IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF TEXAS
HOUSTON DIVISION

LUCIO DEVELOPMENT LLC,	§	
	§	
Plaintiff,	§	Case No: 4:17-cv-3737
	§	
vs.	§	PATENT CASE
	§	
MARVELL SEMICONDUCTOR, INC.,	§	
	§	
Defendant.	§	
	§	

COMPLAINT

Plaintiff Lucio Development LLC ("Plaintiff" or "Lucio") files this Complaint against Marvell Semiconductor, Inc. ("Defendant" or "Marvell") for infringement of United States Patent No. 7,069,546 (hereinafter "the '546 Patent").

PARTIES AND JURISDICTION

1. This is an action for patent infringement under Title 35 of the United States Code. Plaintiff is seeking injunctive relief as well as damages.

2. Jurisdiction is proper in this Court pursuant to 28 U.S.C. §§ 1331 (Federal Question) and 1338(a) (Patents) because this is a civil action for patent infringement arising under the United States patent statutes.

3. Plaintiff is a Texas limited liability company with its office address at 555 Republic Dr., Suite 200, Plano, Texas 75074.

4. On information and belief, Defendant is a California corporation with a place of business at 5488 Marvell Lane, Santa Clara, CA 95054.

5. This Court has personal jurisdiction over Defendant because Defendant has

committed, and continues to commit, acts of infringement in this District, has conducted business in this District, and/or has engaged in continuous and systematic activities in this District.

6. On information and belief, Defendant's instrumentalities that are alleged herein to infringe were and continue to be used, imported, offered for sale, and/or sold in this District.

VENUE

7. Venue is proper in this District pursuant to 28 U.S.C. §1400(b) because acts of infringement are occurring in this District and Defendant has a regular and established place of business in this District. For instance, on information and belief, Defendant has a regular and established place of business at 20333 State Highway 249, Suite 200. Houston, TX 77070.

COUNT I
(INFRINGEMENT OF UNITED STATES PATENT NO. 7,069,546)

8. Plaintiff incorporates paragraphs 1 through 7 herein by reference.

9. This cause of action arises under the patent laws of the United States and, in particular, under 35 U.S.C. §§ 271, *et seq*.

10. Plaintiff is the owner by assignment of the '546 Patent with sole rights to enforce the '546 Patent and sue infringers.

11. A copy of the '546 Patent, titled "Generic Framework for Embedded Software Development," is attached hereto as Exhibit A.

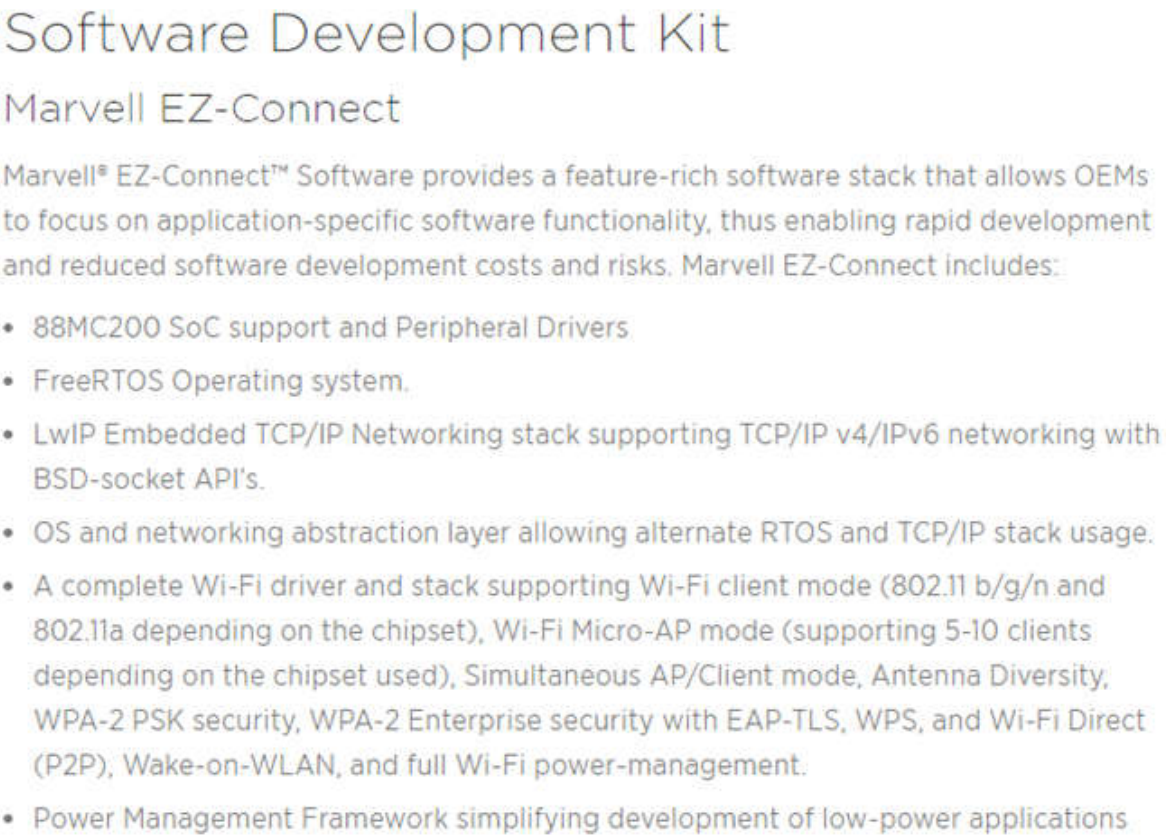
12. The '546 Patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code.

