DIGIMARC®

Ensuring the Integrity and Security of ID Documents with Digital Watermarking

Workshop on Storage and Processor Card-Based Technologies
July 7-9, 2003
National Institute of Standards and Technology
Gaithersburg, Maryland

Rob Durst
VP, World-Wide Marketing and Business Development
Digimarc ID Systems

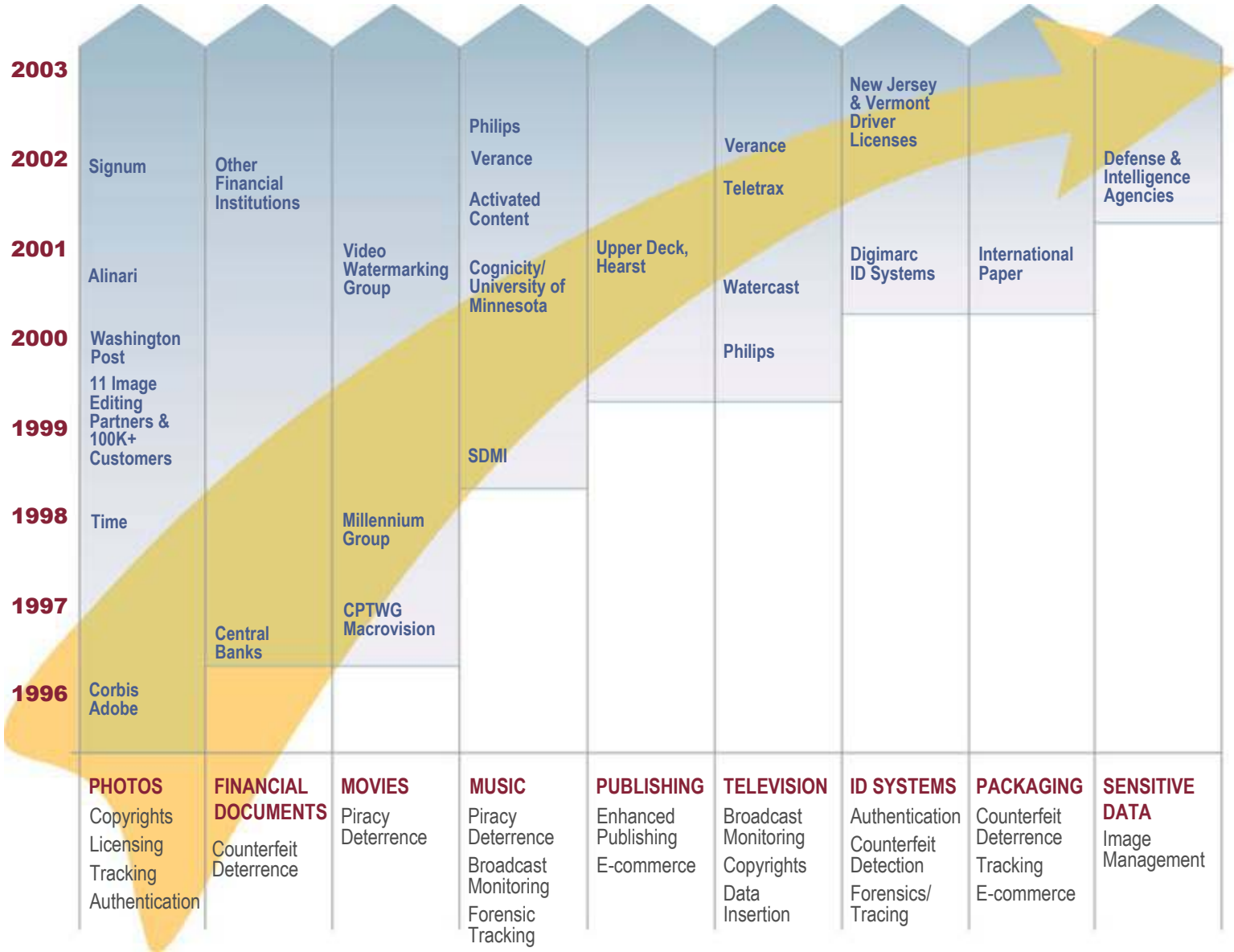
What is Digital Watermarking?

