



## **Accessory Test System (ATS)**

# **Installation Guide and User Manual**

### **Revision 30**

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# Chapter 1

## Overview

### Note

Throughout this document all models of iPod, iPhone and iPad are referred to as "Apple device." Where the name Apple device is used, iPod, iPhone or iPad may be appropriate. Where the name iPod is used, iPhone or iPad may be appropriate.

This document describes the configuration and use of Apple's Accessory Test System (ATS). ATS consists of:

- a set of real-time tools for diagnosing and debugging the hardware-layer and iPod Accessory Protocol (iAP) performance of accessories
- a set of automated validation tools for ensuring that new accessories more fully comply with the MFi specifications
- various hardware components for connecting to various types of MFi accessories

ATS is designed to analyze iAP traffic delivered over UART, USB, and Bluetooth transports.

### 1.1 Equipment List

Before getting started, make sure you have all of the equipment listed below. Macs may be purchased at <https://store.apple.com>. The ATS boxes, USB breakout board, Total Phase Beagle™ USB 480 analyzer, USB hub, and Frontline ComProbe® BPA® 100 analyzer may be purchased from Avnet using your MFi licensee account.

### 1.1.1 Mac Hardware

ATS will run on any Intel-based Mac computer running OS X 10.8 (Mountain Lion) or later. If you do not already have ATS, download it from the MFi Portal (<https://mfi.apple.com>) or contact your MFi representative. A USB hub (Figure 1.1) is useful to centralize connections for all equipment.

Figure 1.1: USB hub



### 1.1.2 30-pin Hardware

The ATS 30-pin Box (Figure 1.2) is required to use ATS with 30-pin accessories. Accessories utilizing USB will also require a Beagle™ USB 480 analyzer and USB breakout board (Figure 1.3). The 30-pin USB breakout board is a component that allows a USB protocol analyzer to be connected to the USB pins of the 30-pin connector.

Figure 1.2: ATS 30-pin Box



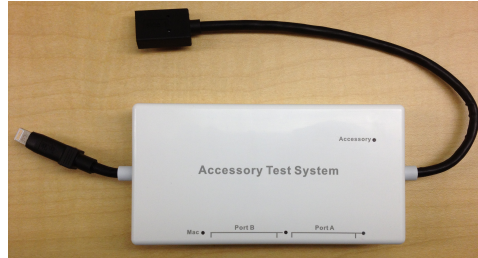
Figure 1.3: USB breakout board (ATS 0201)



### 1.1.3 ATS Lightning Box

The ATS Lightning Box ([Figure 1.4](#)) is required to use ATS with Lightning accessories. It allows for analysis of data over the Lightning connector, and can also act as a USB breakout board for use with the [Beagle™ USB 480 analyzer](#).

Figure 1.4: ATS Lightning Box



### 1.1.4 Beagle™ USB 480 analyzer

The Total Phase Beagle™ USB 480 analyzer ([Figure 1.5](#)) is a high-performance, non-intrusive bus monitor that captures, displays, and filters USB traffic in true real time. The Beagle™ USB 480 analyzer is capable of monitoring of high-/full-/low-speed USB data. With support for real-time class-level decoding of main USB classes, the Beagle™ USB 480 analyzer is a powerful and versatile tool for USB development.

Figure 1.5: Total Phase Beagle™ USB 480 analyzer



### 1.1.5 ComProbe® BPA® 100 analyzer

The Frontline® ComProbe® BPA® 100 analyzer (Figure 1.6) is required to use ATS with Bluetooth accessories. It allows for analysis of iAP-over-Bluetooth data captured wirelessly over the air.

Figure 1.6: Frontline® ComProbe® BPA® 100 analyzer



#### **Note – ATS does not provide a comprehensive Bluetooth analysis solution**

ATS only provides a solution for capturing and validating iAP-over-Bluetooth. For full visibility into the entire Bluetooth stack, Frontline offers the USB-powered ComProbe® BPA® 600 Dual Mode Bluetooth Protocol Analyzer (not for use with ATS software), the industry's most powerful and portable tool for the development of robust and interoperable Classic, low energy and dual mode Bluetooth products. For more information about the ComProbe BPA 600, visit <http://www.fte.com/getbpa600>.

# Chapter 2

## Quick Start

Using ATS for accessory development is a snap! Just follow these steps:

### 2.1 What is your accessory's type?

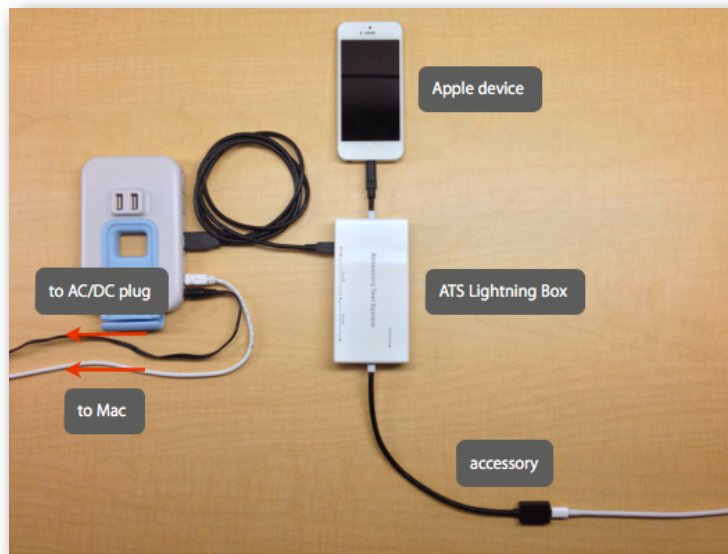
There are three ways to connect the above equipment to ATS. You should use the method most appropriate for your accessory. If your accessory sends iAP data over the UART transport, it is an iAP-over-UART accessory. If your accessory sends iAP data over the USB transport, it is an iAP-over-USB accessory. If, in addition to iAP data, your accessory also sends CarPlay data over the USB transport, it is a CarPlay-over-USB accessory. If your accessory sends iAP data over the Bluetooth transport, it is an iAP-over-Bluetooth accessory. If your accessory does not send iAP data it is a Non-iAP accessory.

### 2.2 iAP-over-UART or Non-iAP

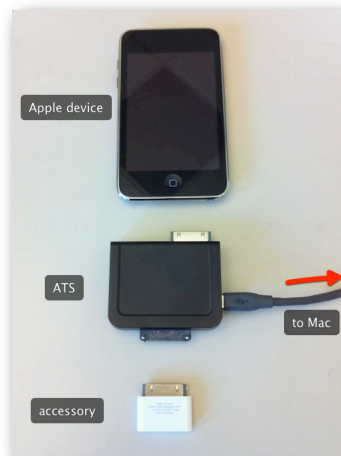
For accessories that only transmit iAP-over-UART or do not transmit iAP data, you only need to connect an ATS Box.

1. Connect either an ATS 30-pin Box for 30-pin accessories or an ATS Lightning Box for Lightning accessories to your computer as shown.

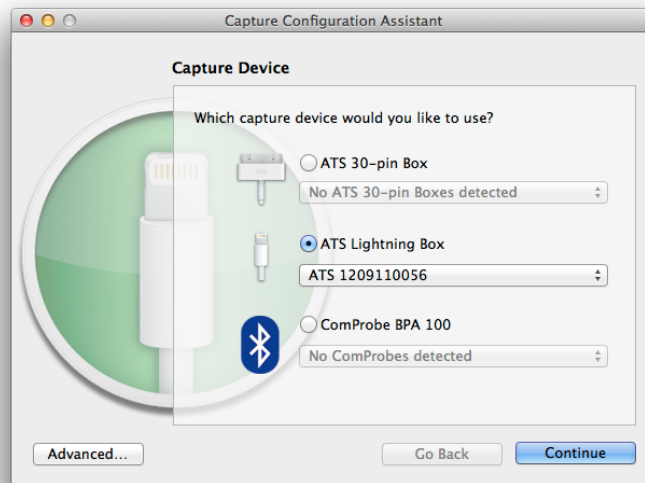
## ATS Lightning Box Configuration



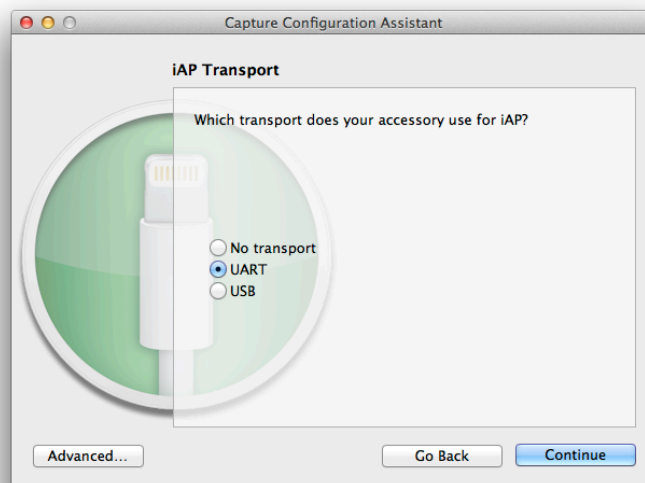
## ATS 30-pin Box Configuration



2. Start the ATS application and dismiss the Welcome Screen.
3. Select a capture device from the Capture Configuration Assistant.



4. Click "Continue."
5. Select the UART transport.



6. Click "Continue."
7. Select the accessory's supported protocol (Lightning connector only).





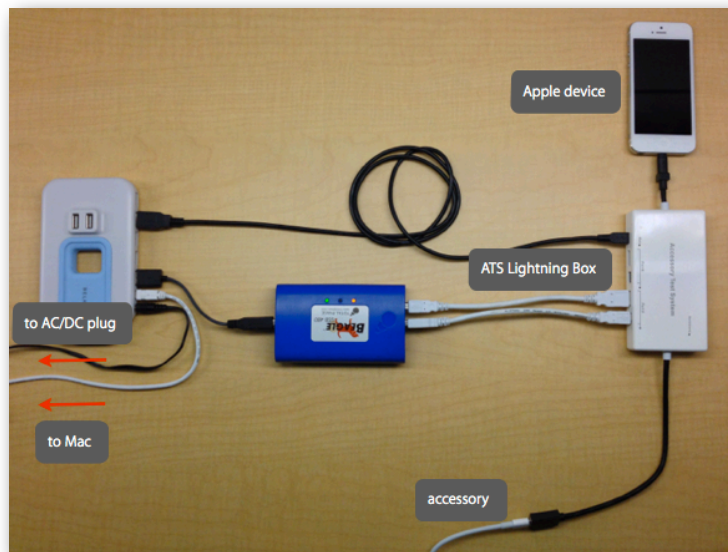
8. Click "Start Capture."

That's it! You may now start using ATS. For more detailed information, please refer to the following sections of this document.

## 2.3 iAP-over-USB (Lightning) or CarPlay-over-USB

For iAP-over-USB accessories which utilize the Lightning connector, as well as for CarPlay-over-USB accessories, you must connect additional equipment.

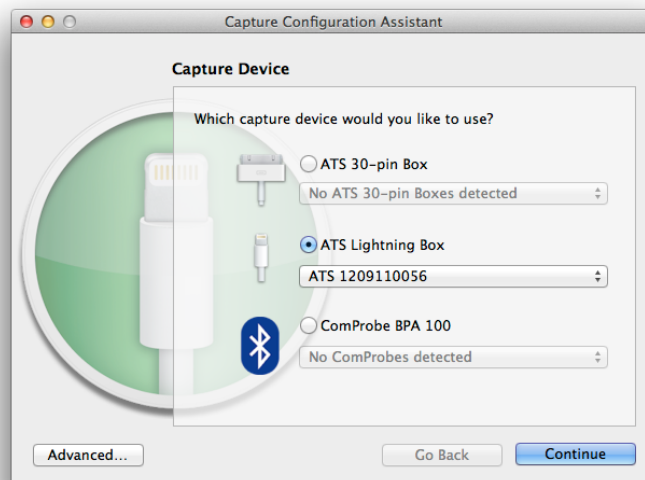
1. Connect the equipment as shown.



