Inventek Systems

Embedding Connectivity Everywhere

**eS-WiFi Module
Application Note**

AN20052

**Soft Access Point
Functionality**

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At Inventek Systems we pride ourselves in being a USA-based, full service GPS and Wi-Fi company. While GPS modules and GPS antennas has been our primary focus, we are expanding to provide a full line of Wi-Fi products. We also provide complete GPS services from consulting to custom design, manufacturing and training.

For more information, call 978-667-1962 or email Sales Support or Technical support

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1.0 SCOPE

The scope of this document is an application note to assist users to understand the capability of the Inventek eS-WiFi Access Point mode. The eS-WiFi family of products has a powerful built in SoftAP that allow customers to easily configure the STA (Station) to join a network, setup a Peer-To-Peer Network and On-The-Go Gaming.

This application note is currently in process and the findings are not complete and subject to change. The document will be updated upon conclusion of the testing.

1.1 Supported Products

This application is applicable to the eS-WiFi firmware release 1.2 and is currently available on the following eS-WiFi modules:

ISM4319-M3-L44-C   (Ceramic Antenna w/ STM103 Microcontroller on board)

ISM4319-M3-L44-E   (Printed Micro-strip Antenna w/ STM103 Microcontroller on board)

ISM4319-M3-L44-U   (U.FL Connector to external antenna w/ STM103 Microcontroller on board)

ISM4319-M3E-L44-E (Printed Micro-strip Antenna w STM205 Microcontroller on board)

ISM4319-M3G-L44-E (Printed Micro-strip Antenna w STM205 Microcontroller on board)

ISM43362-M3G-L44-U/E (Printed Micro-strip Antenna or U.fl w STM205 Microcontroller on board)

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2.0   INTRODUCTION

The eS-WiFi modules are wireless LAN modules that are usually in devices that connect to home networks, Wi-Fi hot spots, and workplace networks. These devices operate as a station, or STA, which can connect to a single wireless router/access point (AP) that is typically hardwired at a fixed location.

The eS-WiFi family of 802.11 b/g/n modules has an embedded microcontroller running a fully integrated TCP/IP stack, simple to use AT command set and also have implemented a Soft Access Point (SoftAP) technology which enables a STA to behave like a wireless/AP.

3.0   SOTFAP OVERVIEW

The Inventek eS-WiFi modules are offered with a complete TCP/IP stack and require only a simple AT command over USB, UART or SPI to communicate with the module. Typically an embedded product can use a simple 8 bit microcontroller to send the AT command set to initiate a SoftAP, once the AP is started other devices (users) can join the network and be connected as a (STA) client on that network.

USE CASES OF THE SOFTAP:
USE CASE 1: JOINING A LOCAL AREA NETWORK USING THE SOFTAP

You have an embedded product and you want to configure that product to join a network. One way, to make this happen, is to have the eS-WiFi automatically power up as an Access Point that a user can use a PC or any smartphone to see the AP and type in the SSID or Password. As soon as the user hits *"Join"* the Access Point is closed and now the eS-WiFi module turns off the AP and joins the network as a STA (client).

Here is an example of the AT command required the above use case happen:

