



**Projects in Electrical &
Computer Engineering
2007-2008**



Optimize Mobile Biometrics Data Networking

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Sponsor: TISCOM, R&D Center, MLCA

Outline

- ◆ Background
- ◆ Biometrics-At-Sea
- ◆ Drawbacks of the current method
- ◆ Objectives
- ◆ Proposed System Design
- ◆ Results

Background

- ◆ Biometrics

- ◆ Biometrics-
At-Sea since
November
2006



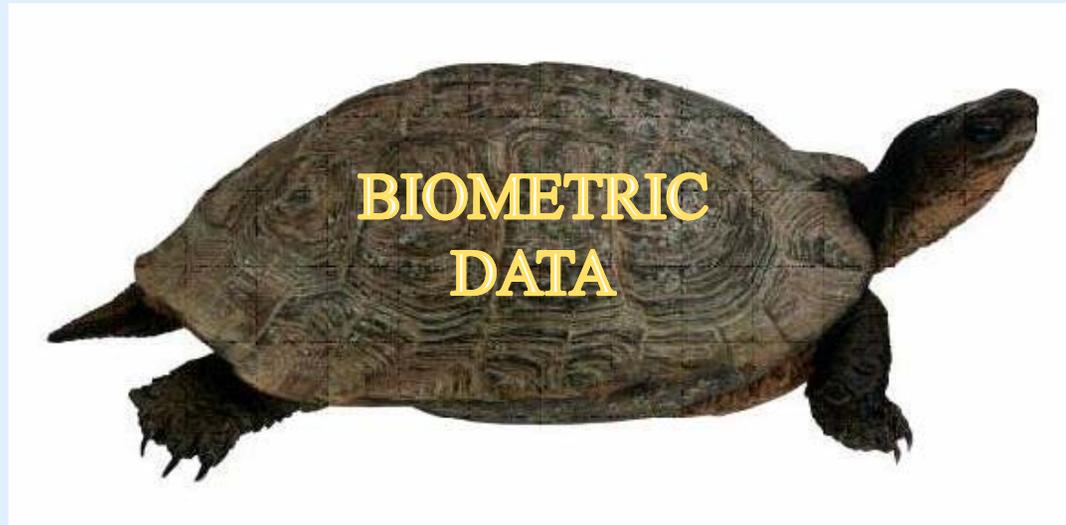
Biometrics-At-Sea

- ◆ **What:** The Coast Guard's way of tracking migrants and/or wanted and dangerous persons.
- ◆ **Why Optimize:** Current method is expensive and time-consuming
- ◆ **Impact:** Save the CG time and money

Current Method



Drawbacks of the current method



- ◆ **Information Assurance**
- ◆ **Slow** speed of service
- ◆ **Expensive** - \$20,833 per month per cutter for the ISDN connectivity

Objectives

- ◆ Optimize transfer by
 1. Decreasing satellite air time
 2. Increasing speed of service
 3. Information accountability
 4. Information privacy

A Typical Case



Proposed design



1. USCG Cutter



2. Satellite



3. Shore Side
File Server



4. & 6. USCG Station

US VISIT

5. US VISIT Software Program

1. On the Cutter

- ◆ Encrypted thumb drive on biometrics laptop
- ◆ Encrypted and password protected zip file
- ◆ Send from ships workstation using Large File Transfer web application
- ◆ User notified through LFT Web application when file transfer is complete



2. Satellite

- ◆ Integrated Services Digital Network (ISDN)
- ◆ \$5.60 per minute for satellite service



3. File Server

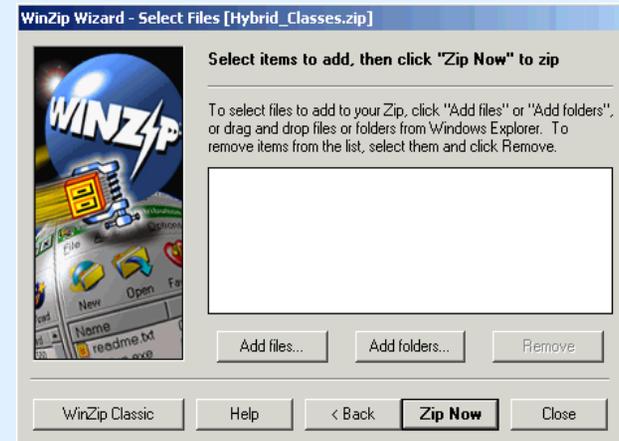
- ◆ Dell Poweredge 2950
- ◆ Front-end html automatically notifies cutter with confirmation
- ◆ Front-end html automatically email Command Center
- ◆ Save for 24 hours, then delete



