BioCTS 2012 for AN-2011

User Guide

NIST/ITL CSD Biometric Conformance Test Software for ANSI/NIST-ITL 2011

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2. Disclaimer

NIST/ITL BioCTS 2012

For AN-2011

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3. Overview

This document describes the features of the Biometric Conformance Test Software 2012 (BioCTS 2012) for ANSI/NIST-ITL 1-2011 (AN-2011) developed by NIST/ITL Computer Security Division. BioCTS 2012 for AN-2011 implements all test assertions specified in NISTIR 7806, "ANSI/NIST-ITL 1-2011 Requirements and Conformance Test Assertions" with additional updated assertions developed after the NISTIR was published.

3.1. Requirements

- Supported Microsoft® Operating Systems
    - Windows® XP ™ Service Pack 3
    - Windows® Vista ™ Service Pack 2
    - Windows® 7 ™ Service Pack 1
- Microsoft® .NET 4.0 Framework
    - Microsoft® .NET 4.0 Web Installer (http://www.microsoft.com/en-us/download/details.aspx?id=17851)
    - Microsoft® .NET 4.0 Stand Alone Installer (http://www.microsoft.com/en-us/download/details.aspx?id=17718)
    - Links working as of 6/12/2012

4. Relevant Standards, Limitations and Additions from the Standard

4.1. Relevant standards and specifications

The relevant standard is ANSI/NIST-ITL 1-2011, NIST Special Publication 500-290 Data Format for the Interchange of Fingerprint, Facial & Other Biometric Information.

The test tool implements all test assertions specified in NISTIR 7806, "ANSI/NIST-ITL 1-2011 Requirements and Conformance Test Assertions" with additional updated assertions developed after the NISTIR was published.

4.2. Test Limitations and/or Additions From the Standards

The only known discrepancies between BioCTS 2012 for AN-2011 and the ANSI/NIST ITL-2011 standard are those outlined in the table below. The Table identifies and provides justification for all exceptions present in the tables.

Exception	Section	Requirement Summary	Justification
Domain Names / Application Profile Specifications	5.3.2	Data contained in this record shall conform in format and content to the specifications of the domain name(s) as listed in Field 1.013 Domain name / DOM found in the Type-1 record, if that field is in the transaction. The default domain is NORAM. Field 1.016 Application profile specifications / APS allows the user to indicate conformance to multiple specifications. If Field 1.016 is specified, the Type-2 record must conform to each of the application profiles. A DOM or APS reference uniquely identifies data contents and formats. Each domain and application profile shall have a point of contact responsible for maintaining this list. The contact shall serve as a registrar and maintain a repository including documentation for all of its common and user-specific Type-2 data fields. As additional fields are required by specific agencies for their own applications, new fields and definitions may be registered and reserved to have a specific meaning. When this occurs, the domain or application profile registrar is responsible for registering a single definition for each number used by different members of the domain or application profile .	The format and content of the record are defined by the DOM or APS. Each DOM and APS has related record-content definitions that may be updated. The evolving nature of the DOM and APS definitions and nature of using registrars makes testing for conformance via the CTS very difficult.
	6	An implementation domain, coded in Field 1.013 Domain name / DOM of a Type-1 record as an optional field, is a group of agencies or organizations that have agreed to use preassigned data fields with specific meanings (typically in Record Type-2) for exchanging information unique to their installations. The implementation domain is usually understood to be the primary application profile of the standard. New to this version of the standard, Field 1.016 Application profile specifications / APS allows multiple application profiles to be referenced. The organization responsible for the profile, the profile name and its version are all mandatory for each application	Since the "transaction must conform to each profile" included in the field, and those profiles are defined by the listed agency, the CTS would have to retrieve the latest requirements from the agency. Also, testing that all specified DOM and APS have the same definitions

		profile specified. A transaction must conform to each profile that is included in this field. It is possible to use Field 1.016 and / or Field 1.013. A specified implementation domain and specified application profiles must all have the same definition for fields, subfields and information items that are contained in the transaction.	for fields, subfields, and information items is not feasible.
Alternate Character Sets	5.6, Table 2	Field 1.015 Character encoding/DCS is an optional field that allows the user to specify an alternate character encoding… Field 1.015 Character encoding/DCS contains three information items: the character encoding set index/ CSI, the character encoding sent name/CSN, and the character encoding set version/CSV. The first two items are selected from the appropriate columns of Table 2.	Table 2 lists ASCII, UTF-16, UTF-8, and UTF-32 as possible encodings. However, the table also allows "User-defined" character encoding sets. Testing for conformance to user-defined character encoding sets is not feasible for the CTS. Further research is needed to support Character sets other than 7-bit ASCII.
Alternate Coordinate System	7.7.3, Table 4	The ninth information item is the geodetic datum code / GDC10. It is an alphanumeric value of 3 to 6 characters in length. This information item is used to indicate which coordinate system was used to represent the values in information items 2 through 7. If no entry is made in this information item, then the basis for the values entered in the first eight information items shall be WGS84, the code for the *World Geodetic Survey 1984 version - WGS 84 (G873)*. See Table 4 for values.	Table 4 lists 22 coordinate systems and the option to include "Other" types as well. It is not feasible for the CTS to test conformance to all coordinate systems, specifically those that are listed by the user under "Other".
	7.7.3	A fourteenth optional information item geographic coordinate other system identifier / OSI allows for other coordinate systems. This information items specifies the system identifier. It is up to 10 characters in length. Examples are: • MGRS (Military Grid Reference System) • USNG (United States National Grid) • GARS (Global Area Reference System) • GEOREF (World Geographic Reference) • LANDMARK (e.g. hydrant) and position relative to the landmark. A fifteenth optional information item, is the geographic coordinate other system value / OCV. It shall only be present if OSI is present in the record. It can be up to 126 characters in length. If OSI is LANDMARK, OCV is free text and may be up to 126 characters. For details on the formatting of OCV for the other coordinate systems shown in OSI as examples, see http://earth-info.nga.mil/GandG/coordsys/grids/referencesys.html	While some examples are listed (MGRS, USNG, GARS, GEOREF, LANDMARK), there may be others that are not listed. It is not feasible for the CTS to test conformance to these coordinate systems, specifically those that may be included but are not listed as examples.
Subject Acquisition Profiles	7.7.5, Table 8,	A subject acquisition profile is used to describe a set of characteristics concerning the capture of the biometric sample.	It is not feasible to test if the image was captured under the conditions

