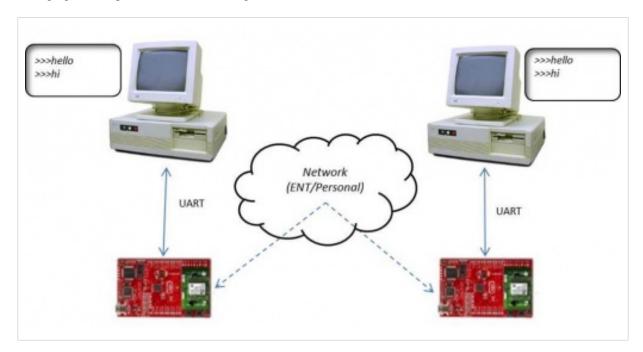
CC32xx Serial Wifi

Overview

Serial WiFi is a capability designed to provide easy, self-contained terminal access behavior, over UART interface. This provides a 'driver-less' solution and allows out-of-the box operation based on ASCII character set interpretation. This application runs over the UART interface and behaves as a command line interpreter.



Leveraging the complete network stack integration it allows secure, robust end-to-end communication.



Note: This wiki page is only applicable for CC3200-SDK v0.5.2 and upward releases. For documentation on older SDKs' examples, refer corresponding file in <cc3200-sdk-installation-location>\cc3200-sdk\docs\examples\

Application details

The serial WiFi application supports the following features:

- 1. Support to connect to ENT/Personal network
- 2. Auto discovery of available peer using mDNS
- 3. All communication is secure using the **Secure Sockets**
- 4. Once configured to a network, auto connect to the AP on every boot
- 5. Provision to override default mnemonic strings
- 6. Local/Remote Control modes, to issue commands to the locally/remotely connected simplelink device.

The Serial WiFi application bacsically operates in 3 modes:

1. Terminal/Interpreter mode:

In this case the interpreter mode behaves as pure point-to-point cable replacement. This is the most common and obvious use in which a serial cable formerly used to carry information is replaced by SimpleLink devices on both end of the line.

2. Local control mode:

In this mode it is possible to issue commands to the locally connected device. These commands encompass a close

set of options to control the SimpleLink device while guaranteeing sandbox restrictions. The mode is entered using a predefined escape sequence (//<)

3. Remote control mode:

This allows issuing commands to the remotely connected device. These commands encompass the same set of options to control the remote SimpleLink as the local device, while guaranteeing sandbox restrictions. The mode is entered using a predefined escape sequence(//>)

Caution: Current time must be set in the device. This time is used to validate the certificate. If the date is beyond the validity period of Certificate, sl_connect will return error. Please update the below macros in the serial_wifi.h file to change date.

```
#define DATE
                             18
                                   /* Current Date */
#define MONTH
                             6
                                   /* Month 1-12 */
#define YEAR
                             2014
                                   /* Current year */
                                   /* Time - hours */
#define HOUR
                            12
#define MINUTE
                                   /* Time - minutes */
                             32
#define SECOND
                                   /* Time - seconds */
```

Source Files briefly explained

main.c - creates to 2 tasks, *Task 1:* the interpreter task to opertate the serial wifi functionality, *Task 2:* The UART task to receive data from the UART.

serial_wifi.c - ALl the functionality of the serial wifi is implemented.

uart_config.c - Configures the UART and the task to send and receive chars over the UART.

conversions.c - All conversion utility API into different number formats.

Usage

- 1. Flash the serial wifi code onto both the devices.
- 2. Upon Reset, the device connects to the stored AP by the AUTO connect policy.If the device doesn't connect to an AP in 6secs, the application prompts the user to connect to a known AP using the Local control mode. User can use the below command to connect to an AP

```
wlan_connect [ssid] [type] [Sec] [User] [key] in the local control mode.
```

3. If this is the first boot after an SFALSH erase, one of the devices need to be configured for as mDNS server. THis can be done by using the below command in local control mode.

```
mDNS 0 <0-server, 1-client> in the local control mode.
```

- 4. The client device automatically connects to the advertiser.
- 5. The communication is based on secure sockets. So, the server key, server certificate, client certificate need to be flashed in the SFLASH at file IDs 129,130,131 respectively. Please refer the Generating SSL certificates section for generating certificates using OpenSSL.

