



## Accessory Test System (ATS)

# Installation Guide and User Manual

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## Overview

Throughout this document the names iPod, iPhone and iPad are used interchangeably. Where the name iPod is used, iPhone and iPad are also 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 iAP specification
- various hardware components for connecting to various types of MFi accessories

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

## Equipment List

Before getting started, make sure you have all of the equipment listed below.

	<p><b>Mac running Mac OS X 10.6 (Snow Leopard) or later</b></p> <p>ATS will run on any Intel-based Mac computer running Mac OS X 10.6 (Snow Leopard) or later.</p>
	<p><b>ATS application</b></p> <p>If you do not already have ATS, download it from the Made For iPod portal or contact your MFi account specialist.</p>





### ATS box

The original ATS box that was used previously with ATS 1.x versions.



### 30 pin - USB breakout board (ATS 0201)

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.



### Total Phase Beagle™ USB 480 analyzer

The Beagle™ USB 480 analyzer 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.

[www.totalphase.com/products/beagle\\_usb480/](http://www.totalphase.com/products/beagle_usb480/)



## USB hub

Used to centralize connections for all equipment.

## Quick Start

Using ATS for accessory development is a snap! Just follow these steps to get up and running:

### Always Connect iPod Before Accessory

When attaching devices to the ATS Box, you must always connect an iPod prior to connecting your accessory.

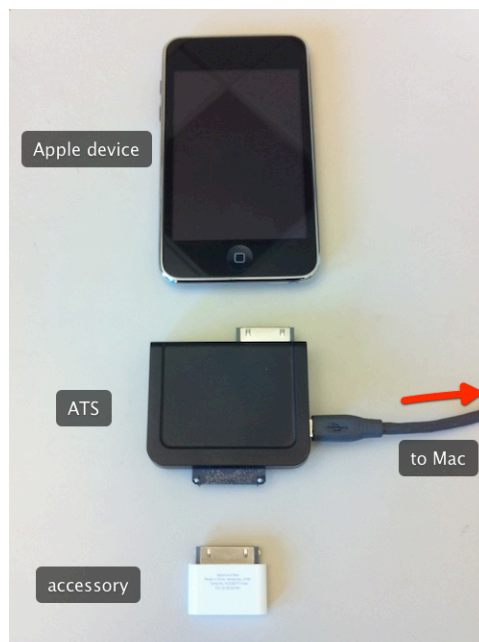
### Is your accessory an iAP-over-USB accessory?

There are two 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 USB transport, it is an iAP-over-USB accessory.

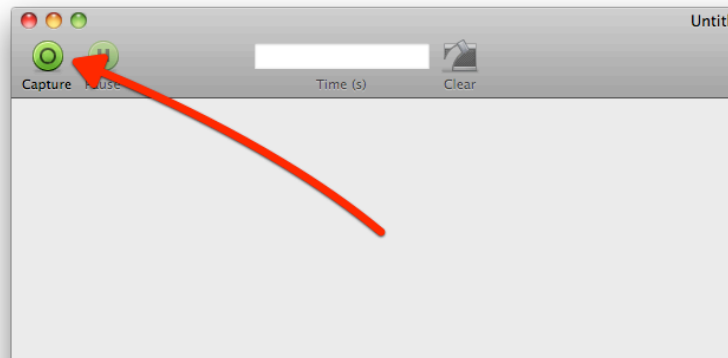
### NOT iAP-over-USB

For accessories that do not transmit iAP data over USB, you only need connect the ATS box. This is identical to ATS 1.x.

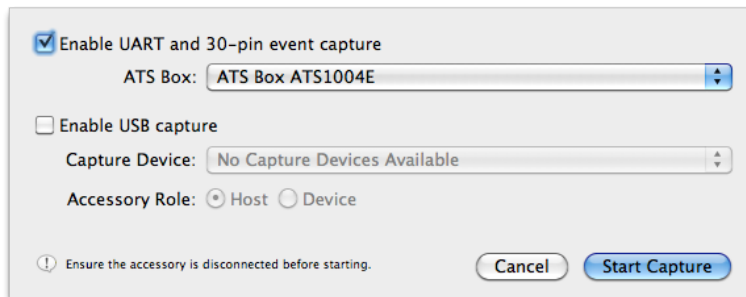
1) Connect the ATS board to your computer as shown



- 2) Start the ATS application and dismiss the Welcome Screen
- 3) Tap “Capture”