4. Command Center



- ◆ Retrieve zip file from server
- ◆ Unzip with prearranged password
- ◆ Send each biometric in an individual e-mail to US VISIT



5. US-VISIT

- ◆ Biometric file's database
- ◆ Scans the received files
- ◆ Compares them to database files
- ◆ Sends the results back to Command Center



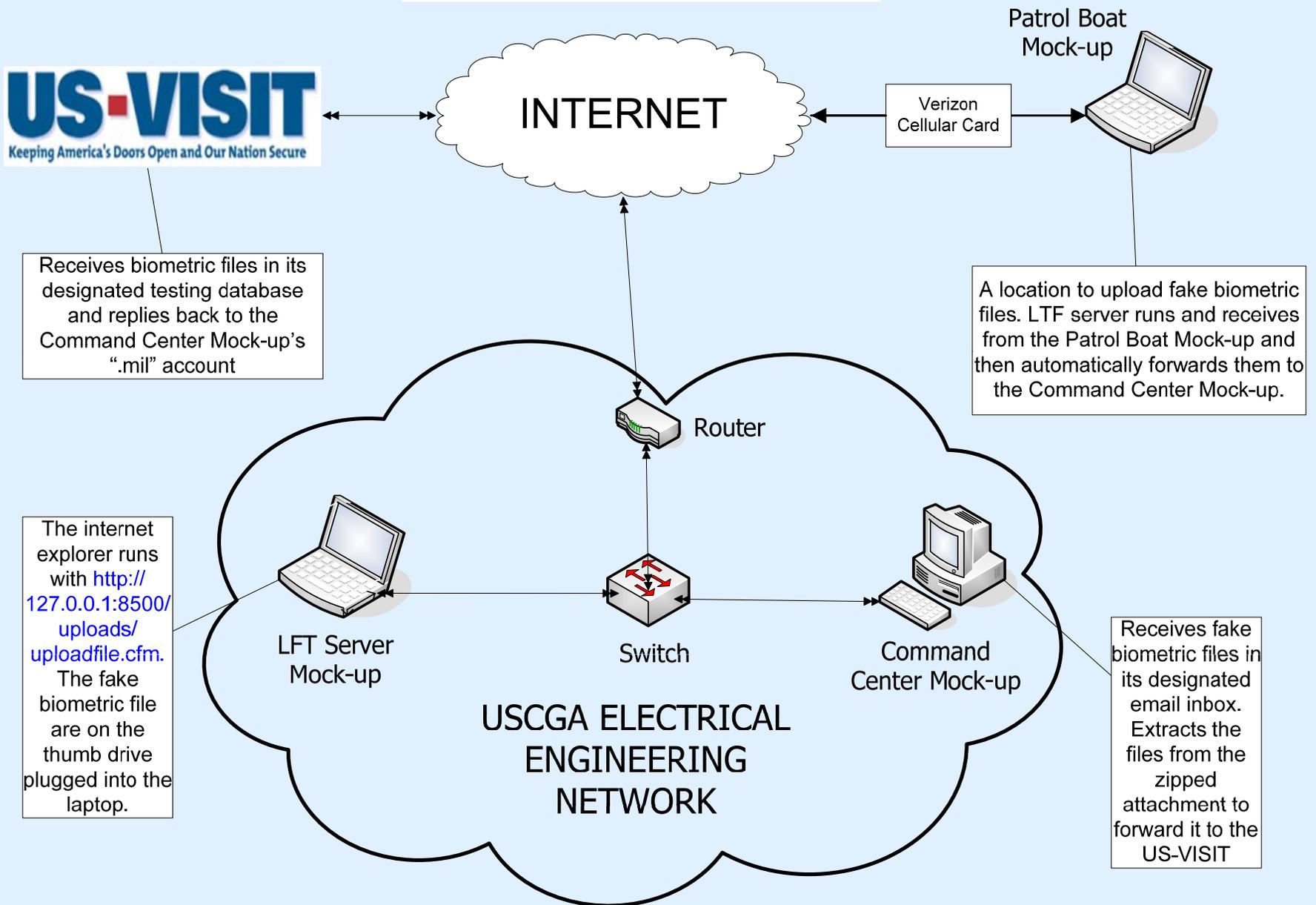
6. Command Center



- ◆ Receive reply from US Visit
- ◆ Communicate all results to ship via radio communications



