CC32xx Deepsleep Application

Overview

DeepSleep is one of the low power modes supported by the CC3200 device. There are various options available to select the module to be active during a low power mode by appropriately configuring the designated registers of the PRCM module and thereby causing an exit from the low power mode based on activity on the chosen active



module. The clock to the other modules, that are not chosen to be active, get disabled. The clock is also halved in case of DeepSleep mode.

The various modules that can be clock gated (enabled/disabled) are:

- 1. UART
- 2. UDMA
- 3. TIMER
- 4. WDT
- 5. GPIO
- 6. I2C

Also in the deep sleep mode, activity on the WiFi network triggered by the NWP can also be chosen as a cause for the wakeup.

Application details

The objective of this application is to showcase the deepsleep as a power saving tool in a networking context (in this case a TCP server). In this example the Idle task hook function available to the application as a FreeRTOS feature is used to enter the deepsleep power mode. Whenever there is activity on the network, the device is brought out of deepsleep state and services the networking sequence. So whenever the networking APIs block, the device enters deepsleep on idle task execution.

Source Files briefly explained

- main Core TCP server implementation. Idle task hook function implementation that enters deepsleep is also present.
- nw_if Common functions to handle connection to AP and FreeRTOS hook functions.
- **gpio if** Basic GPIO interface APIs.
- pinmux Assigns a personality to the pins at the device boundary.
- uart if To display status information over the UART
- **timer_if** Wrapper for timer module driver
- startup_* Tool specific vector table implementation.

Usage

Note: It is recommended that the application be tested by flashing the .bin file onto the serial flash on LaunchPad only. The IAR and CCS debuggers will disconnect on entering low power modes and cannot be used for subsequent debug.

• Setup a serial communication application (HyperTerminal/TeraTerm). For detail info visit CC31xx & CC32xx Terminal Setting.

On the host PC. The settings are:

- Port: Enumerated COM port

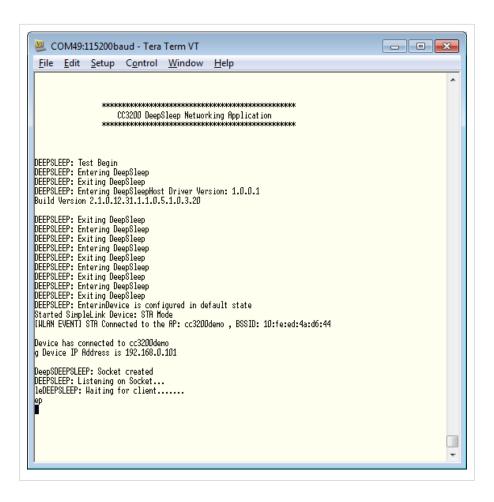
- Baud rate: 115200

- Data: 8 bit- Parity: None- Stop: 1 bit

- Flow control: None

- Run the reference application (Flashing the bin).
- Observe the status messages on the host over serial port to understand the sequence of operations performed by the application.
- The application tries to connect to AP by name DemoAP by default. In case this fails, the user is prompted to enter the AP name (Security type OPEN) to connect to on HyperTerminal/TeraTerm.
- Whenever the server starts waiting for a client, connect to the device from an external networking application. The TCP server port number is 5001 and the IP address is available over the UART logs.
- Notice the exit from the deepsleep whenever a new client connects. There are also other instances of the device entering deepsleep.

Terminal snapshot when application runs on device:



Limitations/Known Issues

The uart print to enter deepsleep is placed in the idle hook function which is of lowest priority and hence the print appear jumbled due to context switches. The print is retained only for clarity of the timing of entering deepsleep.

Article Sources and Contributors

CC32xx Deepsleep Application Source: http://processors.wiki.ti.com/index.php?oldid=184824 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: CC32xx Deep Sleep NW Terminal runScreen 1.0.0.png Source: http://processors.wiki.ti.com/index.php?title=File: CC32xx Deep Sleep NW Terminal runScreen 1.0.0.png 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 APPLICABLE LAW. ANY USE OF THE WORK OTHER THAN AS AUTHORIZED UNDER THIS LICENSE OR COPYRIGHT LAW IS PROHIBITED.

BY EXERCISING ANY RIGHTS TO THE WORK PROVIDED HERE, VOU 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.