13. On information and belief, Defendant has infringed and continues to infringe one or more claims, including at least Claim 1, of the '546 Patent by making, using, importing, selling, and/or offering for sale a software platform for embedded software development,

which is covered by at least Claim 1 of the '546 Patent. Defendant has infringed and continues to infringe the '546 Patent directly in violation of 35 U.S.C. § 271.

14. Defendant, sells, offers to sell, and/or uses embedded software development packages including, without limitation, the Marvell EZ-Connect software developer kit (SDK), and any similar products ("Product"), which infringe at least Claim 1 of the '546 Patent.

15. The Product is a is a programmable Software Development Kit (SDK) for multiple devices such as the 88MC200, 88MW300/302 WLAN Microcontrollers, or other kits such as the AWS IOT Starter Kit. Certain elements of this limitation are illustrated in the screenshots below and in the screenshots referenced in connection with other elements herein.



Software Development Kit

Marvell EZ-Connect

Marvell® EZ-Connect™ Software provides a feature-rich software stack that allows OEMs to focus on application-specific software functionality, thus enabling rapid development and reduced software development costs and risks. Marvell EZ-Connect includes:

- 88MC200 SoC support and Peripheral Drivers
- FreeRTOS Operating system.
- LwIP Embedded TCP/IP Networking stack supporting TCP/IP v4/IPv6 networking with BSD-socket API's.
- OS and networking abstraction layer allowing alternate RTOS and TCP/IP stack usage.
- A complete Wi-Fi driver and stack supporting Wi-Fi client mode (802.11 b/g/n and 802.11a depending on the chipset), Wi-Fi Micro-AP mode (supporting 5-10 clients depending on the chipset used), Simultaneous AP/Client mode, Antenna Diversity, WPA-2 PSK security, WPA-2 Enterprise security with EAP-TLS, WPS, and Wi-Fi Direct (P2P), Wake-on-WLAN, and full Wi-Fi power-management.
- Power Management Framework simplifying development of low-power applications

Source: https://www.marvell.com/microcontrollers/wi-fi-microcontroller-platform/software

88MC200 Cortex-M3 Microcontroller

The Marvell 88MC200 microcontroller is a highly integrated system-on-chip (SoC) built using advanced 55-nanometer process technology . The Marvell 88MC200 has a CPU clock up to 200Mhz, 512KB SRAM memory, 8MB of on-chip serial flash memory, and rich set of I/O interfaces to offer high performance, lower power consumption and a significantly reduced total bill of materials for a wide variety of smart devices.