For flashing the certificates using UniFlash:(For detailed instructions about using Uniflash, refer Uniflash User Guide.)

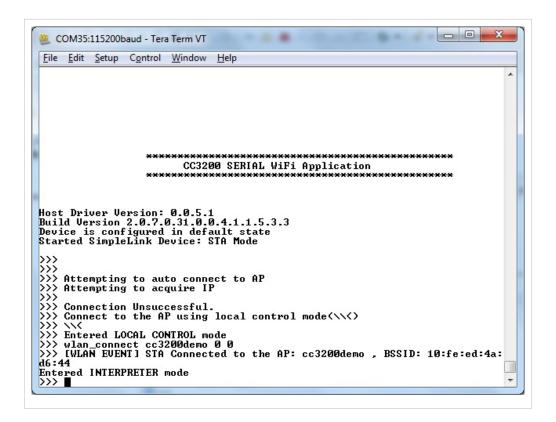
```
    Click "add file"
    Rename the newly created file to "/cert/129.der"
    In the Url field mention the local path to the Server key certificate.
```

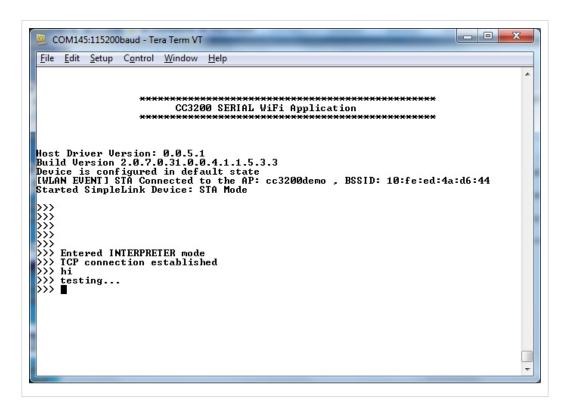
- $\hbox{4. Repeat the above steps for "/cert/130.der" and "/cert/131.der" for server key and client certificate respectively. } \\$
- 5. Check the Erase and Update check boxes and "program"
- 6. Now the devices are connected in Interpreter mode.
- 7. '//<' command is used to enter the local control mode, mode in which we control the local CC3200 device.
- 8. '//>' command is used to enter the remote control mode, mode to control the remote CC3200 device.
- 9. Commands supported in the control modes are:

Supported commands

help	Show menu
wlan_connect [ssid] [type] [Sec] [User] [key]	Connect to wlan AP. ssid:Name of the AP type: 0-Personal,1-ENT
	Sec: 0-OPEN,1-WEP,2-WPA "); Message("\r\n User: user name in case of ENT
	Key: password in case of WEP and WPA
connect [IP name] [port] [TCP UDP]	Connect to specified IP or named server; with an optionally specified port. If not specified, default port is used. Can optionally set transport protocol explicitly. If IP/name not specified use UDP as default transport; otherwise, TCP.
disconnect	Disconnect connected end point.
11<	Enter local control mode.
11>	Enter remote control mode.
exit	Terminate control mode, and resume interpreter mode operation.
quit	Terminate interpreter mode, and free up all related resources.
mode [A B H]	Set data interpretation mode: A - ASCII; B - Binary; H - Hex
wrap [B L]	Set terminal wrap mode level: Message("\r\n B - Byte; L - Line.
send [dest] [data]	Send provided data to dest. If TCP is used, dest is ignored.
recv [dest] [length] [timeout]	Receive data from dest. If TCP is used, dest is ignored. If length not specified, 1 is used. Will wait until length bytes received, the optional timeout [us] is reached, or ^C is received.
ping [IP name] [number]	Ping the provided dest for an optionally specified number of times. If not specified, ping will run until ^C is received.
mDNS [option]	mDNS configuration option: 0-Advertise,1- Listen

10. All communication is secure using the Secure sockets, Security method :SSLV3 and Cipher : RSA WITH RC4 128 SHA.





Generating certificates using OpenSSL

The following are the steps for generating certificates using OpenSSL tool.

