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ZEROG CONFIGURATION OPTIONS FOR MICROCHIP/ZEROG SDK

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ZeroG Configuration Options for Microchip/ZeroG SDK

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ZeroG Configuration Options for Microchip/ZeroG SDK

Overview

This document describes the set of `#define` macros in the `TCPIPConfig.h` file that are related to ZeroG host driver and libraries. It is broken down into sections to help the end developer get up and running with those options that are most beneficial:

- Basic setup contains items that are required to establish communication between the ZeroG PICtail and the rest of the network.
- The network section contains items that control how the ZeroG PICtail will connect into existing networks.
- Security details the options that are necessary to setup secured connections. It is further broken down into WEP and WPA, the two security schemes widely in use today.
- Connection options details settings for how the ZeroG PICtail can be talked to post-compile time, as well as how the PICtail will maintain its connection
- Finally, the miscellaneous section details options that control how the ZeroG driver will work with your existing development tool chain.

The file `TCPIPConfig.h` is a per-application header file that usually resides in the application directory.

This set of compile-time macros determines the default behavior of ZeroG device when the system starts up. Examples of such default behaviors include:

- Adhoc or Infrastructure network
- Which access point to connect to
- Which channel(s) to scan
- Security mode
- Security keys

While this file defines the compile-time configuration, there is a corresponding set of API functions that you can use to configure the ZeroG device from within your application or during run-time. Please refer to the ZeroG link manager library documentation for the C API functions.

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Basic Setup

MY_DEFAULT_MAC_BYTE_n

Name MY_DEFAULT_MAC_BYTE_n

Description MY_DEFAULT_MAC_BYTE1 through MY_DEFAULT_MAC_BYTE6 define the six byte MAC address of the device (commonly seen as 001EC00004C6 or 00:1E:C0:00:04:C6). If the bytes of the MAC address are set as 00:04:A3:00:00:00, the link manager will retrieve the hardware MAC address that was programmed into the ZeroG device NVRAM at the manufacturing factory. The link manager will then use this value as the default MAC address.

When defined

When not defined Must be defined.

Dependencies

Conflicts with

See also

MY_DEFAULT_IP_ADDR_BYTE_n

Name MY_DEFAULT_IP_ADDR_BYTE_n

Description MY_DEFAULT_IP_ADDR_BYTE1 through MY_DEFAULT_IP_ADDR_BYTE4 define the 4 bytes of the IP address, as specified in dot-decimal notation (e.g. 192.168.1.100). This address is also used when the device was unable to obtain a dynamic IP address from the access point.

When defined

When not defined Must be defined.

Dependencies

Conflicts with

See also

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Network Setup

MY_DEFAULT_LINK_MGMT

Name MY_DEFAULT_LINK_MGMT

Description Defines the default network mode, which is either infrastructure, adhoc, or idle.

When defined Set to `kZGLMNetworkModeInfrastructure` if the default behavior is to start up in infrastructure mode. The local station will attempt to search and connect to the access point defined in `MY_DEFAULT_SSID_NAME`.

Set to `kZGLMNetworkModeAdhoc` if the default is to start up in adhoc mode. In this situation, the local station will first try to join a preexisting network whose name matches `MY_DEFAULT_SSID_NAME`. If this network cannot be found, then the SSID defined in `MY_DEFAULT_SSID_NAME` will be used to create a new network.

Set to `kZGLMNetworkModeIdle` if the default behavior is to start up the local station in idle mode.

When not defined The station will start up in infrastructure mode.

Dependencies

Conflicts with

See also

MY_DEFAULT_SSID_NAME

Name MY_DEFAULT_SSID_NAME

Description Defines the default 802.11 wireless network name.

In infrastructure mode, this name should match (case sensitive) the wireless network name that has been programmed into the access point. The SSID is limited to 32 alphanumeric characters.

In ad-hoc mode, this is the name that the ZeroG PICtail will broadcast for the network that it has created. Other devices that want to connect to the ZeroG network should use this name (case sensitive) as their wireless network name.