SAP/FAP/IAP	Table 9, Table 10	These profiles have mnemonics SAP for face, FAP for fingerprints and IAP for iris records.	specified by the SAP, FAP or IAP level as defined in Tables 8, 9 and 10. However, the fields will be tested for valid level values.
Open and Closed Paths	7.8	Several Record Types define open paths (also called contours or polylines) and / or closed paths (polygons) on an image. They are comprised of a set of vertices. For each, the order of the vertices shall be in their consecutive order along the length of the path, either clockwise or counterclockwise. (A straight line of only two points may start at either end). A path may not have any sides crossing. No two vertices shall occupy the same position. There may be up to 99 vertices. An open path is a series of connected line segments that do not close or overlap. A closed path (polygon) completes a circuit. The closed path side defined by the last vertex and the first vertex shall complete the polygon. A polygon shall have at least 3 vertices. The contours in Record Type-17: Iris image record can be a circle or ellipse. A circle only requires 2 points to define it (See Table 16). There are two different approaches to the paths in this standard. The 2007 and 2008 version of the standard used paths for Field 14.025: Alternate finger segment position(s) / ASEG. That approach has been retained in this version for all paths except in the Extended Feature Set (EFS) of Record Type-9. The EFS adopted an approach expressing the path in a single information item, which is different than that used in other record types.	Further research is needed to determine the feasibility of testing for: -simple, plane figure -no sides crossing -no interior holes

5. Guide

5.1. Download and Installation

Download the installer from the website http://www.nist.gov/itl/csd/biometrics/biocta_download.cfm .

After the download completes, run the install program Programs and follow the on screen instructions presented in the dialog boxes.

5.2. Running the Conformance Test Architecture

To run the CTA software from the Start menu:

Select **All Programs** then select **NIST BioCTS**, then select **AN-2011** and click on **BioCTS_AN2011**

5.3. Conformance Test Architecture Features

5.3.1. Batch Testing

The "Batch Test" tab allows multiple transactions (files) to be tested in groups, and displays the overall results for each transaction in the "Files Under Test" pane.

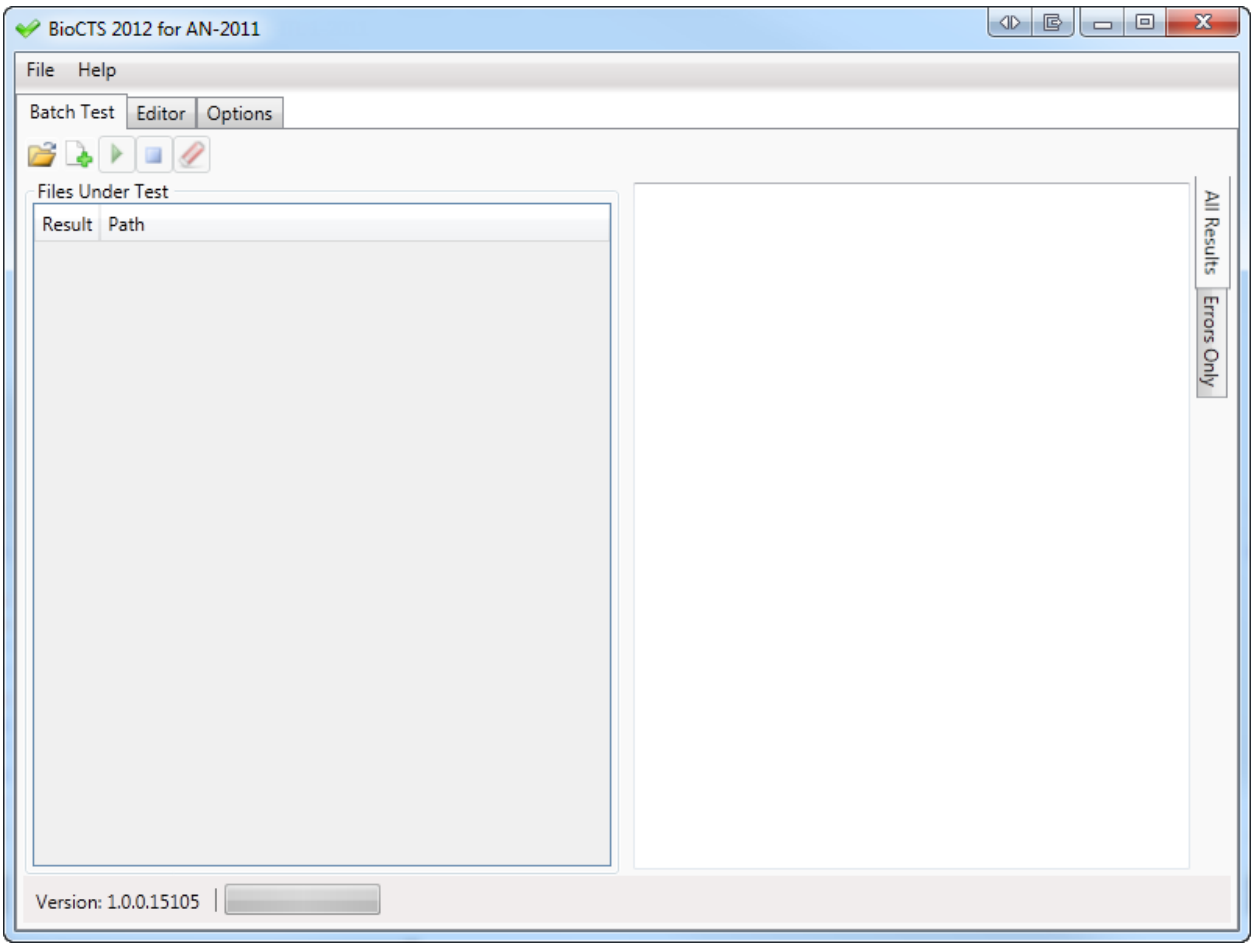

Figure 1 - Empty Batch Test Tab

Several files can be loaded at once.