TEST PLAN DIAGRAM



Test Results: Cutter to File Server and Notification Email

Number of files	Size, kB	Zipping time before transfer, SEC	Cutter-file server transfer time, MIN:SEC	File server-CC notification time, MIN:SEC	Cutter-CC notification time, MIN:SEC
20	1,072	4	0:35	1:37	2:12
65	4,599	5	1:25	1:25	2:52
100	5,412	6	1:47	1:56	3:43
200	10,823	6	4:17	1:37	5:54

Time Comparison

Number of files	Cutter-file server transfer time, MIN:SEC
20	0:35
65	1:25
100	1:47
200	4:17

File #	Sent from Cutter (Local Time)	US-VISIT Response Received (Local Time)	Transmission Time Min:Sec
1	19:46	20:03	17:00
2	19:46	20:03	17:00
3	19:46	20:04	18:00
4	19:47	20:04	17:00
5	19:47	20:05	18:00
6	19:47	20:05	18:00
7	19:47	20:05	18:00
8	19:47	20:06	19:00
9	19:47	20:06	19:00
10	19:47	20:06	19:00
11	19:47	20:06	19:00
12	19:48	20:07	19:00
13	19:48	20:07	19:00
14	19:48	20:07	19:00
15	19:49	20:08	19:00

Price Cut!

Fleet Transmission Time = 22 minutes (from 12 Jan)

Proposed Method Time = 35 seconds

Time Difference = 21 minutes and 25 seconds

Time Difference * \$5.60 (ISDN per min) = **\$120.42!!**

Transferring data from CC to US VISIT

Email Number	Send time, (local time)	Received, (local time)
1	14:20	14:22
2	14:21	14:23
3	14:21	14:23
4	14:21	14:23
5	14:21	14:23
6	14:21	14:23
7	14:21	14:23
8	14:22	14:23
9	14:22	14:24
10	14:22	14:24

Testing in Lab: 12 Biometric Files

- ◆ 12:32:00 Click to zip 12 test biometric files into zip file
- ◆ 12:32:04 Zip complete
- ◆ 12:32:20 Open Large File Transfer web application
- ◆ 12:32:30 Browse to select zip file from 110' cutter
- ◆ 12:33:10 Uploading files to shore side server mock-up
- ◆ 12:33:15 File upload complete
- ◆ 12:34:45 Verification in Command Center mock-up inbox
- ◆ 12:35:30 First email sent to US VISIT test database
- ◆ 12:36:42 First wrap back email received from US VISIT
- ◆ 12:37:20 Last Email sent to US VISIT test database
- ◆ 12:39:30 Last wrap back email received from US VISIT

Future Vision for Biometrics

- ◆ 10 finger print scan
- ◆ Complete automation moved to US-VISIT to serve all Department of Homeland Security (DHS) agencies.
- ◆ Next generation satellite performance will not only radically speed up the transfer process and, subsequently, decrease recurring operating cost but also increase availability and simplicity of the transfer process.

Conclusions

- ◆ Improved Information Assurance
 - ◆ File Transfer Complete Notification, Automatic Emails from Server
- ◆ Decrease Satellite Air Time
 - ◆ Send all emails to shore in one file
 - ◆ Terminate Satellite Connectivity upon transfer completion
- ◆ Save money
 - ◆ Less Satellite Air time = Less Money!!

Questions?



Large File Transfer Web App

This system is for Official Use Only

This system may **NOT** be used to transfer data that is Classified, Sensitive, or violates Privacy Act or HIPAA requirements.