When defined The local station will attempt to establish a connection to the specified access point.

When not defined Must be defined. Default is set to `MicrochipDemoAP`.

Dependencies

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Conflicts with

See also MY_DEFAULT_LINK_MGMT

MY_DEFAULT_DOMAIN

Name MY_DEFAULT_DOMAIN

Description Defines the default 802.11 domain.

When defined Always defined.

Valid options are:

- kZGRegDomainFCC
- kZGRegDomainIC
- kZGRegDomainETSI
- kZGRegDomainSpain
- kZGRegDomainFrance
- kZGRegDomainJapanA
- kZGRegDomainJapanB

When not defined

Dependencies

Conflicts with

See also

MY_DEFAULT_CHANNEL_SCAN_LIST

Name MY_DEFAULT_CHANNEL_SCAN_LIST

Description Defines the list of channels that will be scanned when attempting to join a network. This definition is specified as a comma-separated list of values.

When defined Always defined.

The local station scans the channels in the order given in this list, for the access point identified by MY_DEFAULT_SSID_NAME. The following is a list of acceptable channel values based on the domain the local station is in (as set by MY_DEFAULT_DOMAIN).

Domain	Available Channels
FCC (USA)	1-11

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IC (Canada)	1-11
ETSI (Europe)	1-13
Spain	10-11
France	10-13
Japan A	14
Japan B	1-13

When not defined

Dependencies

Conflicts with

See also MY_DEFAULT_CHANNEL_LIST_SIZE
MY_DEFAULT_DOMAIN
MY_DEFAULT_SSID_NAME

MY_DEFAULT_CHANNEL_LIST_SIZE

Name MY_DEFAULT_CHANNEL_LIST_SIZE

Description Defines the number of channels listed in MY_DEFAULT_CHANNEL_SCAN_LIST.

When defined Always defined.

Must match the number of channels listed in
MY_DEFAULT_CHANNEL_SCAN_LIST.

When not defined

Dependencies

Conflicts with

See also MY_DEFAULT_CHANNEL_SCAN_LIST

Security Setup

MY_DEFAULT_ENCRYPTION_TYPE

Name MY_DEFAULT_ENCRYPTION_TYPE

Description Defines the default security mode.

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When defined Always defined.

The valid options and the associated security mode are detailed below:

Value	Security Types
kKeyTypeNone	No security
kKeyTypeWep	WEP (64-bit and 128-bit)
kKeyTypePsk	WPA/WPA2 TKIP/AES PSK
kKeyTypeCalcPsk	WPA/WPA2 TKIP/AES passphrase Note: Using this option adds a significant delay (about a half a minute) to the connection process.

When not defined

Dependencies

Conflicts with

See also MY_DEFAULT_WEP_KEYS
MY_DEFAULT_WEP_KEY_INDEX
MY_DEFAULT_WEP_AUTH
MY_DEFAULT_PSK
MY_DEFAULT_PSK_PHRASE

MY_DEFAULT_WEP_KEYS

Name MY_DEFAULT_WEP_KEYS

Description Defines a set of 4 WEP keys. Each key value is either 5 bytes (40-bit) in length for 64-bit WEP encryption, or 13 bytes (104-bit) in length for 128-bit WEP encryption. This set of keys need to be equal in length.

When defined These keys are installed to the ZeroG device if MY_DEFAULT_ENCRYPTION_TYPE is set to kKeyTypeWep.

When not defined

Dependencies

Conflicts with

See also MY_DEFAULT_ENCRYPTION_TYPE
MY_DEFAULT_WEP_KEY_INDEX
MY_DEFAULT_WEP_AUTH

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MY_DEFAULT_WEP_KEY_INDEX

Name MY_DEFAULT_WEP_KEY_INDEX

Description Defines the default key index to use for transmission in WEP encryption.

When defined Valid values are 0, 1, 2, or 3. Note that most routers normally define these as values 1, 2, 3, or 4.