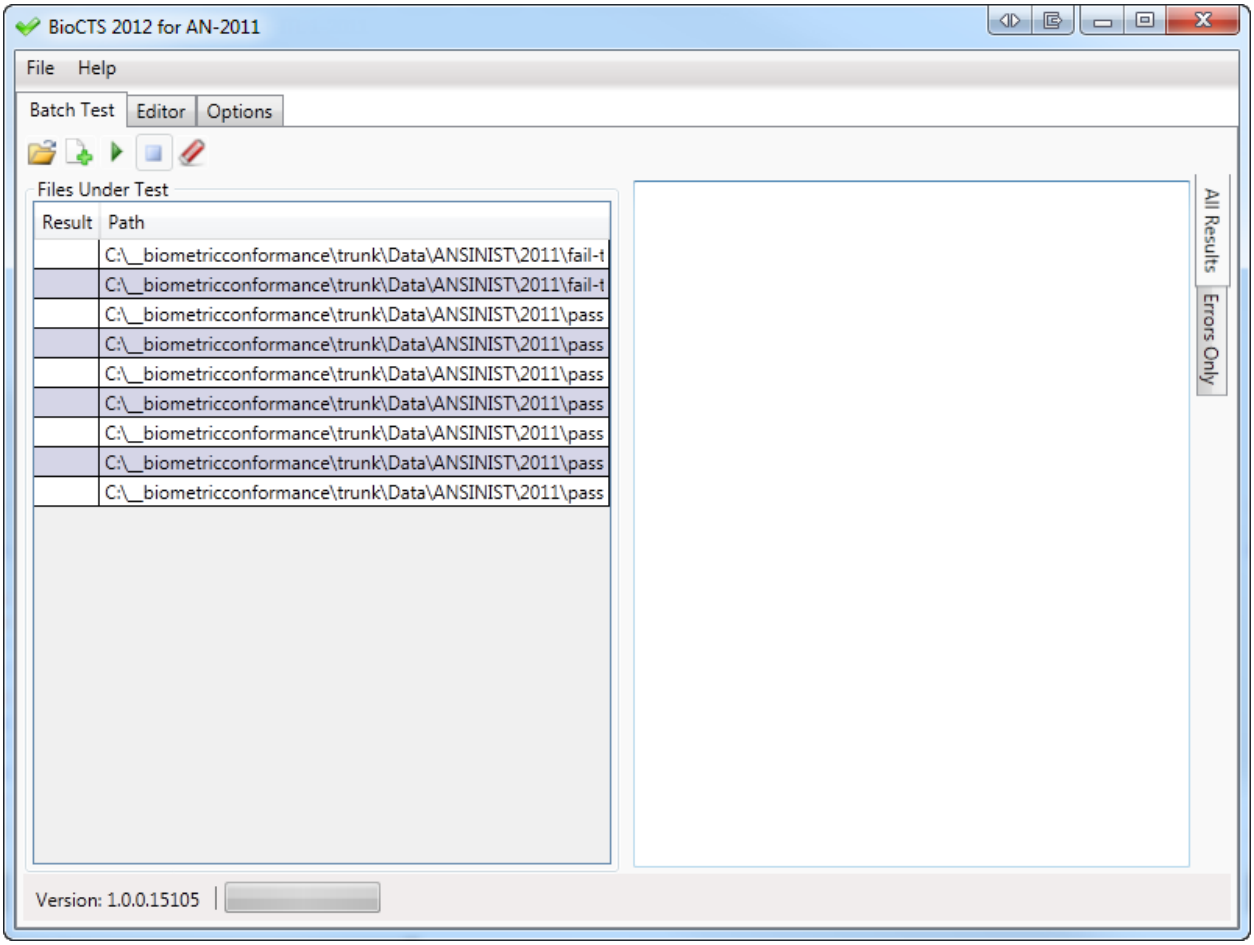

Figure 2 - Files Loaded into the Batch Test Tab

The “Batch Test” tab will display the transaction’s overall result with either:

- - Overall Result of Fail
- - Overall Result of Pass

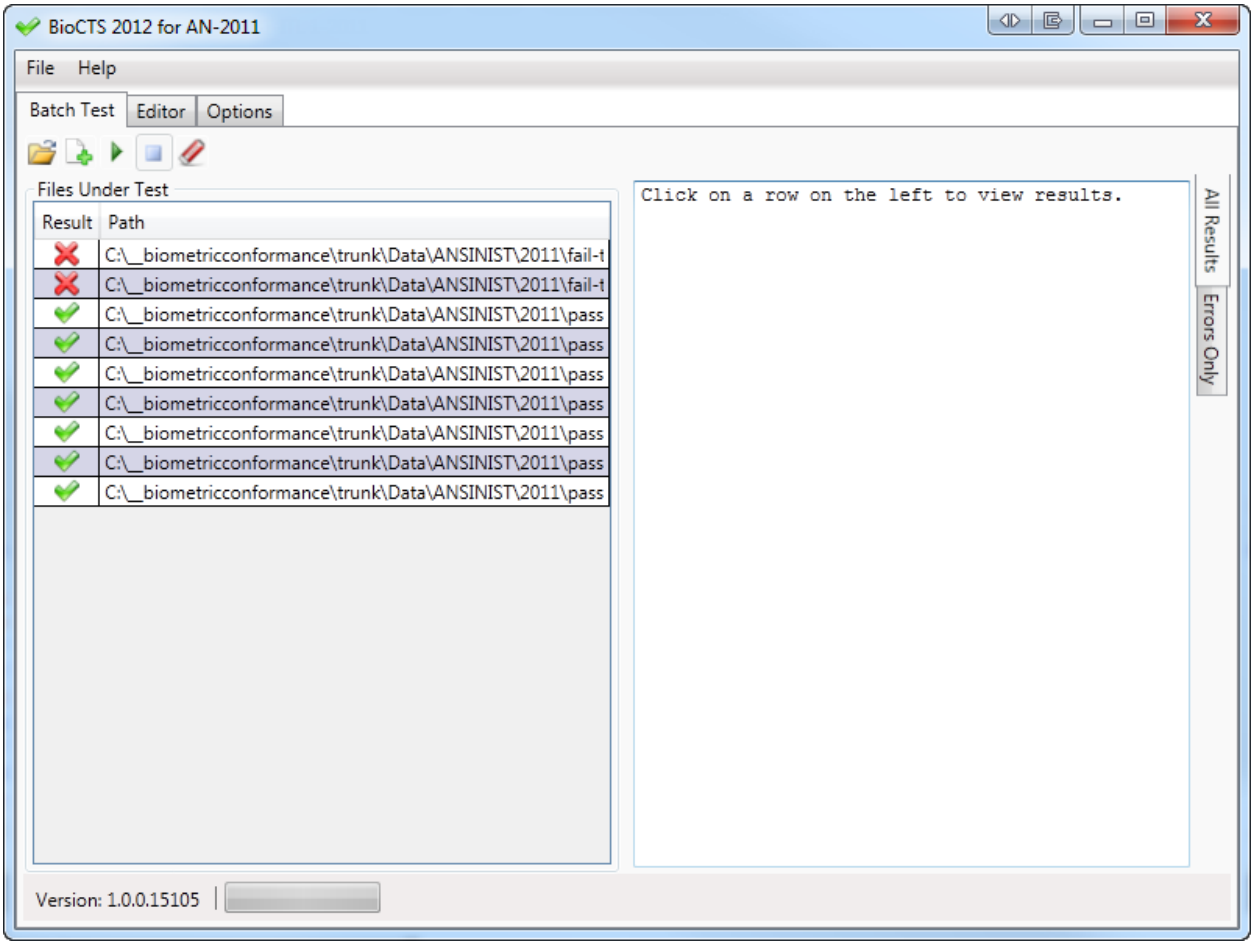

Figure 3 - Batch Test tab showing Overall Results

Textual output results for each transaction can be viewed by clicking on the desired filename in the “File Under Test” pane. The complete textual results are displayed in the pane to the right.

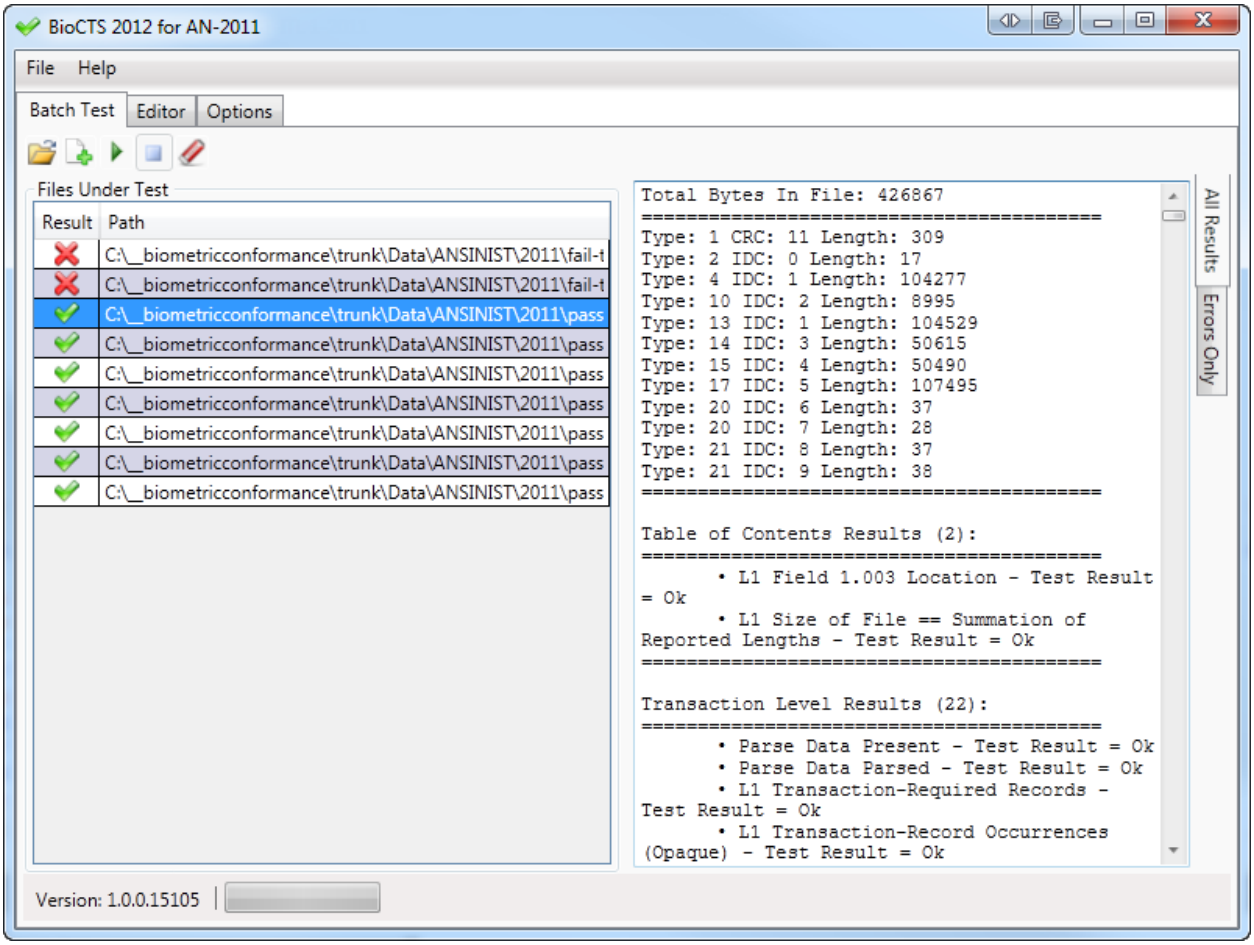

Figure 4 - Batch Test Tab with a Transaction Selected and Results Displayed in Right Pane