DIGIMARC®

- Digital Watermarking (DWM) is:
  - A set of proven software technologies
  - Used to covertly encode and decode digital information
  - In digitally-derived analog
  - And digital content
- DWM is currently being used to secure
  - Both printed and electronic digital photographs
  - Native and broadcast digital audio and video
  - Printed digital graphics
  - Financial documents
  - Identification documents

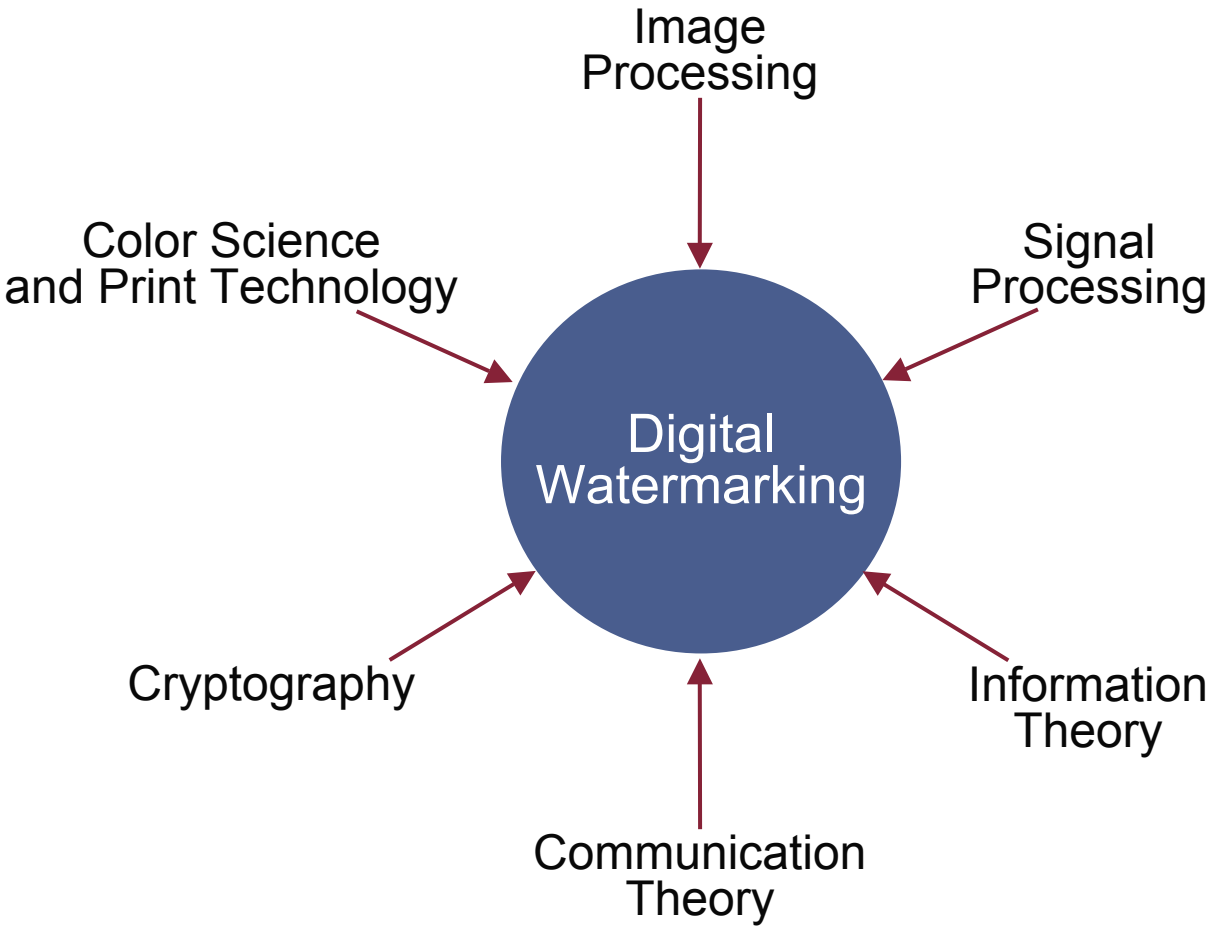
Cross Industry Adoption of DWM

DIGIMARC®



How Does DWM Work?

