Introduction

This release notes describes the software deliveries of the ATWILC1000 and ATWILC3000. The ATWILC1000 supports only Wi-Fi, whereas, the ATWILC3000 supports Wi-Fi and Bluetooth. The deliveries are tested against the SAMA5D4 Xplained board running on Linux Kernel 4.9.

Note: All references to the ATWILC module includes all the devices listed below, unless otherwise noted:
- ATWILC1000
- ATWILC3000
Table of Contents

Introduction......................................................................................................................1

1. ATWILC Software Architecture..................................................................................3

2. ATWILC Release Contents........................................................................................4

3. ATWILC Release Features........................................................................................5

4. Throughput................................................................................................................ 6
   4.1. Wi-Fi Standalone..........................................................................................................................6
   4.2. ATWILC3000 Wi-Fi/BLE Coexistence.......................................................................................... 6

5. Release Revision History.......................................................................................... 7
   5.1. ATWILC Linux Release v15.2...................................................................................................... 7
   5.2. ATWILC Linux Release v15.1...................................................................................................... 7
   5.3. ATWILC Linux Release v15.0...................................................................................................... 8
   5.4. ATWILC Linux Release v14.4...................................................................................................... 8
   5.5. ATWILC Linux Release v14.3...................................................................................................... 8
   5.6. ATWILC Linux Release v14.2...................................................................................................... 9

6. Limitations............................................................................................................... 10

The Microchip Web Site.................................................................................................11

Customer Change Notification Service..........................................................................11

Customer Support..........................................................................................................11

Microchip Devices Code Protection Feature................................................................. 11

Legal Notice...................................................................................................................12

Trademarks................................................................................................................... 12

Quality Management System Certified by DNV.............................................................13

Worldwide Sales and Service........................................................................................14
1. **ATWILC Software Architecture**

The following figures illustrate the ATWILC architecture of the Wi-Fi and Bluetooth software.

**Figure 1-1. ATWILC Wi-Fi Software Architecture**

![ATWILC Wi-Fi Software Architecture Diagram]

**Figure 1-2. ATWILC Bluetooth Software Architecture**

![ATWILC Bluetooth Software Architecture Diagram]
## ATWILC Release Contents

<table>
<thead>
<tr>
<th>Folder Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Binary** | This folder contains the following files:  
  • `wilc1000_wifi_firmware.bin`: Wi-Fi station-P2P-AP concurrency firmware for ATWILC1000.  
  • `wilc3000_wifi_firmware.bin`: Wi-Fi station-P2P-AP concurrency firmware for ATWILC3000.  
  • `wilc3000_ble_firmware.bin`: BTDM firmware for ATWILC3000.  
  • `wilc3000_ble_firmware_no_rtc.bin`: BTDM firmware for ATWILC3000 boards that does not have RTC.  
  • `wilc-sdio.ko`: Linux 4.9 pre-built SDIO driver for ATWILC.  
  • `wilc-spi.ko`: Linux 4.9 pre-built SPI driver for ATWILC.  
  • `linux_kernel_4.9_images`: Pre-built Linux 4.9 image for SAMA5D4. |
| **src** | Linux driver examples for ATWILC1000 and ATWILC3000 for SAMA5D4 Xplained running Linux kernel 4.9. |
3. **ATWILC Release Features**

The ATWILC module supports the following features.

1. **Wi-Fi Station (STA)**
   - IEEE 802.11 b/g/n
   - Open, Wired Equivalent Privacy (WEP), Wi-Fi Protected Access (WPA)/WPA2 personal and WPA/WPA2 enterprise security

2. **Wi-Fi Access Point (AP)**
   - IEEE 802.11 b/g/n
   - Open, WEP, WPA/WPA2 personal and WPA/WPA2 enterprise security
   - Supports eight stations

3. **Wi-Fi Protected Setup (WPS)**
   - PBC
   - PIN code

4. **Wi-Fi direct**
   - P2P Client
   - P2P GO

5. **Concurrent modes**
   - STA-STA
   - STA-AP
   - STA-P2P Client
   - STA-P2P GO
   - AP-P2P Client

6. **Antenna diversity control for Wi-Fi**

7. **Bluetooth (ATWILC3000 only)**
   - Bluetooth Low Energy (BLE) 4.0 support
   - Modes of operation: Central and peripheral support
   - Number of Connections: Supports seven clients
   - Adaptive frequency hopping
   - Coexistence with Wi-Fi

8. **Power save**
   - Beacon monitoring mode
   - Low-power mode when disconnected
   - Host suspend support
   - Wake-up host on wireless LAN events

9. **RF version number 01.1**

   **Note:** RF version number format is xx.y, where xx: "Major" and y: "Minor". Changes in Major number requires re-tests and possibly re-certification.
4. **Throughput**

This section provides the results of throughput test for Wi-Fi standalone and Wi-Fi/BT coexistence feature.