- 4) Check only the “Enable UART” checkbox



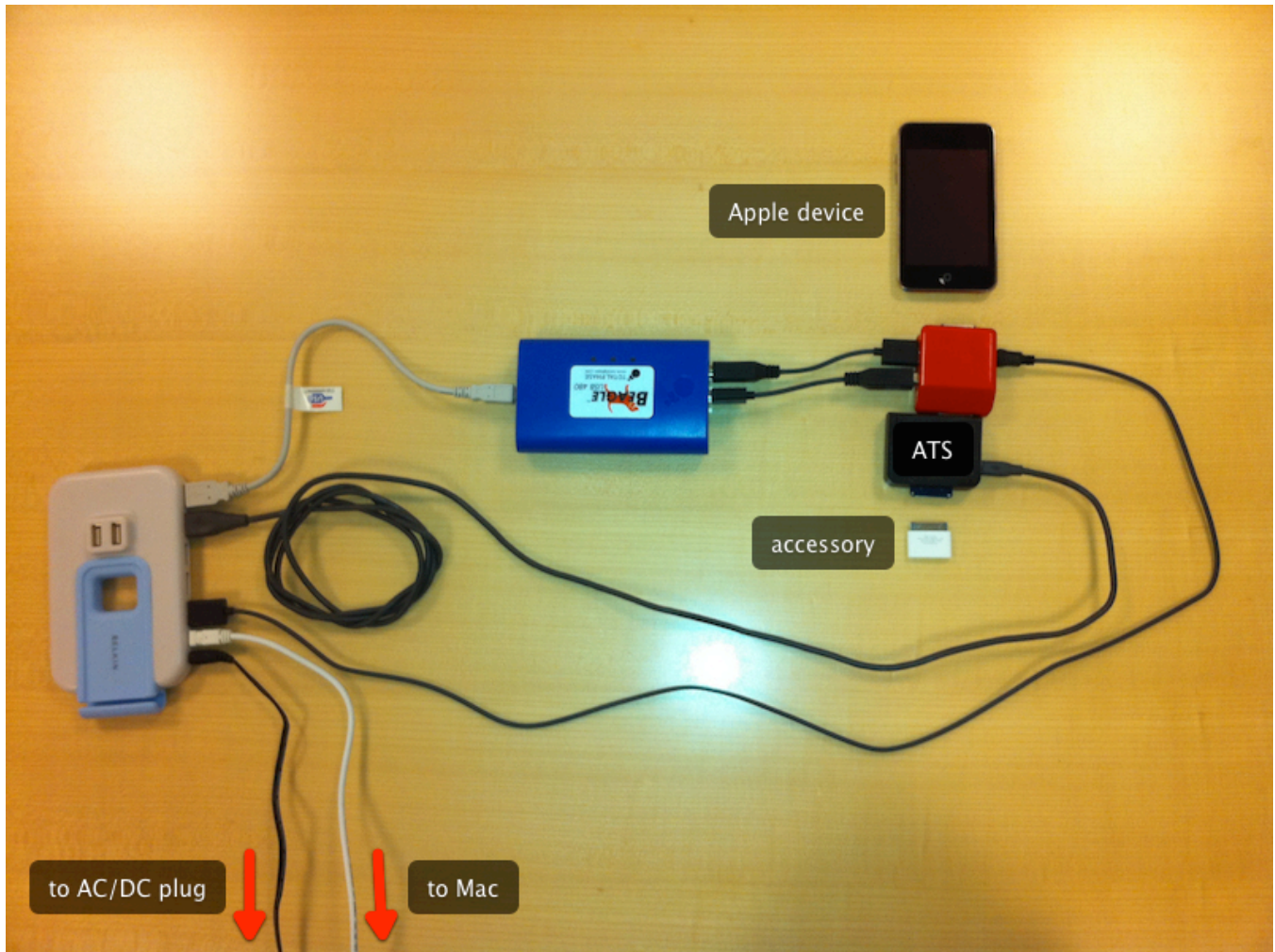
- 5) Select the connected ATS box from the menu
- 6) Tap “Start Capture”

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

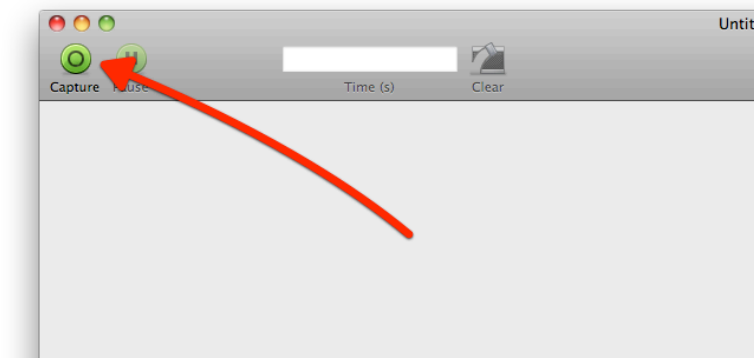
## iAP-over-USB

For iAP-over-USB accessories, you must connect additional equipment.

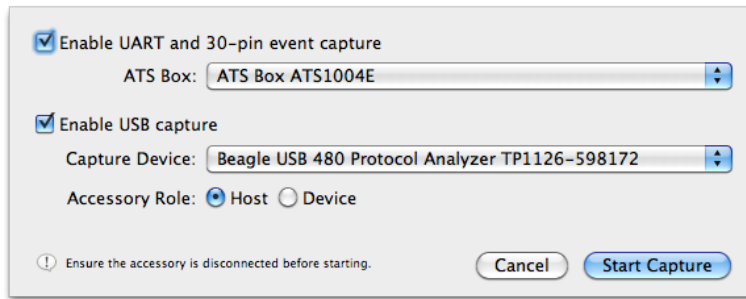
- 1) Connect the equipment as shown



- 2) Start the ATS 2.0 Application and dismiss the Welcome Screen
- 3) Tap “Capture”



4) Check **both** the “Enable UART” and “Enable USB” checkboxes



5) Select **both** the connected ATS box and the connected Beagle™ USB 480 analyzer from the menus.

6) If your accessory behaves as a USB device, change “Accessory Role” to “Device.” (NOTE: most accessories behave as USB Hosts.)

7) Tap “Start Capture”

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

# Installation and Updates

## Software Installation

ATS requires a Mac running Mac OS X 10.6 Snow Leopard or later. If needed, use the “Software Update...” command under the Apple menu to get the latest version of Mac OS X. Fetch the .zip containing the latest ATS application bundle and related drivers from the Made for iPod Portal. (For more information about connecting to the Made for iPod Portal, contact your account specialist.) Unzip the bundle then copy the ATS application to your “Applications” folder.

## Hardware Connection

For accessories that do not send iAP over USB, 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 and Beagle™ USB 480 analyzer.

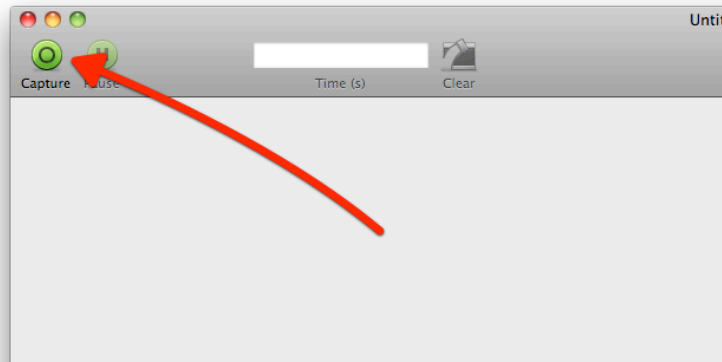
### A Warning About USB Connections

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

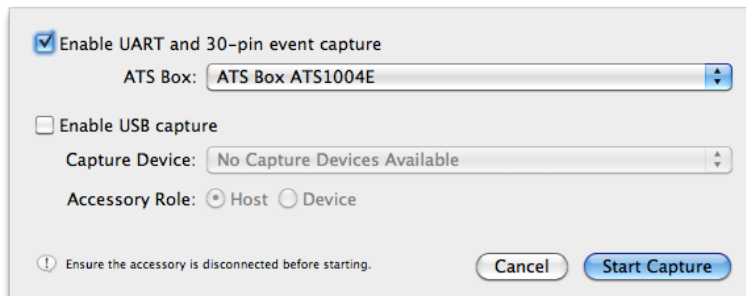
## Testing the Installation

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 (required for use of the ATS box), 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 board by first clicking on the ‘Capture’ button in the application window.