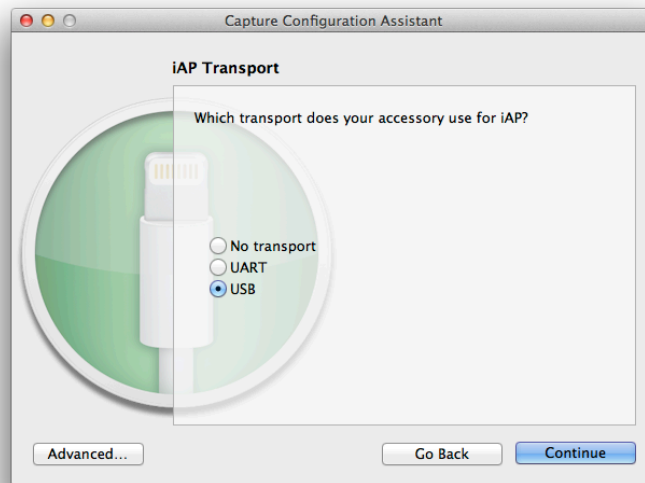
## Note

The Beagle™ USB 480 analyzer must be connected to Port A of the ATS Lightning Box. Port B must remain empty and is reserved for future use.

2. Select an ATS Lightning Box from the Capture Configuration Assistant.



3. Click "Continue."
4. Select the "USB" transport.



5. Click "Continue."

6. Specify the role of the Apple device as USB Host or USB Device.

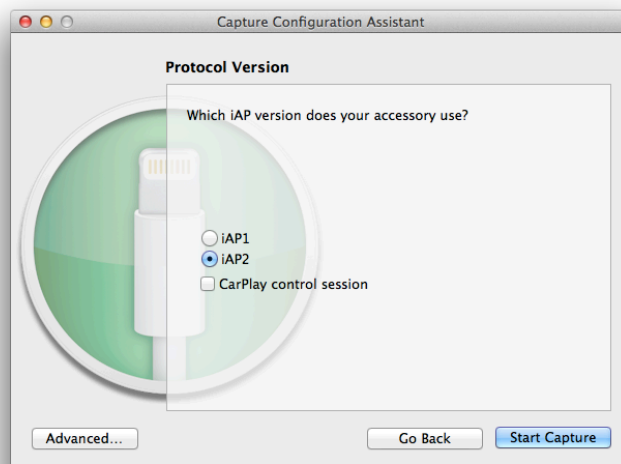


7. Click "Continue."

8. Select a Beagle™ USB 480 analyzer from the menu.



9. Click "Continue."
10. Select the accessory's supported protocol.



### Note

In order to capture CarPlay traffic, the "CarPlay control session" checkbox must be selected.

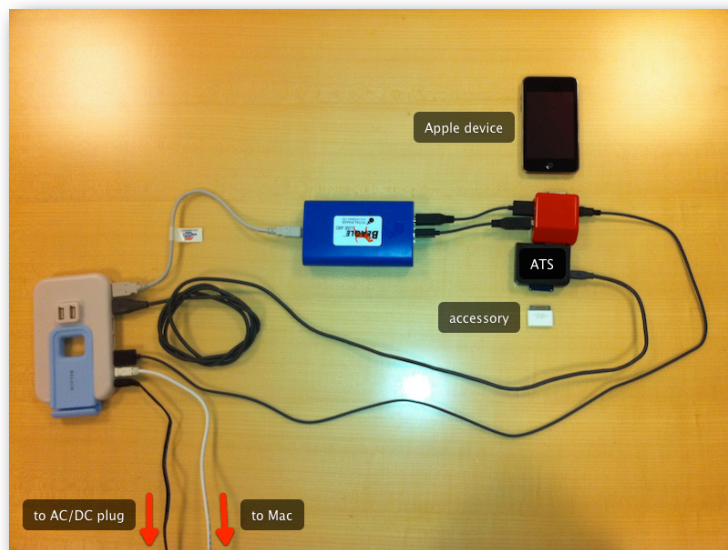
11. Click "Start Capture."

That's it! You may now start using ATS. For more detailed information, please refer to the following sections of this document.

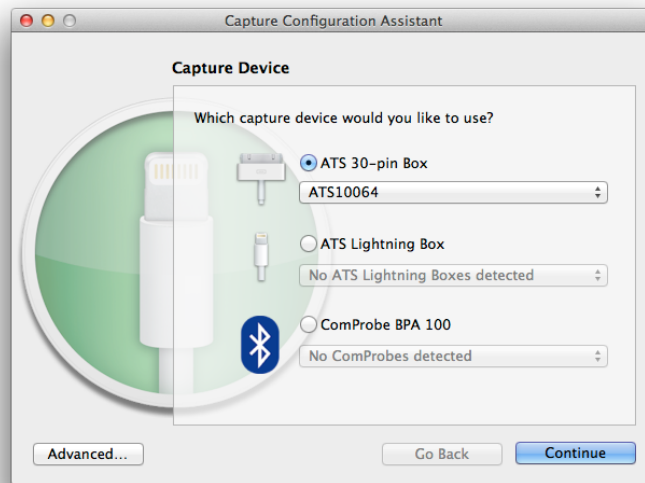
## 2.4 iAP-over-USB (30-pin)

For iAP-over-USB accessories which utilize the 30-pin connector, you must connect additional equipment.

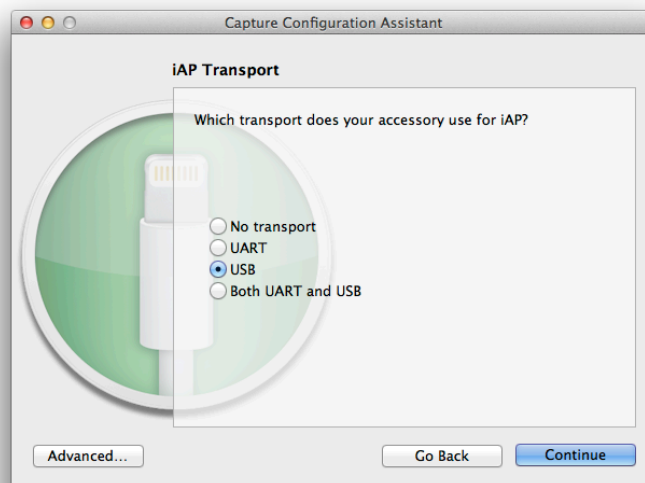
1. Connect the equipment as shown.



2. Select an ATS 30-pin Box from the Capture Configuration Assistant.



3. Click "Continue."
4. Select the "USB" transport.

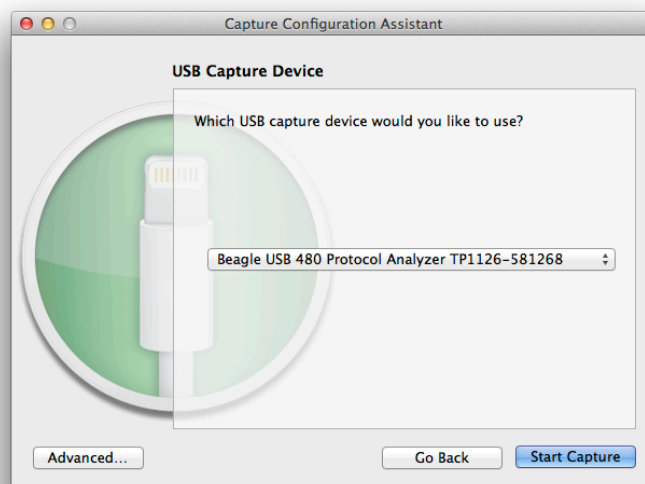


5. Click "Continue."
6. Specify the role of the Apple device as USB Host or USB Device.



7. Click "Continue."

8. Select a Beagle™ USB 480 analyzer from the menu.

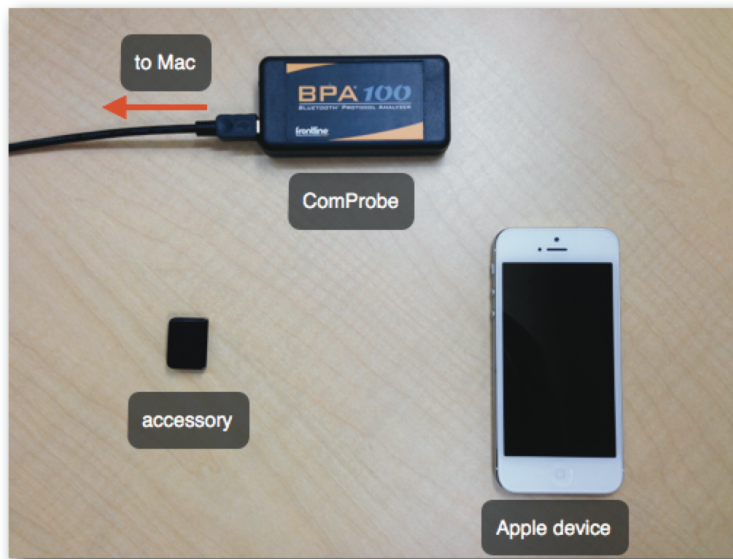


9. Click "Start Capture."

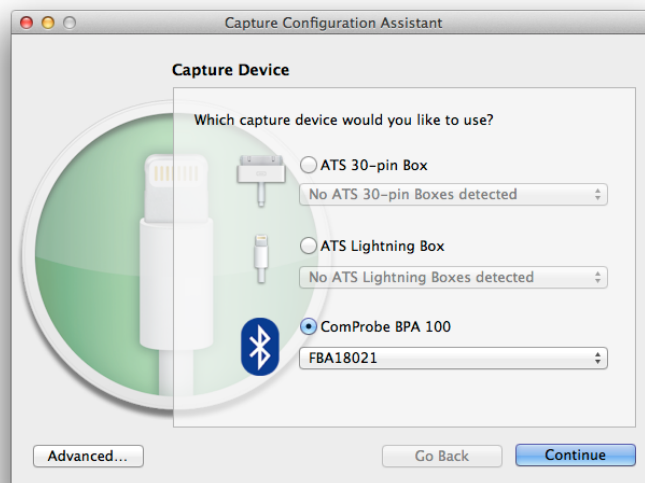
That's it! You may now start using ATS. For more detailed information, please refer to the following sections of this document.

## 2.5 iAP-over-Bluetooth

1. Configure the equipment as shown.

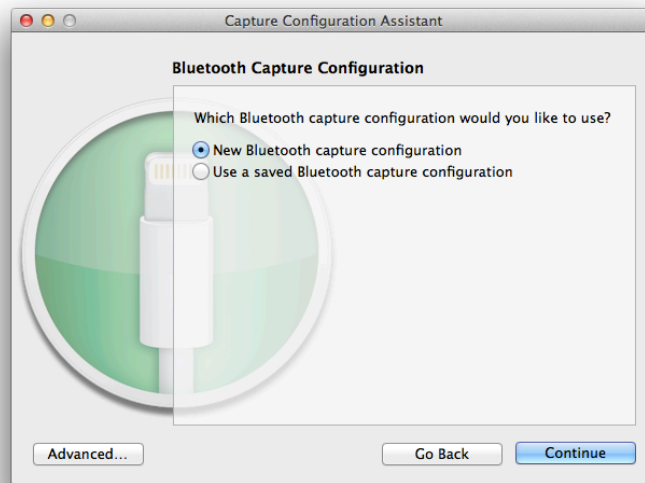


2. Select a ComProbe® BPA® 100 analyzer from the Capture Configuration Assistant.



3. Click "Continue."
4. Select the "New Bluetooth capture configuration" option. Alternatively, you may select "Use a saved Bluetooth capture configuration" if you have previously started a capture and would like to use the same configuration.

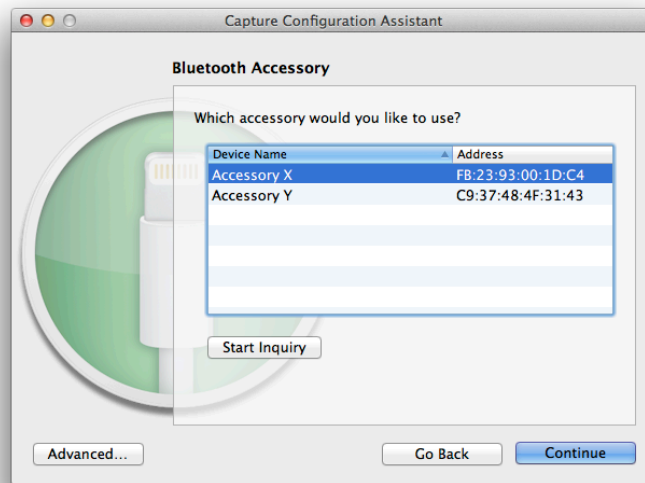




5. Click "Continue."
6. Select which Apple device you would like to capture Bluetooth data from. Click "Start Inquiry" if the Apple device is not in the list.

