) 0x95: macKeyIdLookupDataSize (MAC Key Id Lookup Data Size) 0x96: macKeyTableCrtEntry (MAC Key Table) 0x97: macDeviceTableCrtEntry (MAC Device Table - Curent Entry) 0x98: macSecurityLevelTableCrtEntry (MAC Security Level Table - Curent Entry) 0x99: macKeyIdLookupListCrtEntry (MAC Key Id Lookup List - Curent Entry) 0x9A: macKeyUsageListCrtEntry (MAC Key Usage List - Curent Entry) 0x9B: macKeyDeviceListCrtEntry (MAC Key Device List - Curent Entry) 0x25: macNBSuperFrameInterval (Non-beacon mode superframe interval)

Table 3-102. MacGetPIBAttribute.Request Parameters

PIBAttribute (Part Two of Two)	1	0x50: macPANId (The id of the PAN on which the device is operating) 0x51: macPromiscuousMode (Promiscuous (receive all) mode enabled or not) 0x20: macRole (The current role of the device) 0x24: macBeaconResponseDenied (Beacon response denied - if set to true, no beacon will be issued for an active scan request) 0x52: macRxOnWhenIdle (The receiver is enabled during IDLE periods) 0x53: macShortAddress (The 16-bit short address of the device) 0x54: macSuperframeOrder (The length of the active portion of the superframe) 0x55: macTransactionPersistenceTime (The maximum time (in superframe periods) that data is indicated in the beacon) 0x56: macAssociatedPANCoord (Indicates if the device is curently associated to the PAN coordinator) 0x57: macMaxBe (MAC Maximum Backoff Exponent (BE)) 0x58: macMaxFrameTotalWaitTime (MAC Frame Total Wait time) 0x59: macMaxFrameRetries (MAC Max Frame Retries allowed for a transmission failure) 0x5A: macResponseWaitTime (MAC Response Wait time) 0x5B: macSyncSymbolOffset (MAC Sync Symbol Offset) 0x5C: macTimestampSupported (MAC Timestamp Supported) 0x5D: macSecurityEnabled (MAC Security Enabled) 0x72: macKeyTableEntries (MAc Key Table entries) 0x74: macDeviceTableEntries (MAC Device Table entries) 0x76: macSecurityLevelTableEntries (MAC Security Level Table entries) 0x77: macFrameCounter (MAC Frame Counter) 0x78: macAutoRequestSecurityLevel (MAC Auto Request Security Level) 0x79: macAutoRequestKeyIdMode (MAC Auto Request Key ID Mode) 0x7A: macAutoRequestKeySource (MAC Auto Request Key Source) 0x7B: macAutoRequestKeyIndex (MAC Auto Request Key Index) 0x7C: macDefaultKeySource (MAC Default Key Source) 0x7D: macPANCoordExtendedAddress (MAC PAN Coordinator Extended Address) 0x7E: macPANCoordShortAddress (MAC PAN Coordinator Short Address) 0x80: macKeyIdLookupEntries (MAC Key Id Lookup Entries) 0x82: macKeyDeviceListEntries (MAC Key Device List Entries) 0x84: macKeyUsageListEntries (MAC Key Usage List Entries) 0x85: macKey (MAC Key) 0x86: macKeyUsageFrameType (MAC Key Usage Frame Type) 0x87: macKeyUsageCmdFrameId (MAC Key Usage Cmd Frame Id) 0x88: macKeyDeviceDescriptorHandle (Handle to the DeviceDescriptor corresponding to the device) 0x89: macUniqueDevice (MAC Unique Device) 0x8A: macBlackListed (MAC Blacklisted) 0x8B: macSecLevFrameType (MAC Security Level Frame Type) 0x8C: macSecLevCommandFrameIdentifier (MAC Security Le
Index	1	Index PIB Table entries (not used)

3.3.15 MacGetPIBAttribute.Confirm

Description

MacGetPIBAttribute.Confirm description.

Parameters

Table 3-103. MacGetPIBAttribute.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x05
Length	1	Length in bytes of the following parameters
Status	1	The result of the PhyGetPIBAttribute.Request Possible values: 0x00: gSuccess_c (The MacGetPIBAttribute.Request operation was successful) 0xF4: UNSUPORTED_ATTRIBUTE (Unknown PIB attribute)
PIBAttribute (One of Two)	1	The MAC PIB attribute identifier Possible values: 0x40: macAckWaitDuration (The maximum number of symbols to wait for an acknowledgement) 0x41: macAssociationPermit (The coordinator is allowing association or not) 0x42: macAutoRequest (The device automatically sends data requests (if listed) or not) 0x43: macBattLifeExt (Extended battery life enabled or not) 0x44: macBattLifeExtPeriods (The number of backoff periods where the receiver is enabled) 0x45: macBeaconPayload (The contents of the beacon payload) 0x46: macBeaconPayloadLength (The length of the beacon payload in bytes) 0x47: macBeaconOrder (Specifies the beacon interval) 0x48: macBeaconTxTime (Time (in symbols) since last transmitted beacon frame) 0x49: macBSN (The beacon sequence number) 0x4A: macCoordExtendedAddress (The 64-bit address of the coordinator) 0x4B: macCoordShortAddress (The 16-bit address of the coordinator) 0x4C: macDSN (The data sequence number) 0x4D: macGTSPermit (The coordinator is allowing GTS requests or not) 0x21: macLogicalChannel (The channel used) 0x4E: macMaxCSMABackoffs (The maximum number of backoff slots used) 0x4F: macMinBE (The minimum value of the backoff slot exponent) x8B: macSecLevFrameType (MAC Security Level Frame Type) 0x8C: macSecLevCommandFrameIdentifier (MAC Security Level Command Frame Identifier) 0x8D: macSecLevSecurityMinimum (MAC - Minimum Security Level) 0x8E: macSecLevDeviceOverrideSecurityMinimum (MAC - Minimum Security Level) 0x8F: macDeviceDescriptorPanId (MAC Device Descriptor PAN id) 0x90: macDeviceDescriptorShortAddress (MAC Device Descriptor Short Address) 0x91: macDeviceDescriptorExtAddress (MAC Device Descriptor Extended Address) 0x92: macDeviceDescriptorFrameCounter (MAC Device Descriptor Frame Counter) 0x93: macDeviceDescriptorExempt (MAC Device Descriptor Exempt) 0x94: macKeyIdLookupData (MAC Key Id Lookup Data) 0x95: macKeyIdLookupDataSize (MAC Key Id Lookup Data Size) 0x96: macKeyTableCrtEntry (MAC Key Table) 0x97: macDeviceTableCrtEntry (MAC Device Table) 0x98: macSecurityLevelTableCrtEntry (MAC Security Level Table) 0x99: macKeyIdLookupListCrtEntry (MAC Key Id Lookup List) 0x9A: macKeyUsageListCrtEntry (MAC Key Usage List) 0x9B: macKeyDeviceListCrtEntry (MAC Key Device List)