Install OpenSSI and run the following commands:

Generate a CA

- 1) openssl req -out ca.pem -new -x509
- -generates CA file "ca.pem" and CA key "privkey.pem"

Generate server certificate/key pair

- 2) openssl genrsa -out server.key 1024
- 3) openssl req -key server.key -new -out server.req
- 4) openssl x509 -req -in server.req -CA CA.pem -CAkey privkey.pem -CAserial file.srl -out server.pem
- -contents of "file.srl" is a two digit number. eg. "00"
- 5) Convert the certificates and key generated to DER format.

```
For certificates

openssl x509 -in <input.crt> -inform PEM -out <output.crt> -outform DER

For key

rsa -in input.key -inform PEM -out output.key -outform DER
```

- 6) Flash the server key and the server certificate at /cert/129.der and /cert/130.der respectively.
- 7) Flash the CA certificate at /cert/131.der.

Limitations/Known Issues

None.

Article Sources and Contributors

CC32xx Serial Wifi Source: http://processors.wiki.ti.com/index.php?oldid=180062 Contributors: A0221015, Codycooke, Jitgupta, Malokyle

Image Sources, Licenses and Contributors

File:Cc31xx cc32xx return home.png Source: http://processors.wiki.ti.com/index.php?title=File:Cc31xx_cc32xx_return_home.png License: unknown Contributors: A0221015

File: Cc32xx return sample apps.png Source: http://processors.wiki.ti.com/index.php?title=File: Cc32xx_return_sample_apps.png License: unknown Contributors: A0221015

Image:Serial wifi1.jpg Source: http://processors.wiki.ti.com/index.php?title=File:Serial wifi1.jpg License: unknown Contributors: Codycooke

File:Light_bulb_icon.png Source: http://processors.wiki.ti.com/index.php?title=File:Light_bulb_icon.png License: unknown Contributors: DanRinkes, PagePusher

Image:CC32xx Serial Wifi SDK 0p5p2 1.jpg Source: http://processors.wiki.ti.com/index.php?title=File:CC32xx_Serial_Wifi_SDK_0p5p2_1.jpg License: unknown Contributors: Jitgupta

Image:CC32xx Serial Wifi SDK 0p5p2 2.jpg Source: http://processors.wiki.ti.com/index.php?title=File:CC32xx_Serial_Wifi_SDK_0p5p2_2.jpg License: unknown Contributors: Jitgupta

License

THE WORK (AS DEFINED BELOW) IS PROVIDED UNDER THE TERMS OF THIS CREATIVE COMMONS PUBLIC LICENSE ("CCPL" OR "LICENSE"). THE WORK IS PROTECTED BY COPYRIGHT AND/OR OTHER THE WARK AS DEFINED BELOW IN FROVIDED UNDER THE ERMS OF THIS CREATIVE COMMINES FOR THE LESSE I. THE WORK IS FROTECTED BY COPTING A PUBLICABLE LAW. ANY USE OF THE WORK OF THE THAN AS AUTHORIZED UNDER THIS LICENSE OR COPYRIGHT LAW IS FROHIBITED.

BY EXERCISING ANY RIGHTS TO THE WORK PROVIDED HERE, YOU ACCEPT AND AGREE TO BE BOUND BY THE TERMS OF THIS LICENSE. TO THE EXTENT THIS LICENSE MAY BE CONSIDERED TO BE
A CONTRACT, THE LICENSOR GRANTS YOU THE RIGHTS CONTAINED HERE IN CONSIDERATION OF YOUR ACCEPTANCE OF SUCH TERMS AND CONDITIONS.

License

1. Definitions

- Adaptation means a work based upon the Work, or upon the Work and other pre-existing works, such as a translation, adaptation, derivative work, arrangement of music or other alterations of a literary or artistic work, or phonogram or performance and includes cinematographic adaptations or any other form in which the Work may be recast, transformed, or adapted including in any form recognizably derived from the original, except that a work interestications with a moving image ("synching") will be considered an Adaptation for the purpose of this License.