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1. AT Commands
   a. "*A0*"   The Following happens:
      i. Activate Access Point
      ii. Activate DHCP
      iii. Activate web server
      iv. Activate DNS
2. Select " *Join"* on the Webpage and the following happens:
      i. Access Point shuts down
      ii. DHCP shuts down
      iii. DNS shut down
      iv. Module Joins the network as a STA (client)
3. Done.. You are connected as a client on the network. The user also has the ability to manual enter the information to join to a network as well.
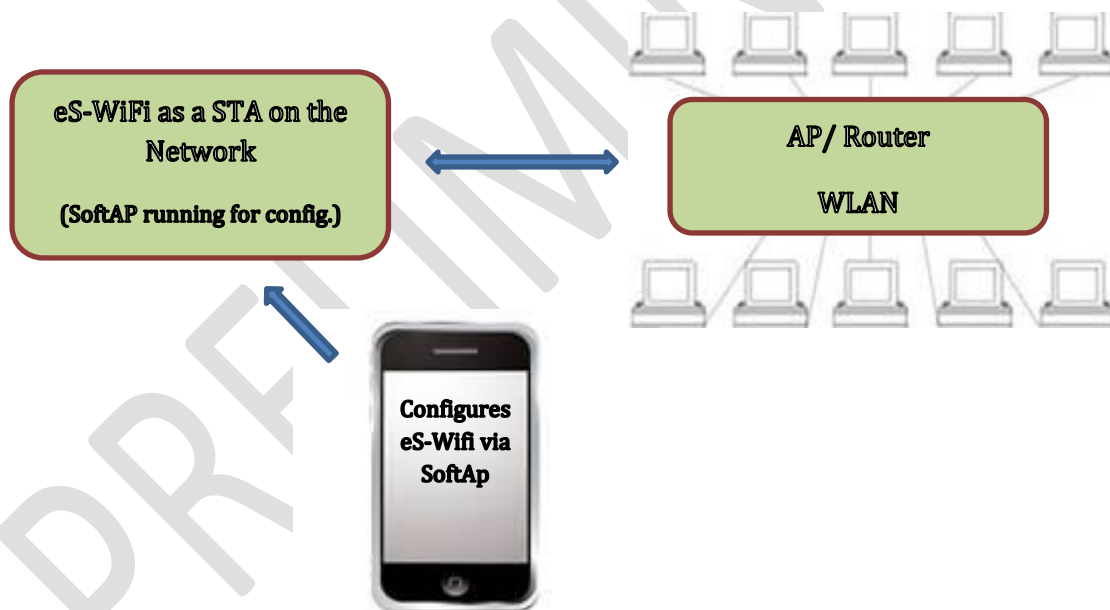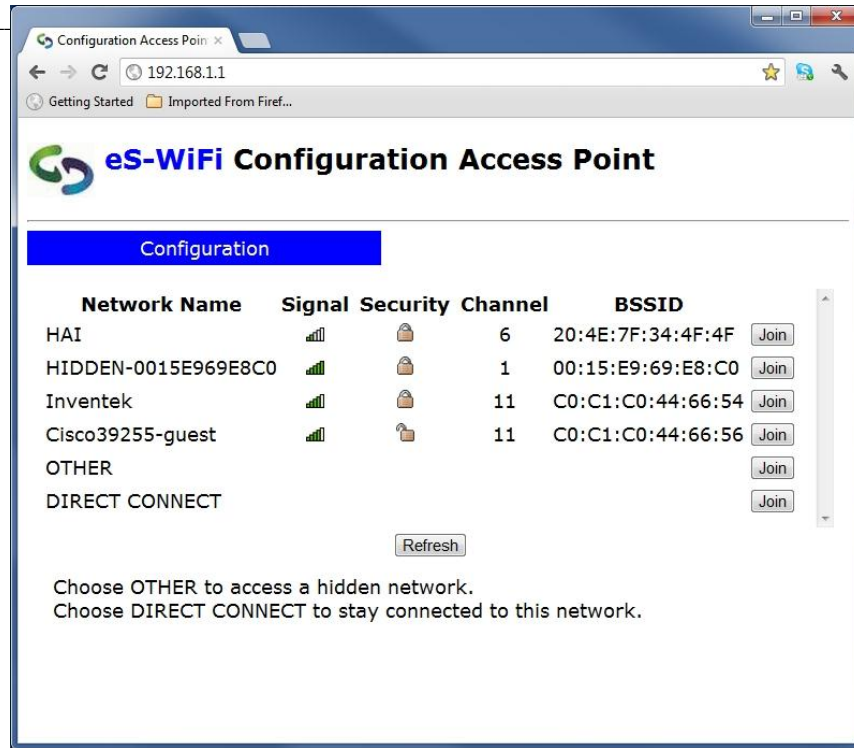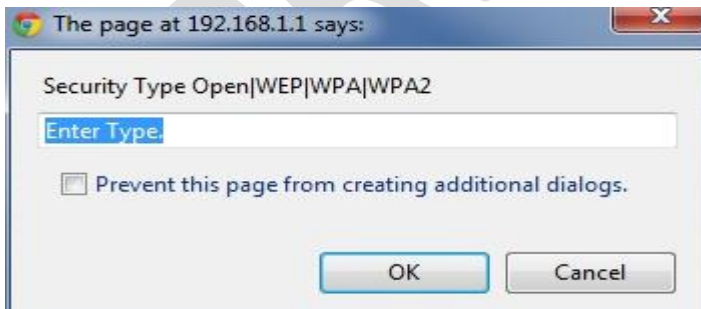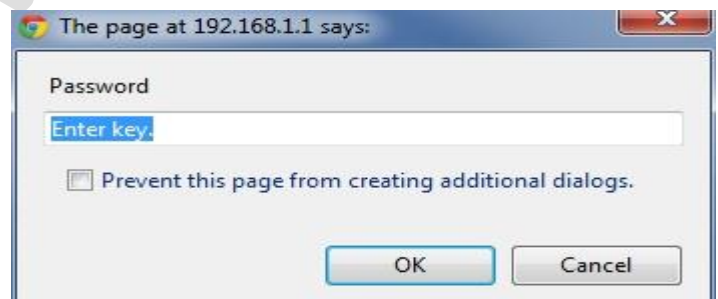