Table 3-103. MacGetPIBAttribute.Confirm Parameters

PIBAttribute (Two of Two)	1	0x50: macPANId (The id of the PAN on which the device is operating) 0x51: macPromiscuousMode (Promiscuous (receive all) mode enabled or not) 0x20: macRole (The current role of the device) 0x24: macBeaconResponseDenied (Beacon response denied - if set to true, no beacon will be issued for an active scan request) 0x52: macRxOnWhenIdle (The receiver is enabled during IDLE periods) 0x53: macShortAddress (The 16-bit short address of the device) 0x54: macSuperframeOrder (The length of the active portion of the superframe) 0x55: macTransactionPersistenceTime (The maximum time (in superframe periods) that data is indicated in the beacon) 0x56: macAssociatedPANCoord (Indicates if the device is curently associated to the PAN coordinator) 0x57: macMaxBe (MAC Maximum Backoff Exponent (BE)) 0x58: macMaxFrameTotalWaitTime (MAC Frame Total Wait time) 0x59: macMaxFrameRetries (MAC Max Frame Retries allowed for a transmission failure) 0x5A: macResponseWaitTime (MAC Response Wait time) 0x5B: macSyncSymbolOffset (MAC Sync Symbol Offset) 0x5C: macTimestampSupported (MAC Timestamp Supported) 0x5D: macSecurityEnabled (MAC Security Enabled) 0x71: macKeyTable (MAC Key Table) 0x72: macKeyTableEntries (MAc Key Table entries) 0x73: macDeviceTable (MAC Device Table) 0x74: macDeviceTableEntries (MAC Device Table entries) 0x75: macSecurityLevelTable (MAC Security Level Table) 0x76: macSecurityLevelTableEntries (MAC Security Level Table entries) 0x77: macFrameCounter (MAC Frame Counter) 0x78: macAutoRequestSecurityLevel (MAC Auto Request Security Level) 0x79: macAutoRequestKeyIdMode (MAC Auto Request Key ID Mode) 0x7A: macAutoRequestKeySource (MAC Auto Request Key Source) 0x7B: macAutoRequestKeyIndex (MAC Auto Request Key Index) 0x7C: macDefaultKeySource (MAC Default Key Source) 0x7D: macPANCoordExtendedAddress (MAC PAN Coordinator Extended Address) 0x7E: macPANCoordShortAddress (MAC PAN Coordinator Short Address) 0x7F: macKeyIdLookupDescriptor (MAC Key Id Lookup Descriptor) 0x80: macKeyIdLookupEntries (MAC Key Id Lookup Entries) 0x81: macKeyDeviceList (MAC Key Device List) 0x82: macKeyDeviceListEntries (MAC Key Device List Entries) 0x83: macKeyUsageList (MAC Key Usage List) 0x84: macKeyUsageListEntries (MAC Key Usage List Entries) 0x85: macKey (MAC Key) 0x86: macKeyUsageFrameType (MAC Key Usage Frame Type) 0x87: macKeyUsageCmdFrameId (MAC Key Usage Cmd Frame Id) 0x88: macKeyDeviceDescriptor (MAC Key Device Descriptor) 0x89: macUniqueDevice (MAC Unique Device) 0x8A: macBlackListed (MAC Blacklisted)
Index	1	
DataLength	2	Length of the attribute data
PIBAttributeValue	DataLength	The MAC PIB attribute value

3.3.16 MacGTS.Request

Description

MacGTS.Request description.

Parameters

Table 3-104. MacGTS.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x04
Length	1	Length in bytes of the following parameters
GTSCharacteristics	1	The characteristics of the GTS request
securityLevel	1	The security level to be used
keyIdMode	1	The mode used to identify the key to be used
keySource	8	The originator of the key to be used
keyIndex	1	The index of the key to be used

3.3.17 MacGTS.Confirm

Description

MacGTS.Confirm description.

Parameters

Table 3-105. MacGTS.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x07
Length	1	Length in bytes of the following parameters

Table 3-105. MacGTS.Confirm Parameters

Status	1	The status of the GTS request Possible values: 0x00: gSuccess_c (Disassociation successful) 0xE1: gChannelAccessFailure_c (Transmission failed due to activity on the channel) 0xE2: gDenied_c (The GTS request has been denied by the PAN coordinator) 0xE4: gFailedSecurityCheck_c (The received frame failed security check) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xE9: gNoAck_c (No acknowledgement was received) 0xEB: gNoData_c (No response data was available following a request) 0xEC: gNoShortAddress_c (The operation failed due to a short address not being allocated) 0xF3: gUnavailableKey_c (The appropriate key is not available in the ACL)
GTSCharacteristics	1	The characteristics of the GTS request

3.3.18 MacGTS.Indication

Description

MacGTS.Indication description.

Parameters

Table 3-106. MacGTS.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x06
Length	1	Length in bytes of the following parameters
DeviceAddress	2	The short address of the device that has been allocated or deallocated a GTS
GTSCharacteristics	1	The characteristics of the GTS request
securityLevel	1	The security level for the packet
keyIdMode	1	The key identifier mode for the packet
keySource	8	The key source for the packet
keyIndex	1	The key index for the packet

3.3.19 MacInputError.Confirm

Description

generic message for indicating errors in input parameters.