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 derivographic adaptations or any other form in which the Work may be recast, transformed, or adapted including in any form recognizably phenographic adaptations of a literary or artistic work, or phonogram or performance or phonogram, the synchronization of the Work in constitution of the Work in the considered and phenographic adaptations of the Work in constitution and arrangement of their constitutions, and the phenographic adaptations of the Work in constitution and arrangement of their contents, constitution intellectual creations, in which they is caused on the vorks is in themselves, and the present of their contents, constitution intellectual creations, in which they is caused in its entirety in unmodified form along with one or more other contributions, acceled the 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 purposes of this License. "Creative Commons Straighte Licenses," means a license that is listed at http://creative/commons.org/coverommons.org

2. Fair Dealing Rights

ended 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

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 Non-wavance Compusory License Schemes. In those jurisdictions in which the right to collect royalties through any statutory or compulsory licensing scheme cannot be warved, the Licensor reserves the exclusive right to collect used to royalties for any exercise by You of the rights granted under this License;

 ii. 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,

 iii. Voluntary License Schemes. The Licensor waives the right to collect royalties, 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.

- 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. You may not offer or impose any terms on the Work that restrict the terms of this License or the ability of the recipient of the Work to exercise the rights granted to that recipient under the terms of the License. You may not sublicense the Work. You must keep intact all notices that refer to this License and to the disclaimer of warranties with every copy of the Work You Distribute or Publicly Perform. When You Distribute or Publicly Perform any not 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 istelf to be made subject to the terms of this License. If You create a Collection, upon notice from the Collection apart from the Work istelf to be made subject to the terms of this License. If You create a Collection, upon notice from the Collection apart from the Work istelf to be made subject to the terms of the North You may Distribute or Publicly Perform an Adaptation only under the terms of: (i) this License (eight remove from the Adaptation any credit as required by Section 4(c), as requested.

 You may Distribute or Publicly Perform an Adaptation only under the terms of that License. (eight remove from the Adaptation only under the terms of the Adaptation on the Collection apart from the Adaptation on the Adaptation on the Adaptation of the Adaptation
- You Distribute of runlety Perform the Adaptation, 10 may not not impose any errective technological measures on the Adaptation to make a complete the tending that recipient under the terms of the Applicable License. This Section 4(b) applies to the Adaptation as incorporated in a Collection, but this does not require the Collection apart from the Adaptation runlet that recipient under the terms of the Applicable License. If you Distribute, or Publicly Perform the Work or any Adaptations or Collections, You must, unless a request has been made pursuant to Section 4(a), keep intact all copyright notices for the Work and provide, reasonable to the medium or means You are utilizing: (i) the name of the Original Author (or pseudonym, if applicable) if supplicable if supplicable and the reasonable means, the name of such party or parties; (ii) the title 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; and (iv), consistent with Section 4(c) may be implemented in any reasonable manner; provided, however, that in the case of a Adaptation or Collection appears, then as part of these credits and in a manner at least as prominent as the credits for the other contributing authors. For the avoidance of doubt, You may only use the credit required by this 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 or imply any connection with, sponsorship or endorsement by the Drigmal Author. Licensor and/or Attribution Parties.

 Except as otherwise agreed in writing by the Licensor or as may be otherwise permitted by applicable law, if You Reproduce, Distribute or Publicly Perform the Work either by itself or as part of any Adaptations or Collections. Except as otherwise agreed in writing by the Licensor will avoid to a particular or relation

5. Representations, Warranties and Disclaimer

UNLESS OTHERWISE MUTUALLY AGREED TO BY THE PARTIES IN WRITING, LICENSOR OFFERS THE WORK AS-IS AND MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND CONCERNING THE WORK, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF TITLE, MERCHANTIBILITY, FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT, OR THE ABSENCE OF LATENT OR OTHER DEFECTS, ACCURACY, OR THE PRESENCE OF ABSENCE OF ERRORS, WHETHER OR NOT DISCOVERABLE. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES, SO SUCH EXCLUSION MAY NOT APPLY TO YOU.

6. Limitation on Liability
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

License 5

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, 7, 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 right 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 license that has been, or is required to be, granted under the terms of this License.

8. Miscellaneous

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 law, it shall not affect the validity or enforceablity 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 valid and enforceable.

No term or provision of this License, shall be deemed waived and no breach consented to unless such waiver or consent 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. There are no understandings, agreements or representations with respect to the Work not specified here. Licensor shall not be bound by any additional provisions that may appear in any communication from You. This License ward to be modified without the mutual written agreement of the License and You.

The rights granted under, and the subject matter referenced, in this License were drafted utilizing the terminology of the Berne Convention of 10f, the WPIO Copyright Treaty of 1996, the WPIO Performances and Phonograms Treaty of 1996 and the Universal Copyright Convention of any 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 corresponding provisions of the implementation of those treaty provisions in the applicable anional law. If the standard sutic of rights granted under applicable copyright law includes additional rights not granted under this License is not