Required fields = *

Step 1: File to be uploaded: *
(Maximum file size is 250 megabytes)

Step 2: Recipient Email Address: *
Multiple addresses can be separated with commas, (joe@uscg.mil,mary@uscg.mil).
@uscg.mil or @uscga.edu addresses only

Step 3: Recipient First and Last Name:

Step 4: Sender Email Address: *

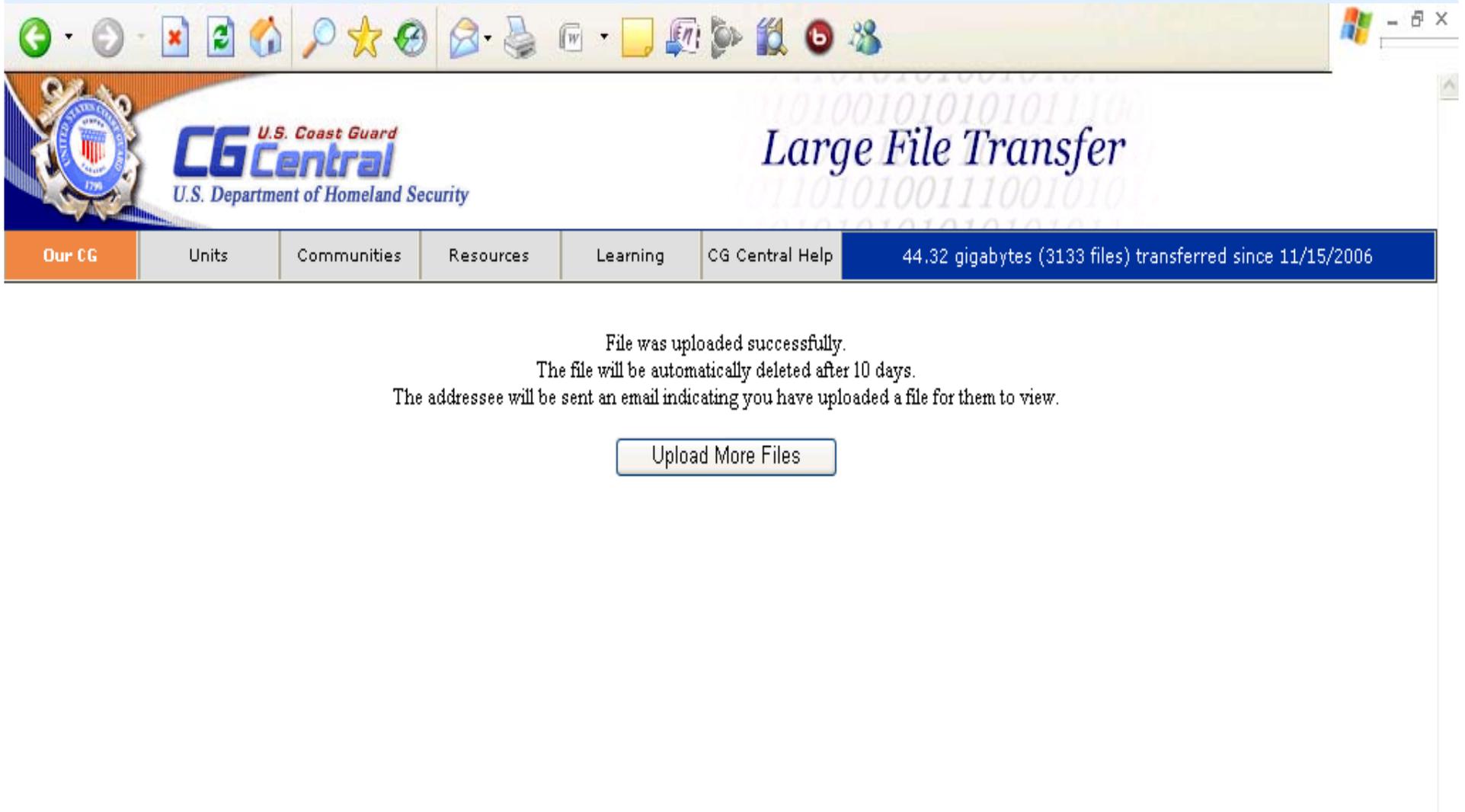
Step 5: Sender First and Last Name:

Step 6: Subject: *

Optional: Carbon Copy Email Address:

Message:
A file has been uploaded for you to view. Click the link below to view the file. The file will be deleted in 10 days.

Upload Completion Notification



The screenshot shows a web browser window with a Windows XP-style taskbar at the top. The browser's address bar is empty. The page header features the U.S. Coast Guard logo on the left, the text "CG Central U.S. Coast Guard U.S. Department of Homeland Security" in the center, and "Large File Transfer" in a large, blue, serif font on the right. Below the header is a navigation menu with tabs for "Our CG", "Units", "Communities", "Resources", "Learning", and "CG Central Help". A blue bar on the right side of the menu displays the text "44.32 gigabytes (3133 files) transferred since 11/15/2006". The main content area of the page contains the following text:

File was uploaded successfully.
The file will be automatically deleted after 10 days.
The addressee will be sent an email indicating you have uploaded a file for them to view.

