



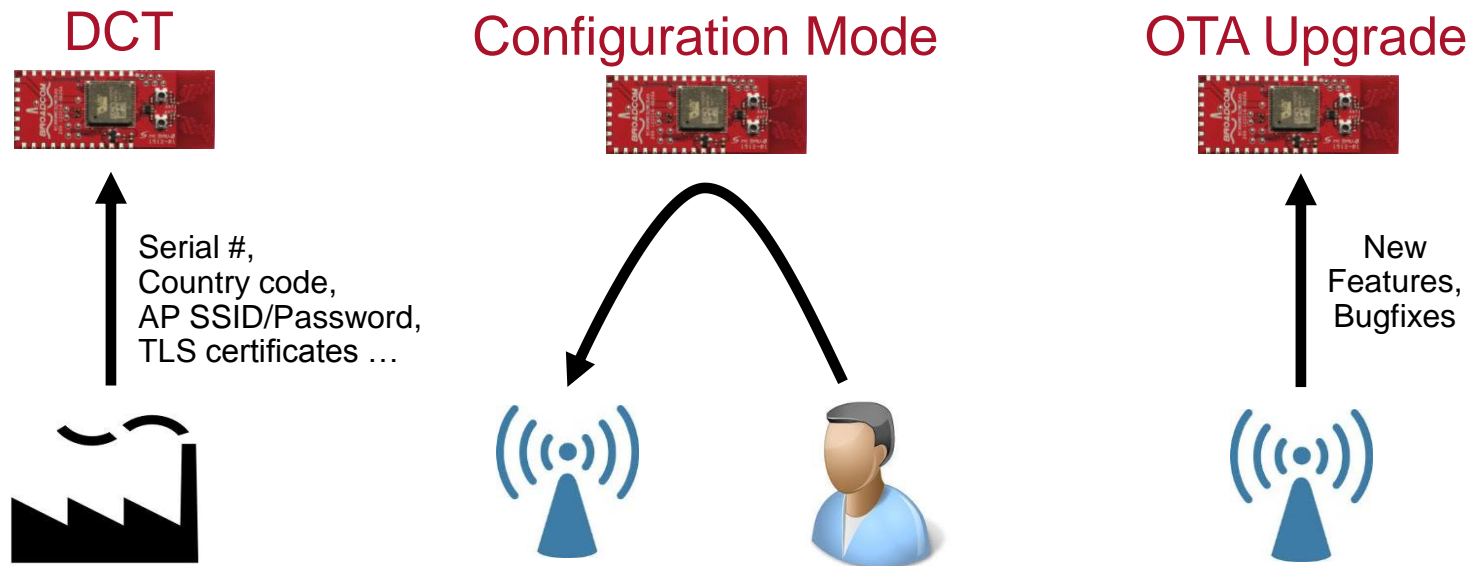
## WICED Application Framework

April 2013

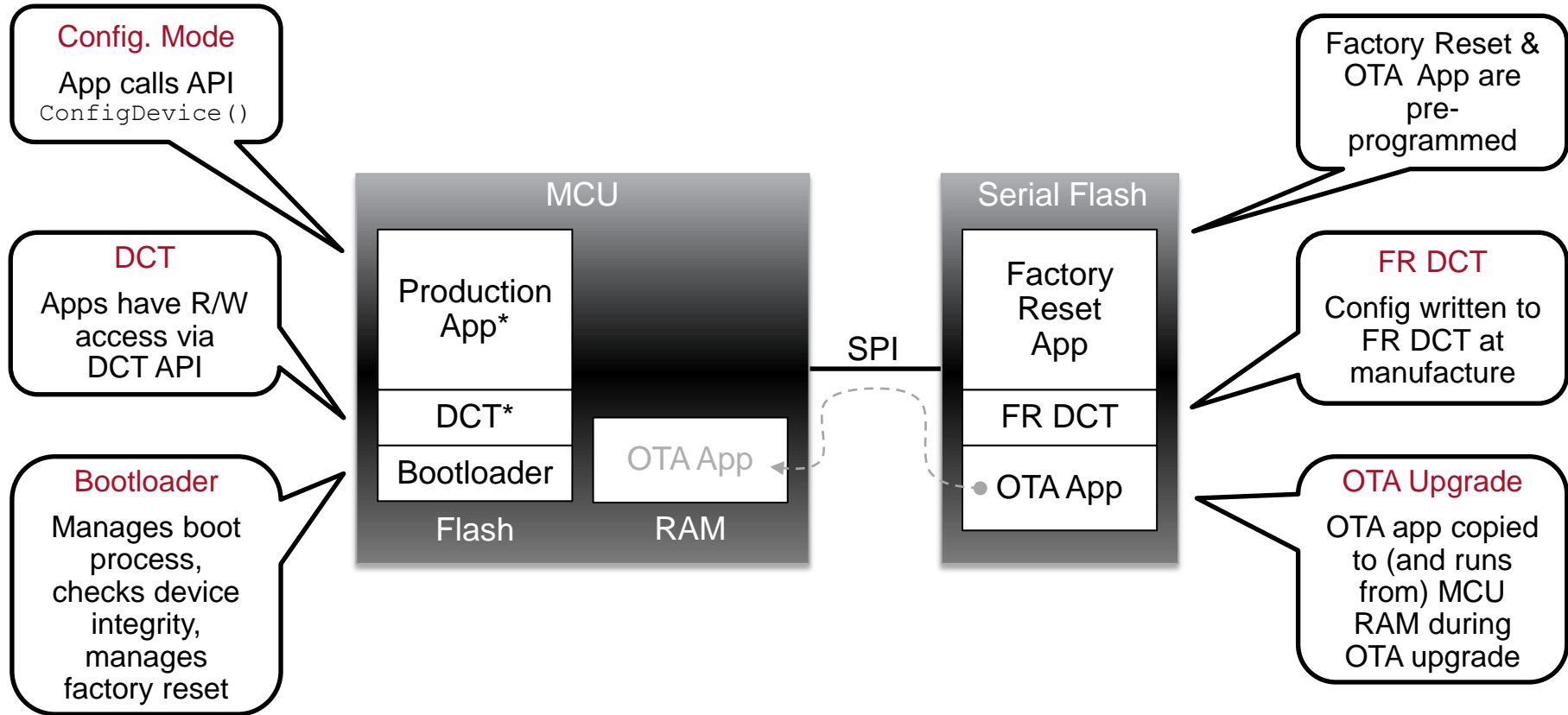


- **Secure wireless devices typically require ...**
  - A process for factory configuration of ...
    - Radio regulatory domain, AP credentials, security certs, serial number, etc
  - A user-friendly way to get the device connected to a network
  - A wireless upgrade mechanism
    - aka Over The Air (OTA) Upgrade
  
- **These requirements drive the need for ...**
  - A dedicated area in Flash memory to store configuration information
  - A simple wireless user configuration process
  - A fault-tolerant OTA Upgrade process
    - OTA application. Performs OTA firmware upgrade
    - Factory reset. What if the new OTA firmware is corrupt?
    - Bootloader. Manages device integrity and factory reset.

- **Provides infrastructure, tools and software components for ...**
  - Programming and storing factory and user app configuration items
    - Device Configuration Table (DCT)
  - An automated wireless configuration and connection process
    - WICED Configuration Mode
  - OTA Upgrade Process
    - OTA Upgrade App, Factory Reset, Bootloader