4.1 **Wi-Fi Standalone**

*Note:* The following throughput values are valid only for ATWILC Linux 15.2 RTP Release.

- **ATWILC1000**
  
  Throughput test is performed for ATWILC1000 using iPerf application on SAMA5D4 on a radiated setup.

<table>
<thead>
<tr>
<th>Protocol</th>
<th>SDIO</th>
<th>SPI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Downlink (Mbps)</td>
<td>Uplink (Mbps)</td>
</tr>
<tr>
<td>UDP</td>
<td>45.1</td>
<td>19.2</td>
</tr>
<tr>
<td>TCP</td>
<td>38.8</td>
<td>18.5</td>
</tr>
</tbody>
</table>

- **ATWILC3000**
  
  Throughput test is performed for ATWILC3000 using iPerf application on SAMA5D4 on a radiated setup.

<table>
<thead>
<tr>
<th>Protocol</th>
<th>SDIO</th>
<th>SPI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Downlink (Mbps)</td>
<td>Uplink (Mbps)</td>
</tr>
<tr>
<td>UDP</td>
<td>47.3</td>
<td>18.5</td>
</tr>
<tr>
<td>TCP</td>
<td>40.9</td>
<td>20.6</td>
</tr>
</tbody>
</table>

4.2 **ATWILC3000 Wi-Fi/BLE Coexistence**

*Note:* The following throughput values are valid only for ATWILC Linux 15.2 RTP Release.

Throughput test is performed using iPerf application on SAMA5D4 using SDIO shield board radiated setup while BLE interface advertises the packets with default payload and interval.

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Downlink (Mbps)</th>
<th>Uplink (Mbps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UDP</td>
<td>45.8</td>
<td>18.6</td>
</tr>
<tr>
<td>TCP</td>
<td>39.7</td>
<td>20.4</td>
</tr>
</tbody>
</table>
5. Release Revision History

5.1 ATWILC Linux Release v15.2

The following are the bug fixes for ATWILC Linux release v15.2.

1. Regression in v15.1 while connecting to WPA AP.
2. Fix for corrupted packets reported on the Monitor mode.
3. Better consistency to find ATWILC softAP’s in stations’ scan results.
4. Consistent assignment of printed MAC address to wlan0.
5. Better TX performance with significant temperature changes.
6. SoftAP fails to operate correctly when its MAC address is assigned from the host.
7. Staging review fixes.
8. GPIO descriptor related changes. Requires changes on the host’s Device Tree file.
9. Fix for crash from v15.1 when switching between AP and station interface.
10. Enable Antenna diversity using GPIO3 for ATWILC3000.
11. SoftAP fails to associate eighth station.
12. Improve transmission performance in noisy environment.
14. Fix for ATWILC firmware overwriting MAC address in received broadcast packets.
15. Incorrect pointer passed while getting IF handler.
16. Refactor coreconfigurator.c file to use API’s provided in kernel framework.
17. High latency on receiving firmware start interrupt and intermittent lower throughput on SAMA5D4 board.
18. iPhone intermittently fails to connect to ATWILC SoftAP.

5.2 ATWILC Linux Release v15.1

The following are the new features in ATWILC Linux Release v15.1:

1. Use mainline buildroot https://git.buildroot.net/buildroot/ tag 2017_08.
2. Idle (Disconnected) power save mode.
3. Ability to change WILC mac address dynamically from Linux host.
4. Support for sam-ba 3.2 to flash prebuilt images.
5. CAPI Agent code added to Buildroot.
7. Single kernel module is now used; either wilc-sdio.ko or wilc-spi.ko depending to the used bus.
8. Firmware binaries are now compiled as part of the Linux kernel’s image, instead of the file system image. The firmware should be located on the target under /lib/firmware/mchp.
9. Chip_en and Reset_n GPIOs’ numbers are now retrieved from the platform’s device tree file (dts).
10. BLE example application (btgatt-server) for BlueZ 5.46.
11. Use Linux Style Tracing System.
12. Implement Linux community recommendations and notes.
13. Ability to change Antenna diversity GPIOs dynamically.