Figure. 1 Wireless Configuration

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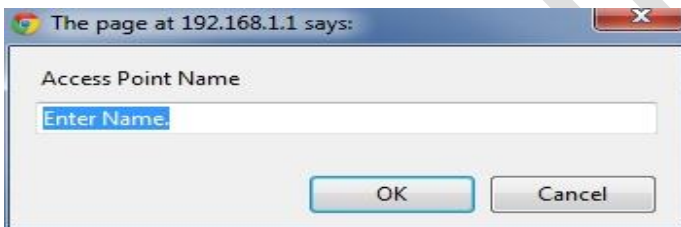
SoftAP screen shots:

Note: Customers can use an AT command to change the name of the SoftAP name to identify their product, i.e. change **eS-WIFI to INVENTEK**

SoftAP Manual Join screen shots

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USE CASE 2: DIRECT CONNECTION TO THE SOFTAP

You have embedded the eS-WiFi in a terminal device at the airport configured as a SoftAP that allows smartphone/ PC's or other devices to make a **"Direct Connection"** via the eS-WiFi SoftAP.   The SoftAP enables file transfers, file sharing, printing, and information exchange between as many as 8 clients (STA). This is all accomplished without the use of a fixed AP
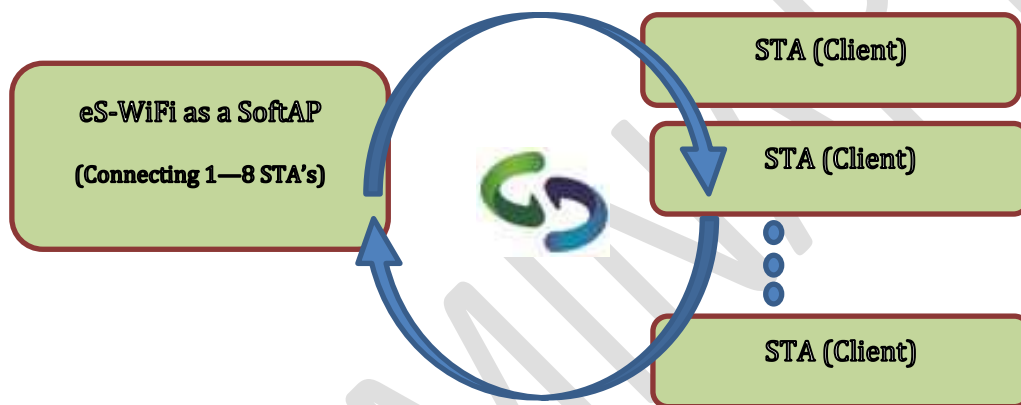
One way, to make this happen, is to have the eS-WiFi automatically power up as a SoftAP that a user can see using a PC or any smartphone and selects **"Direct Connect"** on the eS-WiFi SoftAP web server.   As soon as the user selects *"Direct Connect"* the Access Point remains running and the client (STA) is connected to the eS-WiFi SoftAP. This allows WLAN devices to easily connect without the need for a fixed AP. This allows for WiFi Peer-To-Peer and ON-The-GO Gaming capability, printing and file sharing.

  Here is an example of the AT commands required in the above use case:

1. AT Commands
   a. "*A0*"   The Following happens:
      i. Activate Access Point
      ii. Activate DHCP
      iii. Activate web server
      iv. Activate DNS
2. Select " *Direct Connect"* on the Webpage and the following happens:
      i. Access Point continues to run and manage the SoftAP
      ii. DHCP continues to run
      iii. Web server is shutdown, but SoftAP is visible
3. Stations is connected to the SoftAP
4. Done. You are connected as a client on the network.

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"Direct Connection" allows the embedded eS-WiFi to run as a SoftAp

- Share files between STA's
- Allows for Device to Device connection
- Machine to Machine
- Full interoperability

4.0 SOFTAP FEATURES

Feature	Description
Stations Support	8
SSID Broadcast	Yes
DHCP	Yes
Security	Open (WEP /WPA-PSK in development)
Limit Station association	Yes, ISM4319x support 2 ; ism43362 support 8

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5.0 DOCUMENT REVISION HISTORY

Date	Name	Description	Revision	File Name
7/20/12	MFT	Initial Creation	1.0	User Manual Initial Release

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