# WAF : Device Memory Architecture



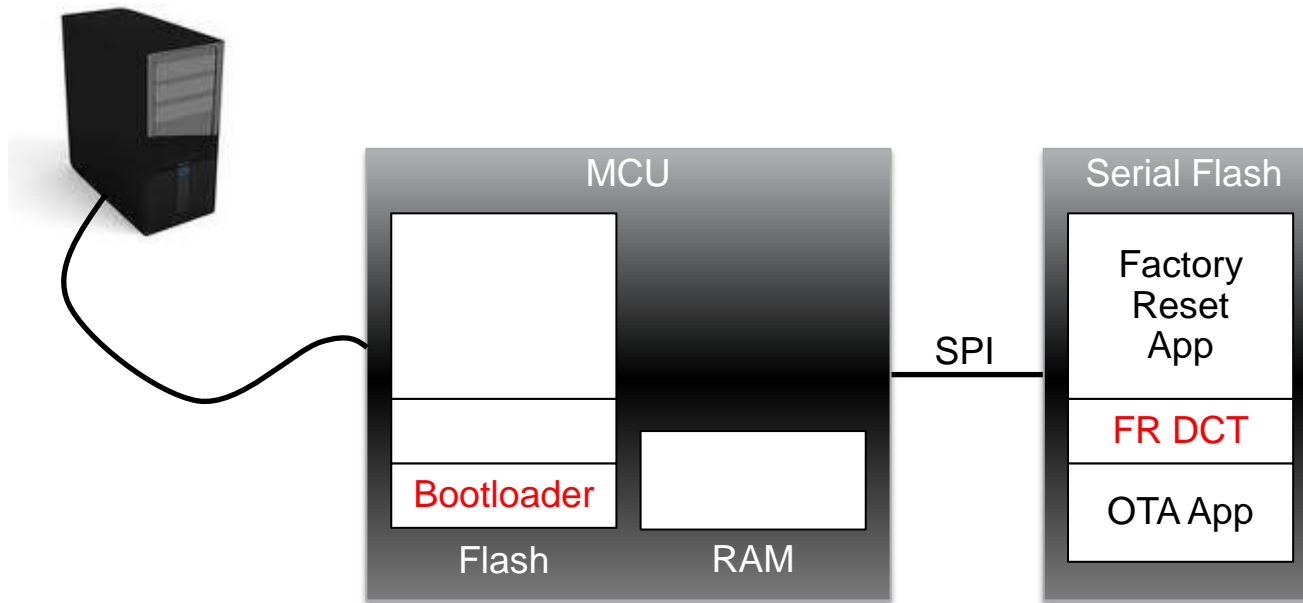
## NOTE

\* The Production App & DCT are identical to the Factory Reset App and FR DCT at time of manufacture

# Factory Config Steps for a WICED Device (1)



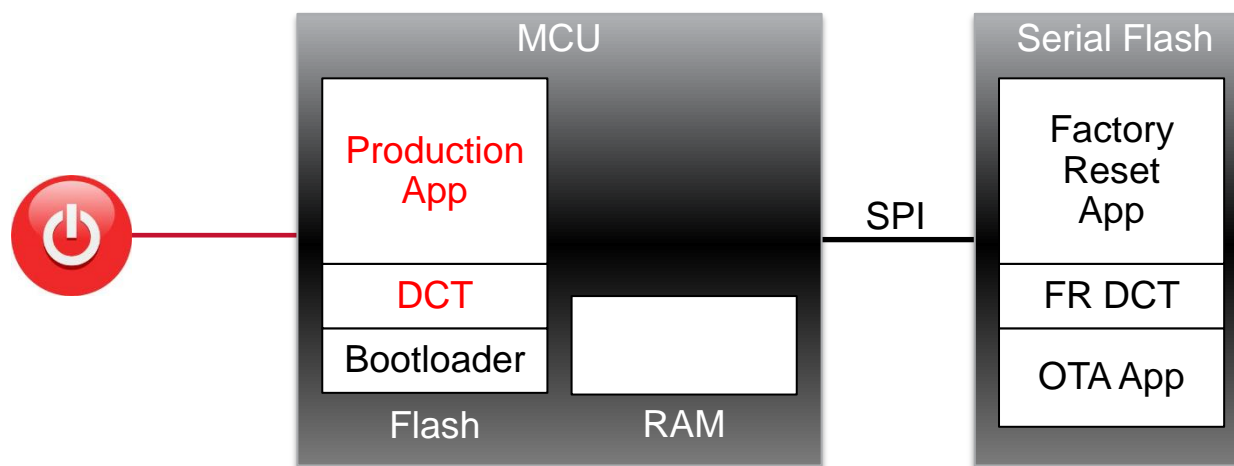
1. **Test Controller creates a unique FR DCT for the device**
  - Serial number, security certificates, AP SSID, etc
2. **TC uses WICED toolchain to write FR DCT to serial flash**
  - Factory Reset App & OTA App may be pre-programmed in serial flash
3. **TC uses WICED toolchain to write Bootloader to MCU flash**