The following are the bug fixes for RTP:

1. Wi-Fi/BLE Power save mode.
2. Host power save (Suspend/Resume).
3. Antenna diversity.
4. Scan results should not include APs from adjacent channels.
5. Fixed concurrency regression.
6. Fixed spurious emissions issue in Wi-Fi/BLE coexistence mode.
7. Replayed packets are not discarded in the firmware.
8. Second Wi-Fi interface failure.

5.3 ATWILC Linux Release v15.0

The following are new features in ATWILC Linux Release v15.0:

1. Used staging ATWILC driver
2. ATWILC3000 WFA certification.

The following are the bug fixes for RTP:

1. DUT disconnects from the AP when AP is in mixed mode.
2. Updated ATWILC1000 and ATWILC3000 gain tables
3. Autorate Algorithm enhancements

5.4 ATWILC Linux Release v14.4

The following are key enhancements and bug fixes in ATWILC Linux Release v14.4:

1. Fixed ATWILC1000 loading error.

5.5 ATWILC Linux Release v14.3

The following are key enhancements and bug fixes in ATWILC Linux Release v14.3:

1. European Telecommunications Standards Institute (ETSI) certification support to implement per channel Rx Received Signal Strength Indicator (RSSI) offset.
2. Increased BLE transmit power granularity to 7 levels.
3. Eliminate spurious emissions for BLE.
4. Avoid user setting BLE power to the level exceeding Federal Communications Commission (FCC) recommendations.
5. Fixed for low-side injection for higher channels on Bluetooth.
6. Adding support on linux to change regulatory domains.
7. Fixed to enable BT test mode from characterization GUI.
8. Added new feature to the characterization GUI to send Host Controller Interface (HCI) commands, dynamically.
9. Support for SPI on ATWILC3000 Shield board.
10. Updated porting guide and Linux user guide.
11. Suspend/Resume support tested overnight.
13. Eliminated Lint error in Wi-Fi firmware.
14. Eliminated GCC warning in Wi-Fi driver.

5.6 ATWILC Linux Release v14.2

The following are key enhancements and bug fixes in ATWILC Linux Release v14.2:

1. Fixed WEP40 and WEP104 shared authentication.
2. Antenna diversity for ATWILC3000.
3. Using latest tool chain to compile Wi-Fi firmwares.
4. [ATWILC3000] Support for WILC3000D2.
5. [ATWILC3000] Using PMU code 0x1 as recommended to pass FCC tests, and lowering sleep LDO voltage to code 0xe to minimize sleep current.
6. Limitations

1. Concurrency:
   - Multichannel concurrency is not supported. Concurrent modes have to run on the same channel.

2. P2P Client:
   - By default, the driver acts as a P2P GO to be able to select the channel to overcome the multichannel concurrency limitation.
   To use the P2P client mode, the required mode has to be set in /sys/wilc/p2p_mode.

```
echo <mode> > /sys/wilc/p2p_mode
```
The Microchip Web Site

Microchip provides online support via our web site at http://www.microchip.com/. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user’s guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQ), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

Customer Change Notification Service

Microchip’s customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.


Customer Support

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or Field Application Engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: http://www.microchip.com/support

Microchip Devices Code Protection Feature

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip’s Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
• Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as “unbreakable.”

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip’s code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Legal Notice

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer’s risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

Trademarks

The Microchip name and logo, the Microchip logo, AnyRate, AVR, AVR logo, AVR Freaks, BeaconThings, BitCloud, CryptoMemory, CryptoRF, dsPIC, FlashFlex, flexPWR, Heldo, JukeBlox, KeeLoq, KeeLoq logo, Kleer, LANCheck, LINK MD, maXSylus, maXTouch, MediaLB, megaAVR, MOST, MOST logo, MPLAB, OptoLyzer, PIC, picoPower, PICSTART, PIC32 logo, Prochip Designer, QTouch, RightTouch, SAM-BA, SpyNIC, SST, SST Logo, SuperFlash, tinyAVR, UNI/O, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

ClockWorks, The Embedded Control Solutions Company, EtherSynch, Hyper Speed Control, HyperLight Load, IntelliMOS, mTouch, Precision Edge, and Quiet-Wire are registered trademarks of Microchip Technology Incorporated in the U.S.A.


SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.
Quality Management System Certified by DNV

ISO/TS 16949
Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company’s quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEEOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip’s quality system for the design and manufacture of development systems is ISO 9001:2000 certified.
<table>
<thead>
<tr>
<th>AMERICAS</th>
<th>ASIA/PACIFIC</th>
<th>ASIA/PACIFIC</th>
<th>EUROPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate Office</td>
<td>Asia Pacific Office</td>
<td>China - Xiamen</td>
<td>Austria - Wels</td>
</tr>
<tr>
<td>2355 West Chandler Blvd.</td>
<td>Suites 3707-14, 37th Floor Tower 6, The Gateway</td>
<td>Tel: 86-592-2388138</td>
<td>Tel: 43-7242-2244-39</td>
</tr>
<tr>
<td>Chandler, AZ 85224-6199</td>
<td>Harbour City, Kowloon</td>
<td>Fax: 86-592-2388130</td>
<td>Fax: 43-7242-2244-393</td>
</tr>
<tr>
<td>Tel: 480-792-7200</td>
<td>Hong Kong</td>
<td>China - Zhuhai</td>
<td>Denmark - Copenhagen</td>
</tr>
<tr>
<td>Fax: 480-792-7277</td>
<td>Tel: 852-2943-5100</td>
<td>Tel: 86-756-3210040</td>
<td>Tel: 45-4450-2828</td>
</tr>
<tr>
<td>Technical Support: <a href="http://www.microchip.com/support">http://www.microchip.com/support</a></td>
<td>Fax: 852-2401-3431</td>
<td>Fax: 86-756-3210049</td>
<td>Fax: 45-4485-2829</td>
</tr>
<tr>
<td>Web Address: <a href="http://www.microchip.com">www.microchip.com</a></td>
<td>Australia - Sydney</td>
<td>India - Bangalore</td>
<td>Finland - Espoo</td>
</tr>
<tr>
<td></td>
<td>Tel: 61-2-9868-6733</td>
<td>Tel: 91-80-3090-4444</td>
<td>Tel: 358-9-4520-820</td>
</tr>
<tr>
<td></td>
<td>Fax: 61-2-9868-6755</td>
<td>Fax: 91-80-3090-4123</td>
<td>France - Paris</td>
</tr>
<tr>
<td></td>
<td>China - Beijing</td>
<td>India - New Delhi</td>
<td>Tel: 33-1-69-53-63-20</td>
</tr>
<tr>
<td></td>
<td>Tel: 86-10-8569-7000</td>
<td>Tel: 91-11-4160-8632</td>
<td>Fax: 33-1-69-30-90-79</td>
</tr>
<tr>
<td></td>
<td>Fax: 86-10-8528-2104</td>
<td>India - Pune</td>
<td>France - Saint Cloud</td>
</tr>
<tr>
<td></td>
<td>China - Chengdu</td>
<td>Tel: 91-11-4160-8632</td>
<td>Tel: 33-1-30-60-70-00</td>
</tr>
<tr>
<td></td>
<td>Tel: 86-28-8665-5511</td>
<td>Fax: 91-11-4160-8632</td>
<td>Germany - Garching</td>
</tr>
<tr>
<td></td>
<td>Fax: 86-28-8665-7899</td>
<td>China - Chongqing</td>
<td>Tel: 49-8931-970</td>
</tr>
<tr>
<td></td>
<td>China - Chongqing</td>
<td>Tel: 86-23-8980-9588</td>
<td>Germany - Haan</td>
</tr>
<tr>
<td></td>
<td>Tel: 86-23-8980-9588</td>
<td>Fax: 86-23-8980-9500</td>
<td>Tel: 49-2129-3766400</td>
</tr>
<tr>
<td></td>
<td>China - Dongguan</td>
<td>China - Dongguan</td>
<td>Germany - Heilbronn</td>
</tr>
<tr>
<td></td>
<td>Tel: 86-769-8702-9880</td>
<td>Tel: 86-769-8702-9880</td>
<td>Tel: 49-7131-67-3636</td>
</tr>
<tr>
<td></td>
<td>China - Guangzhou</td>
<td>China - Guangzhou</td>
<td>Germany - Karlsruhe</td>
</tr>
<tr>
<td></td>
<td>Tel: 86-20-8755-8029</td>
<td>Tel: 86-20-8755-8029</td>
<td>Tel: 49-72-625370</td>
</tr>
<tr>
<td></td>
<td>China - Hangzhou</td>
<td>China - Hangzhou</td>
<td>Germany - Munich</td>
</tr>
<tr>
<td></td>