5.3.2. Editor

The editor is designed to display as much information as possible upon demand; the editor makes use of expander sections, which can be expanded to display more information by pressing the button within sections.

There are currently 2 limitations in the editor:

1. New Items (Records, Fields, Subfields, Information Items) cannot be added
2. Items (Records, Fields, Subfields, Information Items) cannot be removed

The editor displays the data and associated results in an expandable, hierarchical format, and allows editing of existing data using text fields.

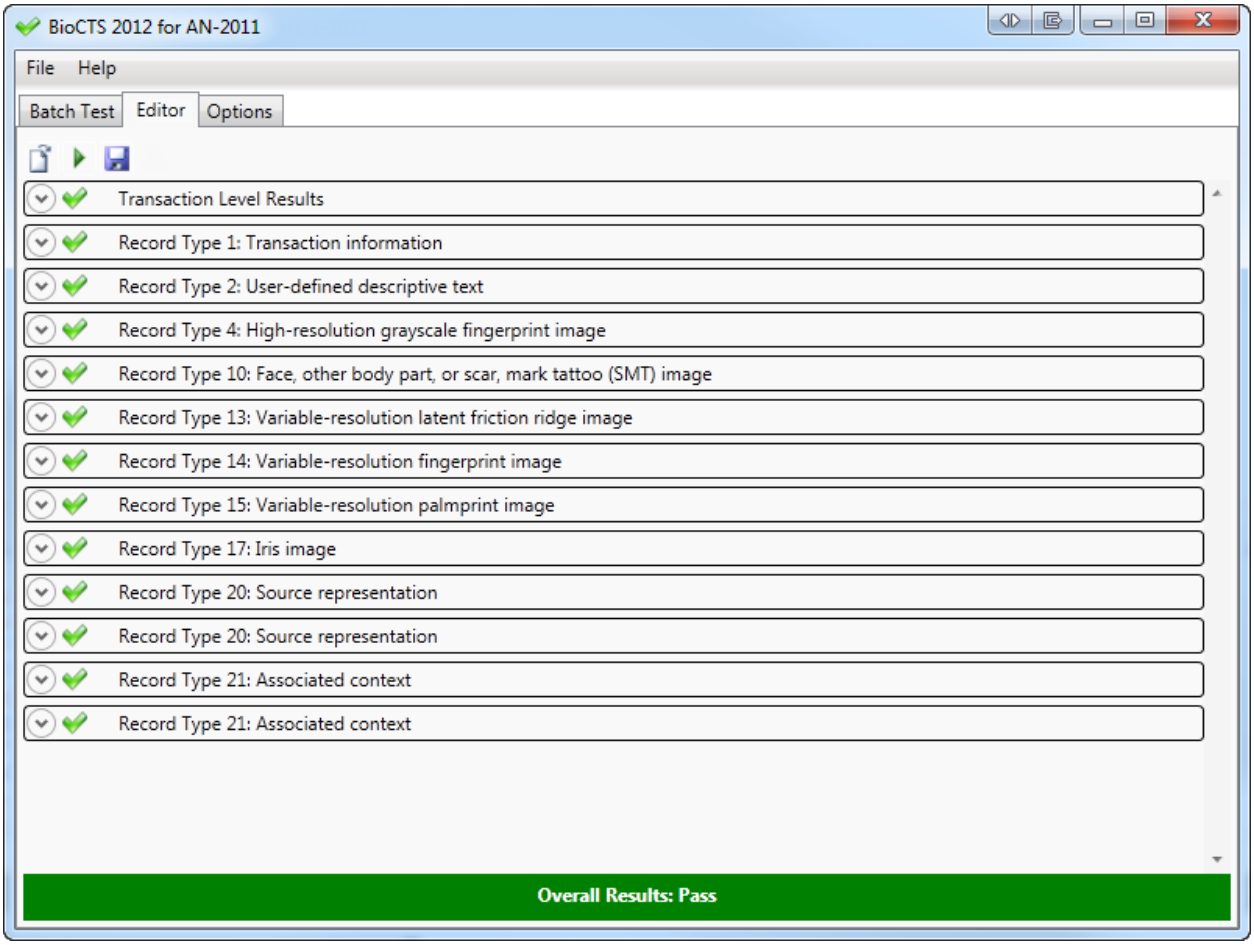

Figure 5 - The Editor with a Passing Transaction Loaded

The Editor displays results in expander sections where appropriate.