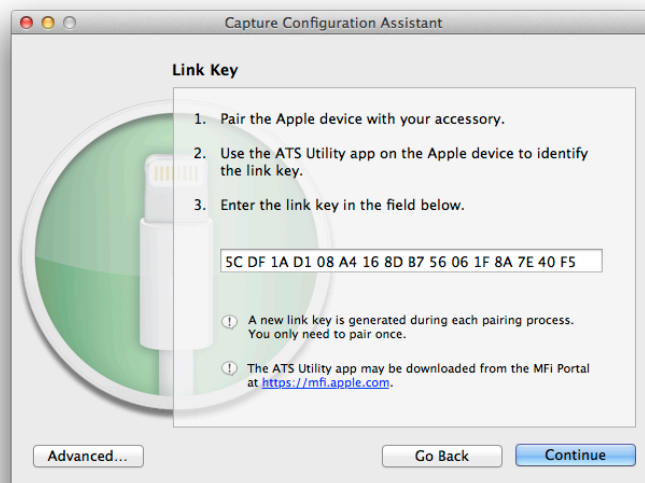


7. Click "Continue."
8. Select the accessory you would like to capture Bluetooth data from. Click "Start Inquiry" if the accessory is not in the list.



9. Click "Continue."

10. Follow the instructions on screen and enter the Bluetooth link key in the field.



11. Click "Continue."

12. Select the accessory's supported protocol.



13. Click "Continue."
14. Review your selections and follow the instructions on screen for starting a Bluetooth capture.



15. Click "Start Capture."

That's it! You may now start using ATS. For more detailed information, please refer to the following sections of this document.

# Chapter 3

## Hardware Considerations

There are several things to keep in mind when using ATS to ensure validation occurs correctly.

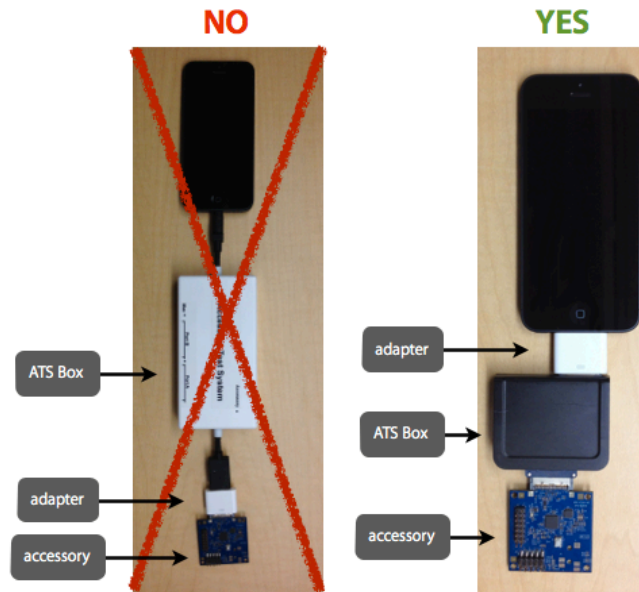
### 3.1 Connector Adapters

30-pin accessories must use the ATS 30-pin Box. Lightning accessories must use the ATS Lightning Box. Accessory developers must not connect a Lightning to 30-pin Adapter to the accessory side of the the ATS Lightning Box. If your accessory uses the Lightning to 30-pin Adapter, then the ATS 30-pin Box must be used instead of the ATS Lightning Box. Either variant of the Lightning to 30-pin Adapter may be used (the Lightning to 30-pin Adapter and the Lightning to 30-pin Adapter (0.2 m)). See [Figure 3.1](#).

#### **Note – 30-pin Accessories Cannot Claim Compatibility with Lightning**

Adapters may only be used in Sniffer mode and are not allowed during certification.

Figure 3.1: Permitted Adapter Configurations



## 3.2 Connection Order

When attaching devices to the ATS 30-pin Box, the Apple device must always be connected before connecting an accessory. For the ATS Lightning Box, the order is reversed: the accessory must be connected before the Apple device is connected.

### Note – A Warning About the ATS Lightning Box When Connecting

The ATS Lightning Box's Lightning connector must be plugged directly into the Apple device. Once inserted, do not torque the Lightning connector. Improper use may result in the breakage of the ATS Lightning Box or Apple device.

## 3.3 Accessory Connection Orientation

Although the Lightning connector supports multiple orientations, the ATS Lightning Box requires that the connector be inserted in a specific orientation. When connecting your accessory to the ATS Lightning Box, ensure that the light next to the accessory connector is green and not red. If red, turn the connector over and re-insert.

## 3.4 ATS Lightning Box without USB Traffic

When configuring a capture with the ATS Lightning Box and with an accessory which does not use USB, the Total Phase Beagle™ USB 480 analyzer must not be physically connected to the ATS Lightning Box. Connection of a Beagle™ USB 480 analyzer will prevent accurate voltage measurements of the D+/D- lines and prevent correct operation of brick detection and load testing.

## 3.5 Capturing iAP-over-Bluetooth

When configuring a capture with the ComProbe® BPA® 100 analyzer make sure to turn the Apple device's Bluetooth off before starting the capture. Once the capture has begun, turn the Apple device's Bluetooth back on, connect to your accessory, and begin using it.

Due to the inherent nature of capturing data wirelessly, ATS may not be able to always correctly capture the communication between the Apple device and accessory. If there is too much RF interference, or the Apple device and accessory are placed incorrectly with respect to the ComProbe® BPA® 100 analyzer you may see missing Bluetooth data in the ATS trace. To help alleviate these issues make sure that the ComProbe® BPA® 100 analyzer, Apple device, and accessory are placed to form an equilateral triangle during capture. You should also make sure that the RF environment is free of noise by turning off other devices that may use the 2.4 GHz frequency range such as Wi-Fi and other Bluetooth devices.

### **Note – Reducing RF Interference with Shielding Cloth**

If excessive RF noise is interfering with ATS's ability to capture iAP traffic, consider using RF shielding cloth to protect your test environment.

### **Note – ATS Only Supports One ComProbe® BPA® 100 analyzer**

ATS only supports one attached ComProbe® BPA® 100 analyzer at a time. Even if multiple are connected to your Mac at a time, ATS will only ever show one as selectable.

### **Note – iAP Detection and SDP**

ATS relies on seeing a Service Discovery Protocol (SDP) exchange during the capture in order to determine which RFCOMM channel contains iAP. If SDP is not seen, an info message will be posted when an RFCOMM channel opens informing you that ATS may be ignoring an iAP channel. This is *not* an indication of bad behavior, but rather a technical limitation of the capture environment.



# Chapter 4

## Installation and Updates

### 4.1 Software Installation

ATS requires a Mac running OS X 10.8 Mountain Lion or later. If needed, use the "Software Update..." command under the Apple menu or check the Mac App Store to get the latest version of OS X. Download the .zip bundle containing the latest ATS application from the MFi Portal. For more information about connecting to the MFi Portal, contact your MFi representative. Unzip the bundle then copy the ATS application to your "Applications" folder.

### 4.2 Hardware Connection

For accessories that do not send iAP-over-USB or iAP-over-Bluetooth, connect the ATS Box to the Mac running the ATS application. The USB port to which the ATS Box is connected must be a high-power port capable of running at least full speed USB operation, which typically excludes keyboard USB ports.

For accessories that send iAP-over-USB, also connect the USB hub, USB breakout board (for 30-pin only) and Beagle™ USB 480 analyzer.

#### **Note – A Warning About USB Connections**

The Total Phase Beagle™ USB 480 analyzer has three connections: one for the ATS host computer, and two for 30-pin USB breakout board or the ATS Lightning Box. Never connect the Beagle™ USB 480 analyzer's ATS host connection to the same USB bus on which the the Apple device and accessory communicate. If you do so, the Beagle™ USB 480 analyzer will recursively capture its own data and ATS performance will dramatically suffer.

For accessories that send iAP-over-Bluetooth, connect the ComProbe® BPA® 100 analyzer to the Mac running the ATS application.

## 4.3 Testing the Installation

### 4.3.1 Captures with ATS Boxes

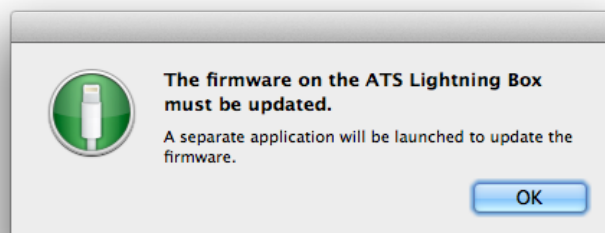
After connecting the hardware, run the ATS application by double-clicking the ATS application icon in your Applications folder. If your Mac requires an updated FTDI USB serial driver, ATS will notify you, then launch the FTDI USB serial driver installer. Once installation is complete, ATS will proceed normally. Attempt to connect to the ATS Box by starting a capture using the Capture Configuration Assistant, which can be opened through the application's File menu or by clicking ATS in your dock.

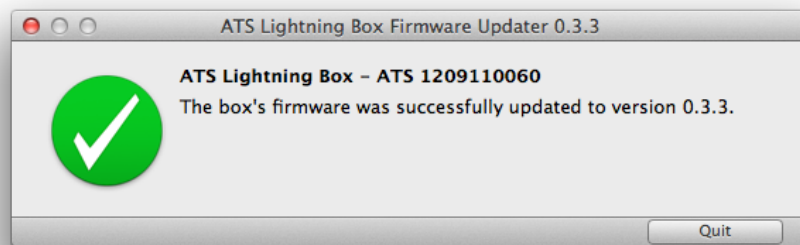
### 4.3.2 Captures with ComProbe® BPA® 100 analyzer

Before connecting the ComProbe® BPA® 100 analyzer hardware, run the ATS application by double-clicking the ATS application icon in your Applications folder. If your Mac requires an updated ComProbe® BPA® 100 analyzer driver, ATS will notify you, then launch the driver installer. Once installation is complete, you may attach the ComProbe® BPA® 100 analyzer and begin using it.

## 4.4 Firmware Updates

Updates for the ATS Box firmware, Beagle™ USB 480 analyzer firmware, and ComProbe® BPA® 100 analyzer firmware are contained in the ATS application bundle. If an ATS application update includes firmware that is newer than the version on the selected capture hardware, ATS will prompt you to update the firmware.





This step should only be necessary once per application / firmware update.

## 4.5 Reporting Bugs

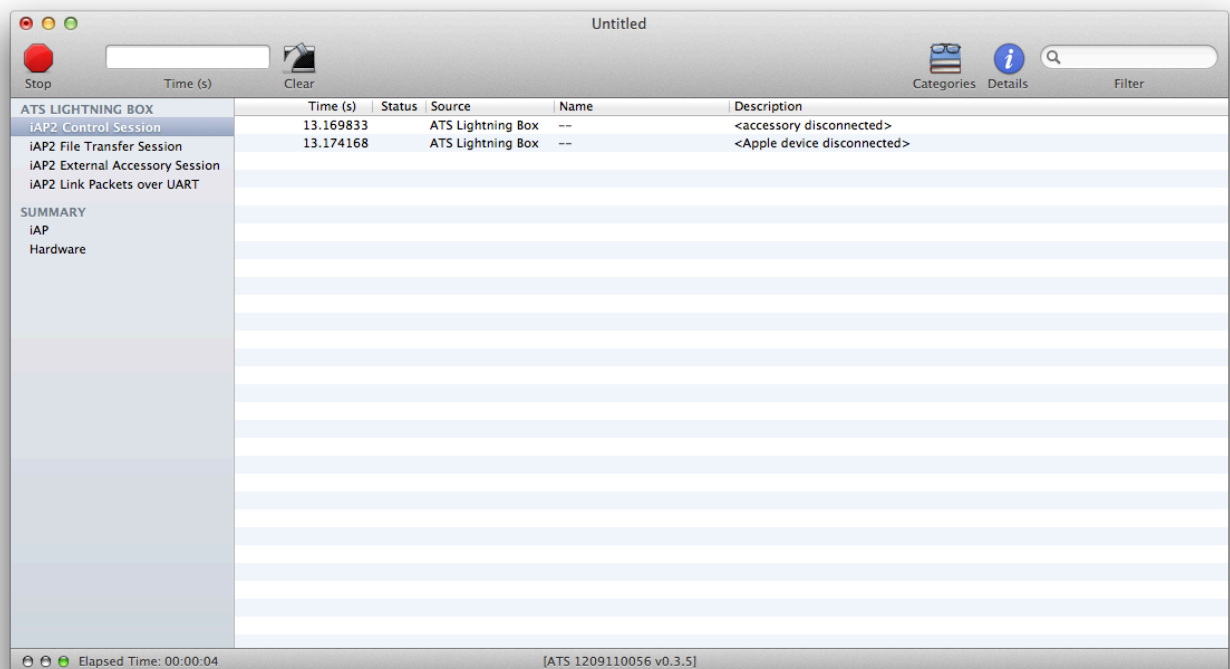
To report bugs or request enhancements to ATS, file a New Problem at <https://bugreport.apple.com>. Include "MFi ATS" in the Title field.