Next, check the “Enable UART” checkbox



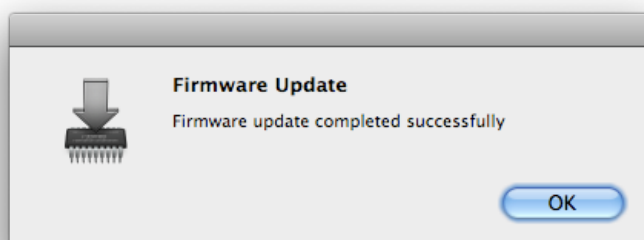
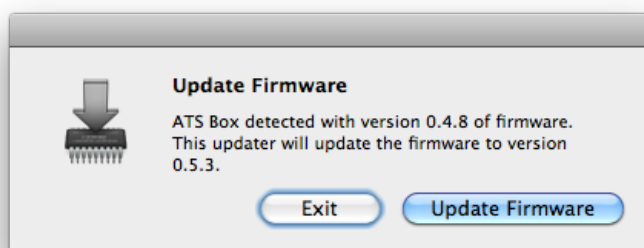
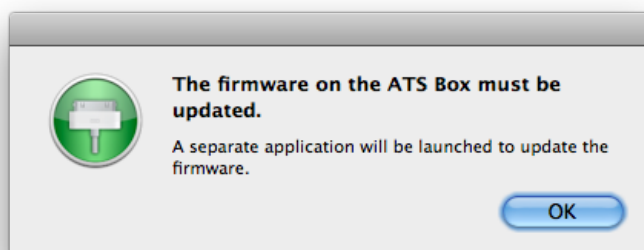
Select the connected ATS box from the menu. If your accessory is an iAP over USB accessory, you must also check the “Enable USB capture” checkbox, then select the attached Total Phase Beagle™ USB 480 analyzer.

Finally, tap “Start Capture.”

## Firmware Updates

Updates for the ATS box firmware are contained in the ATS application bundle. If an ATS application update includes firmware that is newer than the version on the ATS box, ATS will prompt you to update the firmware.





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

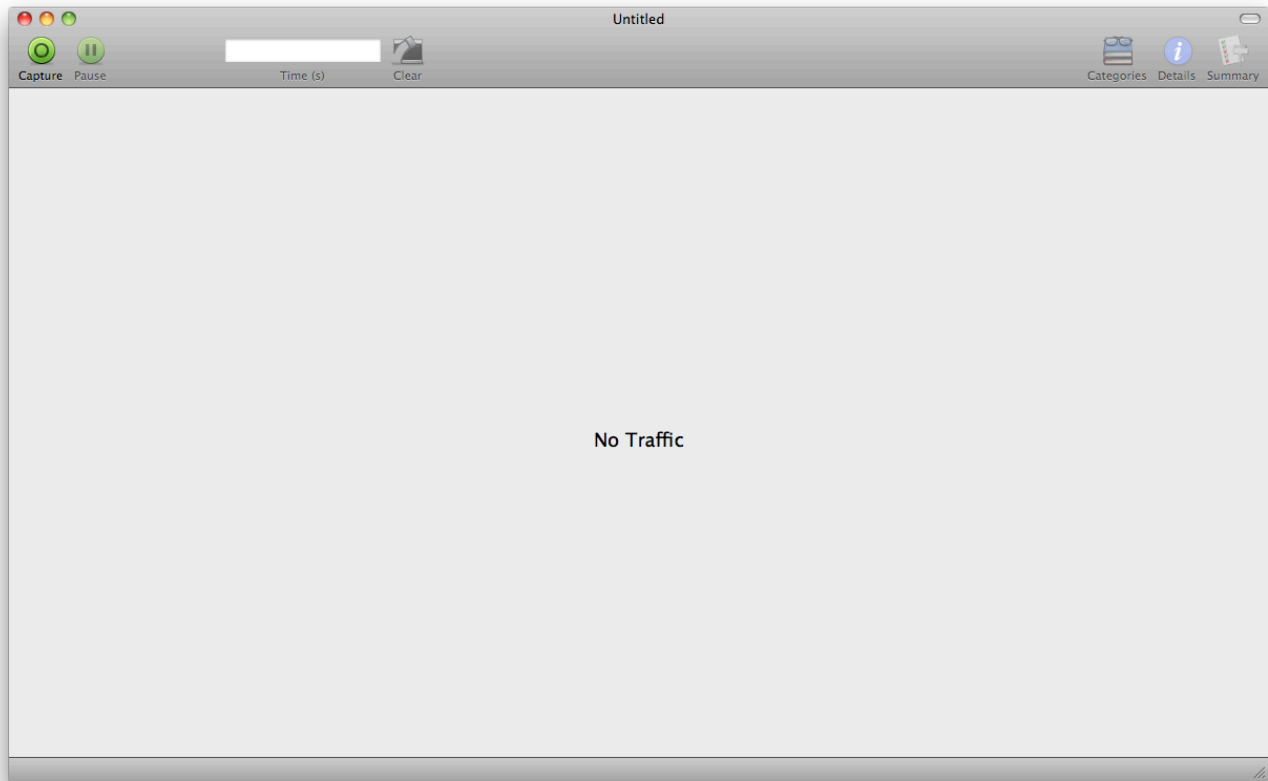
## Reporting Bugs

To report bugs or request enhancements to ATS, please file a New Problem at [bugreport.apple.com](http://bugreport.apple.com). Include "ATS" in the Title field.