Parameters

Table 3-107. MacInputError.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x11
Length	1	Length in bytes of the following parameters
Error	1	Error code from input parsing Possible values: 0x00: gSuccess_c (...) 0x01: gPanAtCapacity_c (...) 0x02: gPanAccessDenied_c (...) 0xE0: gBeaconLoss_c (...) 0xE1: gChannelAccessFailure_c (...) 0xE2: gDenied_c (...) 0xE3: gDisableTrxFailure_c (...) 0xE4: gFailedSecurityCheck_c (...) 0xE5: gFrameTooLong_c (...) 0xE6: gInvalidGts_c (...) 0xE7: gInvalidHandle_c (...) 0xE8: gInvalidParameter_c (...) 0xE9: gNoAck_c (...) 0xEA: gNoBeacon_c (...) 0xEB: gNoData_c (...) 0xEC: gNoShortAddress_c (...) 0xED: gOutOfCap_c (...) 0xEE: gPanIdConflict_c (...) 0xEF: gRealignment_c (...) 0xF0: gTransactionExpired_c (...) 0xF1: gTransactionOverflow_c (...) 0xF2: gTxActive_c (...) 0xF3: gUnavailableKey_c (...) 0xF4: gUnsupportedAttribute_c (...)

3.3.20 MacMaintenanceScan.Confirm

Description

MacMaintenanceScan.Confirm.

Parameters

Table 3-108. MacMaintenanceScan.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x13

Table 3-108. MacMaintenanceScan.Confirm Parameters

Length	1	Length in bytes of the following parameters
Status	1	

3.3.21 MacOrphan.Indication

Description

MacOrphan.Indication description.

Parameters

Table 3-109. MacOrphan.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x08
Length	1	Length in bytes of the following parameters
OrphanAddress	8	Extended address of orphaned device
securityLevel	1	The security level for the packet
keyIdMode	1	The key identifier mode for the packet
keySource	8	The key source for the packet
keyIndex	1	The key index for the packet

3.3.22 MacOrphan.Response

Description

MacOrphan.Response description.

Parameters

Table 3-110. MacOrphan.Response Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x05
Length	1	Length in bytes of the following parameters
OrphanAddress	8	Address of orphaned device
ShortAddress	2	Orphans association address, if applicable

Table 3-110. MacOrphan.Response Parameters

AssociatedMember	1	Indicates if orphaned device was associated to this coord
securityLevel	1	The security level to be used
keyIdMode	1	The mode used to identify the key to be used
keySource	8	The originator of the key to be used
keyIndex	1	The index of the key to be used

3.3.23 MacPoll.Request

Description

MacPoll.Request description.

Parameters

Table 3-111. MacPoll.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x0C
Length	1	Length in bytes of the following parameters
CoordAddress	8	The coordinator address
CoordPANId	2	The PAN coordinator ID
CoordAddrMode	1	The coordinator addressing mode Possible values: 0x02: Value16bitAddr (16 bit short addresses are used) 0x03: Value64bitAddr (64 bit extended addresses are used)
securityLevel	1	The security level to be used
keyIdMode	1	The mode used to identify the key to be used
keySource	8	The originator of the key to be used
keyIndex	1	The index of the key to be used

3.3.24 MacPoll.Confirm

Description

MacPoll.Confirm description.

Parameters

Table 3-112. MacPoll.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x10
Length	1	Length in bytes of the following parameters
Status	1	The status of the poll request Possible values: 0x00: gSuccess_c (Association successful) 0xE1: gChannelAccessFailure_c (Transmission failed due to activity on the channel) 0xE4: gFailedSecurityCheck_c (The received frame failed security check) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xE9: gNoAck_c (No acknowledgement was received) 0xEB: gNoData_c (No response data was available following a request) 0xF3: gUnavailableKey_c (The appropriate key is not available in the ACL)

3.3.25 MacPollNotifyIndication.Indication

Description

MacPollNotifyIndication.Indication description.

Parameters

Table 3-113. MacPollNotifyIndication.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x14
Length	1	Length in bytes of the following parameters
SrcAddrMode	1	The source address mode to use Possible values: 0x00: None (No source address supplied) 0x01: Reserved (This address mode is reserved) 0x02: Value16bitAddr (16 bit address supplied) 0x03: Value64bitAddr (64 bit address supplied)
SrcAddr	8	The source address
SrcPanId	2	The source PAN identifier

3.3.26 MacPurge.Request

Description

MacPurge.Request description.

Parameters

Table 3-114. MacPurge.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x87
OpCode	1	0x01
Length	1	Length in bytes of the following parameters
msduHandle	1	Handle of packet to be purged

3.3.27 MacPurge.Confirm

Description

MacPurge.Confirm description.

Parameters

Table 3-115. MacPurge.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x86
OpCode	1	0x02
Length	1	Length in bytes of the following parameters
msduHandle	1	Handle of packet to be purged
status	1	The status of the purge request Possible values: 0x00: gSuccess_c (Purge successful) 0xE7: gInvalidHandle_c (Invalid handle)

3.3.28 MacReset.Request

Description

MacReset.Request description.

Parameters

Table 3-116. MacReset.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x06
Length	1	Length in bytes of the following parameters
SetDefaultPib	1	Reset MAC PIB attributes to default values

3.3.29 MacReset.Confirm

Description

MacReset.Confirm description.

Parameters

Table 3-117. MacReset.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x09
Length	1	Length in bytes of the following parameters
Status	1	The status of the reset attempt Possible values: 0x00: gSuccess_c (Reset successful) 0xE3: gDisableTrxFailure_c (Failed to disable the transceiver)

3.3.30 MacRxEnable.Request

Description

MacRxEnable.Request description.

Parameters

Table 3-118. MacRxEnable.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85

Table 3-118. MacRxEnable.Request Parameters

OpCode	1	0x07
Length	1	Length in bytes of the following parameters
DeferPermit	1	Defer receiver enable
RxOnTime	3	Number of symbols from the start of the superframe before receiver is to be enabled
RxOnDuration	3	The number of symbols the receiver is turned on

3.3.31 MacRxEnable.Confirm

Description

MacRxEnable.Confirm description.

Parameters

Table 3-119. MacRxEnable.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x0A
Length	1	Length in bytes of the following parameters
Status	1	Status field Possible values: 0x00: SUCCESS (Scan completed with requested info found) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xF2: gTxActive_c (The transceiver was in the transmitter enabled state when the receiver was requested to be enabled.) 0xED: gOutOfCap_c (A receiver enable request was unsuccessful because it could not be completed within the CAP.)

3.3.32 MacScan.Request

Description

MacScan.Request description.