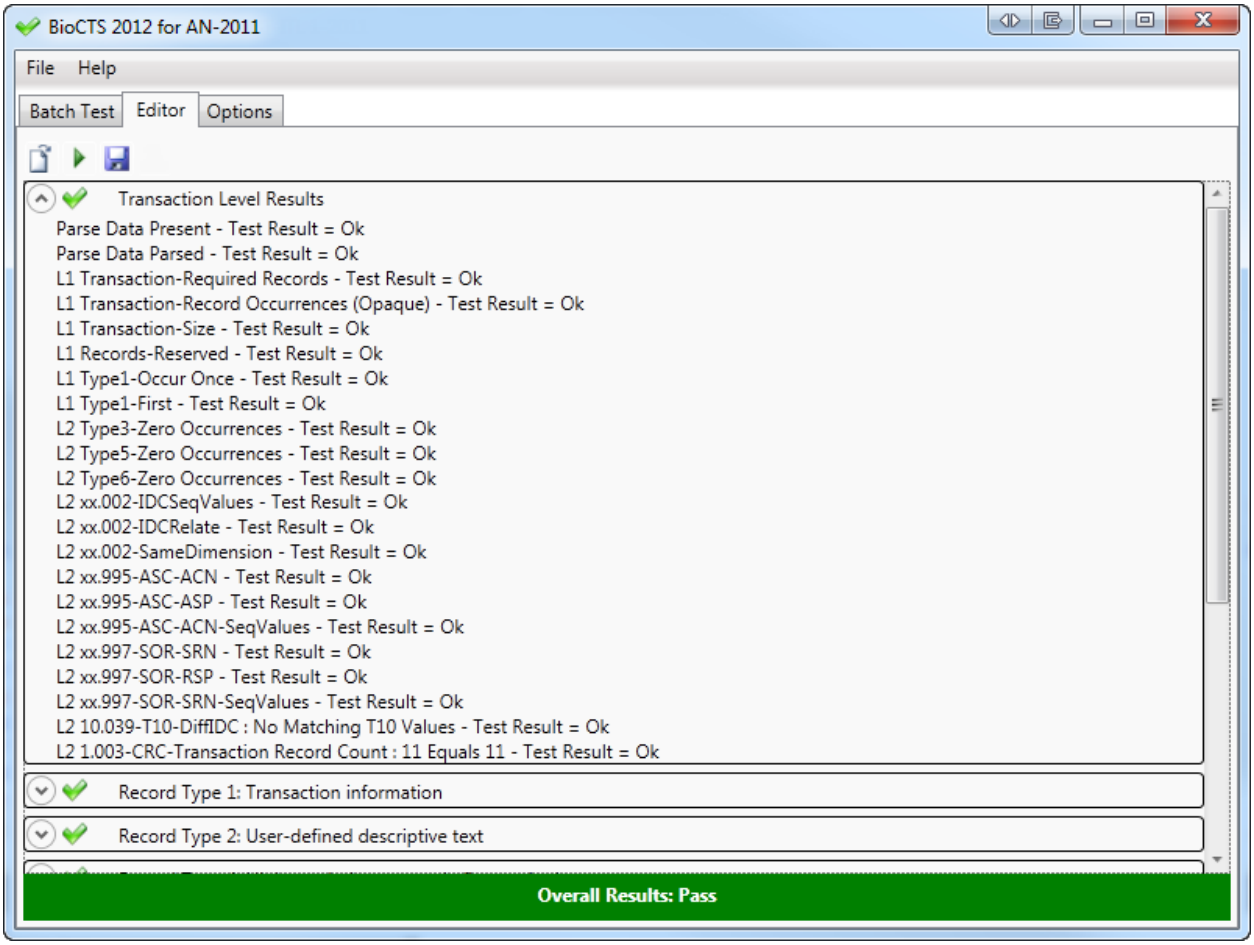

Figure 6 - The Editor Tab with a Passing Transaction Loaded - Displaying Transaction Level Results

When a record is expanded, the Editor displays a list of the fields contained in the record. Each field may also be expanded to reveal the data contained within and the associated results.