 "Collection" means a collection of literary or artistic works, such as encyclopedias and anthologies, or performances, phonograms or broadcasts, or other works or subject matter other than works listed in Section 1(f) below, which, by reason of the selection and arrangement of their contents, constitute intellectual creations, in which the work is included in its entirety in unmodified form along with one or more other contributions, each constituting separate and independent works in themselves, which together are assembled into a collective whole. A work that constitutes a Collection will not be considered an Adaptation (as defined below) for the purpose of this License.

 "Creative Commons Compatible Licenses" means a license that is listed at http://creative/commons.org/coverommons.or

anded to reduce, limit, or restrict any uses free from copyright or rights arising from limitations or exceptions that are provided for in connection with the copyright protection under copyright law or other

3. License Grant
Subject to the terms and conditions of this License, Licensor hereby grants You a worldwide, royalty-free, non-exclusive, perpetual (for the duration of the applicable copyright) license to exercise the rights in the Work as stated

- to Reproduce the Work, to incorporate the Work into one or more Collections, and to Reproduce the Work as incorporated in the Collections; to create and Reproduce Adaptations provided that any such Adaptation, including any translation in any medium, takes reasonable steps to clearly label, demarcate or otherwise identify that changes were made to the original Work. For example, a translation could be marked "The original work was translated from English to Spanish," or a modification could indicate "The original work has been modified."; to Distribute and Publicly Perform the Work including as incorporated in Collections; and, to Distribute and Publicly Perform Adaptations.
- - For the avoidance of doubt
 - Non-waivable Compulsory License Schemes. In those jurisdictions in which the right to collect royalties through any statutory or compulsory licensing scheme cannot be waived, the Licensor reserves the exclusive right to collect such royalties for any exercise by You of the rights granted under this License; Waivable Compulsory License Schemes. In those jurisdictions in which the right to collect royalties through any statutory or compulsory licensing scheme can be waived, the Licensor waives the exclusive right to collect such royalties for any exercise by You of the rights granted under this License; and, Youlnary License Schemes. The Licensor waives the right to collect oryalties, whether individually or, in the event that the Licensor is a member of a collecting society that administers voluntary licensing schemes, via

that society, from any exercise by You of the rights granted under this License.

The above rights may be exercised in all media and formats whether now known or hereafter devised. The above rights include the right to make such modifications as are technically necessary to exercise the rights in other media and formats. Subject to Section 8(f), all rights not expressly granted by Licensor are hereby reserved.

ed in Section 3 above is expressly made subject to and limited by the following restrictions:

- license granted in Section 3 above is expressly made subject to and limited by the following restrictions:

 You may Distribute or Publicly Perform the Work only under the terms of this License. You must include a copy of, or the Uniform Resource Identifier (URI) for, this License with every copy of the Work You Distribute or Publicly Perform. When You Distribute or Publicly Performs on the Work that restrict the terms of this License or the ability of the recipient of the Work You Distribute or Publicly Perform. When You Distribute or Publicly Perform and you impose any effective technological measures on the Work that restrict the ability of a recipient of the Work You Distribute or Publicly Perform. When You Distribute or Publicly Perform and you impose any effective technological measures on the Work that restrict the ability of a recipient of the Work from You to exercise the rights granted to that recipient under the terms of the License.