Parameters

Table 3-120. MacScan.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x08
Length	1	Length in bytes of the following parameters
ScanType	1	Type of scan to perform Possible values: 0x00: EnergyDetection (Request energy detection (ED) scan) 0x01: ActiveScan (Request active scan, transmitting Beacons (FFD only)) 0x02: PassiveScan (Request passive scan, not transmitting Beacons) 0x03: OrphanScan (Request scanning for orphans)
ScanChannels	4	List of bits, indicating (=1) channels to scan
ScanDuration	1	Duration of scan (order of 2), for each channel
securityLevel	1	The security level to be used
keyIdMode	1	The mode used to identify the key to be used
keySource	8	The originator of the key to be used
keyIndex	1	The index of the key to be used

3.3.33 MacScan.Confirm

Description

MacScan.Confirm description.

Parameters

Table 3-121. MacScan.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x0B
Length	1	Length in bytes of the following parameters
Status	1	Status field Possible values: 0x00: SUCCESS (Scan completed with requested info found) 0xEA: NO_BEACON (No coordinator responded with requested info) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range)

Table 3-121. MacScan.Confirm Parameters

ScanType	1	Type of scan to perform Possible values: 0x00: EnergyDetection (Request energy detection (ED) scan) 0x01: ActiveScan (Request active scan, transmitting Beacons (FFD only)) 0x02: PassiveScan (Request passive scan, not transmitting Beacons) 0x03: OrphanScan (Request scanning for orphans)
ResultListSize	1	Number of elements in result list
UnscannedChannels (only PS/AS)	4	Bit mask indicating unscanned channels
ResultList	Variable	List of results "Union" type parameter. Its structure is based on the value of parameter ScanType. See detailed table below for parameter structure.

Table 3-122. ResultList Parameter Structure

ScanType	Structure Parameter	Size (bytes)	Comments
0x00	EnergyDetection	ResultListSize	List of energy detect results
0x01	Active Scan	31 x ResultListSize	List of PAN Descriptors
0x02	Passive Scan	31 x ResultListSize	List of PAN Descriptors
0x03	Orphan Scan	1	No result list for orphan scan

3.3.34 MacSetPIBAttribute.Request

Description

MacSetPIBAttribute.Request description.

Parameters

Table 3-123. MacSetPIBAttribute.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x09
Length	1	Length in bytes of the following parameters

Table 3-123. MacSetPIBAttribute.Request Parameters

PIBAttribute (One of Three)	1	The MAC PIB attribute identifier Possible values: 0x40: macAckWaitDuration (The maximum number of symbols to wait for an acknowledgement) 0x41: macAssociationPermit (The coordinator is allowing association or not) 0x42: macAutoRequest (The device automatically sends data requests (if listed) or not) 0x43: macBattLifeExt (Extended battery life enabled or not) 0x44: macBattLifeExtPeriods (The number of backoff periods where the receiver is enabled) 0x45: macBeaconPayload (The contents of the beacon payload) 0x46: macBeaconPayloadLength (The length of the beacon payload in bytes) 0x47: macBeaconOrder (Specifies the beacon interval) 0x48: macBeaconTxTime (Time (in symbols) since last transmitted beacon frame) 0x49: macBSN (The beacon sequence number) 0x4A: macCoordExtendedAddress (The 64-bit address of the coordinator) 0x4B: macCoordShortAddress (The 16-bit address of the coordinator) 0x4C: macDSN (The data sequence number) 0x4D: macGTSPermit (The coordinator is allowing GTS requests or not) 0x21: macLogicalChannel (The channel to use) 0x4E: macMaxCSMABackoffs (The maximum number of backoff slots used) 0x4F: macMinBE (The minimum value of the backoff slot exponent)

Table 3-123. MacSetPIBAttribute.Request Parameters

PIBAttribute (Two of Three)	1	0x50: macPANId (The id of the PAN on which the device is operating) 0x51: macPromiscuousMode (Promiscuous (receive all) mode enabled or not) 0x20: macRole (The current role of the device) 0x24: macBeaconResponseDenied (Beacon response denied - if set to true, no beacon will be issued for an active scan request) 0x52: macRxOnWhenIdle (The receiver is enabled during IDLE periods) 0x53: macShortAddress (The 16-bit short address of the device) 0x54: macSuperframeOrder (The length of the active portion of the superframe) 0x55: macTransactionPersistenceTime (The maximum time (in superframe periods) that data is indicated in the beacon) 0x56: macAssociatedPANCoord (Indicates if the device is curently associated to the PAN coordinator) 0x57: macMaxBe (MAC Maximum Backoff Exponent (BE)) 0x58: macMaxFrameTotalWaitTime (MAC Frame Total Wait time) 0x59: macMaxFrameRetries (MAC Max Frame Retries allowed for a transmission failure) 0x5A: macResponseWaitTime (MAC Response Wait time) 0x5B: macSyncSymbolOffset (MAC Sync Symbol Offset) 0x5D: macSecurityEnabled (MAC Security Enabled) 0x72: macKeyTableEntries (MAc Key Table entries) 0x74: macDeviceTableEntries (MAC Device Table entries) 0x76: macSecurityLevelTableEntries (MAC Security Level Table entries) 0x77: macFrameCounter (MAC Frame Counter) 0x78: macAutoRequestSecurityLevel (MAC Auto Request Security Level) 0x79: macAutoRequestKeyIdMode (MAC Auto Request Key ID Mode) 0x7A: macAutoRequestKeySource (MAC Auto Request Key Source) 0x7B: macAutoRequestKeyIndex (MAC Auto Request Key Index) 0x7C: macDefaultKeySource (MAC Default Key Source) 0x7D: macPANCoordExtendedAddress (MAC PAN Coordinator Extended Address) 0x7E: macPANCoordShortAddress (MAC PAN Coordinator Short Address) 0x80: macKeyIdLookupEntries (MAC Key Id Lookup Entries) 0x82: macKeyDeviceListEntries (MAC Key Device List Entries) 0x84: macKeyUsageListEntries (MAC Key Usage List Entries) 0x85: macKey (MAC Key) 0x86: macKeyUsageFrameType (MAC Key Usage Frame Type) 0x87: macKeyUsageCmdFrameId (MAC Key Usage Cmd Frame Id) 0x88: macKeyDeviceDescriptorHandle (Handle to the DeviceDescriptor corresponding to the device) 0x89: macUniqueDevice (MAC Unique Device) 0x8A: macBlackListed (MAC Blacklisted) 0x8B: macSecLevFrameType (MAC Security Level Frame Type) 0x8C: macSecLevCommandFrameIdentifier (MAC Security Level Command Frame Identifier) 0x8D: macSecLevSecurityMinimum (MAC - Minimum Security Level) 0x8E: macSecLevDeviceOverrideSecurityMinimum (MAC - Minimum Security Level) 0x8F: macDeviceDescriptorPanId (MAC Device Descriptor PAN id)