DIGIMARC®



How Does DWM Work?

DIGIMARC®

- A payload consisting of digital data is encoded into an image prior to display or printing
- The encoding process uses a “spread spectrum” technique, similar to that used by the military for secure communications, to multiplex the payload into the spatial frequency spectrum of the image.
- The payload can carry either fixed data or variable data personalized for a specific DWM item or application.
- Encoding and decoding are conducted with conventional printing and scanning devices coupled with cryptographically secured drivers and applications software to ensure system integrity
- Successful attack requires:
  - Detailed knowledge of the DWM algorithms and the parameters and protocols used
  - Compromise of the encryption keys
  - Knowledge of the location of the DWM(s) in the document
  - Knowledge of the specific data contained in the DWM(s) and how it is encoded.
- The presence of the DWM is not obvious to human observers and survives normal printing, scanning and copying operations.
- This allows the DWM to be used for authentication, verification and and forensics in a variety of applications.

What Does a Digital Watermark Look Like?

DIGIMARC®

ORIGINAL PHOTO

Watermark Flexibility & Adaptability

DIGIMARC®

Substrate

- PVC
- Teslin
- DSC
- Polycarbonate
- Paper

Printing Technology

- D2T2
- Color Xerography
- Offset Press
- Digital Press
- Inkjet
- Laser Engraving

Over Laminate

- Clear
- Metallic
- Holographic
- UV

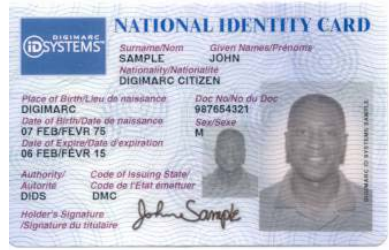
- Robust Watermark Survives Severe Service

DWM and Other Security Technologies

DIGIMARC®

DWMs can be:

- Rendered in non-visible IR and UV Inks
- Used to secure a variety of graphical elements in security documents including:
  - Conventional raster graphics
  - High definition guilloche patterns and microprint
  - Split fountain and/or rainbow printing
  - Fine line artwork
- Used to mark and secure OVDs, such as holograms and kinograms
- Used for substrate verification, serialization and identification of manufacture and/or printer origin
- Used to fuse printed content to smart card chips and other data carriers such as laser data media and 2d bar codes.