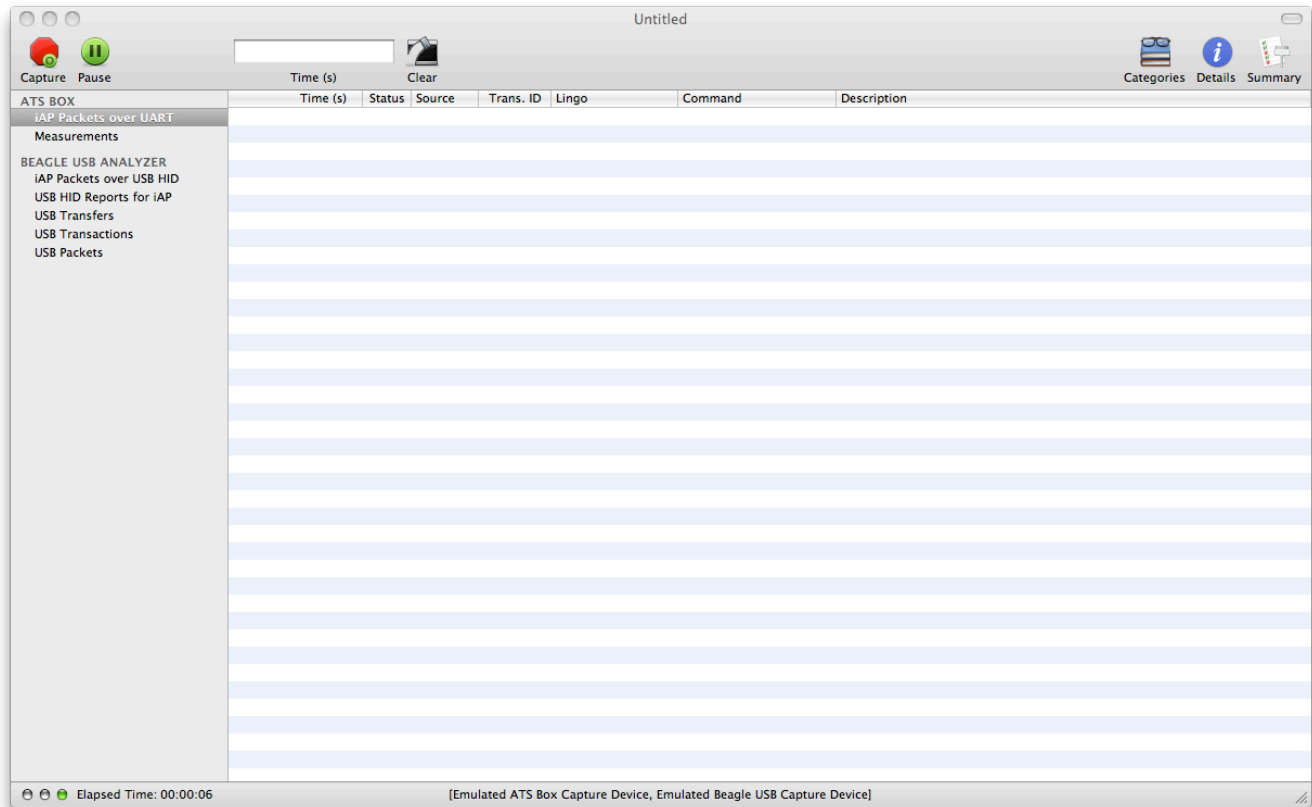
# ATS Application User Interface

## 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.



The 'Capture' button is used to start analysis. All other buttons are disabled until analysis begins.



Once analysis has begun, the 'Pause' button can be used to prevent further updates to the traffic window. Monitored traffic will continue to queue in the background, and the traffic window will be updated with the queued traffic when the display is resumed. It may be helpful to pause the display after isolating a particular event of interest, especially when working with accessories that produce a large quantity of traffic.

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

### 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 view with the arrival of an iAP packet in the iAP Packets over USB HID view.

The ‘Clear’ button clears information from all views. 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 views. 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 ‘Summary’ button enables the Summary Panel drawer.

## 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 views include:

- iAP Packets over UART
- Measurements
- iAP Packets over USB HID
- iAP Packets over USB Bulk Pipe
- USB HID Reports for iAP
- USB Transfers
- USB Transactions
- USB Packets

The list of categories may be hidden by tapping on the “Categories” button in the toolbar.

## iAP Packets Views

Three types of iAP Packets views may be available depending upon your configuration.

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

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

#### **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.

#### **Fields in iAP Packets Views**

The iAP Packets views include a number of descriptive fields for 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 'iPod' 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.

#### **Sync Bytes are not Displayed**

Any extra-packet 0xFF sync bytes (used to wake iPod or otherwise) do not appear in the packet view.

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.