The Marvell 88MC200 integrates the following features:

KEY FEATURES	
CPU Core & Memory	• ARM Cortex-M3 200MHz • 1MB QSPI Flash Memory • 512 kB on-chip SRAM; 4kB retention RAM
System	• RTC, WDT, GPT, PWM • CRC, AES (128-bit)
Connectivity	• QSPI (1) SSP/SPI/I2S (3), I2C (3), UART (4) • SDIO, USB OTG (FS) with integrated PHY
On-Chip Power Management	• DC-DC Charge Pump • 5 Power Modes with Multiple Wakeup Sources

Source: https://www.marvell.com/microcontrollers/wi-fi-microcontroller-platform/software

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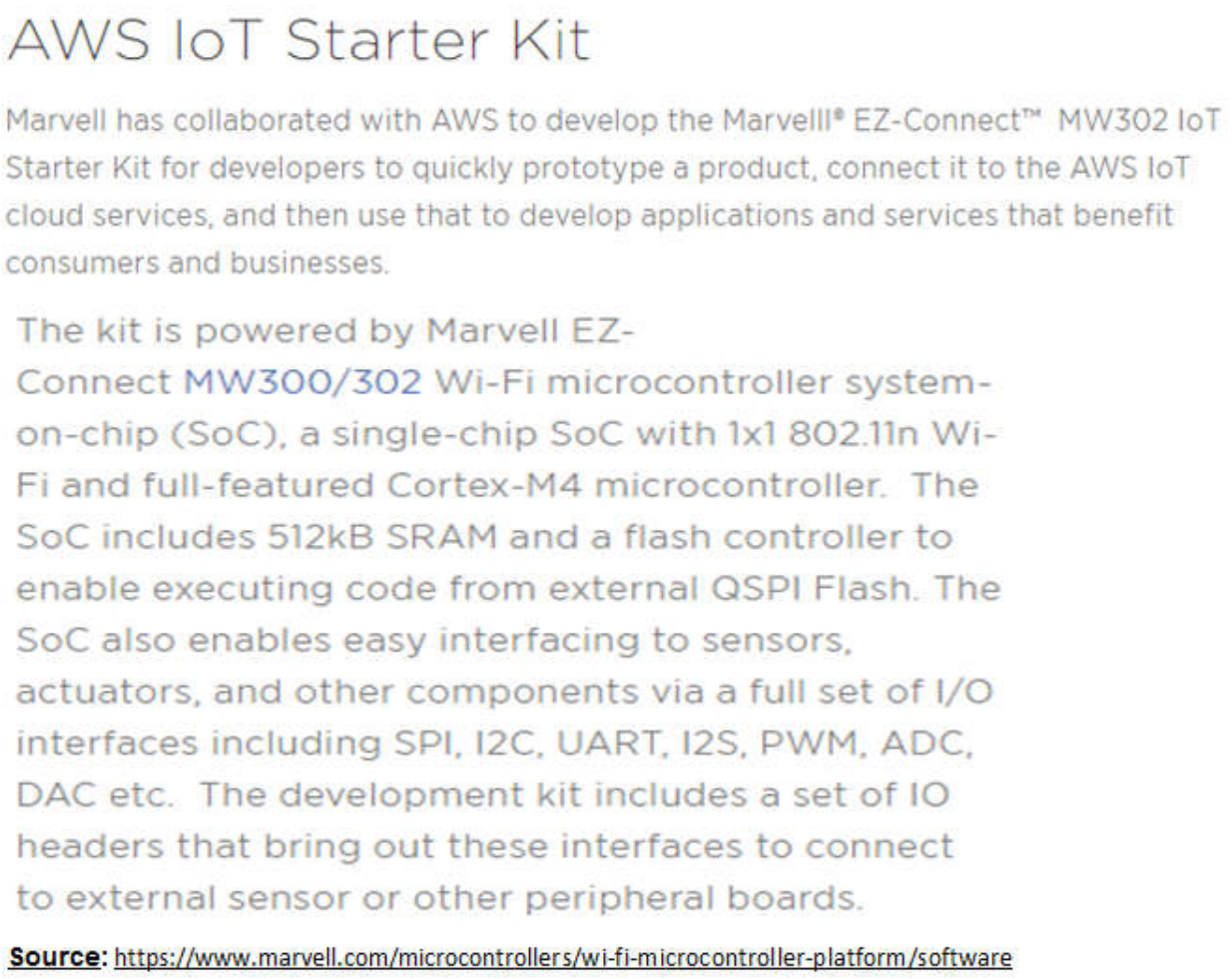
88MW300/302 Wi-Fi Microcontroller SoC