# Factory Config Steps for a WICED Device (2)



1. **Test Controller creates a unique DCT for the device**
  - Serial number, security certificates, AP SSID, etc
2. **TC uses WICED toolchain to write FR DCT to serial flash**
  - Assume Factory Reset & OTA App are pre-programmed in serial flash
3. **TC uses WICED toolchain to write Bootloader to MCU flash**
4. **Power is applied to the WICED Device**
  - Bootloader runs and copies Factory Reset App and FR DCT into internal MCU flash memory (which become Production App and DCT)
  - **Manufacturing Test process follows ...**





- **Upgrade Methods**

1. Pull : The device automatically upgrades itself over a network connection
2. Push : The upgrade process is initiated by a user

- **WICED SDK provides a 'Push' example**

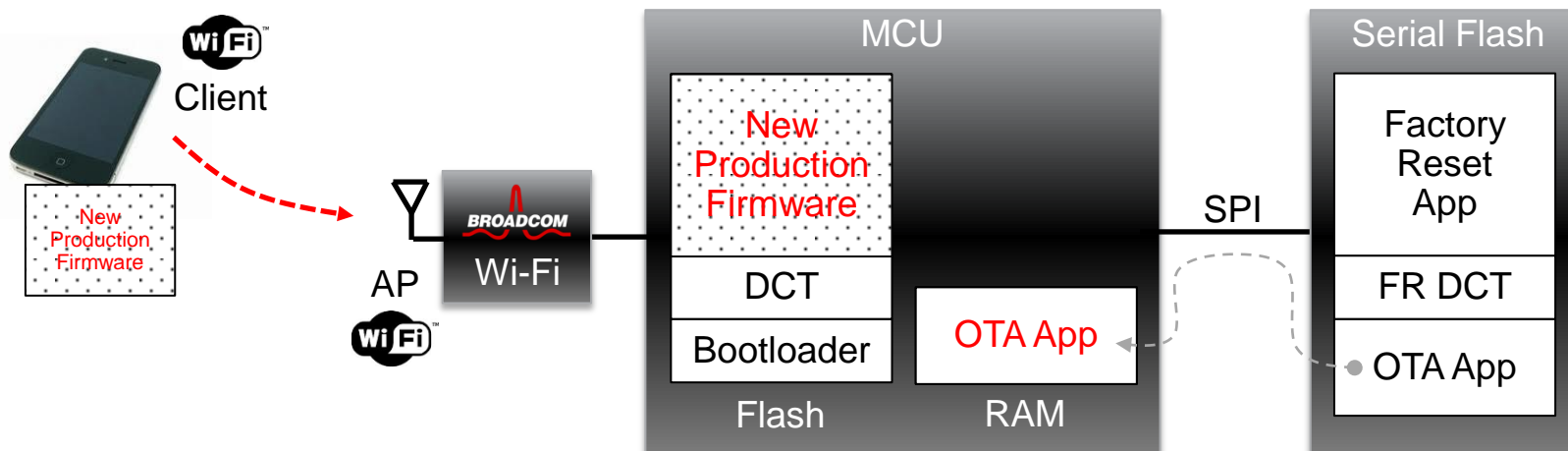
- WICED Device starts ...
  - Wi-Fi Access Point with WPA2 security
  - DHCP server
  - DNS redirect server
  - HTTP webserver
- A Wi-Fi client (eg. PC, tablet, phone ) joins the WICED Device AP
- The Wi-Fi client opens a web browser
- The client uploads new firmware using a webpage on the WICED device