When not defined

Dependencies Key conversions from ASCII to HEX will provide valid entries for key=0 (router key=1). See the WEP Keys Appendix for links to online tools to do the conversion. Subsequent key entries (for 1, 2, and 3) are often custom created on the router and must be transcribed from the router's wireless configuration page if these ones are used.

Conflicts with

See also MY_DEFAULT_WEP_KEYS

MY_DEFAULT_WEP_KEY_LEN

Name MY_DEFAULT_WEP_KEY_LEN

Description Defines the default key length used for authentication.

When defined Valid values are as follows:

Value	WEP Security Mode
kZGWEPKeyLenShort	64-bit WEP security (5 byte key)
kZGWEPKeyLenLong	128-bit WEP security (13 byte key)

When not defined

Dependencies

Conflicts with

See also MY_DEFAULT_WEP_KEYS
MY_DEFAULT_WEP_KEY_INDEX

MY_DEFAULT_WEP_AUTH

Name MY_DEFAULT_WEP_AUTH

Description Defines the authentication algorithm used with WEP security.

When defined Valid values are either of the following:

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Value	Authentication
kZGAuthAlgOpen	In open authentication, any local station can connect and associate. WEP will be used to encrypt the data frames only.
kZGAuthAlgShared	In shared authentication, WEP is used for the authentication also, leading to a four-way challenge-response handshake between the local station and the access point.

When not defined

Dependencies

Conflicts with

See also

MY_DEFAULT_PSK

Name MY_DEFAULT_PSK

Description Defines the default PSK value used in WPA or WPA2 security schemes.

When defined The 32-byte value is installed to the ZeroG device if the MY_DEFAULT_ENCRYPTION_TYPE definition is set to kKeyTypePsk.

Please see the WPA Keys Appendix for online resources to compute the correct hexadecimal values for this key.

When not defined

Dependencies

Conflicts with

See also MY_DEFAULT_ENCRYPTION_TYPE
MY_DEFAULT_PSK_PHRASE

MY_DEFAULT_PSK_PHRASE

Name MY_DEFAULT_PSK_PHRASE

Description Defines the passphrase (human readable) for the ZeroG device to derive the PSK value from.

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When defined The ZeroG device calculates the PSK from this passphrase, if the `MY_DEFAULT_ENCRYPTION_TYPE` definition is set to `kKeyTypeCalcPsk`.

Due to the computationally intense nature of this option, this will add a significant amount of time to the connection process, on the order of a half a minute. During this time, it may seem like the device is hung or not responding.

During development, if you are only interested in testing the WPA/WPA2 security measures, you are better off precalculating the PSK (online options are given in the WPA Keys Appendix) and plugging this key directly into `MY_DEFAULT_PSK`. This will save you a significant amount of time.

When not defined

Dependencies

Conflicts with

See also `MY_DEFAULT_ENCRYPTION_TYPE`

Connection Setup

CONNECTION_LOST_FEATURE

Name `CONNECTION_LOST_FEATURE`

Description Enables the detection of a connection lost condition. The local station will attempt to automatically reconnect when such condition is detected.

When defined By default, 100 consecutive missed beacons will trigger a connection lost condition.

When not defined Missed beacons will not trigger a connection-lost condition.

Dependencies

Conflicts with

See also `ZG_CONFIG_LINKMGRII`

ZG_CONFIG_LINKMGRII

Name `ZG_CONFIG_LINKMGRII`

Description Activates the Link Manager, which handles handshaking events related to connecting to, disconnecting from, and reconnecting to an infrastructure or an adhoc network, as well as the procedures to switch in between these two network modes.

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ZeroG provides two standard components that work with the Link Manager: a Wi-Fi manager that manages handshaking events associated with the infrastructure network, and an adhoc manager for the adhoc network.

You may customize the default Wi-Fi manager and/or adhoc manager, or register with the Link Manager with your own Wi-Fi manager and/or adhoc manager.

When defined Link Manager code is linked into the program image.

When not defined Link Manager code is not linked into the program image.