The Marvell® 88MW300/302 Wi-Fi Microcontroller system-on-chip (SoC) is industry's first true, highly integrated, low-power chip with a full-featured micro controller built using ARM Cortex-M4F CPU and 802.11 b/g/n Wi-Fi. Designed to support the specific needs of Internet-of-Things (IoT) applications, the SoC is optimized for:

- Simplifying development of IoT devices and their integration with IoT platforms and mobile applications
- Low system cost
- Low-power operation including enabling battery operated devices
- Secure operation
- Enabling feature rich functionality enabling manufacturers to create innovative, differentiated products and services

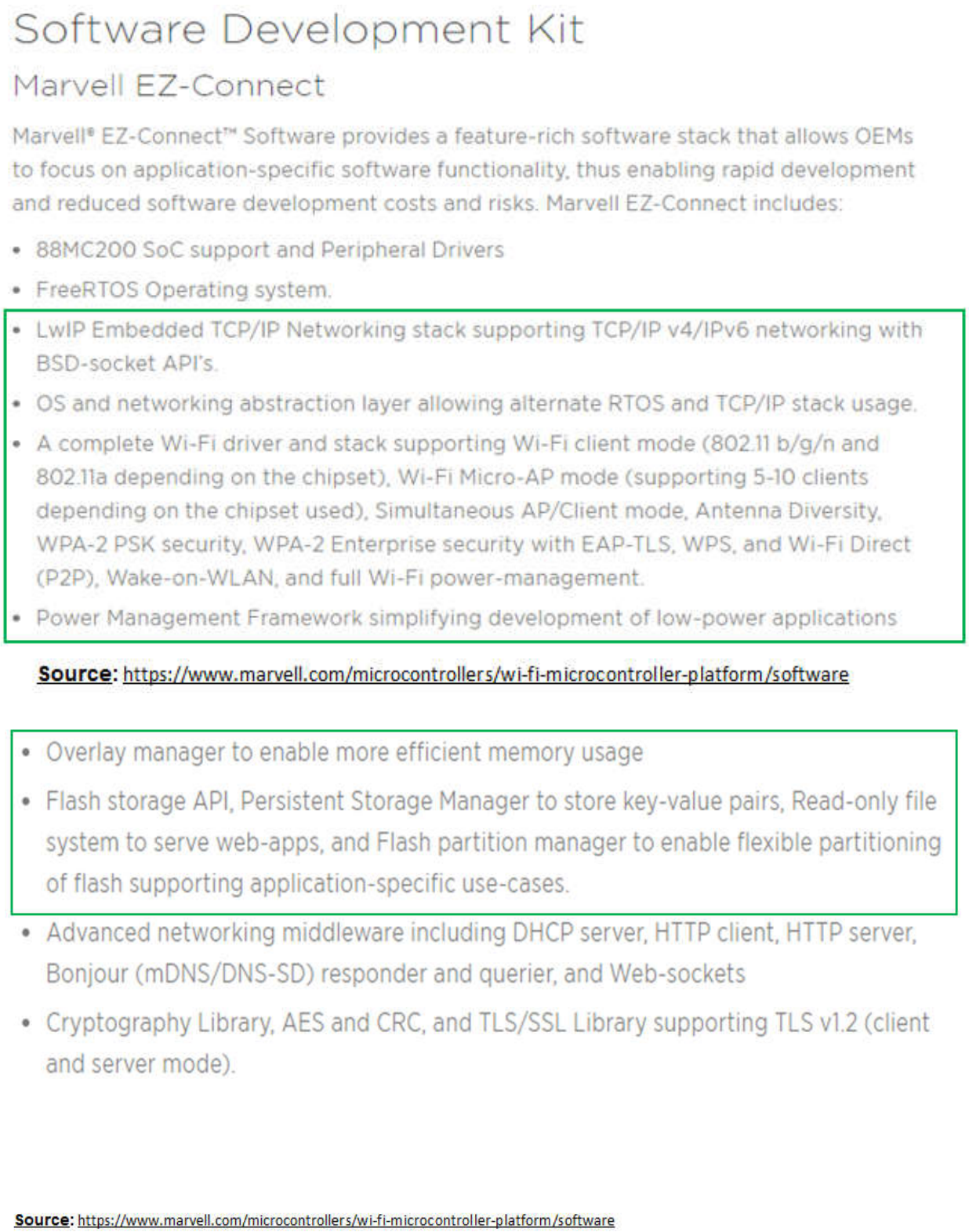
Source: https://www.marvell.com/microcontrollers/wi-fi-microcontroller-platform/software