Table 3-123. MacSetPIBAttribute.Request Parameters

PIBAttribute (Three of Three)	1	0x90: macDeviceDescriptorShortAddress (MAC Device Descriptor Short Address) 0x91: macDeviceDescriptorExtAddress (MAC Device Descriptor Extended Address) 0x92: macDeviceDescriptorFrameCounter (MAC Device Descriptor Frame Counter) 0x93: macDeviceDescriptorExempt (MAC Device Descriptor Exempt) 0x94: macKeyIdLookupData (MAC Key Id Lookup Data) 0x95: macKeyIdLookupDataSize (MAC Key Id Lookup Data Size) 0x96: macKeyTableCrtEntry (MAC Key Table - Curent Entry) 0x97: macDeviceTableCrtEntry (MAC Device Table - Curent Entry) 0x98: macSecurityLevelTableCrtEntry (MAC Security Level Table - Curent Entry) 0x99: macKeyIdLookupListCrtEntry (MAC Key Id Lookup List - Curent Entry) 0x9A: macKeyUsageListCrtEntry (MAC Key Usage List - Curent Entry) 0x9B: macKeyDeviceListCrtEntry (MAC Key Device List - Curent Entry) 0x25: macNBSuperFrameInterval (Non-beacon mode superframe interval)
Index	1	Index PIB Table entries (not used)
Value	16	The value to set the attribute to

3.3.35 MacSetPIBAttribute.Confirm

Description

MacSetPIBAttribute.Confirm description.

Parameters

Table 3-124. MacSetPIBAttribute.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x0D
Length	1	Length in bytes of the following parameters
Status	1	The result of the MacSetPIBAttribute.Request Possible values: 0x00: gSuccess_c (The PhySetPIBAttribute.Request operation was successful) 0xF4: UNSUPORTED_ATTRIBUTE (Unknown PIB attribute) 0xE8: gInvalidParameter_c (Unknown PIB attribute)

Table 3-124. MacSetPIBAttribute.Confirm Parameters

PIBAttribute (One of Two)	1	The MAC PIB attribute identifier Possible values: 0x40: macAckWaitDuration (The maximum number of symbols to wait for an acknowledgement) 0x41: macAssociationPermit (The coordinator is allowing association or not) 0x42: macAutoRequest (The device automatically sends data requests (if listed) or not) 0x43: macBattLifeExt (Extended battery life enabled or not) 0x44: macBattLifeExtPeriods (The number of backoff periods where the receiver is enabled) 0x45: macBeaconPayload (The contents of the beacon payload) 0x46: macBeaconPayloadLength (The length of the beacon payload in bytes) 0x47: macBeaconOrder (Specifies the beacon interval) 0x48: macBeaconTxTime (Time (in symbols) since last transmitted beacon frame) 0x49: macBSN (The beacon sequence number) 0x4A: macCoordExtendedAddress (The 64-bit address of the coordinator) 0x4B: macCoordShortAddress (The 16-bit address of the coordinator) 0x4C: macDSN (The data sequence number) 0x4D: macGTSPermit (The coordinator is allowing GTS requests or not) 0x21: macLogicalChannel (The channel to use) 0x4E: macMaxCSMABackoffs (The maximum number of backoff slots used) 0x4F: macMinBE (The minimum value of the backoff slot exponent) 0x50: macPANId (The id of the PAN on which the device is operating) 0x51: macPromiscuousMode (Promiscuous (receive all) mode enabled or not) 0x20: macRole (The current role of the device) 0x24: macBeaconResponseDenied (Beacon response denied - if set to true, no beacon will be issued for an active scan request) 0x52: macRxOnWhenIdle (The receiver is enabled during IDLE periods) 0x53: macShortAddress (The 16-bit short address of the device) 0x54: macSuperframeOrder (The length of the active portion of the superframe) 0x55: macTransactionPersistenceTime (The maximum time (in superframe periods) that data is indicated in the beacon) 0x56: macAssociatedPANCoord (Indicates if the device is curently associated to the PAN coordinator) 0x57: macMaxBe (MAC Maximum Backoff Exponent (BE)) 0x58: macMaxFrameTotalWaitTime (MAC Frame Total Wait time) 0x59: macMaxFrameRetries (MAC Max Frame Retries allowed for a transmission failure) 0x5A: macResponseWaitTime (MAC Response Wait time) 0x5B: macSyncSymbolOffset (MAC Sync Symbol Offset) 0x5C: macTimestampSupported (MAC Timestamp Supported) 0x5D: macSecurityEnabled (MAC Security Enabled)