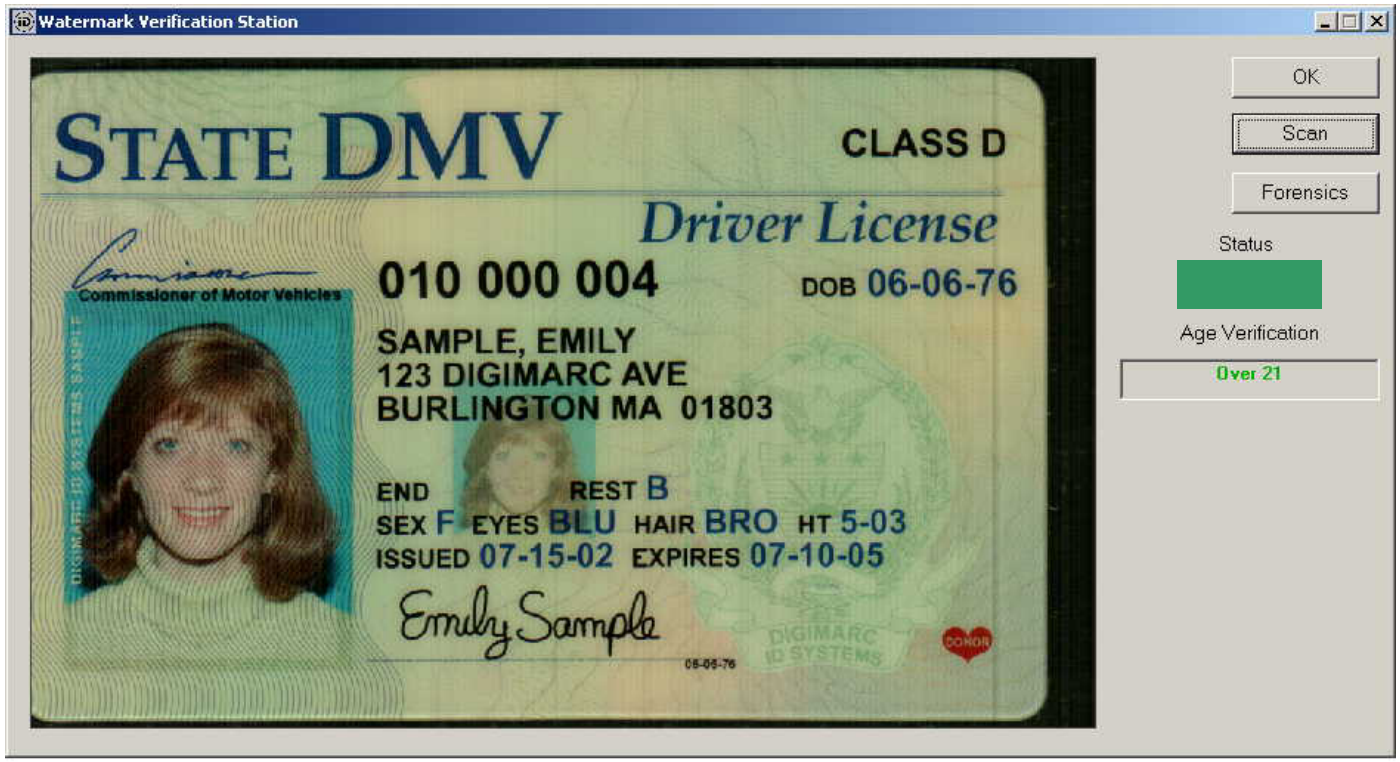


How Can DWM be used to Provide ID Card Integrity and Security?