Source: https://www.marvell.com/microcontrollers/wi-fi-microcontroller-platform/software

16. The Product provides one or more generic application handler programs (e.g., LwIP Networking Stack containing LwIP Application Layer and LwIP source code, OS and networking abstraction layer, Wi-Fi driver and stack, Power Management Framework, Overlay manager Flash storage API containing files and libraries which are common and uniform across all supported EZ-Connect SDK). The generic programs comprise computer program code for performing generic application functions common to multiple types of hardware modules used in a communication environment (e.g., the generic code provides common and generic functions to multiple hardware modules, such as 88MC200, 88MW300/302 WLAN Microcontrollers, or other kits such as the AWS IOT Starter Kit). Certain elements of this limitation are illustrated in the screenshots below and in the screenshots referenced in

connection with other elements herein.



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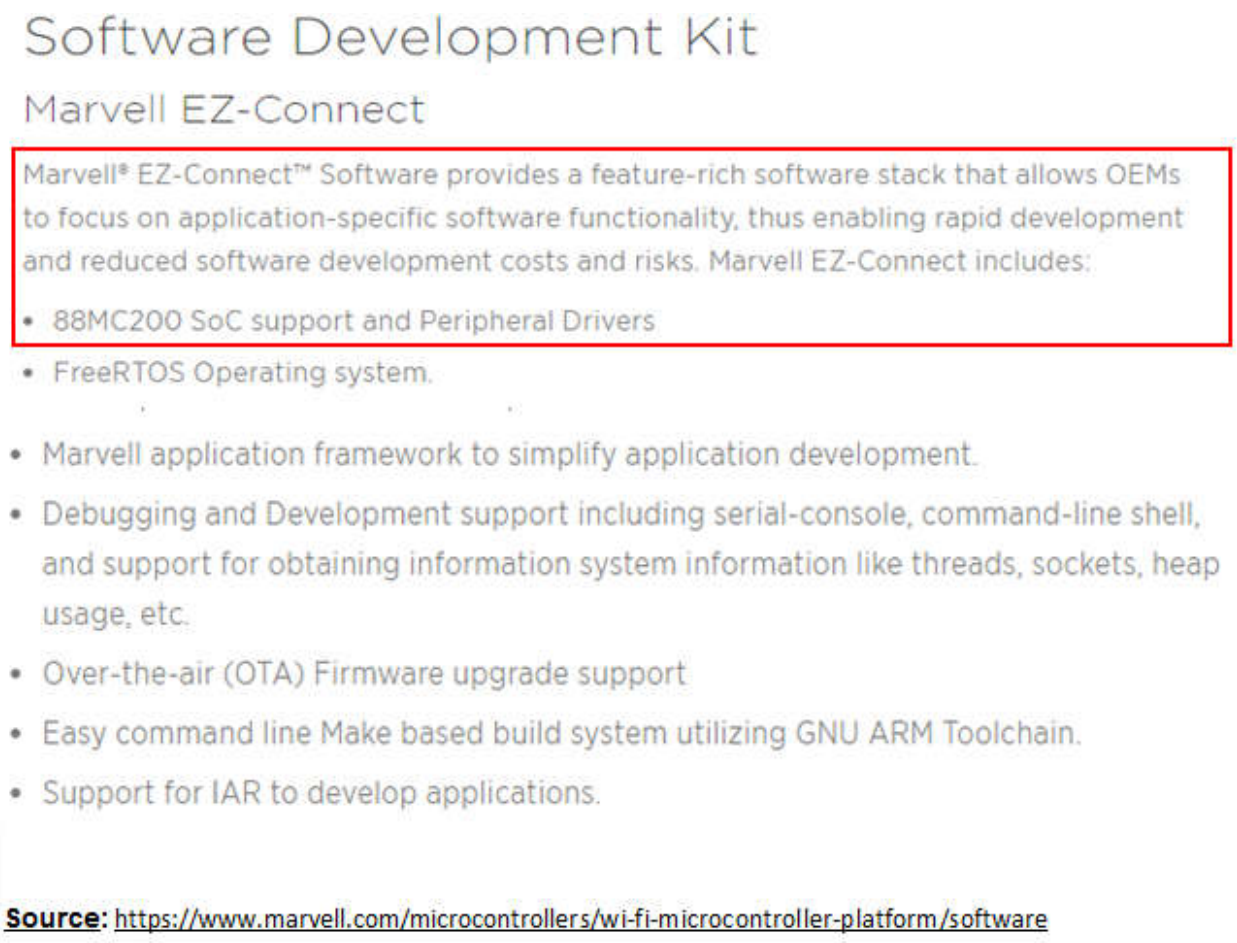
- Overlay manager to enable more efficient memory usage
- Flash storage API, Persistent Storage Manager to store key-value pairs, Read-only file system to serve web-apps, and Flash partition manager to enable flexible partitioning of flash supporting application-specific use-cases.
- Advanced networking middleware including DHCP server, HTTP client, HTTP server, Bonjour (mDNS/DNS-SD) responder and querier, and Web-sockets
- Cryptography Library, AES and CRC, and TLS/SSL Library supporting TLS v1.2 (client and server mode).

