

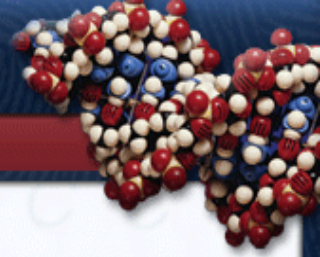
# DNA Record

*Draft Type 18*

ANSI/NIST-ITL-2011 Meeting  
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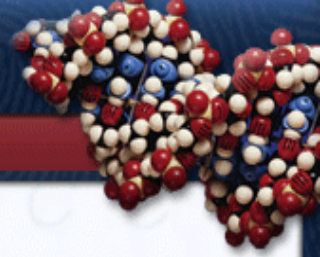
Scott Carey and Joe Pancaro  
FBI Laboratory





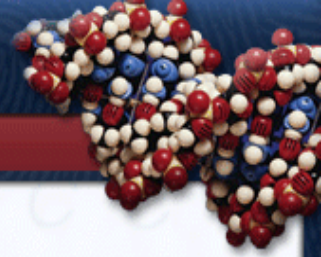
- A natural addition to the ANSI/NIST biometric/forensic exchange standard
- To exchange DNA data:
  - Autosomal Short Tandem Repeat (STR),
  - Y-Short Tandem Repeat (Y-STR),
  - Mitochondrial (mtDNA)
  - “Raw” Electropherogram of DNA data.
- Based on profile data from genetic profiling techniques that are standardized and commonly used for discriminating between individuals.





- Standard profiling systems exploit the non-coding regions of DNA –referred to as “junk” DNA.
- The coding regions are deliberately avoided in order to protect and maintain the privacy and civil rights of the donor.
- National DNA protection and privacy legislation may impose special security safeguards, such as encryption of data transfers and storage.
- Developed to be “organization/use case generic” to enable wide adoption.





- A **DNA Record Header** (Field 18.005) containing information about the sending and receiving parties for DNA processing. This may not be identical to the ORI/SRC and transaction receiving parties.
- A **DNA Sample field** (18.006) describing biological materials used to generate the DNA profile from crime scene and paternity investigation.
- A **DNA Data Profile** field (18.007) describing genotype separation and detection of the full genotype at one or more DNA markers.
- There are additional optional fields that are used depending upon the type of DNA processing that has been performed:
  - DNA STR and Y-STR field (18.008)
  - Mitochondrial field (18.009)
  - Electropherogram image field (18.999)

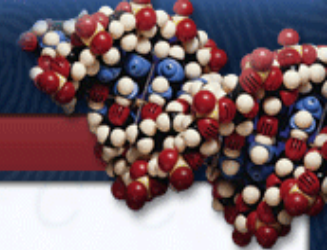


# Type 18 – Record - Field Definitions



1. **Field 18.001: Record Header**
2. **Field 18.002: Image designation character / IDC**
3. **Field 18.003: DNA Technology Type/DNT**
4. **Field 18.004: Source agency/SRC**
5. **Field 18.005: DNA Record Header Information (DRI)**
6. **Field 18.006: DNA Sample Information/DSI**
7. **Field 18.007: DNA Profile Data/DPD**
8. **Field 18.008: DNA STR and Y-STR Profile/DPF**
9. **Field 18.009: DNA Mitochondrial Data/DMP**
10. **Field 18.010: DNA User Defined Data**
11. **Field 18.996: Image Hash**
12. **Field 18.997: Original image reference/OIV**
13. **Field 18.998: Geographic sample location/GEO**
14. **Field 18.999: Electropherogram Image Data**





- **Field 18.001 Record Header**

The content of this field depends upon the encoding chosen. See [www.biometrics.nist.gov/standard](http://www.biometrics.nist.gov/standard) for the content of this field for the encoding used. In Traditional encoding, the content is the length of the record. In NIEM-conformant encoding it is the record type-number.