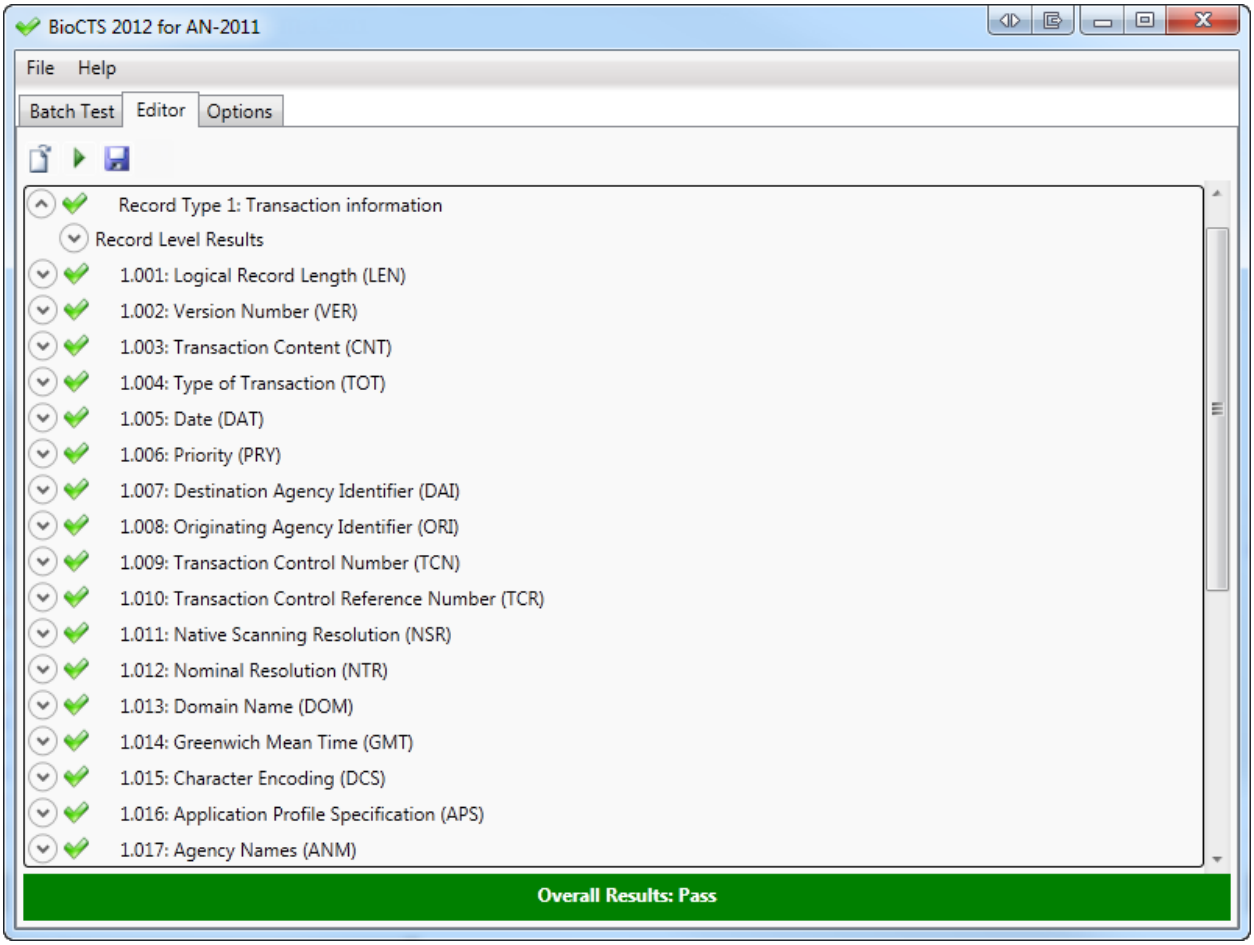

Figure 7 - Editor Tab with Record Type 1 Expanded; revealing collapsed Fields within the Record

When expanded, a field displays expanders for the field-evel results and the data that is held within the field.

The values in the data text fields can be edited. Two buttons are provided to assist when a large amount of data is being manipulated (such as in an image field):

- Loads data into the contents of a field/subfield/information item
- Saves the contents of a field/subfield/information item

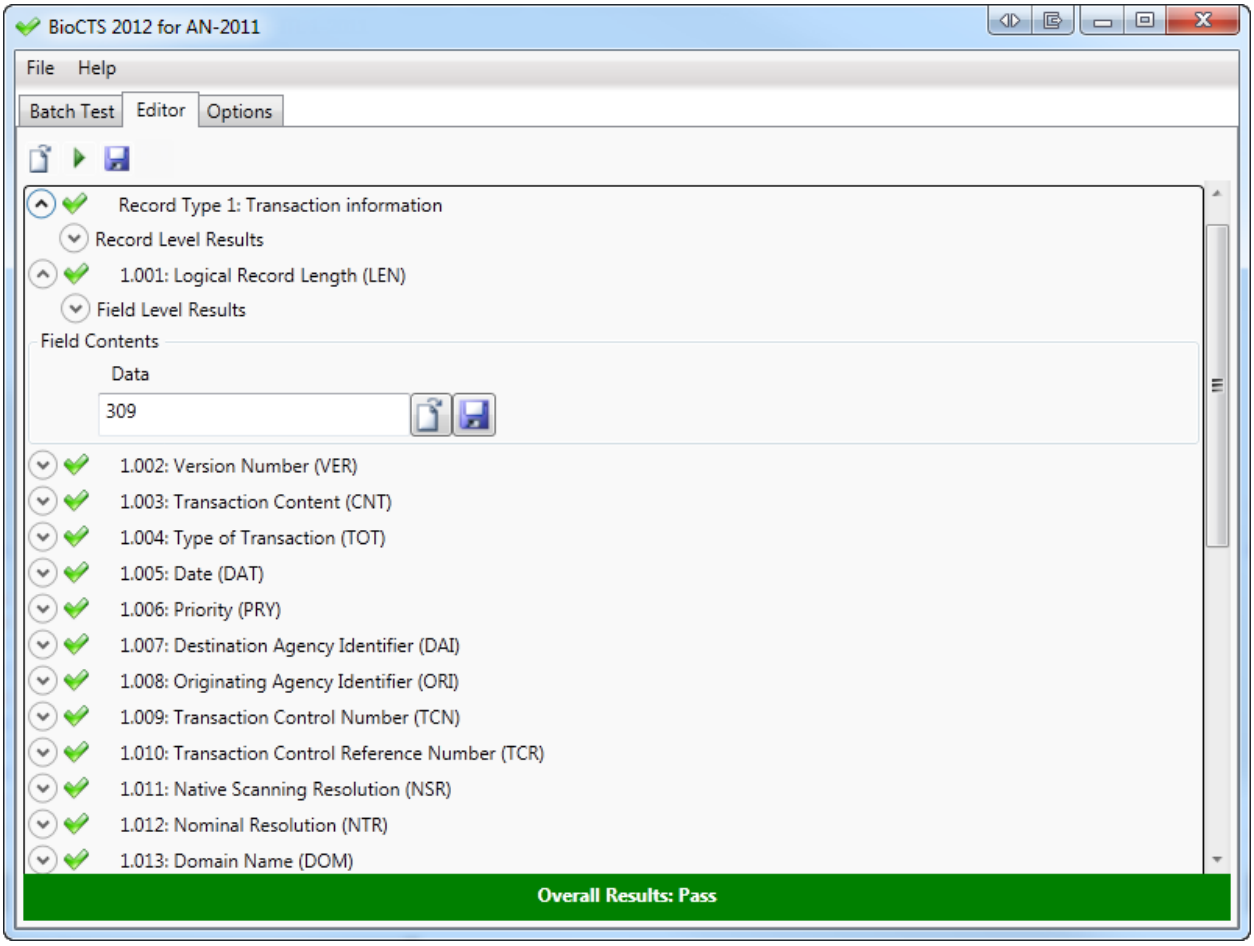

Figure 8 - The Editor Tab with Record Type 1 expanded with Field 1.001 expanded

5.3.3. Options

The “Options” tab provides options for output file type and save location.