# Chapter 5

## ATS User Interface

### 5.1 Capture Document

The main window of the ATS application consists of a set of buttons, menu items and controls, plus a real-time display of hardware-related messages and iAP traffic.



Analysis begins immediately after the document is created through the Capture Configuration Assistant. A new Capture Document can also be created using the Advanced

Capture Configuration window under File > New > Advanced Capture. . . , or by pressing Command-Option-N.

### **Note – Quick Capture**

There's a quick and convenient way of starting a capture. Either select the "Quick Capture" item under the "Capture" menu, or press Command-K. A new Capture Document will be created and automatically connect to the first available capture device(s) using your previous capture settings.

The "Time" field serves two purposes. First, it indicates the timestamp of the currently selected event in the current traffic category. Second, it allows you to enter a timestamp, which causes ATS to automatically select the event nearest the entered timestamp.

### **Note – A Warning About Timestamps**

The ATS Box and the Total Phase Beagle™ USB 480 analyzer have separate, unrelated clocks. ATS does not synchronize timestamps between the ATS Box and the Beagle™ USB 480 analyzer. Timestamps from any of the ATS Box categories cannot be reliably correlated with timestamps from any of the Beagle™ USB 480 analyzer categories. For example, you cannot reliably correlate the arrival of an "Accessory Detect" event in the iAP Packets over UART category with the arrival of an iAP packet in the iAP Packets over USB HID view.

The "Clear" button clears information from all categories. Note: when saving a trace, all data will be saved, even data that has been cleared.

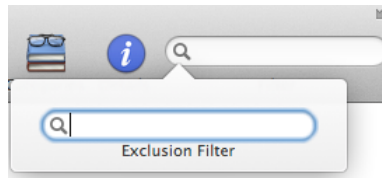
The "Categories" button can be used to toggle the display of the pane that allows selection of various categories. Consider hiding this pane when using a small screen, or screen area is otherwise scarce.

The "Details" button enables display of additional information for the currently selected event.

The filter gives you the ability to limit information displayed in any of the traffic categories. For example, if you're only interested in seeing all occurrences of the word "ContextButtonStatus," simply type "ContextButtonStatus" in the filter field. The traffic category will only show rows that include the word "ContextButtonStatus." The filter will match strings across any of the fields. So if you type the word "Extended," it will match "Extended Interface" in the Lingo column, "EnterExtendedInterfaceMode" in the command column, and any occurrences of the word "Extended" in the Description column.

Clicking the filter's magnifying glass allows you to exclude information from the traffic

categories. This can be useful if there are less-relevant rows making it difficult to see important information in the trace.



To aid in the analysis of ATS traces, you may insert separators or annotations directly in the ATS trace. This is helpful to bring attention to certain information. To insert a separator or annotation, select a row, right click, then choose one of the available options. Alternatively, you may insert separators or annotations by choosing one of the "Insert Annotation" options under the Capture menu. Similarly, if you have already added an annotation or separator and would like to remove it, select the row, right click, then choose remove.

## 5.2 Categories

Once a capture has begun, a list of categories will be displayed along the left side of the capture document. These enable you to review the behavior of your accessory in different ways. Some categories will only be displayed under certain circumstances. For example, the "iAP Packets over USB HID" category is only available when capturing that type of traffic. Possible categories include:

- iAP Packets over UART
- iAP Packets over USB HID
- iAP Packets over USB Bulk Pipe
- iAP Packets over Bluetooth
- iAP2 Control Session
- iAP2 File Transfer Session
- iAP2 External Accessory Session
- iAP2 Link Packets
- CarPlay Session
- HTTP Control

- TCP & UDP
- Network
- NCM
- USB HID Reports for iAP
- USB Transfers
- USB Transactions
- USB Packets
- Measurements
- iAP Summary
- Hardware Summary

The list of categories may be hidden by clicking on the "Categories" button in the toolbar.

## 5.3 iAP Packets and iAP2 Control Session Categories

Four types of iAP Packets categories may be available depending upon your configuration:

- iAP Packets over UART
- iAP Packets over USB HID
- iAP Packets over USB Bulk Pipe
- iAP Packets over Bluetooth

When using iAP2 the following message categories may also be available:

- iAP2 Control Session over UART
- iAP2 Control Session over USB HID
- iAP2 Control Session over USB Bulk Pipe
- iAP2 Control Session over Bluetooth

The primary purpose of these categories is to display iAP packets, iAP2 messages, errors and warnings. Depending on your configuration you may see connection information as well. For example, in the iAP Packets over UART category, you may see Apple device or accessory connection information. In iAP Packets over USB, you may see USB reset information.

### **Note – Missing iAP Packets Over USB?**

ATS does not thoroughly validate USB level information. It only captures enough USB information to assemble iAP packets. If you expect to see iAP over the USB transport but see none, check whether ATS displays error messages in any of the USB categories. If so, exit ATS and use the Total Phase Data Center application to debug your accessory's USB communication.

## **5.3.1 Fields in iAP2 Control Session Categories**

The iAP2 Control Session categories include a number of descriptive fields for iAP2 Control Session traffic observed by ATS.

The "Timestamp" field provides an absolute timestamp for each event. (Review the warning about timestamps above.)

The "Status" field can indicate whether a problem occurred with each particular event.

The "Source" field describes the source of the traffic. For iAP2 traffic, this will be either "Apple device" or "accessory" depending on which device sent the packet. For hardware-level notifications, such as those alerting the ATS application that a device has been attached or removed, the source will read "ATS Lightning Box".

The "Name", and "Description" fields provide a human-readable description of the contents of each iAP2 message or hardware-level event.

## **5.3.2 Fields in iAP Packets Categories**

The iAP Packets categories include a number of descriptive fields for iAP traffic observed by ATS.

The "Timestamp" field provides an absolute timestamp for each event. (Review the warning about timestamps above.)

The "Status" field can indicate whether a problem occurred with each particular event.

The "Source" field describes the source of the traffic. For iAP traffic, this will be either "Apple device" or "accessory" depending on which device sent the packet. For hardware-level notifications, such as those alerting the ATS application that a device has been attached or removed, the source will read "ATS".



The "Lingo", "Command", and "Description" fields provide a human-readable description of the contents of each iAP packet or hardware-level event.

**Note – By Default, Sync Bytes are not Displayed**

By default, any extra-packet 0xFF sync bytes (used to wake the Apple device or otherwise) do not appear in the packet view. You may configure ATS to display these bytes in the ATS preferences.

## 5.4 CarPlay Control Session and Network Categories

Two CarPlay data categories are always available when capturing CarPlay traffic:

- CarPlay Session
- HTTP Control

Using the Advanced Capture Configuration window, it is also possible to capture low-level NCM data that is normally filtered from CarPlay captures. When a capture document is configured to include NCM data, three additional traffic categories are available:

- TCP & UDP
- Network
- NCM

**Note**

Including NCM data can be helpful when diagnosing problems in the lowest layers of the network protocol stack, but the additional data will result in a much larger capture document when saved to disk.

### 5.4.1 CarPlay Session and HTTP Control

The CarPlay Session category displays CarPlay messages exchanged between the Apple device and the accessory. The HTTP Control category displays the HTTP requests and responses from which the CarPlay Session data is parsed.

## 5.4.2 TCP & UDP, Network, and NCM

The TCP & UDP category displays TCP packets and UDP datagrams exchanged during a CarPlay session. The Network category displays an even more complete picture of the network traffic by including Bonjour records and ethernet frames not associated with a TCP or UDP stream. The NCM category displays individual NCM transfer blocks.

## 5.5 Copying Trace Data

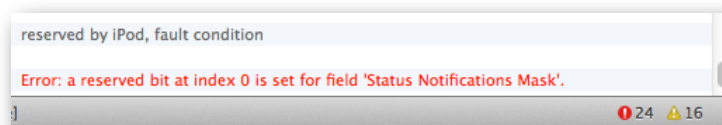
Information from the traffic window may be copied and pasted into other applications. Simply select several rows of traffic then press Command-C to copy the data. Then open another application and press Command-V. This is a convenient way to reference test results in email. The pasted data is formatted as comma-separated values.

## 5.6 Error Reporting

As ATS detects accessory errors, it adds feedback in the main traffic window. A more detailed view of each message is available in the "Details" pane of each traffic category.

8.329255	✓	accessory	-- General	Identify	Simple Remote
8.329255	!	--	-- --	--	the first command from the accessory must be StartIDPS
8.329255	⚠	--	-- --	--	General lingo Identify command is deprecated

The bottom right corner of the Capture Document will also provide a count of all the errors and warnings in the trace.



## 5.7 iAP2 File Transfer Session Category

The iAP2 File Transfer Session category displays data from the iAP2 File Transfer Session declared during iAP2 link synchronization.

## 5.8 iAP2 External Accessory Session Category

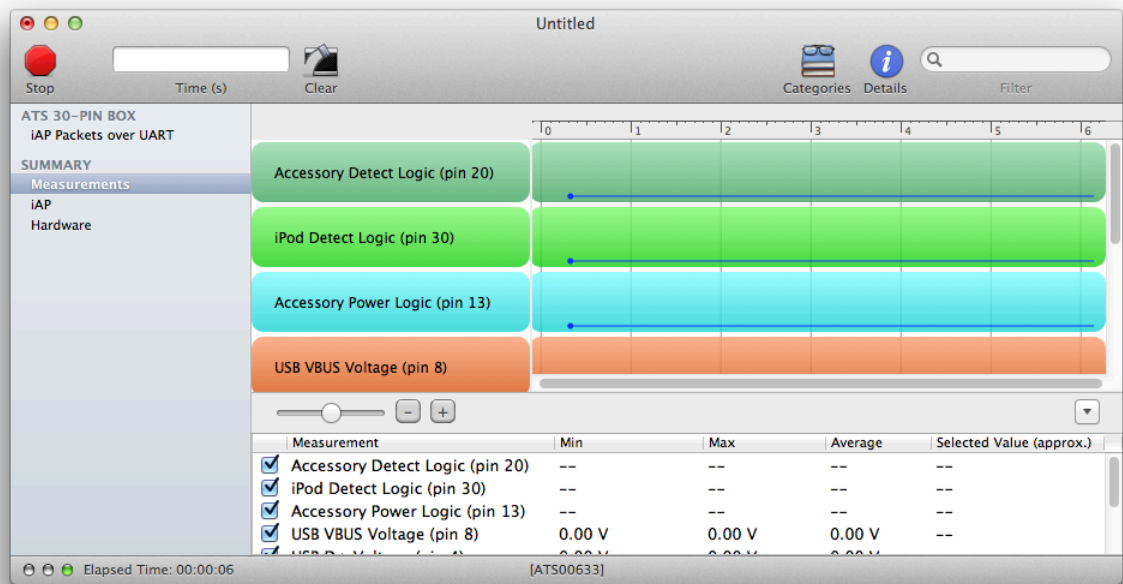
The iAP2 External Accessory Session category displays data from the iAP2 EA Session declared during iAP2 link synchronization.

**Note – External Accessory Native Transport**

ATS does not capture External Accessory Native Transport (USB Host Mode) data, and therefore the External Accessory Session category will remain blank in this configuration. ATS will, however, validate the accessory’s configuration with this setup.

## 5.9 Measurements Category

The Measurements category provides a way of visualizing the behavior of the Apple device and your accessory over time. This view is only available when using the ATS 30-pin Box.



The Measurements category provides a graphical area that shows various pin states over time. Below the graphical area is a summary of each pin state, their minimum, maximum and average values. The value of each pin at a particular time can be shown

by clicking any point within the graphical area.