Table 3-124. MacSetPIBAttribute.Confirm Parameters

PIBAttribute (Two of Two)	1	0x71: macKeyTable (MAC Key Table) 0x72: macKeyTableEntries (MAc Key Table entries) 0x73: macDeviceTable (MAC Device Table) 0x74: macDeviceTableEntries (MAC Device Table entries) 0x75: macSecurityLevelTable (MAC Security Level Table) 0x76: macSecurityLevelTableEntries (MAC Security Level Table entries) 0x77: macFrameCounter (MAC Frame Counter) 0x78: macAutoRequestSecurityLevel (MAC Auto Request Security Level) 0x79: macAutoRequestKeyIdMode (MAC Auto Request Key ID Mode) 0x7A: macAutoRequestKeySource (MAC Auto Request Key Source) 0x7B: macAutoRequestKeyIndex (MAC Auto Request Key Index) 0x7C: macDefaultKeySource (MAC Default Key Source) 0x7D: macPANCoordExtendedAddress (MAC PAN Coordinator Extended Address) 0x7E: macPANCoordShortAddress (MAC PAN Coordinator Short Address) 0x7F: macKeyIdLookupDescriptor (MAC Key Id Lookup Descriptor) 0x80: macKeyIdLookupEntries (MAC Key Id Lookup Entries) 0x81: macKeyDeviceList (MAC Key Device List) 0x82: macKeyDeviceListEntries (MAC Key Device List Entries) 0x83: macKeyUsageList (MAC Key Usage List) 0x84: macKeyUsageListEntries (MAC Key Usage List Entries) 0x85: macKey (MAC Key) 0x86: macKeyUsageFrameType (MAC Key Usage Frame Type) 0x87: macKeyUsageCmdFrameId (MAC Key Usage Cmd Frame Id) 0x88: macKeyDeviceDescriptor (MAC Key Device Descriptor) 0x89: macUniqueDevice (MAC Unique Device) 0x8A: macBlackListed (MAC Blacklisted) 0x8B: macSecLevFrameType (MAC Security Level Frame Type) 0x8C: macSecLevCommandFrameIdentifier (MAC Security Level Command Frame Identifier) 0x8D: macSecLevSecurityMinimum (MAC - Minimum Security Level) 0x8E: macSecLevDeviceOverrideSecurityMinimum (MAC - Minimum Security Level) 0x8F: macDeviceDescriptorPanId (MAC Device Descriptor PAN id) 0x90: macDeviceDescriptorShortAddress (MAC Device Descriptor Short Address) 0x91: macDeviceDescriptorExtAddress (MAC Device Descriptor Extended Address) 0x92: macDeviceDescriptorFrameCounter (MAC Device Descriptor Frame Counter) 0x93: macDeviceDescriptorExempt (MAC Device Descriptor Exempt) 0x94: macKeyIdLookupData (MAC Key Id Lookup Data) 0x95: macKeyIdLookupDataSize (MAC Key Id Lookup Data Size) 0x96: macKeyTableCrtEntry (MAC Key Table) 0x97: macDeviceTableCrtEntry (MAC Device Table) 0x98: macSecurityLevelTableCrtEntry (MAC Security Level Table) 0x99: macKeyIdLookupListCrtEntry (MAC Key Id Lookup List) 0x9A: macKeyUsageListCrtEntry (MAC Key Usage List) 0x9B: macKeyDeviceListCrtEntry (MAC Key Device List)

3.3.36 MacStart.Request

Description

MacStart.Request description.

Parameters

Table 3-125. MacStart.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x0A
Length	1	Length in bytes of the following parameters
PANId	2	The PAN ID to be used by the beacon
LogicalChannel	1	The logical channel on which to start transmitting beacons
StartTime	4	The time at which to begin transmitting beacons
BeaconOrder	1	The beacon order
SuperframeOrder	1	The superframe order
PANCoordinator	1	Device will be PAN coordinator if true
BatteryLifeExtension	1	Battry life extention enabled
CoordRealignment	1	Transmit coordinator realignment command
CoordRealignSecurityLevel	1	The security level for the realign
CoordRealignKeyIdMode	1	The key identifier mode for the realign
CoordRealignKeySource	8	The key source for the realign
CoordRealignKeyIndex	1	The key index for the realign
BeaconSecurityLevel	1	The security level for the beacons
BeaconKeyIdMode	1	The key identifier mode for the beacons
BeaconKeySource	8	The key source for the beacons
BeaconKeyIndex	1	The key index for the beacons

3.3.37 MacStart.Confirm

Description

MacStart.Confirm description.

Parameters

Table 3-126. MacStart.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x0E

Table 3-126. MacStart.Confirm Parameters

Length	1	Length in bytes of the following parameters
Status	1	The status of the start attempt Possible values: 0x00: gSuccess_c (Success) 0xE4: gFailedSecurityCheck_c (The received frame failed security check) 0xE5: gFrameTooLong_c (The frame was too long to send after security processing) 0xE8: gInvalidParameter_c (A parameter in the primitive is out of the valid range) 0xEC: gNoShortAddress_c (No short address was allocateda) 0xF3: gUnavailableKey_c (The appropriate key is not available in the ACL)

3.3.38 MacSync.Request

Description

MacSync.Request description.

Parameters

Table 3-127. MacSync.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x85
OpCode	1	0x0B
Length	1	Length in bytes of the following parameters
LogicalChannel	1	The logical channel on which to attempt synchronization
TrackBeacon	1	Track the beacon

3.3.39 MacSyncLoss.Indication

Description

MacSyncLoss.Indication description.

Parameters

Table 3-128. MacSyncLoss.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x84
OpCode	1	0x0F
Length	1	Length in bytes of the following parameters

Table 3-128. MacSyncLoss.Indication Parameters

LossReason	1	The Possible values: 0xEE: gPanIdConflict_c (PAN ID conflict) 0xEF: gRealignment_c (Coordinator realignment) 0xE0: gBeaconLoss_c (Beacon lost)
PanID	2	The PanID with which the device lost synch
LogicalChannel	1	The logical channel on which the device lost synch
securityLevel	1	The security level for the packet
keyIdMode	1	The key identifier mode for the packet
keySource	8	The key source for the packet
keyIndex	1	The key index for the packet

3.4 ASP Messages

3.4.1 AspAcome.Request

Description

AspAcome.Request.

Parameters

Table 3-129. AspAcome.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x05
Length	1	Length in bytes of the following parameters
clko_en	1	clko_en description

3.4.2 AspAcome.Confirm

Description

AspAcome.Confirm.

Parameters

Table 3-130. AspAcome.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94

Table 3-130. AspAcome.Confirm Parameters

OpCode	1	0x05
Length	1	Length in bytes of the following parameters
Status	1	The status of the acome request Possible values: 0x00: SUCCESS (Request successfully performed)

3.4.3 AspAutoDoze.Request

Description

AspAutoDoze.Request.

Parameters

Table 3-131. AspAutoDoze.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x04
Length	1	Length in bytes of the following parameters
autoEnable	1	Auto Enable Flag Possible values: 0x00: DisableAutoDoze (Unit will not enter doze mode automatically) 0x01: EnableAutoDoze (Unit will enter doze mode if idle)
enableWakeIndication	1	Enable Wake Indication
autoDozeInterval	4	The Doze Interval
clko_en	1	Clock enable

3.4.4 AspAutoDoze.Confirm

Description

AspAutoDoze.Confirm.