Source: https://www.marvell.com/microcontrollers/wi-fi-microcontroller-platform/software

17. The Product includes generating specific application handler code to associate

the generic functions with the specific functions at a device driver for at least one of the types of hardware modules. For example, in addition to the generic drivers, EZ-Connect SDK also includes specific application handler code that is specific to the application (such as applications on Android and iOS etc.) and specific to particular hardware (such as 88MC200 SoC and peripheral drivers such as JTAG and serial drivers, or other kits such as the AWS IOT Starter Kit). Certain elements of this limitation are illustrated in the screenshots below and in the screenshots referenced in connection with other elements herein.



Software Development Kit

Marvell EZ-Connect

Marvell® EZ-Connect™ Software provides a feature-rich software stack that allows OEMs to focus on application-specific software functionality, thus enabling rapid development and reduced software development costs and risks. Marvell EZ-Connect includes:

- 88MC200 SoC support and Peripheral Drivers
- FreeRTOS Operating system.
- Marvell application framework to simplify application development.
- Debugging and Development support including serial-console, command-line shell, and support for obtaining information system information like threads, sockets, heap usage, etc.
- Over-the-air (OTA) Firmware upgrade support
- Easy command line Make based build system utilizing GNU ARM Toolchain.
- Support for IAR to develop applications.

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- Over-the-air (OTA) Firmware upgrade support
- Easy command line Make based build system utilizing GNU ARM Toolchain.
- Support for IAR to develop applications.
- OpenOCD support for JTAG operations including flashing, loading code into RAM, flashing etc.
- Flash programming tools over JTAG and Serial.
- Support for Linux, Windows (Cygwin) and MacOS as host-development platforms

Source: https://www.marvell.com/microcontrollers/wi-fi-microcontroller-platform/software

18. The Product generates specific application handler code and defines a specific element in the specific code to be handled by one of the generic application functions for that hardware module. For example**,** EZ-Connect SDK generates system-specific application handler code by defining a specific element such as functions and data structures corresponding to specific hardware modules such as Flash, JTAG, I/O interfaces such as SPI,I2C,UART,I2S,PWM,ADC,DAC etc., 88MW300/302 WLAN Microcontrollers, or other kits such as the AWS IOT Starter Kit that extend or otherwise connect the system-specific application handler code to the functions and data structures defined and made available by the generic application handler code of the EZ Connect SDK. When specific functions are written for handling defined specific elements, the specific functions must be registered. EZ-Connect accordingly contains data structures that register and embed the required functions. Certain elements of this limitation are illustrated in the screenshots below and in the screenshots referenced in connection with other elements herein.