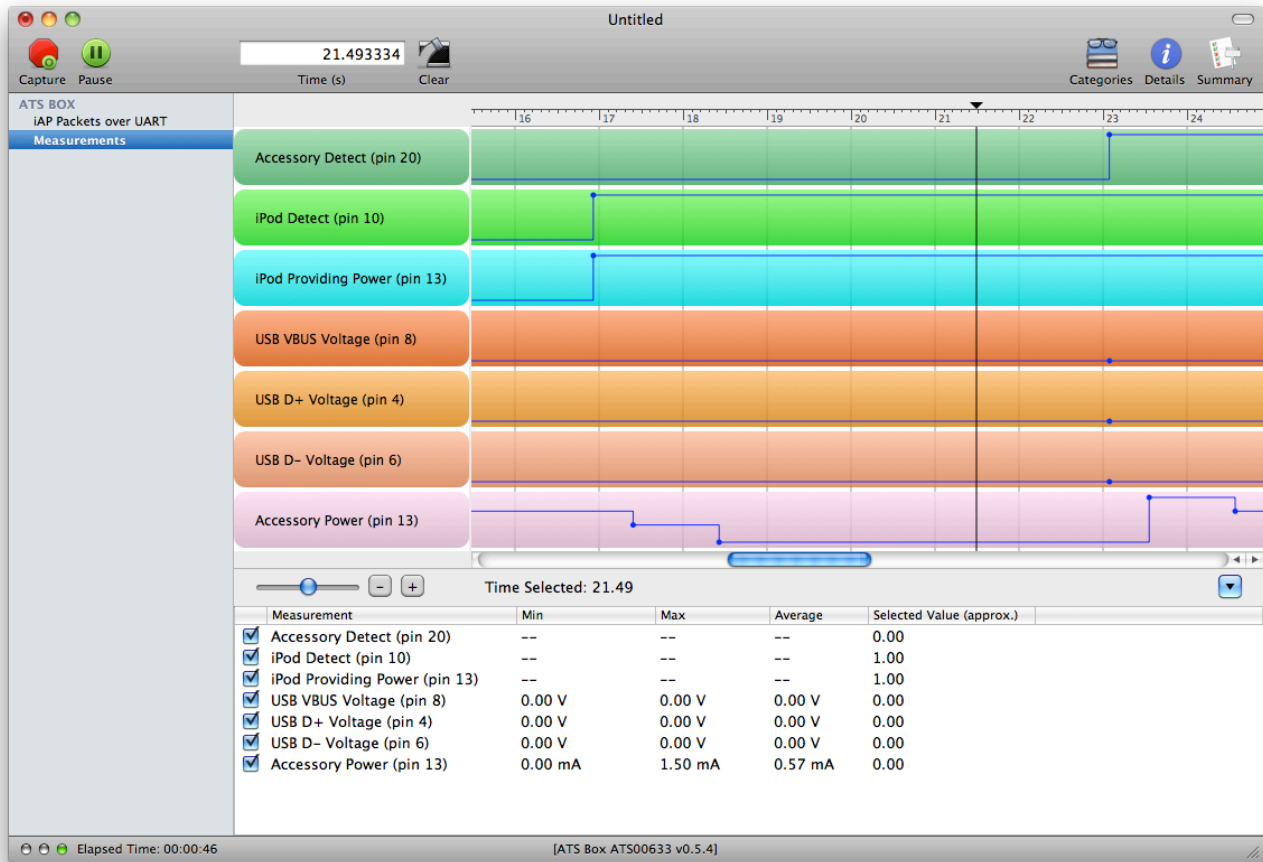
## Error Reporting

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 view.

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

## Measurements View

The Measurements view provides a way of visualizing the behavior of the iPod and your accessory over time.



The Measurements view 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 'Pause' and 'Clear' buttons affect the Measurements view in the same manner as the traffic views.

## Summary Panel

A summary of accessory information can be opened with the 'Summary' button.

The summary panel contains a variety of items that characterize the accessory at a higher level than that of individual iAP packets or hardware-event messages.

The 'electrical' section of the summary panel contains low-level hardware observations about the connected accessory. The 'serial transport' section of the summary panel contains statistics about the quality of the serial transmissions by the connected accessory. The 'iAP identification + authentication' section of the summary panel summarizes iAP traffic of general relevance to accessory identification and authentication.

All fields on the summary panel can be reset with the 'Clear Panel' button.

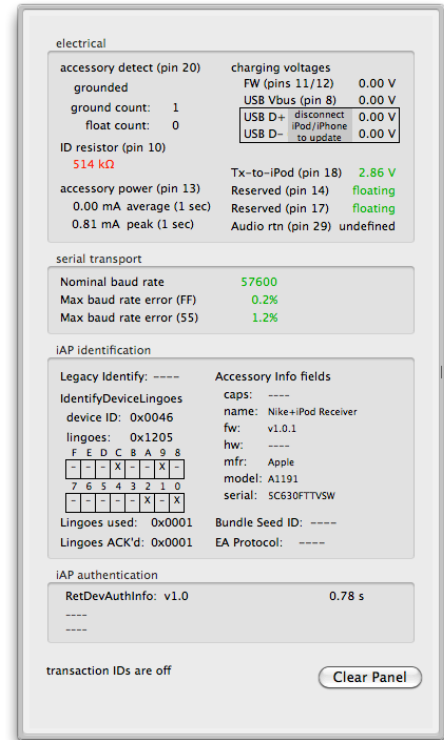
The 'Accessory detect' field counts the number of rising and falling edges on pin 20 of the iPod / iPhone / accessory connector. This information may help detect failures or inconsistencies in how an accessory drives this pin, which should typically be grounded.

The 'Accessory ID' field reports the accessory ID resistor value measured by the ATS 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 'Charging voltages' field 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 iPod charging has been deprecated 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 iPod 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.

The 'Tx voltage (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.





The 'Accessory Power (pin 13)' fields show the peak and average accessory current consumption during the most recent one-second window. Individual current samples are taken at a rate of approximately 500 Hz.

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.

The 'Legacy Identify' field describes the lingo sent during an accessory's most recent use of the deprecated Identify command.

The 'IdentifyDeviceLingoes' fields describe the claimed device ID and lingo bit-field sent during an accessory's most recent use of this command. (The lingo bit-field is also shown graphically by lingo.) For detailed information about this and other iAP commands, see the standard iAP specification document.

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 iPod 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.)

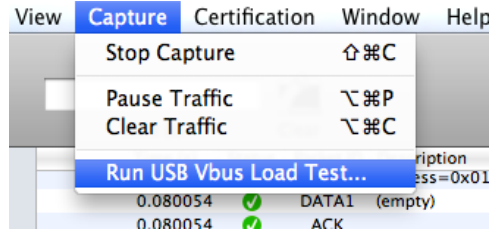
The 'Accessory info' fields provide human-readable description of all information returned by the accessory via RetAccessoryInfo iAP packets.

The 'Authentication' fields provide the total elapsed time taken to complete authentication, 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 IdentifyDeviceLingoes packet and to end with the iPod's successful acknowledgement of authentication via a RetDevAuthenticationStatus packet.

An additional message indicates when ATS expects transaction IDs to be used.

## USB Vbus Load Test

For 500 mA, 1 A, and 2.1 A Vbus charging accessories, you may invoke a test of your accessory's power supply by accessing "Run USB Vbus Load Test" under the "Tools" menu. This test will only run for accessories that present appropriate D+/D- resistors. Accessories that charge the iPod but do not present appropriate D+/D- resistors will not be able to use the USB Vbus Load Test. Additionally, 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 iPod before running this test.



## MFfi Certification Tests

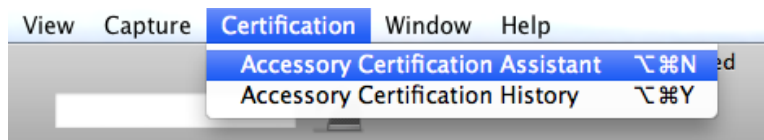
As of version 1.2, ATS supports some Made for iPod certification tests within ATS and submitting results electronically to Apple. To use ATS' Accessory Certification Assistant, you must have an approved product plan, Made for iPod Portal user ID and password. If you do not have this information, contact your account specialist.