Below the text is a button labeled "Upload More Files".

Mail Response from US VISIT

Inbox - Outlook Express

File Edit View Tools Message Help

Create Mail Reply Reply All Forward Print Delete Send/Recv Addresses Find

Inbox

Folders: Outlook Express, Local Folders (Inbox, Outbox, Sent Items, Deleted Items, Drafts)

From	Subject	Received
Siaudinis, Donatas Cadet	test 4	4/8/2008 9:06 AM
biometrics.testing@bluebottle.com	20 Test Files	4/10/2008 1:44 PM
biometrics.testing@bluebottle.com	20 Test Files	4/10/2008 2:38 PM
biometrics.testing@bluebottle.com	65 Test Files	4/10/2008 2:42 PM
biometrics.testing@bluebottle.com	100 Test Files	4/10/2008 2:51 PM
biometrics.testing@bluebottle.com	200 Test Files	4/10/2008 2:57 PM
biometrics.testing@bluebottle.com	Test 1	4/15/2008 12:31 PM
biometrics.testing@bluebottle.com	Test 22 APR 08	4/22/2008 2:02 PM
biometrics.testing@bluebottle.com	Test 22 APR 08 #2	4/22/2008 4:09 PM

From: biometrics.testing@bluebottle.com **To:** biometrics.testing@bluebottle.com
Subject: Test 22 APR 08 #2

Al Sowers,

A file has been uploaded for you to view. Click the link below to view the file. The file will be deleted in 10 days.
[Link to file](#)

VR,
Donatas Siaudinis

This file transfer utility provided to you by the MLCLANT webteam.
The utility is available at <http://webgis.mlca.uscg.mil/uploads/>

9 message(s), 0 unread

Found New Hardware
Disk drive

HTML Document

C:\Biometrics\WPB999902Apr081.htm - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites

Address C:\Biometrics\WPB999902Apr081.htm Go Links

File 01 of 65	n:\WPB999902Apr081\00001_765408038216.xml	Restore
File 02 of 65	n:\WPB999902Apr081\00002_765308038220.xml	Restore
File 03 of 65	n:\WPB999902Apr081\00003_765308038221.xml	Restore
File 04 of 65	n:\WPB999902Apr081\00004_765408038219.xml	Restore
File 05 of 65	n:\WPB999902Apr081\00005_765408038218.xml	Restore
File 06 of 65	n:\WPB999902Apr081\00006_765508038218.xml	Restore
File 07 of 65	n:\WPB999902Apr081\00007_765608038232.xml	Restore
File 08 of 65	n:\WPB999902Apr081\00008_766108038231.xml	Restore
File 09 of 65	n:\WPB999902Apr081\00009_765508038219.xml	Restore
File 10 of 65	n:\WPB999902Apr081\00010_765608038233.xml	Restore
File 11 of 65	n:\WPB999902Apr081\00011_766108038232.xml	Restore
File 12 of 65	n:\WPB999902Apr081\00012_765508038220.xml	Restore
File 13 of 65	n:\WPB999902Apr081\00013_765608038234.xml	Restore
File 14 of 65	n:\WPB999902Apr081\00014_766108038233.xml	Restore
File 15 of 65	n:\WPB999902Apr081\00015_764408038226.xml	Restore
File 16 of 65	n:\WPB999902Apr081\00016_764808038230.xml	Restore

Done My Computer

Quick Facts:

- ◆ 1 Biometric file is between 80-100 kB
- ◆ Cutter Connectivity = 64 kbps

Cost Example

- ◆ 15 files at 100KB = 1.5MB X 8 = 12Megabits
- ◆ 12Mbits divided by 50Kbps = 240 sec = 4min
- ◆ 4min X \$6 [ISDN PER MIN] = \$24 + \$12 [2min for route to be in place] = \$36
- ◆ Vice 10-30min of satellite time that would equate to \$60-180 [\$120 on average] of satellite airtime costs for each Biometric transfer evolution.
- ◆ \$36 = optimized vice \$120 for MS Exchange transfers [or non optimal]
- ◆ Multiplied by X migrant interdictions per year = X savings per year