DIGIMARC®

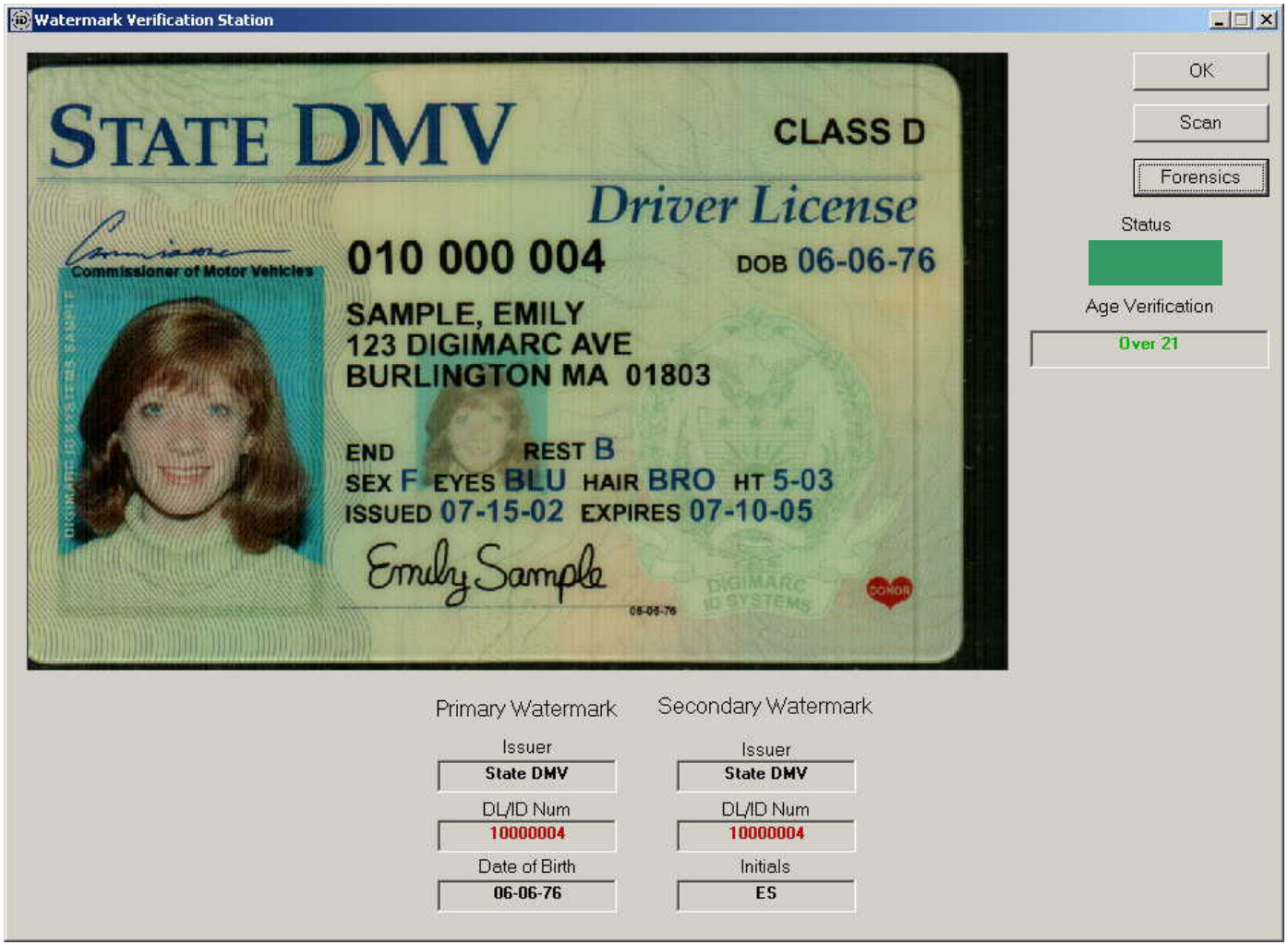
- Verify authenticity of document features
  - Authentic features have DWMs
- Verify the integrity of the document
  - The content of the DWM payloads in multiple features is consistent
  - Consistency can also be linked to other data carriers (smart cards, 2D codes)
- Verify the identity of the bearer
  - One or more DWMs include PIN, password or other information elements in their payload, which are used to challenge the bearer.
  - DWM secured human verified biometric (photograph)
  - DWM secured machine verified biometric
    - Facial template derived from DWM photograph
    - DWM secured data carrier with stored biometric
- Authorize an on-line transaction
  - DWM in feature is used as a verification token to confirm document is physically involved in on-line transaction
- Forensics
  - Element integrity and origin
  - Document integrity and origin