- **Field 18.002 Image Designation character/IDC**

This mandatory field shall be the IDC of the Type-18 record as found in the file content (CNT) field of the Type-1 record.

- **Field 18.003 DNA Technology Type/DNT**

This field is mandatory and the numeric value is selected from one of two types with the value:

1. Laboratory DNA processing unit or
2. Rapid DNA / mobile processing unit.





- **Field 18.004: Source agency/SRC**
  - Mandatory field containing the identification of the organization that is sending the DNA data contained in the record. Normally, the Originating Agency Identifier, ORI, will be contained in this field. The SRC shall be defined by the user and be in accordance with the receiving agency.
  
- **Field 18.005: DNA Record Header Information (DRI)**
  - Mandatory field used to provide information relating to the DNA record. It consists of subfields: Format Identifier, Header Type, Header Direction, Version, Sending Party, Receiving Party, Laboratory Type, Batch ID, Kit ID, Number of DNA Record Data, Certification Flag.
  
- **Field 18.006: DNA Sample Information/DSI**
  - Mandatory field containing subfields: Sample Category, Sample Cellular Type, Sample Typing Technology, Sample Source Indicator, Sample Collection Method, Sample Collection Date, Coordinated Universal Time, Local Date/Time.



## Type 18 – Record - Details of each Field Definition (continued)



- Field 18.007: DNA Profile Data/DPD
  - Mandatory field containing subfields: Date and Time, Profile Type, Result, Profile ID, Request Type, Error Message, Supplement Message,
- Field 18.008: DNA STR and Y-STR Profile /DPF
  - Optional field comprised of subfields: DNA STR Type, DNA Loci





- **Field 18.009: DNA Mitochondrial Data/DMP**
  - Accommodates the worldwide differences in how mtDNA types are derived (differences from reference),
  - mtDNA interpretation issue is avoided by sending the entire control region (in 2 fields)
    - Ensures any insertions / deletions/ C-stretches are included.
  - This method enables any receiver of the data to use it in a way that that are accustomed (either using the full sequence or interpreting the full sequence according to their own methodology).
  - The resultant data use is fully consistent with the receiver's database.
  - Four subfields: Mito Control Region 1, Mito Control Region 2, Mito DNA Quality 1, Mito DNA Quality 2.





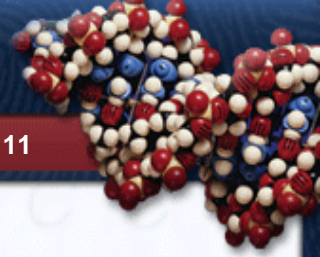
- Field 18.010: DNA User Defined Data
  - Optional field is user defined, when other than STR, Y-STR mtDNA, or an Electropherogram is included as part of the transaction. The sender must provide the receiver with a description of the field contents.
- Field 18.996: Image Hash
  - Optional field has the hash value of the image contained in the 999 field of this record, hash value shall be calculated using SHA 256.
- Field 18.997: Original image reference / OIV
  - Optional field refers to an image in Record Type-20 with the same OIR. This is an optional field and is used when the image transmitted in this record is derived from an original image.
  - This field consists of two subfields: reference code for a Type-20 record which is mandatory while the second subfield is optional it specifies he reference to the segmentation coordinates of the original image that is represented in this record type, which is a reference type value / RTV.





- **Field 18.998: Geographic Sample location/GEO**
  - Optional field composed of three optional subfields; one of which must be chosen.
    1. Geographic reference text / GRT is free form text describing a street address or other physical location.
    2. Degree value / DEG has the format xxx.xxxx yyy.yyyy, where x refers to latitude and y refers to longitude. For example, +039.1455-077.2057.
    3. Degree minute second value / DMS has the format xxxDxxMxxS yyyDyyMyyS, where x refers to latitude and y refers to longitude. For example, +039D08M44S-077D12M20S
  
- **Field 18.999: Electropherogram Image Data**
  - This optional field contains electropherogram data.





Appreciation:

Brad Wing

Joe Pancaro