Parameters

Table 3-132. AspAutoDoze.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x15

Table 3-132. AspAutoDoze.Confirm Parameters

Length	1	Length in bytes of the following parameters
Status	1	The status of the Auto Doze request Possible values: 0x00: SUCCESS (Request successfully performed) 0xE8: INVALID_PARAMETER (A parameter is invalid or the primitive is not allowed at the moment)

3.4.5 AspBattery.Confirm

Description

AspBattery.Confirm.

Parameters

Table 3-133. AspBattery.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0xA1
Length	1	Length in bytes of the following parameters
level	1	The current battery voltage level

3.4.6 AspClko.Request

Description

AspClko.Request.

Parameters

Table 3-134. AspClko.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x09
Length	1	Length in bytes of the following parameters

Table 3-134. AspClko.Request Parameters

clkoEnable	1	Enable ABEL CLK output Possible values: 0x00: DisableCLKO (Do not generate a clock on CLKO) 0x01: EnableCLKO (Generate clock on CLKO)
clkoRate	1	Frequency selection for CLKO Possible values: 0x00: Value16MHz (16 MHz) 0x01: Value8MHz (8 MHz) 0x02: Value4MHz (4 MHz) 0x03: Value2MHz (2 MHz) 0x04: Value1MHz (1 MHz) 0x05: Value625KHz (62.5 KHz) 0x06: Value3125KHz (31.25 KHz) 0x07: Value15625KHz (15.625 KHz)

3.4.7 AspClko.Confirm

Description

AspClko.Confirm.

Parameters

Table 3-135. AspClko.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x09
Length	1	Length in bytes of the following parameters
Status	1	The status of the CLKO request Possible values: 0x00: SUCCESS (Request successfully performed) 0xE8: INVALID_PARAMETER (A parameter is invalid)

3.4.8 AspDdr.Request

Description

AspDdr.Request.

Parameters

Table 3-136. AspDdr.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95

Table 3-136. AspDdr.Request Parameters

OpCode	1	0x0B
Length	1	Length in bytes of the following parameters
directionMask	1	The ABEL GPIO direction register mask (bits 3-7, zero means input)

3.4.9 AspDdr.Confirm

Description

AspDdr.Confirm.

Parameters

Table 3-137. AspDdr.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x0B
Length	1	Length in bytes of the following parameters
Status	1	The status of the DDR request Possible values: 0x00: SUCCESS (Request successfully performed)

3.4.10 AspDoze.Request

Description

AspDoze.Request.

Parameters

Table 3-138. AspDoze.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x03
Length	1	Length in bytes of the following parameters
dozeDuration	4	The Doze Duration
clko_en	1	Clock enable

3.4.11 AspDoze.Confirm

Description

AspDoze.Confirm.

Parameters

Table 3-139. AspDoze.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x14
Length	1	Length in bytes of the following parameters
Status	1	The status of the Doze request Possible values: 0x00: SUCCESS (Request successfully performed) 0xE8: INVALID_PARAMETER (A parameter is invalid or the primitive is not allowed at the moment)
actualDozeDuration	3	Doze duration granted by the MAC

3.4.12 AspEvent.Request

Description

AspEvent.Request.

Parameters

Table 3-140. AspEvent.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x08
Length	1	Length in bytes of the following parameters
eventTime	4	The time the event will be triggered

3.4.13 AspEvent.Confirm

Description

AspEvent.Confirm.

Parameters

Table 3-141. AspEvent.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x08
Length	1	Length in bytes of the following parameters
Status	1	The status of the Event request Possible values: 0x00: SUCCESS (Request successfully performed) 0xE8: INVALID_PARAMETER (A parameter is invalid or no more events can be activated at this time)

3.4.14 AspEvent.Indication

Description

AspEvent.Indication.

Parameters

Table 3-142. AspEvent.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x04
Length	1	Length in bytes of the following parameters
handle	1	The handle of the triggered event

3.4.15 AspGetInactiveTime.Request

Description

AspGetInactiveTime.Request.

Parameters

Table 3-143. AspGetInactiveTime.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95

Table 3-143. AspGetInactiveTime.Request Parameters

OpCode	1	0x01
Length	1	0x00 - This message does not have any parameters

3.4.16 AspGetInactiveTime.Confirm

Description

AspGetInactiveTime.Confirm.

Parameters

Table 3-144. AspGetInactiveTime.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x12
Length	1	Length in bytes of the following parameters
Status	1	The status of the Get Inactive Time request Possible values: 0x00: SUCCESS (Request successfully performed) 0xE8: INVALID_PARAMETER (A parameter is invalid or the primitive is not allowed at the moment)
time	3	

3.4.17 AspGetMacState.Request

Description

AspGetMacState.Request.

Parameters

Table 3-145. AspGetMacState.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x02
Length	1	0x00 - This message does not have any parameters

3.4.18 AspGetMacState.Confirm

Description

AspGetMacState.Confirm.

Parameters

Table 3-146. AspGetMacState.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x13
Length	1	Length in bytes of the following parameters
Status	1	The status of the Mac

3.4.19 AspGetPowerLevel.Request

Description

AspGetPowerLevel.Request.

Parameters

Table 3-147. AspGetPowerLevel.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x1F
Length	1	0x00 - This message does not have any parameters

3.4.20 AspGetPowerLevel.Confirm

Description

AspGetPowerLevel.Confirm.

Parameters

Table 3-148. AspGetPowerLevel.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x1F

Table 3-148. AspGetPowerLevel.Confirm Parameters

Length	1	Length in bytes of the following parameters
Value	1	The Value of Power Level

3.4.21 AspGetTime.Request

Description

AspGetTime.Request.

Parameters

Table 3-149. AspGetTime.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x00
Length	1	0x00 - This message does not have any parameters

3.4.22 AspGetTime.Confirm

Description

AspGetTime.Confirm.

Parameters

Table 3-150. AspGetTime.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x00
Length	1	Length in bytes of the following parameters
status	1	
time	3	

3.4.23 AspHibernate.Request

Description

AspHibernate.Request.

Parameters

Table 3-151. AspHibernate.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x06
Length	1	0x00 - This message does not have any parameters

3.4.24 AspHibernate.Confirm

Description

AspHibernate.Confirm.

Parameters

Table 3-152. AspHibernate.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x06
Length	1	Length in bytes of the following parameters
Status	1	The status of the Hibernate request Possible values: 0x00: SUCCESS (Request successfully performed) 0xE8: INVALID_PARAMETER (A parameter is invalid or the primitive is not allowed at the moment)

3.4.25 AspIdle.Indication

Description

AspIdle.Indication.