The "Clear" button affects the Measurements category in the same manner as the traffic categories.

**Note – High Impedance**

High impedance is displayed in the Measurements view as "inf kΩ," an abbreviation for "infinite kilo-ohms."

## 5.10 Hardware Category

The Hardware category provides a real time summary of various hardware related information observed during the capture.

### 5.10.1 Electrical (ATS Lightning Box)

The "Electrical" section of the Hardware category contains observations about the electrical behavior of the accessory. It contains the following information:

Electrical	
<b>Power to Accessory</b> Voltage 5.00 V Current 5 mA Power 0.0 W	<b>USB Power Brick Detection</b> USB Vbus 5.00 V USB D+ (220kΩ shunt to ground) 2.42 V USB D+ (220kΩ shunt to vcc) 2.90 V USB D- (220kΩ shunt to ground) 2.42 V USB D- (220kΩ shunt to vcc) 2.90 V Brick Detect: 2.4 A USB power brick
<b>Power to Apple device</b> Voltage 5.00 V Current 4 mA Power 0.0 W	

### 5.10.2 Electrical (ATS 30-pin Box)

The "Electrical" section of the Hardware category contains observations about the electrical behavior of the accessory. It contains the following information:

## Electrical

<b>Accessory detect (pin 20)</b>	<b>Pin Voltages</b>
State floating	FW (pins 11/12) 0.00 V
Ground count 107	USB Vbus (pin 8) 0.00 V
Float count 181	USB D+ (pin 4) 0.00 V
	USB D- (pin 6) 0.00 V
<b>ID resistor (pin 10)</b>	Tx-to-iPod (pin 18) 0.00 V
State floating	Reserved (pin 14) --
	Reserved (pin 17) --
<b>Accessory Power (pin 13)</b>	
Current 118.00 mA (1 sec average)	

The "accessory detect" section counts the number of rising and falling edges on pin 20 of the 30-pin connector. This information may help detect failures or inconsistencies in how an accessory drives this pin, which should typically be grounded.

The "ID resistor" section reports the accessory ID resistor value on pin 10 measured by the ATS 30-pin Box, and also displays how close the value is to the nominal value for a given accessory type. Due to measurement resolution, the exact numerical value that is displayed may differ slightly from what is in the circuit.

The "accessory power" section shows the average accessory current consumption during the most recent one second. Individual current samples are taken at a rate of approximately 500 Hz.

The "pin voltages" section reports the voltages present on the FireWire, USB Vbus, USB D+ and USB D- pins. Non-zero FireWire voltages are displayed in red as a reminder that FireWire-based charging is no longer allowed for new accessory designs. If the three USB voltages are all within specification for a 500 mA, 1 A, or 2.1 A charging accessory, this fact will be noted below the voltages. For USB D+ and D- voltage measurements to be made, no Apple device may be connected. This ensures that if an iAP-over-USB accessory happens to be connected to the ATS 30-pin Box, it will not have its USB signal integrity affected by attempts by the ATS 30-pin Box to measure its USB D+ and D- voltages as though it were a USB charging accessory.

The "Tx-to-iPod (pin 18)" field reports the voltage on the accessory serial transmit pin. Voltages outside of the legal range for the marking-high/idle state will be shown in red.

The "Reserved (pin 14)" and "Reserved (pin 17)" fields report whether the accessory incorrectly drives or correctly leaves as floating the two 30-pin connector pins marked as reserved for future use.

The "Nominal baud rate" field is determined by looking for standard baud rates in the vicinity of the actual baud rates measured for iAP traffic from the accessory. Only 19200 bps and 57600 bps are allowed for new accessory designs, so rates other than these will be shown in red.

### 5.10.3 Serial Transport

The "Serial Transport" section of the Hardware category contains statistics about the quality of the serial data transmitted by the accessory. It includes the following information:

#### Serial Transport

Nominal baud rate	57600
Max baud rate error (FF)	2.9%
Max baud rate error (55)	2.9%

The two "Max baud rate error" fields latch the highest observed deviations from the nominal baud rate, according to both the 0xFF (start-bit) and 0x55 methods. A worst-case deviation between 2% and 3% is shown in yellow. A worst-case deviation beyond 3% is shown in red. Significant deviation of these values from nominal typically indicates firmware and/or hardware problems with an accessory.

## 5.11 Summary Category

The Summary category displays sections which provide real time accessory information as a high level overview of the events seen.

All fields in the Summary category sections can be reset with the "Clear" toolbar button.

### 5.11.1 iAP Section

The iAP category provides real time information about the state of iAP.

### 5.11.2 Identification (iAP2) Section

The "Identification" section of the iAP category summarizes accessory identification information, providing useful excerpts from the latest information available. This includes the following:

## Identification

<b>Messages Sent By Accessory</b> (none)	<b>Accessory Info</b>
	<b>Name</b> --
	<b>Model</b> --
<b>Messages Received From Device</b> (none)	<b>Manufacturer</b> --
	<b>Serial</b> --
	<b>Firmware</b> --
	<b>Hardware</b> --
	<b>Power Source Type</b>
	<b>Max Current Draw</b>

### 5.11.3 Identification (iAP1) Section

The "Identification" section of the iAP category summarizes both Apple device and accessory identification settings, preferences, and other information. It includes the following information:

## Identification

ID	Lingo Name	Identified Version	Accessory Info
0x00	General	No --	<b>Capabilities</b> --
0x01	Microphone	No --	<b>Name</b> --
0x02	Simple Remote	No --	<b>Firmware</b> --
0x03	Display Remote	No --	<b>Hardware</b> --
0x04	Extended Interface	No --	<b>Manufacturer</b> --
0x05	Accessory Power	No --	<b>Model</b> --
0x06	USB Host Mode	No --	<b>Serial</b> --
0x07	RF Tuner	No --	<b>Identification Method</b> --
0x08	Accessory Equalizer	No --	<b>Device ID</b> --
0x09	Sports	No --	<b>Lingoes</b> 0x0000
0x0A	Digital Audio	No --	<b>Lingoes Used</b> 0x0000
0x0C	Storage	No --	<b>Lingoes ACK'd</b> 0x0000
0x0D	iPod Out	No --	<b>iPod Software</b> --
0x0E	Location	No --	<b>EA Protocol</b> --
			<b>Transaction IDs</b> --

The "Lingoes used" field provides a bit-field summarizing all lingoes for which the accessory has sent at least one packet.

The "Lingoes ACK'd" field provides a bit field summarizing all lingoes for which the Apple device has sent a positive (successful) acknowledgement back to the accessory. Because not all lingoes include ACK commands, these two fields will not, in general, be the same. (Each offers a particular kind of iAP traffic summary, which may or may not be relevant to the problem at hand.)

The "iPod SW" field shows the version information sent by the iPod in response to GetiPodSoftwareVersion.

The "Bundle Seed ID" field shows the application ID provided by the accessory.

The "EA protocol" shows the reverse domain name protocol name representing the External Accessory framework protocol that the accessory supports.

The transaction ID state represents whether ATS expects to see transaction IDs.

The "Accessory info" fields provide human-readable description of all information returned by the accessory via RetAccessoryInfo iAP packets.

The Lingo usage table indicates whether each lingo has been identified for and its version information sent by the iPod in response to RequestLingoProtocolVersion.

## 5.11.4 Authentication Section

The "Authentication" fields of the iAP category provide the total elapsed time taken to complete authentication (for iAP only), as well as the level of authentication used and (in the case of level 2 authentication) the serial number and class of the authentication coprocessor IC. The total elapsed time is defined to start with the accessory's Identify-DeviceLingoes packet and to end with the Apple device's successful acknowledgement of authentication via a RetDevAuthenticationStatus packet.

### Authentication

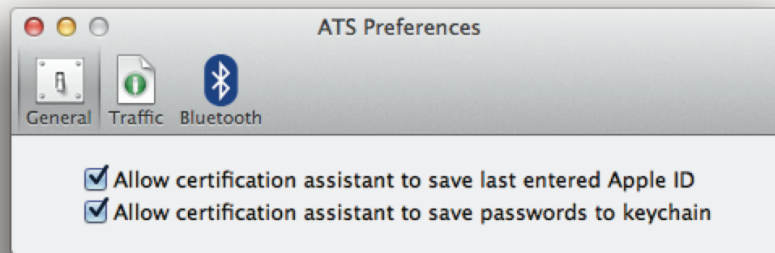
Version	--
Certificate Serial	--
Certificate Description	--
Elapsed Time	--

## 5.12 Preferences

The ATS preferences pane provides the ability to customize ATS's behavior. The preferences are accessible under the ATS menu.

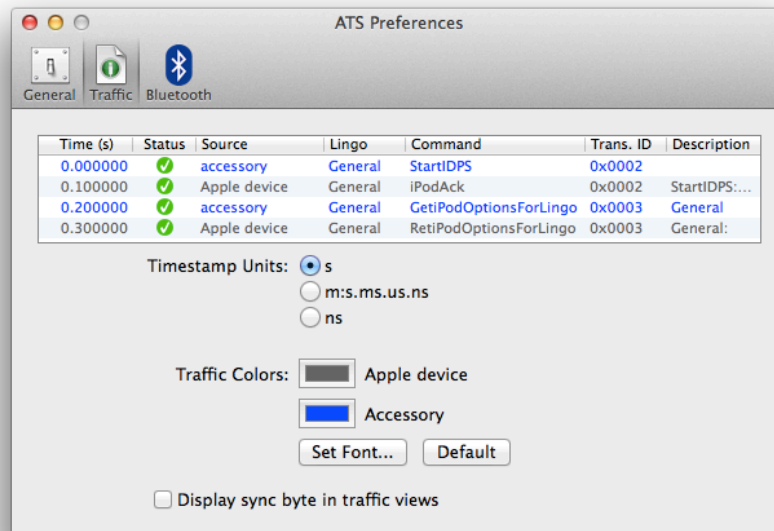


## 5.12.1 General Preferences



The General Preferences view provides options for storing Certification Assistant credentials.

## 5.12.2 Traffic Preferences



The "Timestamp Units" setting gives you the ability to change the format of the timestamps shown in any of the traffic categories. The available options are:

s	display the time expressed in number of seconds
m:s.ms.us.ns	display the time in units separated into minutes : seconds . milliseconds . microseconds . nanoseconds
ns	display the time expressed in number of nanoseconds

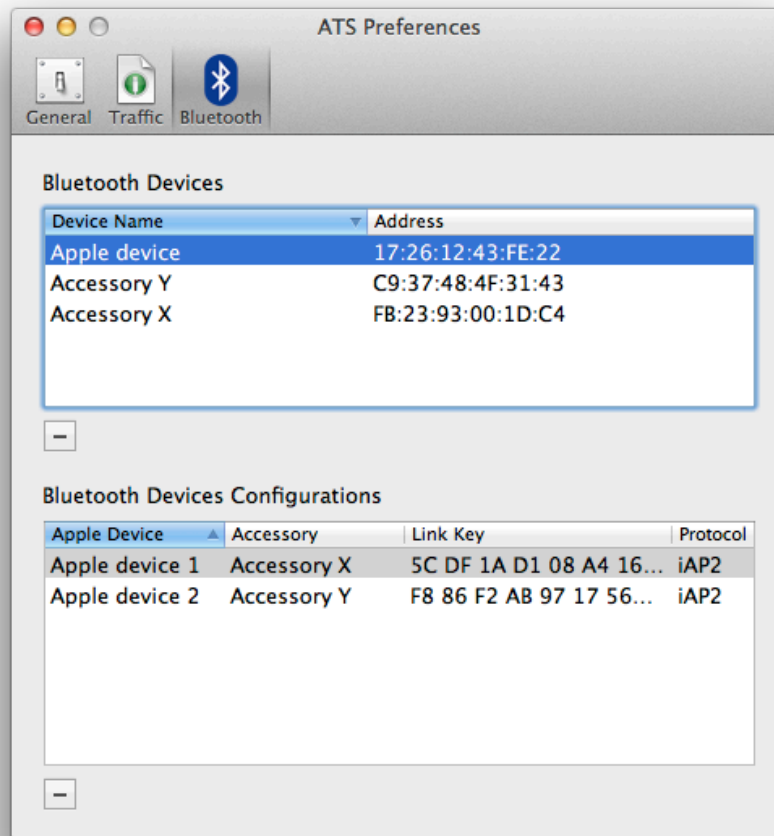
The "Traffic Colors" preference allows you to change the color of iAP packets shown in any of the traffic categories based upon their source.