The kit is powered by Marvell EZ-Connect MW300/302 Wi-Fi microcontroller system-on-chip (SoC), a single-chip SoC with 1x1 802.11n Wi-Fi and full-featured Cortex-M4 microcontroller. The SoC includes 512kB SRAM and a flash controller to enable executing code from external QSPI Flash. The SoC also enables easy interfacing to sensors, actuators, and other components via a full set of I/O interfaces including SPI, I2C, UART, I2S, PWM, ADC, DAC etc. The development kit includes a set of IO headers that bring out these interfaces to connect to external sensor or other peripheral boards.

Source: https://www.marvell.com/microcontrollers/wi-fi-microcontroller-platform/software

- Production quality software SDK providing libraries for networking middleware (HTTP, TLS, BSD Sockets, MQTT, Web-Sockets, JSON, XML, etc.), easy connection to Wi-Fi networks, Secure over-the-air (OTA) firmware update, persistent storage, and more.
- Tools and documentation to facilitate hardware and software development and optimizations, and help customers through manufacturing and certifications to bring products to market quickly.

Target Applications

The 88MW300/302 SoC enables smart connectivity to a broad range of devices such as thermostats, air conditioners, appliances, lighting controls, mobile clients, cloud services, and other devices on the Internet of Things including:

- White goods/appliances: refrigerator, washer, dryer, oven range, microwave, dishwasher, water, heater, air conditioner
- Consumer devices and accessories: toys, speakers, headset, alarm clock, gaming accessory, remote control
- Home automation: smart outlet, light switch, security camera, thermostat, sprinkler controller, sensor, door lock, door bell, garage door, security system

Source: https://www.marvell.com/microcontrollers/wi-fi-microcontroller-platform/software

Create new application code

To create a new application called `my-new-app`, follow these steps:

- Create a directory in *sample_apps* (or any other directory) called `my-new-app`

```
mkdir my-new-app
```

2. In this directory, create a `build.mk`. Copy the following into this file

```
# Copyright (C) 2008-2016 Marvell International Ltd.
# All Rights Reserved.
#

exec-y += my-new-app
my-new-app-objs-y := src/main.c
my-new-app-cflags-y := -I$(d)/src -DAPPCONFIG_DEBUG_ENABLE=1

# Applications could also define custom linker files if required using following:
#my-new-app-ld-y := /path/to/ldscript

# Applications could also define custom board files if required using following:
#my-new-app-board-y := /path/to/boardfile
```

Source: https://github.com/marvell-iot/ez-connect-lite/tree/master/sample_apps

19. When a specific application is needed for a particular hardware, the generic functions and the specific functions are compiled together to yield a machine readable code. Marvell and/or its customers compile the generic functions and the specific functions using EZ-Connect, Eclipse IDE and/or any other IDE supported by Marvell. Certain elements of this limitation are illustrated in the screenshots below and in the screenshots referenced in connection with other elements herein.

- Marvell application framework to simplify application development.
- Debugging and Development support including serial-console, command-line shell, and support for obtaining information system information like threads, sockets, heap usage, etc.
- Over-the-air (OTA) Firmware upgrade support
- Easy command line Make based build system utilizing GNU ARM Toolchain.
- Support for IAR to develop applications.
- OpenOCD support for JTAG operations including flashing, loading code into RAM, flashing etc.
- Flash programming tools over JTAG and Serial.
- Support for Linux, Windows (Cygwin) and MacOS as host-development platforms
- Support for Eclipse IDE with CDT including JTAG based debugging with integrated Eclipse debugger and GDB
- Sample applications illustrating usage model for different features and API's.
- Complete production-ready reference applications
- Support for Wi-Fi testing, and applications to test in manufacturing and certifications.
- User-guide and complete reference documentation
- Serial-to-Wi-Fi Firmware application that can be used as-is, or customized as appropriate.
- Integrated support for a growing number of Cloud partners
- Support built in Segger JFLASH for production