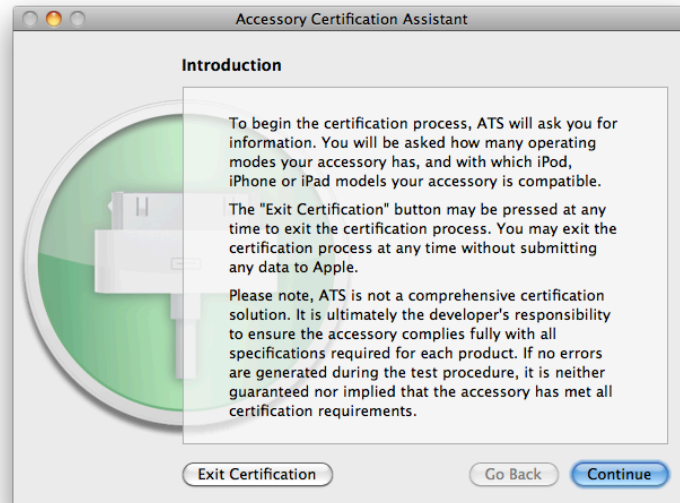
### Disclaimer

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.

## Accessory Certification Assistant

The Accessory Certification Assistant is your guide for running the MFfi certification tests within ATS. It may be accessed via the "Accessory Certification Assistant" menu item under the "Certification" menu. Before running the assistant, ensure your ATS hardware is connected, your computer is connected to the internet, and all open capture documents are closed.

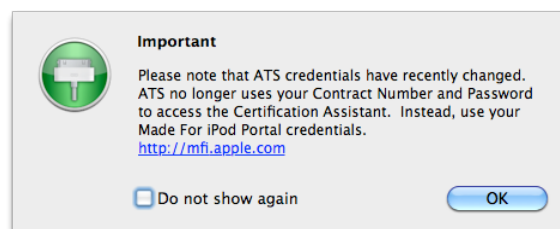




From here on, the assistant will guide you through the procedure of configuring and running certification tests for your accessory. The first step is authentication.

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:

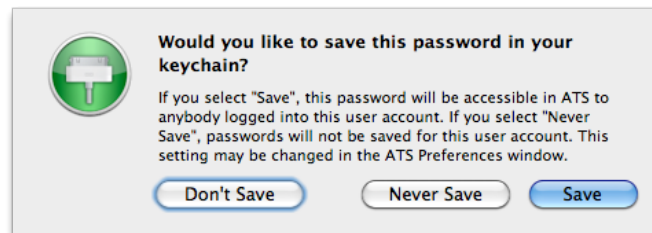
Domain:	bogart.apple.com
Port:	443





Use your Made for iPod Portal credentials to access the Certification Assistant. If you do not have this information, contact your account specialist. Otherwise, enter your contract number and password, then hit continue.

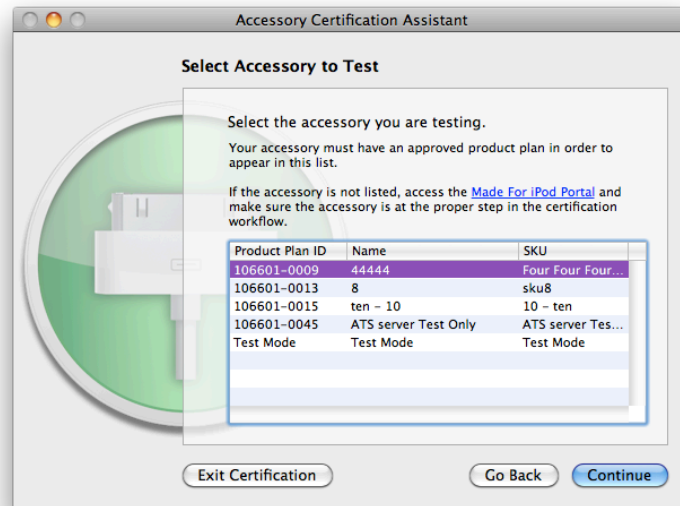
ATS may ask whether you would like to save your password. If you indicate ATS may save your password, it will be entered automatically the next time you use the Accessory Certification Assistant. Otherwise, ATS will not save your password. You may also indicate that ATS should never save your password. If you choose this option, you may re-enable password-saving in ATS' preferences. To remove a password that was previously saved, use the "Keychain Access" application and remove the password associated with "iPod ATS."



### How to Remove Saved Passwords

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

The next screen displays a list of the accessories that are associated with your contract, have approved product plans, and that you may submit certification test results for. If you do not have an approved product plan, or 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 account specialist.



### About the Test Mode Accessory

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.

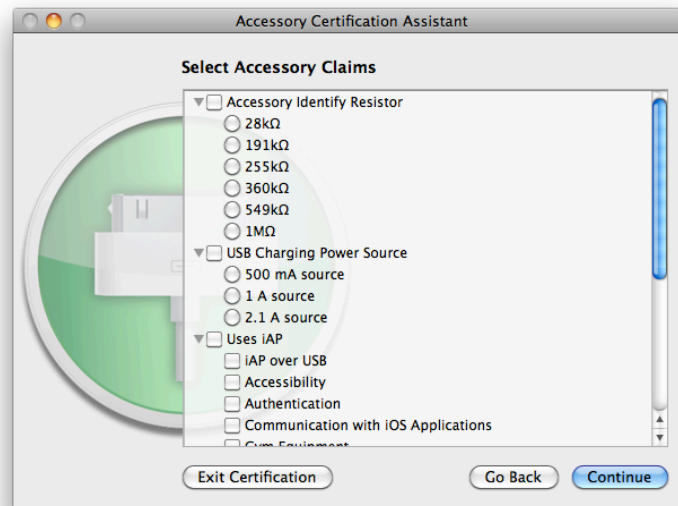
Select the accessory you would like to test, then hit continue.

Next you will be asked whether your accessory supports more than one operating mode. If your accessory supports multiple modes, select "Yes." For most accessories the correct answer is "No."

Each operating mode is a distinct and separate set of accessory functionality. From the perspective of the iPod, each mode looks like a newly attached accessory. Each mode will have separate initialization and identification procedures and will most likely use different iAP Lingo's.