 This Section 4(a) applies to the Work as incorporated in a Collection, but this does not require the Collection apart from the Work itself to be made subject to the terms of this License. If You create a Collection, upon notice from any Licensor You must, to the extent practicable, remove from the Collection apart from the Work itself to be made subject to the terms of this License. If You create a Collection, upon notice from any Licensor You must, to the extent practicable, remove from the Collection apart from the Work itself to be made subject to the terms of this License You may to the extent practicable, remove from the Collection apart from the Work itself to be made subject to the terms of the Adaptation and you made the terms of (i), as requested. If You create an Adaptation, upon notice from any Licensor From the Collection apart from the Work itself to be an adaptation to the Adaptation to the Adaptation in the Adaptation in the Adaptation in the Adaptation of the Adaptation in the Adaptation of the Adaptation in the Adaptation in the Adaptation in the Adaptat
- Too Distribute of runkey Perform the Adaphation, 1 for may in the properties the terms of the Applicable License. This Section 4(b) applies to the Adaphation as incorporated in a Collection, but this does not require the Collection apart from the Adaphation is self to be made subject to the terms of the Applicable License. It is section 4(b) applies to the Adaphation as incorporated in a Collection, but this does not require the Collection apart from the Adaphation is self to be made subject to the terms of the Applicable License. It is a consistent of the Applicable License and the provide, reasonable to the medium or means You are utilizing: (i) the name of the Original Author (or pseudonym, if applicable) if supplied, and/or if the Original Author and/or Licensor designate another party or parties (e.g., a sponsor institute, publishing entity, journal) for attribution ("Attribution Parties") in Licensor's copyright notice, terms of service or by other reasonable means, the name of such party or parties; (ii) the tile of the Work if supplied, (iii) to the extent reasonably practicable, the URI, if any, that Licensor specifies to be associated with the Work, unless such URI does not refer to the copyright notice or licensing information for the Work by Original Author," or "Screenpaly based on original Work by Original Author)". The credit required by this Section 4(c) may be implemented in any reasonable manner; provided, however, that in the case of a Adaptation or Collection, at a minimum such credit will appear, if a credit for all contributing authors. For the avoidance of doubt, You may only use the credit required by this Section of the purpose of attribution in the manner set out above and, by exercising Your rights under this License, You may not implicitly or explicitly assert or imply any connection with, sponsorship or endorsement by the Section for the purpose of attribution in the manner set out above and, by exercising Your rights under this License, You may not implicitly or explicitly assert o

Elegise (1)git to hirds caughations) due that caughations of the value transfer of the value of val

6. Limitation on Liability

License

EXCEPT TO THE EXTENT REQUIRED BY APPLICABLE LAW, IN NO EVENT WILL LICENSOR BE LIABLE TO YOU ON ANY LEGAL THEORY FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR EXEMPLARY DAMAGES ARISING OUT OF THIS LICENSE OR THE USE OF THE WORK, EVEN IF LICENSOR HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

7. Termination

- This License and the rights granted hereunder will terminate automatically upon any breach by You of the terms of this License. Individuals or entities who have received Adaptations or Collections from You under this License, however, will not have their licenses terminated provided such individuals or entities remain in full compliance with those licenses. Sections 1, 2, 5, 6, and 8 will survive any termination of this License. Subject to the above terms and conditions, the license granted here is perpetual (for the duration of the applicable copyright in the Work). Notwithstanding the above, Licensor reserves the fight to release the Work under different license terms or to stop distributing the Work at any time; provided, however that any such election will not serve to withdraw this License (or any other license that has been, or is required to be, granted under the terms of this License) and little licenses that has been and the license terms of this License. The license terms of this License (or any other license that has been, or is required to be, granted under the terms of this License).

- Each time You Distribute or Publicly Perform the Work or a Collection, the Licensor offers to the recipient a license to the Work on the same terms and conditions as the license granted to You under this License. Each time You Distribute or Publicly Perform an Adaptation, Licensor offers to the recipient a license to the original Work on the same terms and conditions as the license granted to You under this License. If any provision of this License is invalid or unenforceable under applicable law, it shall not affect the validity or enforceability of the remainder of the terms of this License, and without further action by the parties to this agreement, such provision shall be reformed to the minimum extent necessary to make such provision shall and enforceable.

 No term or provision of this License shall be deemed waived and no breach consented to unless such waiver or consents shall be in writing and signed by the party to be charged with such waiver or consent. This License constitutes the entire agreement between the parties with respect to the Work licensed here. Licensor shall be in writing and signed by the party to be charged with such waiver or consent. This License constitutes the entire agreements between the parties with respect to the Work licensed here. Licensor shall not be bound by any additional provisions that may appear in any communication from You. This License may not be modified without the mutual written agreement of the Licenser and You.

 The rights granted under, and the subject matter referenced, in this License were drafted utilizing the terminology of the Berne Convention for the Protection of Literary and Artistic Works (as amended on September 28, 1979), the Rome Convention of 1901, the WIPO Copyright Teasy of 1996, the WIPO Performances and Phonograms Treaty of 1996 and the Universal Copyright Convention (as revised on July 24, 1971). These rights and subject matter take effect in the relevant jurisdiction in which the License terms are sought to be enforced according to the corr