Example 1: Valid License, DWM Data Hidden



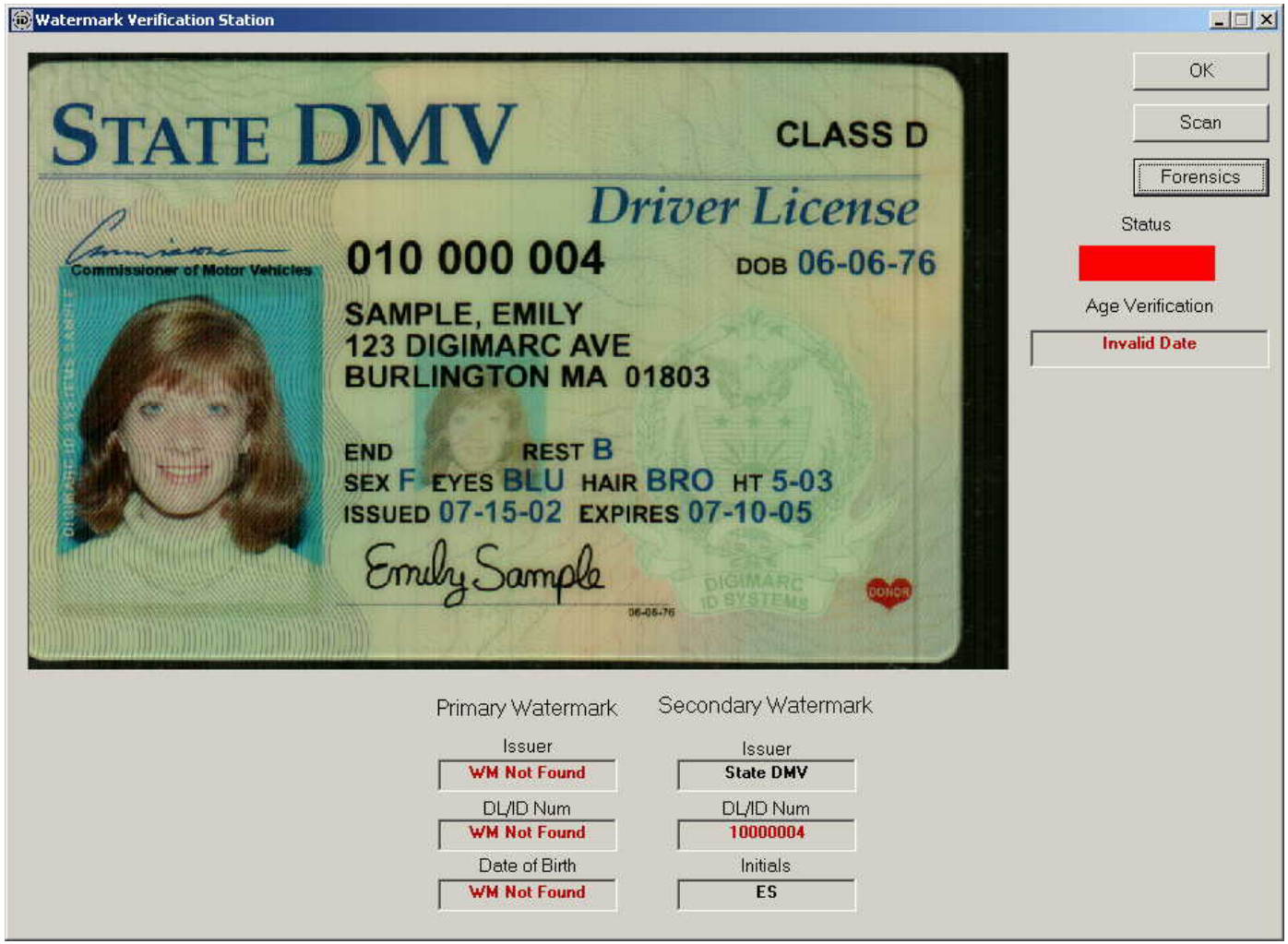
Example 2: Valid License, with Forensic Data