The "Set Font. . ." button allows you to change the font, size and styling of the text used in the traffic categories. The Default button reverts this setting back to its original state.

The "Allow certification assistant to save last entered Apple ID" option controls whether the Accessory Certification Assistant will save and automatically populate the "Apple ID" field on the login screen.

The "Allow certification assistant to save passwords to keychain" is used to either disable or re-enable the saving and automatic population of the password field on the login screen. This is only necessary if you have set the Accessory Certification Assistant to "Never Allow" the saving of passwords.

## 5.12.3 Bluetooth Preferences



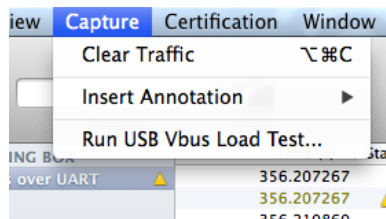
The "Bluetooth Devices" table displays all of the stored Bluetooth devices that have been seen during device inquiry. You can delete unwanted Bluetooth devices by selecting them in the table and clicking the "-" button below the table.

The "Bluetooth Devices Configuration" table displays all of the stored Bluetooth capture configurations. You can delete unwanted configurations by selecting them in the table and clicking the "-" button below the table.

# Chapter 6

## USB Vbus Load Test

For 500 mA, 1 A, 2.1 A, and 2.4 A Vbus charging accessories, you may invoke a test of your accessory's power supply by selecting "Run USB Vbus Load Test" under the "Capture" menu. This test will only run for accessories that present appropriate D+/D- resistors. Accessories that charge the Apple device but do not present appropriate D+/D- resistors will not be able to use the USB Vbus Load Test. Additionally when using the ATS 30-pin Box, only a maximum of 1 A load will be applied during the test. For accessories capable of handling loads greater than 1 A, be sure to conduct additional load testing outside of ATS. Disconnect any Apple device before running this test.



The USB Vbus Load Test is run inside of an existing Capture Document. After the test has completed, check the trace for any errors that were thrown during the test. When using the ATS Lightning Box, a voltage summary will be displayed when the test completes.

Untitled							
Stop	Time (s)	Clear				Categories	Details
							Filter
ATS LIGHTNING BOX	Time (s)	Status	Source	Lingo	Command	Trans. ID	Description
IAP Packets over UART	200.662688		ATS Lightning Box	--	--	--	<accessory disconnected>
	200.666367		ATS Lightning Box	--	--	--	<Apple device disconnected>
SUMMARY	203.253525		ATS Lightning Box	--	--	--	<accessory connected>
IAP	205.769000		Vbus Load Test	--	--	--	<USB Vbus load test began>
Hardware	205.769000		Vbus Load Test	--	--	--	<executing 1.0 A load test>
	205.994372		Vbus Load Test	--	--	--	<initial USB Vbus voltage: 5.13 V>
	205.994372		Vbus Load Test	--	--	--	<average USB Vbus voltage: 4.95 V>
	205.994372		Vbus Load Test	--	--	--	<final USB Vbus voltage: 4.95 V>
	205.994372		Vbus Load Test	--	--	--	<USB Vbus load test finished>

Elapsed Time: 00:00:14

[ATS DWHKONGPRO4984649 v0.3.5]

# Chapter 7

## Certification Assistant

ATS supports running MFi self-certification tests within ATS and submitting results electronically to Apple. To use the Accessory Certification Assistant, you must have an approved product plan and an Apple ID and password that is registered with the MFi program. If you do not have this information, contact your MFi representative.

### Note – Disclaimer

ATS is not a comprehensive certification solution. It is ultimately the accessory developer's responsibility to ensure the accessory complies fully with all specifications required for each product. If no errors are generated during the test procedure, it is neither guaranteed nor implied that the accessory has met all certification requirements. For guidance about what additional tests to run, please see "MFi Suggested Test Cases" under the ATS help menu.

The Accessory Certification Assistant is your guide for running the MFi self-certification tests within ATS. It can be accessed via the "Accessory Certification Assistant" menu item under the "Certification" menu. Before running the assistant, ensure your computer is connected to the internet.





From here on, the assistant will guide you through the procedure of configuring and running certification tests for your accessory. The first step is authentication.

You must be connected to the Internet to use the Certification Assistant. If you are not connected to the Internet, you will not be able to run any tests. The Certification Assistant connects to the ATS server over an SSL-encrypted secure connection. Please ensure your firewall settings allow you to access the ATS server at:

Domain	bogart.apple.com
port	443





Use your Apple ID credentials that were registered with the MFi program to access the Certification Assistant. If you do not have this information, contact your MFi representative. Otherwise, enter your Apple ID and password, then hit continue.

ATS may ask whether you would like to save your password. If you indicate ATS may save your password, it will be entered automatically the next time you use the Accessory Certification Assistant. Otherwise, ATS will not save your password. You may also indicate that ATS should never save your password. If you choose this option, you may re-enable password-saving in ATS's preferences.

To remove a password that was previously saved, use the "Keychain Access" application and remove the password associated with "MFi ATS."

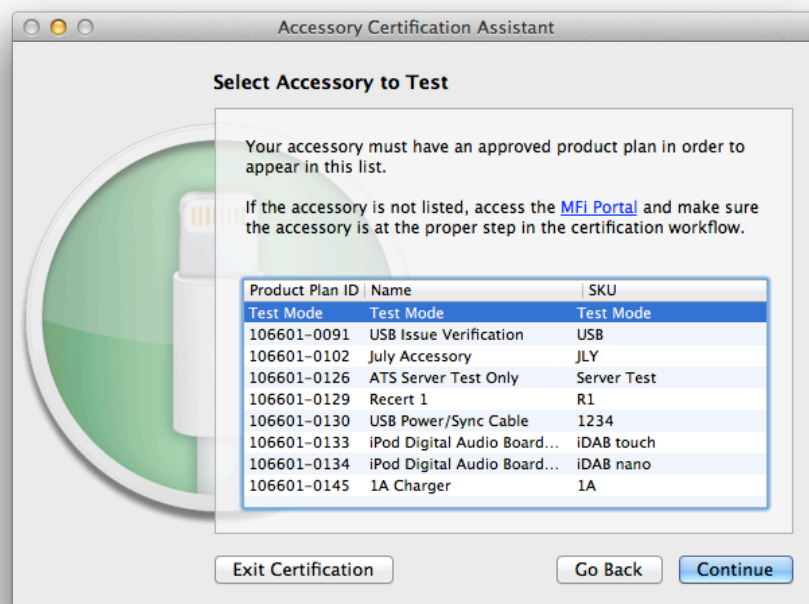


### Note – How to Remove Saved Passwords

To remove passwords you have previously allowed ATS to save, open Keychain Access. Keychain Access is an application included with OS X. After opening Keychain Access, type "ATS" into the search bar, then delete any passwords associated with "MFi ATS" that you no longer wish to be saved.

The next screen displays a list of the accessories that are associated with your contract, and that you may submit certification test results for. If you have already completed certification for a particular accessory, it will not be displayed in this list. To add an accessory to this list, please contact your MFi representative.

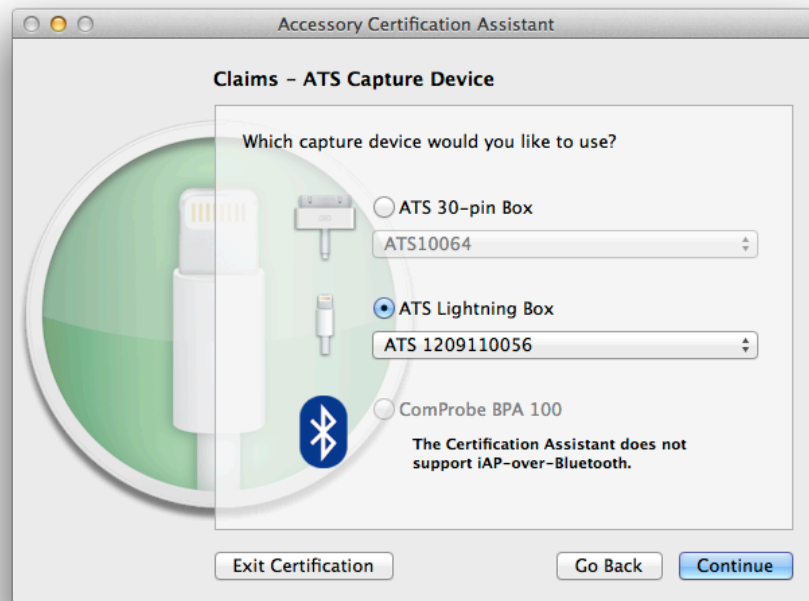
A non-submittable accessory called "Test Mode" is available for you to test your accessory against the Certification Assistant prior to conducting your actual self-certification. Note that any tests conducted against the test mode accessory will not be allowed to be submitted for self-certification.



Select the accessory you would like to test, then hit continue.

## 7.1 Capture Device

Next, ATS will prompt you to select the capture device to use during the tests. Note that all capture devices should be correctly configured as shown in the [Quick Start](#) section of this document before proceeding.



### Note – Self-Certification of iAP1-Over-Lightning and iAP-Over-Bluetooth are not Supported

ATS does not support self-certification of iAP1 over the Lightning connector, iAP-over-Bluetooth, or CarPlay-over-USB. For these types of accessories, please review the the MFi Suggested Test Cases under the Help menu, and follow the self-certification procedure described by the MFi Portal.

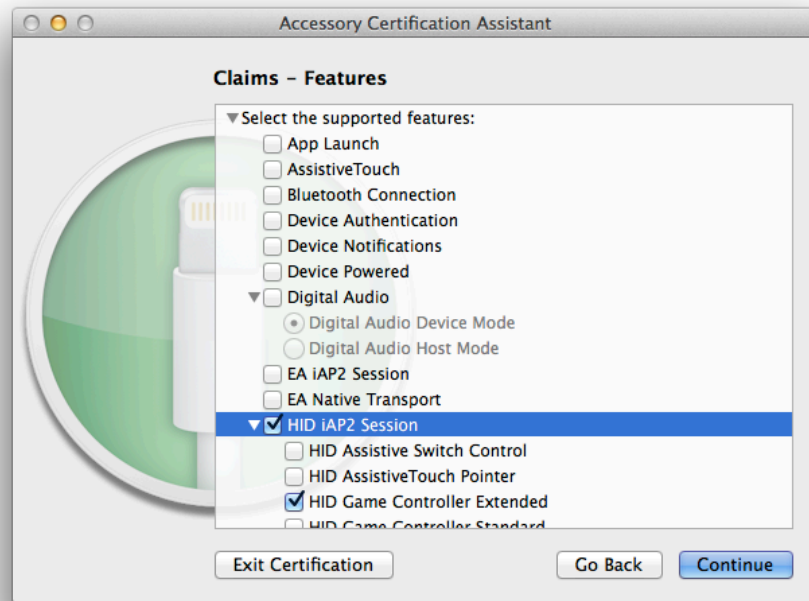
## 7.2 Claims

ATS checks for and reports on accessory hardware, serial transport, and iAP problems. For ATS to know which requirements apply for the connected accessory, it is necessary to define the properties of the accessory. Before running any tests, ATS will ask a series of questions about your accessory to define the required properties.

### Note – Claims and Submission

It is important that the selected claims accurately represent the characteristics of your accessory. This data will be uploaded to the MFi Portal and will be associated with your accessory's product plan upon submission. Your self-certification may be rejected if your claims do not accurately reflect the characteristics of your accessory.

Select your accessory's claims.