- **An app on a smartphone or tablet could be used instead of a web browser**

# OTA Upgrade Process – Details

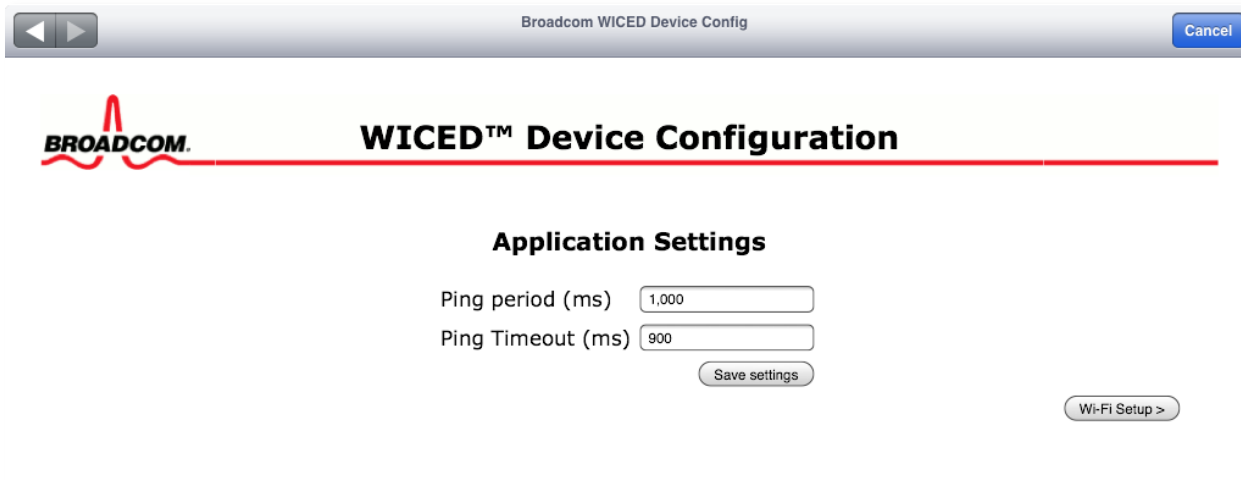


1. OTA Upgrade initiated by an API call from the Production App
2. Device reboots, Bootloader copies OTA App into MCU RAM
3. OTA App runs from RAM, starts Wi-Fi AP and webserver
4. Wi-Fi Client connects and browses to the upgrade webpage
5. OTA App writes new firmware over existing Production App
6. Device reboots, Bootloader verifies New Production Firmware
  - If the image is corrupt, Factory Reset occurs as a failsafe





- A single API call manages Wi-Fi configuration and connection
  - `wiced_configure_device()`
- **WICED Configuration Mode**
  - Starts an open Wi-Fi Access Point, DHCP & DNS redirect server
  - Starts a secure HTTPS webserver to encrypt the setup process
  - Provides web pages to enable application and Wi-Fi setup
  - Configuration information entered by users is stored in the DCT
  - Coming soon : Support for Apple MFi Wi-Fi autoconfig via Bluetooth



The screenshot shows a web browser window titled "Broadcom WICED Device Config" with a "Cancel" button in the top right. The main content area features the Broadcom logo on the left and the title "WICED™ Device Configuration" in the center. Below this, the "Application Settings" section contains two input fields: "Ping period (ms)" with the value "1,000" and "Ping Timeout (ms)" with the value "900". There are "Save settings" and "Wi-Fi Setup >" buttons at the bottom right of the settings area.

# Thank you