DIGIMARC®



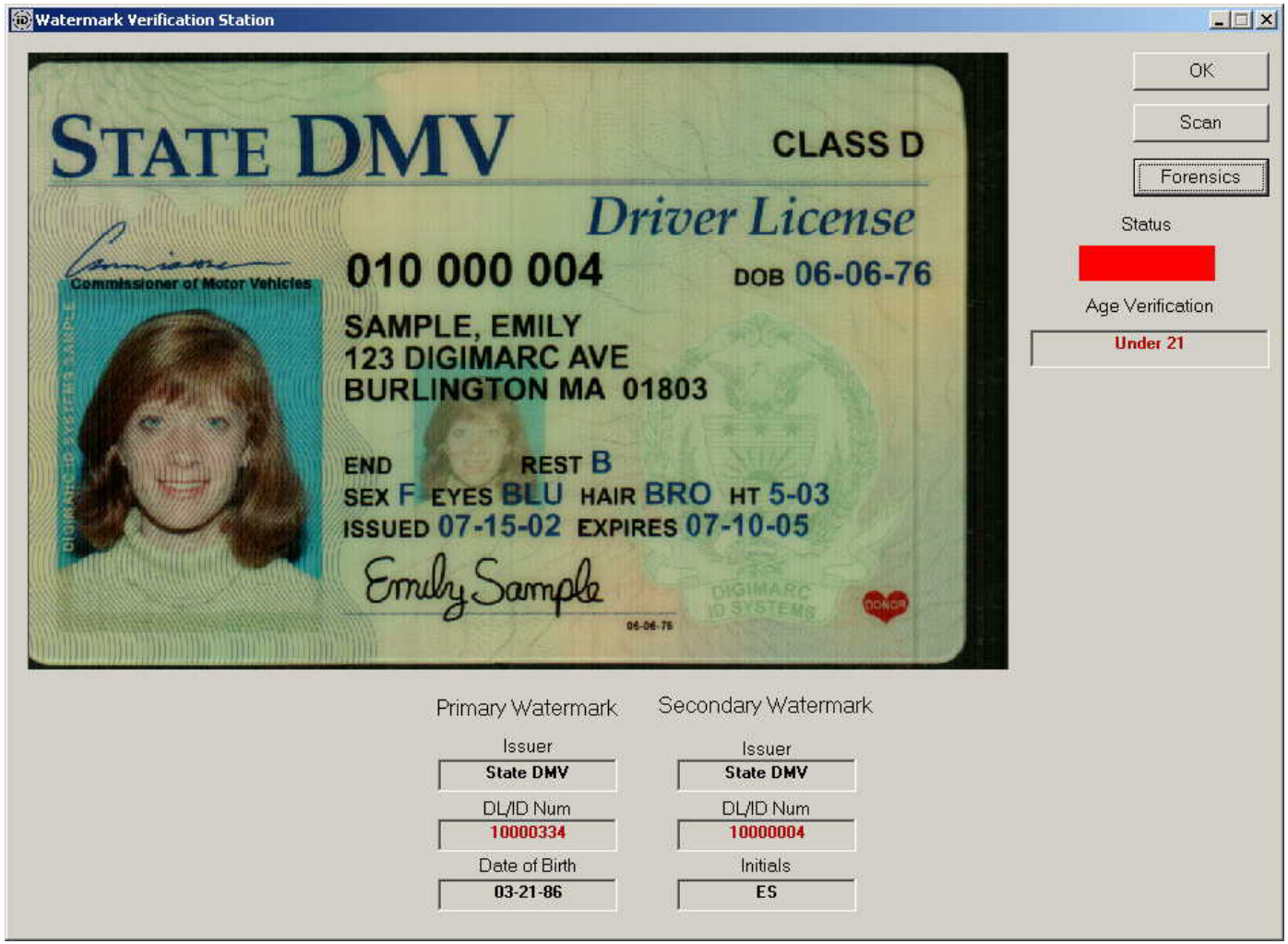
Example 4: Scanned and Altered
(Photo with no watermark)