<td>Tel: 86-571-8792-8115</td>
<td>Tel: 86-571-8792-8115</td>
<td>Tel: 49-89-627-144-0</td>
</tr>
<tr>
<td></td>
<td>Fax: 86-571-8792-8116</td>
<td>Fax: 86-571-8792-8116</td>
<td>Fax: 49-89-627-144-44</td>
</tr>
<tr>
<td></td>
<td>China - Hong Kong SAR</td>
<td>China - Hong Kong SAR</td>
<td>Germany - Rosenheim</td>
</tr>
<tr>
<td></td>
<td>Tel: 852-2943-5100</td>
<td>Tel: 852-2943-5100</td>
<td>Tel: 49-8031-354-560</td>
</tr>
<tr>
<td></td>
<td>Fax: 852-2401-3431</td>
<td>Fax: 852-2401-3431</td>
<td>India - Daegu</td>
</tr>
<tr>
<td></td>
<td>China - Nanjing</td>
<td>China - Nanjing</td>
<td>Tel: 82-2-53-744-4301</td>
</tr>
<tr>
<td></td>
<td>Tel: 86-25-8473-2460</td>
<td>Tel: 86-25-8473-2460</td>
<td>Fax: 82-53-744-4302</td>
</tr>
<tr>
<td></td>
<td>Fax: 86-25-8473-2470</td>
<td>China - Qingdao</td>
<td>Korea - Seoul</td>
</tr>
<tr>
<td></td>
<td>China - Qingdao</td>
<td>Tel: 86-532-8502-7355</td>
<td>Tel: 82-2-554-7200</td>
</tr>
<tr>
<td></td>
<td>Tel: 86-532-8502-7355</td>
<td>Fax: 86-532-8502-7205</td>
<td>Fax: 82-2-558-5932 or 82-2-558-5934</td>
</tr>
<tr>
<td></td>
<td>China - Shanghai</td>
<td>China - Shenyang</td>
<td>Malaysia - Kuala Lumpur</td>
</tr>
<tr>
<td></td>
<td>Tel: 86-21-3326-8000</td>
<td>Tel: 86-24-2334-2829</td>
<td>Tel: 60-3-6201-9857</td>
</tr>
<tr>
<td></td>
<td>Fax: 86-21-3326-8021</td>
<td>Fax: 86-24-2334-2393</td>
<td>Fax: 60-3-6201-9859</td>
</tr>
<tr>
<td></td>
<td>China - Shenzhen</td>
<td>China - Shenzhen</td>
<td>Malaysia - Penang</td>
</tr>
<tr>
<td></td>
<td>Tel: 86-755-8864-2200</td>
<td>Tel: 86-755-8864-2200</td>
<td>Tel: 60-4-227-8870</td>
</tr>
<tr>
<td></td>
<td>Fax: 86-755-8203-1760</td>
<td>Fax: 86-755-8203-1760</td>
<td>Fax: 60-4-227-4068</td>
</tr>
<tr>
<td></td>
<td>China - Wuhan</td>
<td>China - Wuhan</td>
<td>Philippines - Manila</td>
</tr>
<tr>
<td></td>
<td>Tel: 86-27-5980-5300</td>
<td>Tel: 86-27-5980-5300</td>
<td>Tel: 63-2-634-9065</td>
</tr>
<tr>
<td></td>
<td>Fax: 86-27-5980-5118</td>
<td>Fax: 86-27-5980-5118</td>
<td>Fax: 63-2-634-8069</td>
</tr>
<tr>
<td></td>
<td>China - Xian</td>
<td>China - Xian</td>
<td>Singapore</td>
</tr>
<tr>
<td></td>
<td>Tel: 86-29-8833-7252</td>
<td>Tel: 86-29-8833-7252</td>
<td>Tel: 65-6334-8870</td>
</tr>
<tr>
<td></td>
<td>Fax: 86-29-8833-7256</td>
<td>Fax: 86-29-8833-7256</td>
<td>Fax: 65-6334-8850</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Taiwan - Hsin Chu</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tel: 886-3-5778-366</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fax: 886-3-5770-955</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Taiwan - Kaohsiung</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tel: 886-7-213-7830</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Taiwan - Taipei</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tel: 886-2-2508-8600</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fax: 886-2-2508-0102</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Thailand - Bangkok</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tel: 66-2-694-1351</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fax: 66-2-694-1350</td>
</tr>
</tbody>
</table>