**Introduction:**

This section talks about how to configure BG2CD dongle.

BG2CD dongle, which runs on Android JB 4.2, has a webserver in the background, that runs on "uap0" interface, with the ip address 192.168.49.1

"uap0" is a soft wireless Access Point, to which external devices can be connected and using which they can communicate with BG2CD.

External device can be anything such as phone, tablet, laptop or desktop which can be connected to a WiFi AP.

**How to Configure BG2CD:**

To setup the BG2CD to connect to any WiFi AP, one has to do below steps:

**From BG2CD:**

* Restart the BG2CD
* Once BG2CD is booted up completely, from "AllApps" Menu start/click on "WebServer"

**From External Devices:**

* Turn on the WiFi on the external device (laptop/phone/tablet)
* Scan and connect to the WiFi AP "BG2CDAP" with password "12345678"
* Open the browser with the URL as 192.168.49.1:8080
* Alternatively, we have the Android based APP, which you can launch
* A page opens with configuration options for "WiFi" and "Resolution"
* Select "WiFi" and click "Submit"
* It opens a page with a pop-up list with all the available WiFi Access Points
* Select an AP and enter the Password and click "Connect"
* The BG2CD device will be connected to the WiFi AP

**Design of Web Server for Device Configuration:**

This module is written in Java Language as a WebServer that runs on uap0 (SoftAP) interface.

**Class Diagram:**



Classes in yellow color are defined by this module and others are from either Java Language or Android framework.

***StartActivity*** class is the main class that drives most of the operations. Once "uap0" interface is up, it creates an instance of ***Server*** and runs it on "uap0" interface with the port no 8080. "uap0" interface always gets the IP address as 192.168.49.1. So the web server runs on 192.168.49.1:8080

***Server*** class is responsible for listening and accepting connections from the clients (clients are those devices that open up connection with 192.168.49.1:8080).For each connection (from the clients), Server creates an instance of ***ServerHandler*** class to handle the HTTP request and responses.

***ServerHandler*** class is responsible for handling incoming requests, parsing it and responding back accordingly. The main responsibility is to send a web page to the client that lists all the available wireless networks that BG2CD can scan. Once the client responds back with a wireless network (and the password), it initiates connection with the wireless network and responds back to the client with the status of the same.

**State Diagram:**

Below diagram depicts the state of the BG2CD Device Configuration Web Server with respect to Wi-Fi state.

Disable Wi-Fi

Stop SoftAP

Enable Wi-Fi

Start Server

Add Network

Scan Wi-Fi

Start SoftAP

**Sequence Diagram:**

**Sequence Diagram for the web-server app when it boots/launches:** When WebServer APP is started; it does following actions before it can launch the web-server on “uap0” interface.

* Turn on the WiFi, if it’s OFF
* Start SoftAP
* Once SoftAP is ON, start the web-server on SoftAP (uap0) interface
* At the same time issue a WiFi SCAN
* Once WiFi scan is complete (which generally takes 5-10 seconds) create a list of available wireless networks
* During this time, the Server will be waiting on connection from the clients

Once after launching the Web-Server on "uap0" and after receiving connection request followed by the Wi-Fi setup request from the client, below operations happen

* Turn Off the SoftAp?
* Turn Off the Wi-Fi
* Turn On the Wi-Fi
* Add and Enable Wi-Fi network that the client (external device) asked the BG2CD to get configured with

Below sequence diagram covers both these use-case

**When Wi-Fi is OFF**

setWifiEnabled (true)

StartActivity

Server

ServerHandler

WiFiScanReceiver

WifiManager

**When Wi-Fi is ON**

setupWifiSoftAp

onReceive

scanWifi

onReceive

setWifiApEnabled (true)

Start

startScan

startServer

During this time a client device establishes connection with BG2CD Web-Server and tries to set-up Wi-Fi

setWiFiAPList

onReceive

Start

getScanResults

connectToWiFiAP

disableWifi

onReceive

setWifiApEnabled (false)

enableWifi

onReceive

setWifiEnabled (false)

At this point SoftAP (uap0) is down and BG2CD connected to a wireless network

addAndEnableNetwork

onReceive

setWifiEnabled (true)

enableNetwork

addNetwork

**Sequence Diagram for client-server connection and wifi configuration:** Once the WiFi is ON and after creating SoftAP (uap0) following sequence of operation happens between the Client (External Device) and the Server (BG2CD)

connectToWiFiAP

configuration type

Index.html

Connect

Start

Start

StartActivity

Server

ServerHandler

select-wifi.html

status.html

Wi-Fi network details

**Features yet to be implemented:**

* The device should display the SoftAP Name and Password for user to connect to
* SoftAP name and password should be random every time for security purpose
* Right now, the WebServer should be launched manually, but it should be made as a service, which launches during boot-time if the BG2CD is not connected to any wireless AP.
* To test and verify all the corner cases

**References**

1. Source code is based out of WebServer implementation ​from <https://code.google.com/p/android-webserver/>
2. Android API help reference from <http://developer.android.com/reference/android/net/wifi/p2p/WifiP2pInfo.html>