The time-stamped folder format:

- yyyy – 4 digit year (e.g. 2012)
- MM – 2 digit month (e.g. 10)
- dd – 2 digit day (e.g. 31)
- HH – 2 digit hour in 24-hour scale (e.g. 13)
- mm – 2 digit minutes (e.g. 59)
- ss – 2 digit seconds (e.g. 22)

In the example provided below:

- Text Output will be generated in the directory:

C:\Users\dyaga\Desktop\BioCTS 2012 for AN-2011 Output\2012.10.31.13.59.22\Text Output

- XML Output will be generated in the directory:

C:\Users\dyaga\Desktop\BioCTS 2012 for AN-2011 Output\2012.10.31.13.59.22\XML Output

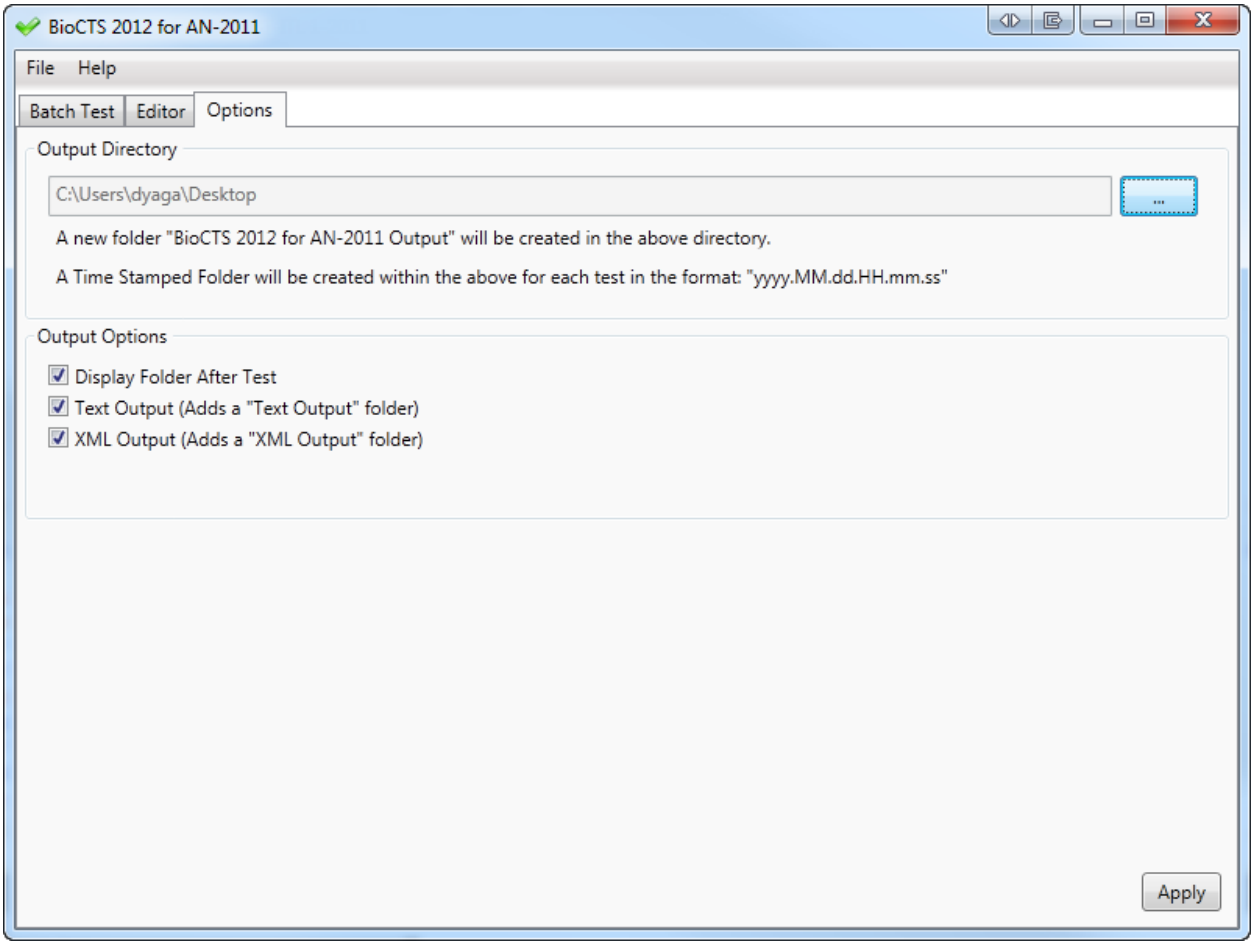

Figure 9 - The Options Tab

5.4. Anatomy of a Result

The result of any test is comprised of 5 elements:

- Test Level – Testing can take place at multiple levels
  - Parse – A parsing error occurred with this element
  - L1 – A level 1 test
  - L2 – A level 2 test
  - L3 – A level 3 test
- Test Name – A string to define what test took place
- Result Symbol – Displayed in the text output to help distinguish from passing results
  - Warning – "---"
  - Error – "***"
  - Critical Error – "*!*"
- Test Result
  - Ok – The test passed
  - Warning – The test passed, but warranted a warning statement (i.e. used a "Unspecified" value, etc.)
  - Error – The test failed
  - Critical Error – The test failed and is preventing other tests from being performed
- Test Message – A description of what went on during the test, and possible error message

Test Level Test Name Test Message Test Result Result Symbol

Some color-coded example results:

In the Text log, a result is a single string per result:

```
L1 1.001-CharCount: 3 Greater Than Equal To 1 test results = Ok

*** L1 17.011-CharCount: 5 Is In Inclusive Range 3 to 4 test results = Error ***
```

In the XML log, a result is broken up in a similar way, however the Result Symbol is omitted:

```
<Result>
    <Level>L1</Level>
    <Message>3 Greater Than Equal To 1</Message>
    <Results>Ok</Results>
    <Test>1.001-CharCount</Test>
</Result>

<Result>
    <Level>L1</Level>
    <Message>5 Is In Inclusive Range 3 to 4</Message>
    <Results>Error</Results>
    <Test>17.011-CharCount</Test>
</Result>
```