DIGIMARC®



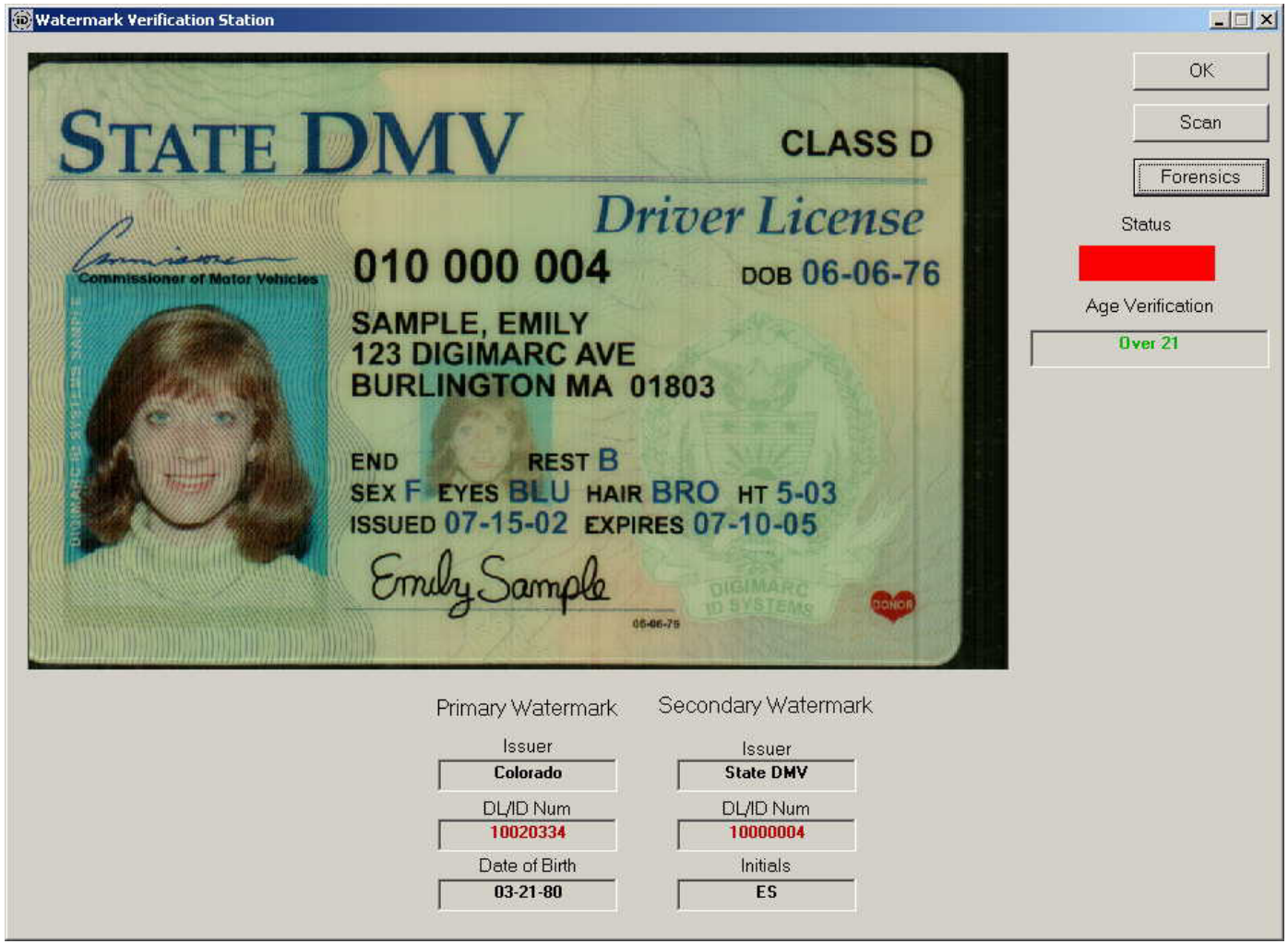
Example 5: Scanned and Altered
(Photo from another license)

DIGIMARC®



Example 6: Scanned and Altered
(Photo is from another jurisdiction's license)

DIGIMARC®



Digimarc Highlights

DIGIMARC®

- Publicly traded (NASDAQ:DMRC)
- $88mm 2002 revenues; 400+ employees
- Healthy balance sheet [$ 50+ Million in Cash; no debt]
- Widely-acknowledged leader in digital watermarking R&D and solutions
  - De Facto Standard for copyright communication in commercial photography
  - Anti-counterfeiting system for leading central banks
  - Joint Venture w/leading consumer electronics companies to deter video piracy
- Millions of readers; billions of watermarked objects
- Largest producer of Government Issued Photo IDs (GIPIDs) used for law enforcement, age verification, air transportation security and as “breeder” documents.
  - US Driver License (DL) issuance system supplier for 33 states
  - DL supplier for the UK and Russia
- Strong patent position (100 issued, 386+ pending)
- Investors, OEMs, and customers are market leaders

Contact

DIGIMARC®

Rob Durst
Vice President, World-Wide Marketing and Business Development
Digimarc ID Systems
rdurst@digmarc.com
+1.781.744.6450

Mahmood Sher-Jan
Director of Segment Marketing
Digital Watermarking Solutions
msher-jan@digimarc.com
+1.503.495.4576