If you answer "Yes" to this question, you must name the various modes. Try to pick a name that describes what the accessory does in that mode. Next you will select the appropriate claims for that mode. This procedure will repeat until you indicate your accessory has no further operating modes.

ATS checks for and reports on accessory hardware, serial transport and iAP problems. In order for it to know which requirements apply for the connected accessory, it is necessary to define the properties of the accessory. Select each claim that your accessory supports. It is important to select claims that accurately represent the characteristics of your accessory as described in the product plan filed with the MFi licensing team. If the claims selected do not match the product plan, your certification test results will be rejected.



## Claim summary

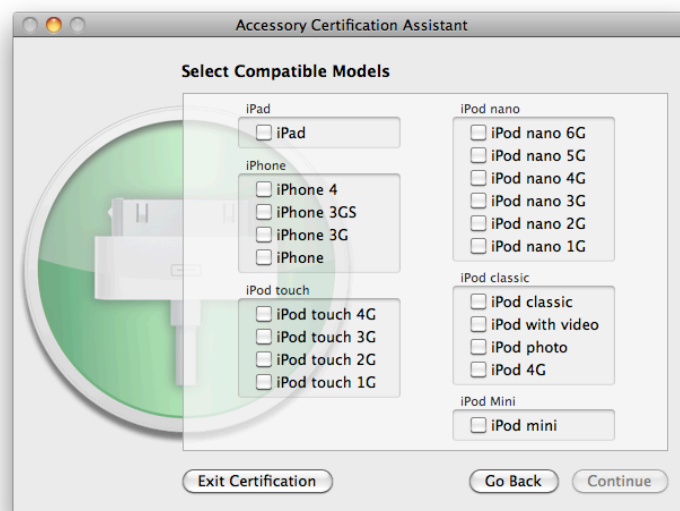
Claim Name	When To Enable?
Accessory Identify Resistor	This claim and the associated resistor values are used to indicate whether your accessory was constructed with an identification resistor and, if so, the type of resistor.  When a resistor value is selected, this claim is checked automatically. To disable any selected resistor, uncheck this claim.
	28 kΩ
	191 kΩ
	255 kΩ
	360 kΩ
	549 kΩ
	1 MΩ

USB Charging Power Source	Check this claim and the appropriate charge current to indicate that your accessory provides charging power via USB Vbus.  When a charge current is selected, this claim is checked automatically. To disable any selected charge current, uncheck this claim.
	500 mA
	1 A
	2.1 A
Uses iAP	Check this claim and the appropriate sub-claims to indicate that your accessory can communicate with the iPod or iPhone via the iPod Accessory Protocol.
iAP over USB	Check this claim if your accessory sends any information over USB transport. You must have a Beagle™ USB 480 analyzer connected to your computer before the Certification Assistant will proceed.
Accessibility	Check this claim to indicate that your accessory supports accessibility commands.
Authentication	Check this claim to indicate that your accessory supports iAP authentication. That is, it will send Identify or IdentifyDeviceLingoes with authentication bits set.
Communication With iOS Applications	Check this claim to indicate your accessory will use iAP commands to communicate with iOS applications.
Gym Equipment	Check this claim to indicate your accessory supports the Nike + iPod feature.
High Power	Check this claim to indicate that your accessory will identify for high power support (i.e. your accessory will send Identify or IdentifyDeviceLingoes with the high power option bit set).
IDPS	Check this claim to indicate your accessory supports Identify Device Preferences and Settings (StartIDPS).
iPod Out	Check this claim to indicate your accessory supports the iPod Out lingo and related functionality.
Line Out Accessory	Check this claim to indicate your accessory may enable audio out from the iPod.
Location	Check this claim to indicate your accessory will use the Location Lingo
Remote UI (Head Unit)	Check this claim to indicate your accessory will use the Remote UI Lingo.
RF Tuner	Check this claim to indicate that your accessory will use the RF Tuner lingo.

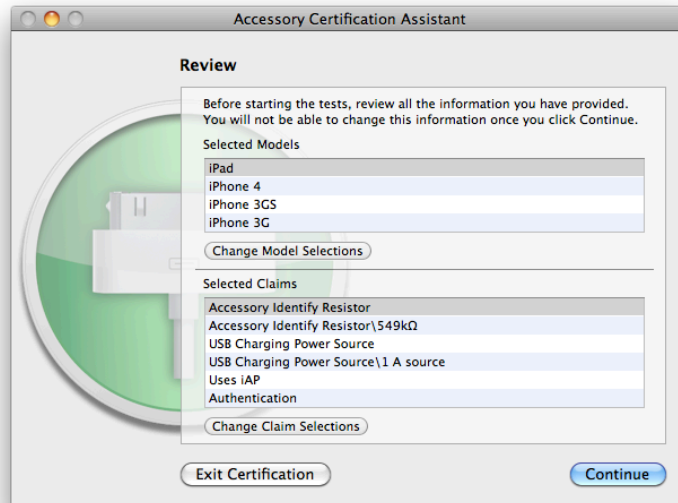


Simple Remote Accessory	Check this claim to indicate your accessory will use the Simple Remote Lingo.
Storage Lingo Accessory	Check this claim to indicate your accessory will use the Storage Lingo.
USB Host Mode lingo	Check this claim to indicate your accessory will use “USB Host Mode lingo commands” with iPad.
Video Out Accessory	Check this claim to indicate your accessory may enable video out from the iPod.

Next select the iPod / iPhone models with which your accessory is compatible. Again, this information must match your product plan. The assistant will later ask you to test with each model you select.



Before you begin the tests, the assistant gives you the opportunity to review and make changes to modes, claims, or iPod compatibility. Once you proceed beyond this screen you will not be able to change your test configuration without restarting the entire procedure.



Once you are satisfied the test setup is correct and matches your product plan, 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 will require you to interact with your accessory. If any failures occur during testing, you will be given the option of exiting the certification assistant immediately, rerunning the current test, or continuing with the rest of the tests.

Make sure that each iPod you use during the test is fully charged before beginning the test. If the iPod battery is depleted during the test, the test will fail.

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.

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

### 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.

## Known Issues

For USB D+ and D- voltage measurements to be made, no iPod 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.

If an accessory for some reason 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 iPod, the ATS board 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. An accessory should be designed to use all available DGND pins as possible, however, which makes such a case highly unusual.