Parameters

Table 3-153. AspIdle.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x02
Length	1	Length in bytes of the following parameters
timeRemaining	3	Time left of the CAP

3.4.26 AspInactive.Indication

Description

AspInactive.Indication.

Parameters

Table 3-154. AspInactive.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x03
Length	1	Length in bytes of the following parameters
timeRemaining	3	Time left of the inactive part of the super frame

3.4.27 AspNvRam.Confirm

Description

AspNvRam.Confirm.

Parameters

Table 3-155. AspNvRam.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0xA0
Length	1	Length in bytes of the following parameters
Status	1	The status of the NVRAM request Possible values: 0x00: SUCCESS (Request successfully performed) 0xE8: INVALID_PARAMETER (A parameter is invalid)

3.4.28 AspPort.Request

Description

AspPort.Request.

Parameters

Table 3-156. AspPort.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x0C
Length	1	Length in bytes of the following parameters
portWrite	1	The ABEL GPIO data port mask (bits 3-7, one means write to port)
portValue	1	The data to be written to the ABEL GPIOs (bits 3-7)

3.4.29 AspPort.Confirm

Description

AspPort.Confirm.

Parameters

Table 3-157. AspPort.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x0C
Length	1	Length in bytes of the following parameters
Status	1	The status of the Port request Possible values: 0x00: SUCCESS (Request successfully performed)
portResult	1	The new port contents

3.4.30 AspSetMinDozeTime.Request

Description

Set the minimum doze time.

Parameters

Table 3-158. AspSetMinDozeTime.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x0D

Table 3-158. AspSetMinDozeTime.Request Parameters

Length	1	Length in bytes of the following parameters
minDozeTime	4	The Minimun Doze Time

3.4.31 AspSetMinDozeTime.Confirm

Description

AspSetMinDozeTime.Confirm.

Parameters

Table 3-159. AspSetMinDozeTime.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x0D
Length	1	Length in bytes of the following parameters
Status	1	The status of the Temperature request Possible values: 0x00: SUCCESS (Request successfully performed)

3.4.32 AspSetNotify.Request

Description

AspSetNotify.Request.

Parameters

Table 3-160. AspSetNotify.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x0E
Length	1	Length in bytes of the following parameters
notifications	1	

3.4.33 AspSetNotify.Confirm

Description

AspSetNotify.Confirm.

Parameters

Table 3-161. AspSetNotify.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x0E
Length	1	Length in bytes of the following parameters
Status	1	The status of the Set Notify request Possible values: 0x00: SUCCESS (Request successfully performed)

3.4.34 AspSetPowerLevel.Request

Description

AspSetPowerLevel.Request.

Parameters

Table 3-162. AspSetPowerLevel.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x0F
Length	1	Length in bytes of the following parameters
powerLevel	1	Power Level

3.4.35 AspSetPowerLevel.Confirm

Description

AspSetPowerLevel.Confirm.

Parameters

Table 3-163. AspSetPowerLevel.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x0F

Table 3-163. AspSetPowerLevel.Confirm Parameters

Length	1	Length in bytes of the following parameters
Status	1	The status of the Set Power Level request Possible values: 0x00: SUCCESS (Request successfully performed) 0xE8: INVALID_PARAMETER (A parameter is invalid or the primitive is not allowed at the moment)

3.4.36 AspTelecSendRawData.Request

Description

TelecSendRawData.Request.

Parameters

Table 3-164. AspTelecSendRawData.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x16
Length	1	Length in bytes of the following parameters
DataLength	1	Max len is 125, min is 3
Data	DataLength	PSDU Data

3.4.37 AspTelecSetFreq.Confirm

Description

AspTelecSetFreq.Confirm.

Parameters

Table 3-165. AspTelecSetFreq.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x11
Length	1	Length in bytes of the following parameters
Status	1	The status of the Telec Set Frequency Possible values: 0x00: SUCCESS (Request successfully performed)

3.4.38 AspTelectTest.Confirm

Description

AspTelectTest.Confirm.

Parameters

Table 3-166. AspTelectTest.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x10
Length	1	Length in bytes of the following parameters
Status	1	The status of the telec test Possible values: 0x00: SUCCESS (Request successfully performed)

3.4.39 AspTrim.Request

Description

AspTrim.Request.

Parameters

Table 3-167. AspTrim.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x0A
Length	1	Length in bytes of the following parameters
trimValue	1	The capacitor trim value

3.4.40 AspTrim.Confirm

Description

AspTrim.Confirm.

Parameters

Table 3-168. AspTrim.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94

Table 3-168. AspTrim.Confirm Parameters

OpCode	1	0x0A
Length	1	Length in bytes of the following parameters
Status	1	The status of the Trim request Possible values: 0x00: SUCCESS (Request successfully performed)

3.4.41 AspWake.Request

Description

AspWake.Request.

Parameters

Table 3-169. AspWake.Request Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x07
Length	1	0x00 - This message does not have any parameters

3.4.42 AspWake.Confirm

Description

AspWake.Confirm.

Parameters

Table 3-170. AspWake.Confirm Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x07
Length	1	Length in bytes of the following parameters
Status	1	The status of the Wake request Possible values: 0x00: SUCCESS (Request successfully performed)

3.4.43 AspWake.Indication

Description

AspWake.Indication.

Parameters

Table 3-171. AspWake.Indication Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x94
OpCode	1	0x01
Length	1	Length in bytes of the following parameters
Status	1	The power saving mode before the Wake up Possible values: 0x00: Awake 0x01: Doze (Woke up from Doze) 0x02: Hibernate (Woke up from Hibernate) 0x03: Acoma (Woke up from Acoma)

3.4.44 TelecSetFreq

Description

TelecSetFreq.

Parameters

Table 3-172. TelecSetFreq Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x11
Length	1	Length in bytes of the following parameters
mode	1	

3.4.45 TelecTest

Description

TelecTest.

Parameters

Table 3-173. TelecTest Parameters

Parameter	Size (bytes)	Comments
OpGroup	1	0x95
OpCode	1	0x10

Table 3-173. TelecTest Parameters

Length	1	Length in bytes of the following parameters
mode	1	