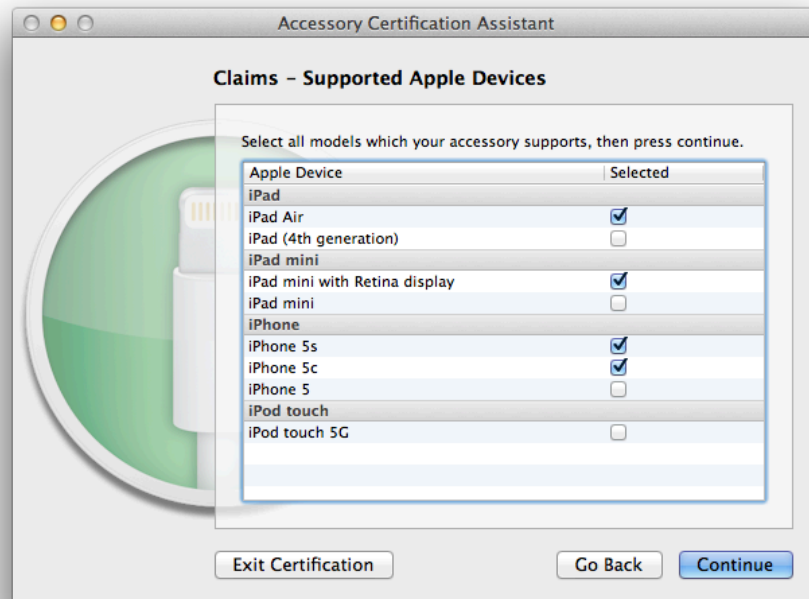
### Note – Accessories That Use iAP Over Both UART and USB

If your accessory uses the 30-pin connector and starts communication with the Apple device over UART, then later transitions to communication over USB, select the "Both UART and USB" transport. This will assume that the Apple device is the USB host.

Next select the Apple device models with which your accessory is compatible. The assistant will later ask you to test with each model you select. ATS verifies that the correct Apple device model is attached. Make sure that you have the selected Apple device models available, fully charged and that they have the latest software installed before proceeding.

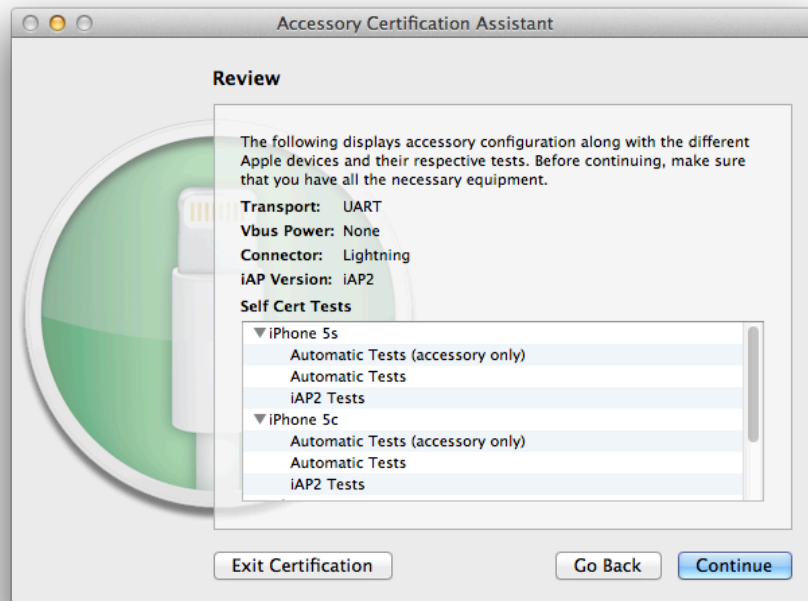
## Note – 30-pin Accessories Cannot Claim Compatibility with Lightning

The Certification Assistant does not allow you to test 30-pin accessories against Apple devices with Lightning. If you are developing a 30-pin accessory, do not indicate compatibility with these devices on packaging or marketing materials.



## 7.3 Test Configuration Review and Execution

Before you begin the tests, the assistant gives you the opportunity to revise the accessory's claims. Once you proceed beyond this screen you will not be able to change your accessory's claims. An entry for this certification will be available in the Accessory Certification History window after the tests have begun.



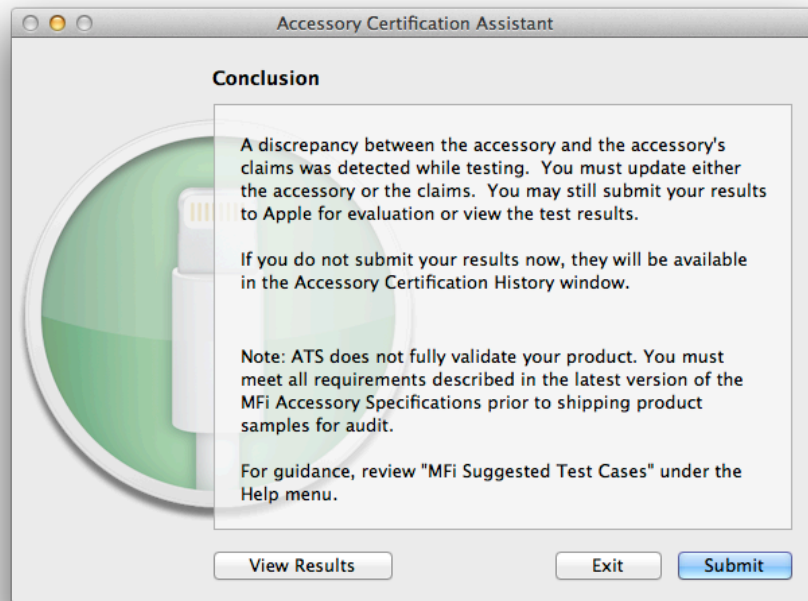
Once you are satisfied the test setup is correct and reflects your accessory's functionality, hit continue.

At this point, the Accessory Certification Assistant will guide you through each step of running the tests. Some steps will occur automatically while others require you to interact with your accessory or the Apple device. If any errors are found, you will be given the option of exiting the assistant immediately, rerunning the current test, or continuing with the rest of the tests.

#### **Note – Make Sure Your Apple Devices are Ready**

Make sure that each Apple device you use during the test is fully charged before beginning the test. If the Apple device battery is depleted during the test, the test will fail. Also make sure the latest software is installed on each device. To update the software of an Apple device, connect it to iTunes.

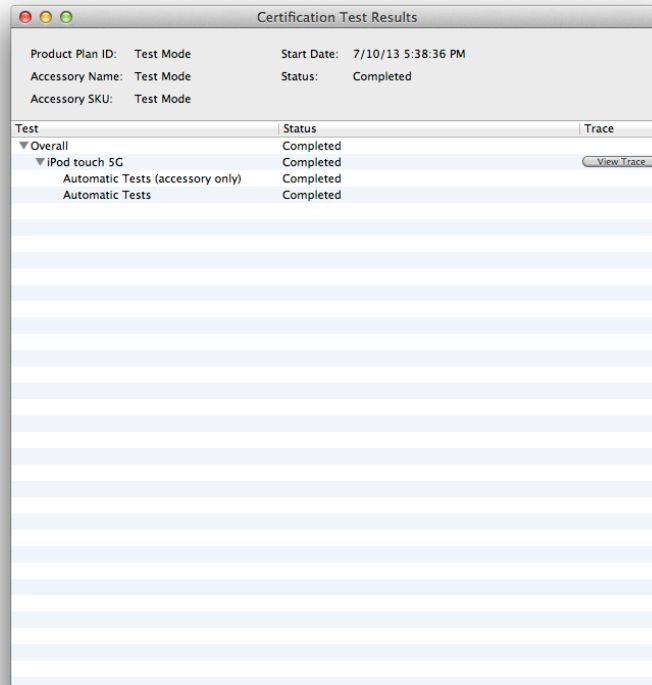
At the end of the test procedure, you will be given the option to submit your results.



If you choose to submit your results, ATS will upload the results to Apple, and you will be provided a confirmation code. Please keep a permanent record of this code, as you may need it later to reference this submission. The confirmation code will also be stored in the Accessory Certification History under the Certification menu. Note that after you have submitted, the claims selected in the Certification Assistant will be uploaded and associated with your accessory's product plan. Make sure the claims accurately reflect your accessory's characteristics before submitting.

Regardless of whether you submit now, a record of this test run is stored in the Accessory Certification History.

It is often helpful to view the ATS trace that was captured during the certification test. This information can be used to help resolve errors that were generated during a certification test. The trace can be saved and attached to an email or a bug report. To open a trace captured during the test, click "View Results."



The Certification Test Results provides a summary of the test configuration. To view a trace from any of the tests click the "View Trace" button. A window will open containing the trace captured during the test. The trace may be annotated, saved, emailed or attached to a bug report.

This can also be done from the Accessory Certification History by selecting a certification run and clicking "View Report."

### Note – Conduct Additional Tests Without ATS

ATS does not fully validate your product. You must complete additional testing to ensure that your product meets all requirements described in the latest version of the MFi Accessory Specifications prior to shipping product samples to Apple. Review the "MFi Suggested Test Cases" available under the ATS help menu.



# Chapter 8

## ATS Utility



ATS Utility is an iOS application that runs on the Apple device to facilitate various features in the ATS app. Currently, ATS Utility provides support for retrieving Bluetooth link keys created during Bluetooth pairing.

### 8.1 Software Installation

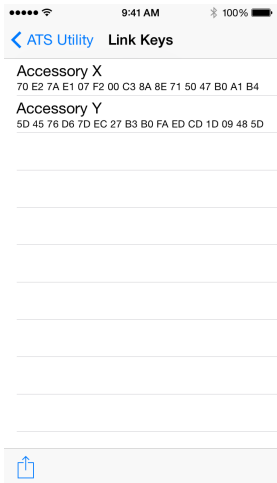
ATS Utility requires an iOS device running iOS 7 or later. If needed, open Settings and choose General > Software Update to get the latest version of iOS. The latest version of ATS Utility is available for download from the MFi Portal. ATS Utility will display an alert message when a new version of the app is available. For more information about connecting to the MFi Portal, contact your MFi representative.

To install ATS Utility on your iOS device, follow these steps:

1. Download the ATS Utility .zip file from the MFi Portal.
2. Unzip the file.
3. Drag ATS Utility.ipa into your iTunes app library.
4. Sync ATS Utility.ipa to your iOS device using iTunes.

# 8.2 Features

## 8.2.1 Bluetooth Link Keys



ATS Utility provides a table of Bluetooth accessories that the iOS device has been paired with. The accessory’s name is shown at the top of the row and the link key associated with that accessory is shown at the bottom. The table will only show accessories that advertise support for iAP (accessory includes the Service Class UUID for the iAP protocol in its Extended Inquiry Response packet). Double tapping on a row will bring up the accessory’s MAC address.

Use this functionality of ATS Utility in ATS’s Capture Configuration Assistant when you are prompted to enter the Bluetooth link key.

# Chapter 9

## Known Issues

For USB D+ and D- voltage measurements to be made, no Apple device may be connected. This ensures that if an iAP-over-USB accessory happens to be connected to the ATS Box, it will not have its USB signal integrity affected by attempts by the ATS Box to measure its USB D+ and D- voltages as though it were a USB charging accessory.

For USB D+ and D- voltage measurements to be made using an ATS Lightning Box, no Total Phase Beagle™ USB 480 analyzer may be attached. USB Brick Detect will fail if a Beagle™ USB 480 analyzer is connected even when it is not configured in ATS.

For the 30-pin connector, if an accessory happens to use only one of the five available DGND pins, and this pin happens to be pin 30, then a number of side effects may be caused by the introduction of ATS into the system. For example, ATS will not properly measure the ID resistor for such an accessory. Because pin 30 is the recommended pin by which the accessory can detect the presence of Apple device, the ATS 30-pin Box treats this signal as more than just a basic DGND, so an accessory that relies exclusively on pin 30 for its DGND connection may behave in unexpected ways. However, an accessory should be designed to use all available DGND pins as possible.

For the 30-pin connector, ATS keeps Pin 30 grounded at all times, regardless of whether an Apple device is attached. For this reason you must always connect an Apple device before connecting your accessory. If you do not, your accessory may attempt to interact with ATS even though no Apple device is connected.

When running ATS with an accessory that transmits iAP-over-UART at baud rates other than 57600, the first accessory byte immediately after power-cycling the ATS hardware box may be preceded by a report of a single phantom unrecognized byte.

For accessories that transmit iAP-over-UART, if sync (0xFF) bytes are not transmitted with iAP packets, then the ATS autobauder may fail to lock to the serial traffic successfully. In such a case, the likely outcome is a series of unrecognized bytes in the iAP Packets over UART category.

The ATS autobauder is bounds-checked to a maximum possible reported baud rate. A very narrow glitch in the serial signal—immediately after accessory start-up, for example—may cause a series of unrecognized bytes in the iAP traffic category as the autobauder attempts to lock to the serial traffic.

The USB Vbus connection in the 30-pin extender cable has a DC resistance in the range of 200 mΩ to 250 mΩ. If the extender cable is placed between the accessory under test and the ATS hardware unit, the reported USB Vbus measurement may be artificially low, especially when the accessory is supplying a full 1 A or 2.1 A of charging current to Apple device.