Dependencies

Conflicts with

See also ZG_CONFIG_NO_ADHOCMGR II
ZG_CONFIG_NO_WIFIMGR II

ZG_CONFIG_NO_ADHOCMGR II

Name ZG_CONFIG_NO_ADHOCMGR II

Description Explicitly exclude the adhoc manager provided by ZeroG from the build.

When defined No adhoc manager will be included in the software build. Note that if you require adhoc network management, you will need to register with the link manager with your own adhoc network management code.

When not defined Uses the adhoc manager supplied with the ZeroG SDK.

Dependencies

Conflicts with

See also ZG_CONFIG_LINKMGR II

ZG_CONFIG_NO_WIFIMGR II

Name ZG_CONFIG_NO_WIFIMGR II

Description Explicitly excludes the Wi-Fi manager provided by ZeroG from the build.

When defined Wi-Fi manager is not linked into the program image. Note that if you require infrastructure network management, you will need to register with the link manager with your own infrastructure network management code.

When not defined Uses the Wi-Fi manager supplied with the ZeroG SDK.

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Dependencies

Conflicts with

See also ZG_CONFIG_LINKMGRII

Miscellaneous Setup

ZG_RAW_DRIVER

Name ZG_RAW_DRIVER

Description Enables the ZeroG device driver.

When defined Must be defined for the Microchip host TCP/IP stack to interface with the ZeroG device.

When not defined

Dependencies

Conflicts with

See also

ZG_NO_FUNC_PTRS

Name ZG_NO_FUNC_PTRS

Description Disallows the use of function pointers in the ZeroG link manager library.

By default, the ZeroG link manager library uses function pointers on all platforms (PIC24, PIC32) other than PIC18.

When defined The link manager library uses a different mechanism to route the calls to callback functions that relate to management request, confirm, and indication.

When not defined The link manager library uses function pointers for callback functions.

Dependencies

Conflicts with

See also

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ZG_CONFIG_LIBRARY

Name ZG_CONFIG_LIBRARY

Description Enables the use of the ZeroG link manager library.

When defined This must be defined in order to use API calls to/from the link manager library.

When not defined

Dependencies

Conflicts with

See also

ZG_CONFIG_CONSOLE

Name ZG_CONFIG_CONSOLE

Description Enable the command line interface, available through the serial port.

When defined The console module created by ZeroG is included in the program image. Commands such as `ifconfig` and `iwconfig`, are available at the serial console. Please see the document Command Line Commands for more information on console usage.

When not defined The console module is not included in the program image

Dependencies

Conflicts with

See also ZG_CONFIG_LINKMGR

ZG_CONFIG_DHCP

Name ZG_CONFIG_DHCP

Description Enables ZeroG console command to start and stop the DHCP client.

When defined Enables the following console commands:

Command	Action
<code>ifconfig auto-dhcp start</code>	Starts the DHCP client.
<code>ifconfig auto-dhcp drop</code>	Stops the DHCP client.

Please see the Command Line Commands document for more information.

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When not defined The console command “`ifconfig auto-dhcp`” has no effect.

Dependencies STACK_USE_DHCP_CLIENT

Conflicts with ZG_CONFIG_CONSOLE

See also ZG_CONFIG_LINKMGRII

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Summary of Usage

	MY_DEFAULT_LINK_MGMT	ZG_CONFIG_LINKMGR II	ZG_CONFIG_NO_WIFIMGR II	ZG_CONFIG_NO_ADHOC MGR II
Possible values for options →	kZGLMNetworkModelIdle, kZGLMNetworkModeAdhoc, kZGLMNetworkModelInfrastructure, (macro is not defined)	y, (macro is not defined)	y, (macro is not defined)	y, (macro is not defined)
↓ Scenarios ↓				
<p>Station starts up in Infrastructure mode.</p> <p>Station will search for the specified network name (SSID). If found, the station attempts to join the network. If this attempt failed, or if such network is not found, the station goes back to Idle mode.</p> <p>App may switch to Adhoc or Idle mode, or back to Infrastructure mode, in run-time.</p>	(macro is not defined)	y	(macro is not defined)	(macro is not defined)
<p>Station starts up in Idle mode.</p> <p>App may switch to Adhoc mode, Infrastructure mode, or back to Idle mode, in run-time.</p>	kZGLMNetworkModelIdle	y	(macro is not defined)	(macro is not defined)