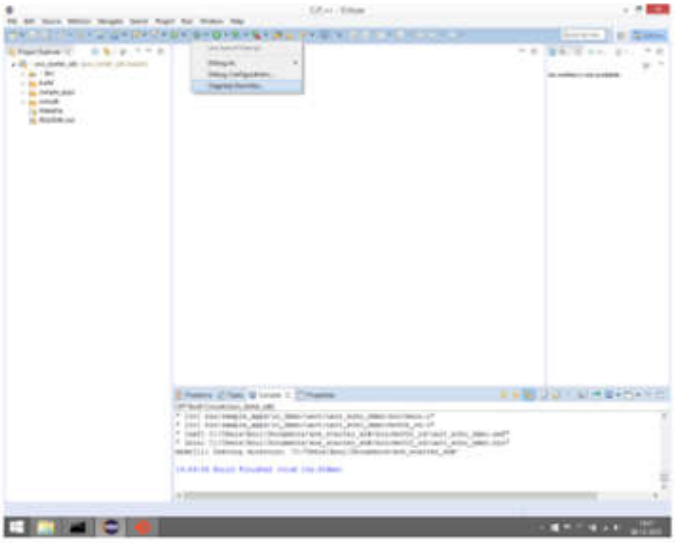
Source: https://github.com/marvell-iot/marvell-iot.github.io/blob/master/docs/development/Readme.md

Configure debug & external tools

The EZ Connect Lite SDK consists of a `.settings` folder which contains Debug & External Tools launchers.

Debug launchers :

1. Debug -> Organize Favourites



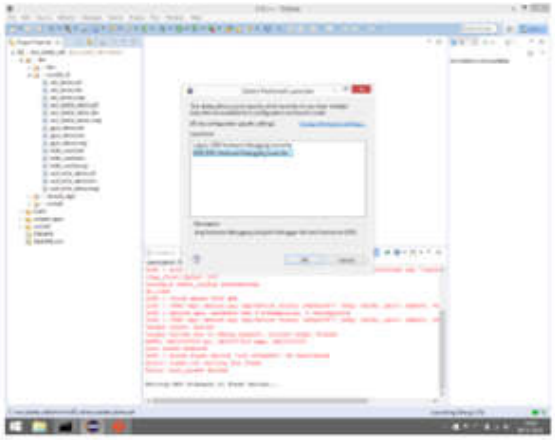
Source: https://github.com/marvell-iot/marvell-iot.github.io/blob/master/docs/development/Readme.md

Debug launchers

1. **Debug.launch**
   It loads the selected application `axf` file using `arm-none-eabi-gdb` and halts at application `main()`. It can be used to debug non-XIP applications from beginning

2. **Live Debug.launch**
   It connects to an already running application on hardware and halts at the current instruction. It only loads the debugging symbols from the selected application `axf` file. This launcher can also be used to debug XIP applications already flashed using `Program MCU Firmware` launcher.

- From the binaries folder in the project view, select the .axf that you would like to debug.
- Press the drop down next to the Debug symbol and select either Debug or Live Debug.
- Select `Use configuration specific settings` and select `GDB Hardware Debugging Launcher`



Source: https://github.com/marvell-iot/marvell-iot.github.io/blob/master/docs/development/Readme.md

20. Defendant's actions complained of herein will continue unless Defendant is enjoined by this court.

21. Defendant's actions complained of herein are causing irreparable harm and monetary damage to Plaintiff and will continue to do so unless and until Defendant is enjoined and restrained by this Court.

22. Plaintiff is in compliance with 35 U.S.C. § 287.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff asks the Court to:

(a) Enter judgment for Plaintiff on this Complaint on all causes of action asserted herein;

(b) Enter an Order enjoining Defendant, its agents, officers, servants, employees, attorneys, and all persons in active concert or participation with Defendant who receive notice of the order from further infringement of United States Patent No. 7,069,546 (or, in the alternative, awarding Plaintiff a running royalty from the time of judgment going forward);

(c) Award Plaintiff damages resulting from Defendant's infringement in accordance with 35 U.S.C. § 284;

(d) Award Plaintiff pre-judgment and post-judgment interest and costs; and

(e) Award Plaintiff such further relief to which the Court finds Plaintiff entitled under law or equity.

Dated: December 11, 2017

Respectfully submitted,

/s/ Jay Johnson

JAY JOHNSON
State Bar No. 24067322
D. BRADLEY KIZZIA
State Bar No. 11547550
KIZZIA JOHNSON, PLLC
1910 Pacific Ave., Suite 13000
Dallas, Texas 75201
(214) 451-0164
Fax: (214) 451-0165
jay@kjpllc.com
bkizzia@kjpllc.com

ATTORNEYS FOR PLAINTIFF

EXHIBIT A