ATS keeps Pin 30 grounded at all times, regardless of whether an iPod or iPhone are attached. For this reason you must always connect an iPod before connecting your accessory. If you do not, your accessory may attempt to interact with ATS even though no iPod or iPhone 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 view.

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 view 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 iPod.

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 iPhone/iPad to the ATS board, the iPhone/iPad may display a message that states, "This accessory is not made to work with iPhone." This is caused by the fact that the ATS board 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 iPhone/iPad without an ATS Box.

While running the Certification Assistant, if the iPod 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 account specialist 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.

When attempting to view the trace generated by the USB Vbus Load Test, no information is displayed in the Summary Panel. To display this information, save the trace to a file, close the window, then reload the trace. The Summary Panel information will then be displayed.

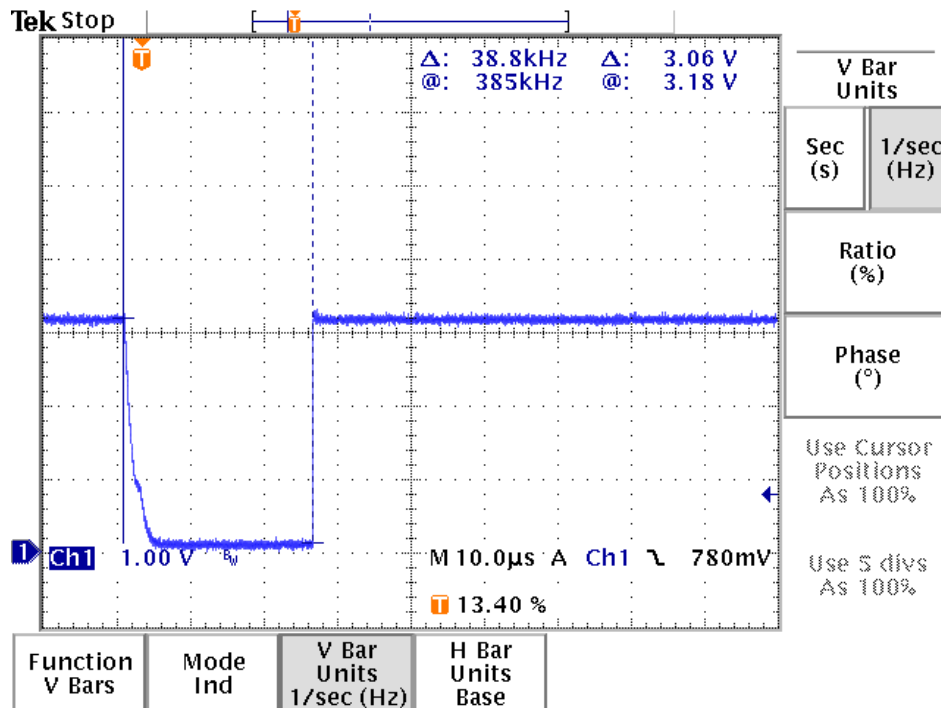
# Technical Notes

## About iAP Over UART Baud Rates

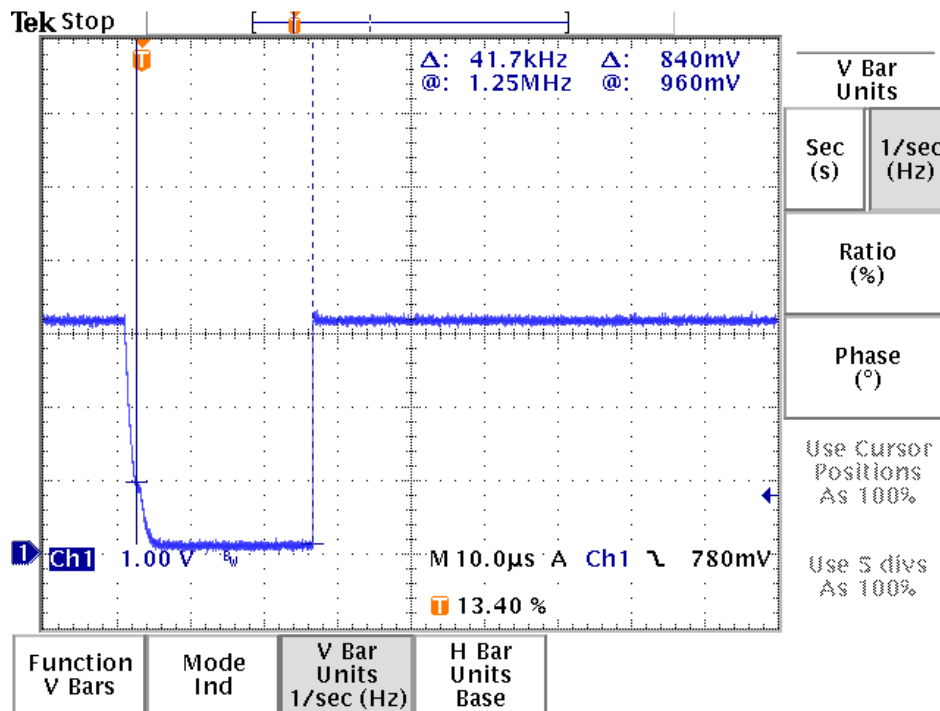
An iPod determines the serial speed of a connected UART accessory by ‘autobauding’ to its Tx signal on a packet-by-packet basis. This is accomplished by measuring the width of the start bit for each start-of-packet 0xFF byte. This measurement can be distorted by the quality of the accessory’s Tx signal, 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 iPod'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 iPod 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 iPod may correspond to 41700 bps instead of 38800 bps. Such an 8.5% deviation from the nominal rate would be completely 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 iPod 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.

## Revision history

Date	Rev	Notes
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 Max 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.
10/20/08	5	Added work-around text for integrated FW updater problem exhibited by some PPC systems.
10/16/08	4	Clarified that lone 0xFF sync / wake-up bytes aren't shown in packet view. Updated docs to reflect dropped Tiger support. Added initial section on Claims, rules and error reporting. Added known issues related to the ATS autobauder.
9/5/08	3	General update to accompany ATS v0.3.8 app (with v0.3.2 firmware) <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>



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 behaviours 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)