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<p>Station starts up in Adhoc mode.</p> <p>Station will search for the specified network name (SSID). If found, the station joins the network. If not found, the station starts the network.</p> <p>App may switch to Infrastructure mode, Idle mode, or back to Adhoc mode, in run-time.</p>	kZGLMNetworkModeAdhoc	y	(macro is not defined)	(macro is not defined)
<p>Station starts up in Infrastructure mode.</p> <p>Station will search for the specified network name (SSID). If found, the station attempts to join the network. If this attempt failed, or if such network is not found, the station goes back to Idle mode.</p> <p>App may switch to Adhoc mode, Idle mode, or back to Infrastructure mode, in run-time.</p>	kZGLMNetworkModeInfrastructure	y	(macro is not defined)	(macro is not defined)
<p>Save as above, except that switching to Infrastructure mode is not allowed.</p> <p>Code size is reduced. Wi-Fi Manager is no longer in the program image.</p>	Any value except kZGLMNetworkModeInfrastructure	y	y	(macro is not defined)

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Save as above, except that switching to Adhoc mode is not allowed. Code size is reduced. Adhoc Manager is no longer in the program image.	Any value except kZGLMNetworkModeAdhoc	y	(macro is not defined)	y
Save as above, except that switching to Adhoc mode or Infrastructure mode is not allowed. Code size is reduced. Both Wi-Fi Manager and Adhoc Manager are not in the program image.	Any value except kZGLMNetworkModeAdhoc or kZGLMNetworkModeInfrastructure	y	y	y
Invalid	kZGLMNetworkModeInfrastructure	y	y	(don't care)
Invalid	kZGLMNetworkModeAdhoc	y	(don't care)	y
Application manages the Layer 2 network. Code size is reduced. Link Manager, Wife Manager, and Adhoc Manager are not in the program image.	(don't care)	(macro is not defined)	(don't care)	(don't care)

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Appendix

Hardware Resources

Below are some additional web resources related to the hardware supplied in the development kit:

[Microchip Ethernet Solutions Design Center](#)

[Microchip PICDEM.net 2 Development Board](#)

[Microchip Explorer 16 Development Board](#)

[ZeroG Wireless Support Portal](#) – additional support documentation is available after registering with the ZeroG support website.

Software Resources

These links point to web resources related to the software required to compile, run, and debug user applications:

[Microchip MPLAB Integrated Development Environment](#)

[MPLAB IDE v8.30 Full Release](#) – direct link to the latest MPLAB IDE build.

[MPLAB C Compilers for PIC18/PIC24/PIC32/dsPIC](#) – register to obtain a 60 day evaluation license for the correct compiler related to your PIC microcontroller.

Wireless Security Resources

WEP Keys

[SpeedGuide.net :: WLAN Key Generator](#) – Use the custom WEP/WPA text fields to convert from ASCII to hex. For 64-bit WEP, enter 5 ASCII characters. For 128-bit WEP, enter 13 ASCII characters.

WPA Keys

WPA/WPA2 PSK keys can be pre-calculated online using the following tool:

[Wireshark: WPA PSK Generator](#). Enter the SSID (MY_DEFAULT_SSID_NAME) and the desired passphrase, and the tool will generate the PSK values that need to be used in MY_DEFAULT_PSK.

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Revision History

Document ID	COM-101.01	
Title	<i>ZeroG Configuration Options for Microchip/ZeroG SDK</i>	
Revision History	1.01	Initial Revision
	1.02	3/27/09 update
	1.03	04.21.2009 - Revised organization - Added more information - Matched with official Microchip release