For the 30-pin connector, accessories that selectively ground pin 20 based on the state of pin 13 may fail to be detected during the setup phase of the Certification Assistant tests. Additionally, the accessory is in violation of the MFi Accessories hardware specification and should be corrected.

When connecting an Apple device to the ATS Box, the Apple device may display a message that states, "This accessory is not made to work with iPhone." This is caused by the fact that the ATS Box itself is not an accessory. When using ATS, this message may be ignored. However, you should make sure your accessory does not trigger this message when connected directly to the Apple device without an ATS Box.

For the 30-pin connector, while running the Certification Assistant, if the Apple device bounces Accessory Power (pin 13), the Certification Assistant may misinterpret that as a disconnection of the accessory. If this occurs, you should disconnect your accessory from ATS, dismiss the Certification Assistant's disconnection dialog, then reattach your accessory. You should then be able to complete the test successfully. If the problem persists, contact your MFi representative for additional support.

The Certification Assistant detects connections and disconnections of the accessory. Both physical and programmatic disconnections are handled in the same way. If your accessory emulates a physical disconnection by manipulating pin states, it should only do so when the Certification Assistant instructs to disconnect the accessory. An emulated disconnection at any other time may prematurely terminate the test and cause an error.

In certain situations, the thresholds of Vbus and device power warnings and errors may change. This is due to the fact that ATS cannot positively identify the accessory's charging capabilities at all times. For example, ATS is unable to positively identify the accessory's charging capabilities whenever an Apple device is connected to the ATS box. These thresholds may change at any time without prior notice. You must satisfy whichever threshold is described in the MFi specifications for your accessory.

9109.232820	ATS Lightning Box	--	<accessory connected>
9109.406362	⚠	--	Warning: accessory is driving device power voltage too low (measured as 4.6 V, threshold is 4.70 V)
9109.532576	--	--	<device power voltage returned to an acceptable level (measured as 4.98 V)>
9115.046058	ATS App	--	<CA finished running "Automatic Tests (accessory only)">
9117.046090	ATS App	--	<CA began running "Automatic Tests">
9121.296016	ATS Lightning Box	--	<Apple device connected>
9121.336805	⚠	--	Warning: accessory is driving device power voltage too low (measured as 3.7 V, threshold is 4.55 V)
9136.046101	ATS App	--	<CA finished running "Automatic Tests">

If the ComProbe® BPA® 100 analyzer is attached before the Frontline® driver is installed, the Mac's internal Bluetooth module may become disabled. If this happens, disconnect the ComProbe® BPA® 100 analyzer from the Mac, install the Frontline® driver, and reboot the Mac. You may connect the ComProbe® BPA® 100 analyzer after the Mac has rebooted.

# Chapter 10

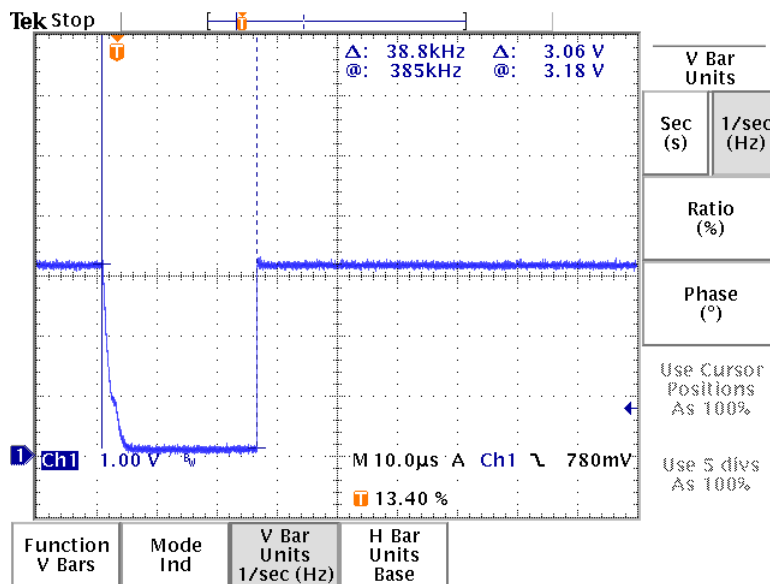
## Technical Notes

### 10.1 About iAP-Over-UART Baud Rates

An Apple device determines the serial speed of a connected UART accessory by "autobauding" to its Tx signal on a packet-by-packet basis. This is accomplished by measuring the width of the start bit for each start-of-packet 0xFF byte. This measurement can be distorted by the quality of the accessory's Tx signal, especially if it exhibits slow rising-edge or falling-edge transitions.

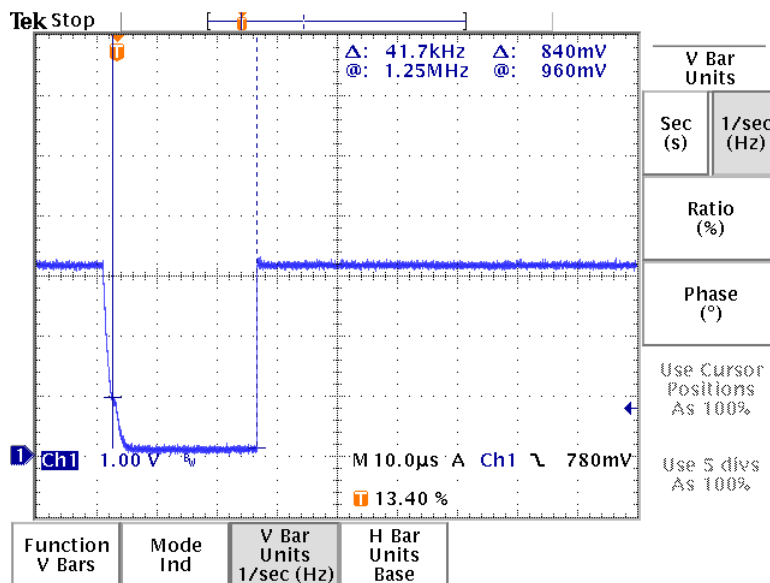
For example, the following two oscilloscope traces show the start bit for an accessory operating at the deprecated legacy rate of 38400 bps. The vertical cursors have been set to mark the start and the end of a start-of-packet 0xFF bit, and the display format has been inverted to use units of Hertz instead of seconds.

The first trace shows that the actual transmitted bit rate is approximately 38800 bps. This is a deviation of only 1.0% from nominal and is entirely acceptable.



Because the Apple device's serial receiver expects digital signals, however, it will not actually register a falling-edge transition until the accessory's serial Tx signal drops below a particular voltage threshold. (The value of this threshold will depend on the generation of Apple device hardware and other factors.)

The following scope trace shows what may occur as a result. Because the falling edge of the accessory's serial Tx signal is relatively slow, the measured low-time of the start bit by Apple device may correspond to 41700 bps instead of 38800 bps. Such an 8.5% deviation from the nominal rate is unacceptable.



In addition to reporting the results of 0xFF start-bit autobauding, ATS also measures the

bit time implied by the time taken for the accessory to transmit the eight data bits of the 0x55 byte that follows each start-of-packet 0xFF byte. It is possible for this alternate measurement method to be affected by the same rise-time and fall-time problems that affect the start-bit method, but the bit-time error should be reduced by a factor of roughly eight, given the measurement of eight bits instead of one.

Even though the Apple device does not do 0x55-based autobauding, ATS reports the results from both measurement methods because large differences between the two are generally indicative of hardware errors, firmware errors, or both. If the rate from 0x55-based autobauding closely matches the intended rate, then the accessory firmware is probably using the right crystal and UART clock divisor. If the rate from 0xFF start-bit-based autobauding shows large errors, however, potential problems with the accessory's serial Tx signal should be investigated further via an oscilloscope.



# Chapter 11

## Revision History

Date	Rev	Notes
1/12/15	30	Updated screenshots that included the beta disclaimer for capturing iAP-over-Bluetooth.
8/18/14	29	General update for ATS 4. Added documentation for capturing CarPlay-over-USB.
3/24/14	28	General update for ATS v3.9.
2/19/14	27	General update for ATS v3.8. Added references to capturing iAP-over-Bluetooth and the Frontline® ComProbe® BPA® 100 analyzer.
12/11/13	26	Re-layout of ATS User Manual.
10/22/13	25	General update for ATS v3.6. Updated screenshots for UI changes.
9/18/13	24	General update for ATS v3.5. Updated screenshots for UI changes. Updated instructions for using new Apple ID authentication.
9/12/13	23	General update for ATS v3.4.
4/5/13	22	General update for ATS v3.2. Changed requirement to OS X 10.8 (Mountain Lion).
10/26/12	21	General update for ATS v3.1.
7/29/12	20	General update for ATS v3.0. Added references to the Lightning connector, new configurations, and general UI changes including the summary category.
6/28/12	19	Replace "Made For iPod" with "MFi."

Date	Rev	Notes
3/7/12	18	General update for ATS v2.3. Changed requirement to Mac OS X 10.7 (Lion), added iPad (3rd generation), updated screenshots to properly describe the Apple device USB host/device role.
10/7/11	17	General update for ATS v2.2. Added preferences, annotations & separators, high impedance. Updated the Summary Panel section. Changed the Cert. Assistant section to accommodate product plan downloading and auto test config. Removed the known issue about the Summary Panel not displaying info after running the USB Vbus load test.
3/15/11	16	General update for ATS v2.1.
1/14/11	15	General update for ATS v2.0.
9/7/10	14	General update for ATS v1.6. Added Mac OS X 10.6 Snow Leopard requirement.
6/21/10	13	General update for ATS v1.5. Updated claims table. Added Made for iPod Portal credential information to the Accessory Certification Assistant.
3/3/10	12	General update for ATS v1.4. Added Mac OS X 10.5 deprecated warning. Updated claims table. Added known issue for "This accessory is not made for iPhone." Added iPad.
9/30/09	11	General update for ATS v1.3.1. Added firewall settings, pin 20 vs 13 known issue and pin 30 known issue.
7/31/09	10	General update for ATS v1.3. Add copy/paste. Remove PPC Updater Crash from Known Issues (it has been fixed). Add UBS Vbus load test.
6/18/09	9	General update for ATS v1.2.1. Add details for each claim and password-saving feature.
4/28/09	8	General update for ATS v1.2. Added MFi / WWi certification section.
1/29/09	7	General update to accompany ATS v1.1 app
11/21/08	6	Added known issue describing DC resistance of 30-pin extended cable and related possibility of USB Vbus voltage drop with large currents flowing.

Date	Rev	Notes
10/20/08	5	Added work-around text for integrated FW updater problem exhibited by some PPC systems.
10/16/08	4	<ul style="list-style-type: none"> <li>• Clarified that lone 0xFF sync / wake-up bytes aren't shown in packet category.</li> <li>• Updated docs to reflect dropped Tiger support.</li> <li>• Added initial section on Claims, rules and error reporting.</li> <li>• Added known issues related to the ATS auto-bauder.</li> </ul>
9/5/08	3	<p>General update to accompany ATS v0.3.8 app (with v0.3.2 firmware)</p> <ul style="list-style-type: none"> <li>• accessory current consumption and Tx voltage hardware measurements added.</li> <li>• session (.ats) files containing events and byte traffic can now be saved and reloaded.</li> <li>• text Find... feature allows for word / phrase searching of active traffic window fields.</li> <li>• general improvements to stability and quality of autobaud measurements.</li> </ul>

Date	Rev	Notes
3/13/08	2	<p>Update to v0.3.7 app (with v0.2.3 firmware)</p> <ul style="list-style-type: none"> <li>• several bugs related to transfer of large blocks of data have been fixed.</li> <li>• a crasher on app close and several strange scrolling behaviors have been fixed.</li> <li>• the highlighted item now stays constant while tabbing between packet / byte views.</li> <li>• ATS now shows a live clock to allow time since most recent traffic to be determined.</li> <li>• a new Leopard feature (tooltip-like boxes appear over text fields) has been disabled.</li> <li>• ATS now verifies that the accessory doesn't try to drive reserved pins 14 and 17.</li> <li>• the accessory's nominal baud rate is now inferred from the total length of 0x55 bytes.</li> </ul> <p>Added "Known issues" section</p>
1/16/08	1	Initial document release in support of v0.3.5 app (with v0.2.0 firmware)